Gordon Institute of Business Science
University of Pretoria

The impact of digitisation on risk management in financial institutions

Molebogeng Masakona
25279859

A research report submitted to the Gordon Institute of Business Science, University of Pretoria, in partial fulfilment of the requirements for the degree of Master of Business Administration

11 November 2019

ABSTRACT

Digital technology has changed the world of banking. Customers are able to transact 24 hours a day using various platforms, including mobile applications. It has introduced operational efficiencies and improved value propositions to customers and a variety of other stakeholders. However, it has brought risks such as cyber threats that have emerged as one of the top risks within the banking industry. These risks are more complex and difficult to manage, with greater financial impacts than before. Thus, the aim of this study was to understand the impact of digitisation on the management of risk in financial institutions, particularly banks.

This was a qualitative and exploratory study with 14 semi-structured interviews conducted with representatives of four South African banks, one international bank and an academic institution. The study found seven themes, revealing areas impacted by digitisation and how risk is managed.

This study aims to contribute towards the existing body of knowledge, particularly to South African academic literature, which is limited from a risk management lens as it relates to digitisation. Subsequently, a digital risk management competency model outlining the skills, knowledge and competencies required to effectively manage digital risk, is proposed for consideration.

KEYWORDS.

Risk Management

Digitisation

Digitalisation

DECLARATION

I declare that this research project is my own work. It is submitted in partial fulfilment of the requirements for the degree of Master of Business Administration at the Gordon Institute of Business Science, University of Pretoria. It has not been submitted before for any degree or examination in any other University. I further declare that I have obtained the necessary authorisation and consent to carry out this research.

Molebogeng Masakona

11 November 2019

CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1: INTRODUCTION OF THE RESEARCH PROBLEM

1.1 Introduction of the Problem

The last few years have seen computing power increase while costs continue to fall. More data is has been recorded and accumulated daily over the past few years than seen in the past decades. The concept of digitisation and digital transformation has generated excitement as well as anxiety in many organisations. This excitement can be attributed to the client centric products offered by organisations, which make customer interactions more personalised and efficient. Nevertheless, these digital opportunities present serious threats to organisations if not managed adequately.

The concept of digitisation is described as the conversion of physical or paper-based information into electronic format using technology (Watson, 2001). While Parviainen, Tihinen, Kääriäinen and Teppola (2017, p.64) refer to it as the "conversion of analogue data (especially in later use images, video, and text) into digital form". Over the past couple of years, organisations both locally and globally, have introduced digitisation to their processes, while some have embarked on a digital transformation journey. Digitisation has lowered the cost of processing, sharing and accessing information (Watson, 2001), making it easier to communicate globally. The conversion of data to a digital format has introduced efficient ways of servicing customers, by collecting data that can be used to extract value and improve product offerings.

Digitisation has enabled organisations to introduce exciting innovations to customers (Boniface, Taylor, Calisti, & Innovate, 2017), including services that make use of mobile applications (app) to perform transactions at any time of the day, as opposed to traditional channels of going to a brick and mortar bank branch. These innovations brought about by the advent of digitisation and are evidenced in South Africa's sophisticated banking industry. First National Bank (FNB) launched the first banking app in July 2011 which has made banking easily accessible (FNB, 2019). Similarly, Absa Group was the first to launch WhatsApp banking in Africa in 2018 (Business Tech, 2019) while Standard Bank launched SnapScan, a mobile payment application, in 2014 (Tech Central, 2016). These are just a few examples of how South African banks are embracing digitisation and leveraging current technology in

order to provide better customer service and value. However, this pace of change in technology has introduced cybersecurity risks and give rise to new entrants in the industry such as Information Technology companies offering basic banking services (FinTech) and actively competing with well-established financial services institutions. The shift to the digital paradigm requires companies to rethink the manner in which risk is managed optimally.

FinTech companies offer standardisable financial services such as transacting and digital payment products and services such as Zapper, Apple Pay, Samsung Pay and many others (Dapp, 2014). This has subsequently led to a "digital revolution in the banking industry as many traditional banks are forced to introduce digital channels and processes to maintain market dominance as FinTech's gradually grow their market share in the banking industry" (Dapp, 2014, p. 22). These customer centric innovations have seen customers deriving and expecting more value from their financial institutions leading to customer satisfaction (Andaleeb, Rashid, & Rahman, 2016).

The evolution of banking, with the rapid technological changes, comes with significant implications for risk management. This has resulted in the emergence of digital risk as of one of the top risks that has introduced new risk types with new business models (McKinsey, & Company, 2017). However, these risks are more complex and more challenging to identify, assess and manage which would encompass unknown financial impacts of opportunities and threats (Vijaykumar, & Nagaraja, 2012). Although banks have grown accustomed to adopting new technology, especially from a security perspective, risk management's adoption of technology has largely been limited to spreadsheets and web pages used to capture risk data instead of using technology to create real value and improve risk processes. (Yang, Hsu, Sarker, & Lee, 2017). Risk management is important to the success of the business and senior management have a responsibility to their shareholders to ensure that strategic objectives are met.

The rapid adoption of the internet, cell phones, and smart devices has resulted in customers interacting with their banks digitally, and banks are scrambling to keep up with this changing phenomenon. As such, it is proving increasingly difficult to manage digital threats and opportunities, not to mention the competitive digital marketplace

(Sia, Soh, & Weill, 2016). The incumbent banks running on legacy systems and processes are not able respond quickly enough, restricting their ability to compete. Rapid technological advances present serious threats to organisations, according to Camilo (2016). In 2015 there was an increase of 80% in theft against the financial sector using malware, 21 million fraud attacks, 45 million rob attacks resulting in the financial sector topping the list in terms of average cost of cybercrime losses suffered to total $28 billion (Camilo, 2016). Digitisation has, both a positive and negative, impact on financial institutions. The ongoing financial and reputational threats could leave banks paralysed, if not properly managed.

According to McKinsey & Company (2017) digitisation efforts have largely focused on customer facing processes or products, while little attention is given to other parts of the bank, including risk management. With this transformation, risk management departments cannot afford to continue operating in a reactive way if they are to remain relevant and add the requisite value. According to Ernst & Young and the Institute of Finance (2018), risk management is at the risk of lagging behind if it continues focussing on the same traditional methods of managing risk. Although many risk management departments may see themselves as still being able to provide value for a digitised organisation, there remains an opportunity to add increased value through digitisation of risk management processes. In the above-mentioned scenarios, risk management in banking should be a key enabler to digital banking transformation by assisting the bank in managing the change in risk introduced.

The role of risk management in financial services was traditionally that of managing downside risk (market, credit, liquidity, etc.) and protecting the bank's value for shareholders, which is still a vital role. The emergence of digitisation has seen a number of banks choosing to embrace technology and as such risk management has been impacted. For risk management to remain relevant, it needs to transform. To avoid being left behind, the implementation of innovative technology and processes is no longer optional, but rather a necessity to be able to manage risk introduced through digitisation (Watson, 2018). Forward looking risk management capabilities need to consider digitisation or digital transformation and must define the capabilities required to manage digital risk adequately. This research aims to

understand the impact of digitisation on how risk is being managed and possibly identify the risk management capabilities required to manage this risk.

1.2 Purpose of Research Problem

Traditional methods of managing risk are no longer sufficient in protecting the interest of the stakeholders. Organisations that want to compete in this digital era require the right capabilities that will ensure continuity in the ever-changing business environment. These capabilities are essential for the management of the organisation, including business, risk managers and assurance providers, to assist organisations in effectively managing risk introduced through digitisation. While there is very limited academic literature on risk management in relation to digitisation, the study aims to contribute to the existing body of knowledge, particularly to the South African literature, which is limited on the management of risk arising from the deployment of digitisation in the banking sector.

While the financial services sector has been at the forefront of employing digital innovations to improve operational efficiencies and create more value for the organisations and customers, this has resulted in heavy reliance on technology that has translated in external or internal security attacks (Yang, Hsu, Sarker, & Lee, 2017). For organisations to survive and become competitive, they also need to transform their risk management practices and employ the right risk management capabilities to manage internal and external threats.

1.3 Research Problem

The aim of this research was to gain a deeper understanding of the risk management practices required in a digitally transforming banking sector, in order to gain an improved understanding of the risk management capabilities and their effectiveness in the digitisation journey.

The aim of this research project is threefold. Firstly, to review literature related to risk management within the digitisation era, especially within a South African context where studies on risk management of digital banking are at a formative phase. Secondly, to gain a deeper understanding of the prevailing risk management practices in the increasingly globalised South African banking sector. Thirdly, based

on the existing praxis and increasing pitfalls inherent within the constantly evolving digitised banking landscape, this research seeks to propose practical interventions that will further contribute to the strengthening and augmentation of risk management scholarship within the South African context.

The past couple of years have seen trigger events, corporate governance failures both locally and globally, not to mention the 2008 financial crisis that has raised expectations for robust risk management oversight from the board of directors and senior management within organisations (Beasley Branson, & Pagach, 2015). In accordance with agency theory, risk management is employed to better manage risk from the agency relationship of an owner and management. It could also be that risk management is implemented to assist the board and provide strategic value by proactively detecting and managing risk that could prevent the organisation from achieving strategic objectives, as suggested by the resource dependency theory. This research aims to understand the impact of digitisation on how risk is being managed and if the risk management implementation during digitisation or digitalisation is aligned to agency or resource dependency theory.

1.4 Scope of Research

The scope of this research was to evaluate the impact of digitisation or digitalisation on risk management within a South African context[1], and the effectiveness of three lines of defence (management) as stakeholders involved in managing the organisation's risk using the agency and/or resource dependency theory. Both theories may be relevant depending on the risk and/or digital maturity of the organisation. However, the focus of this study will be on the impact on risk management and capabilities required as organisations digitise. The research will incorporate the evaluation of the risk management capabilities of the major banks in South Africa and an example from a global bank that have digitised or are digitalising their offerings. The banks will be referred to as Bank A, B, C, D, E and F throughout

[1] Although this study is focussed on the South African banking sector, it also makes reference to global best practice. The globalised nature of technology-based banking necessitates an expansive reading of how banking institutions are dealing with digital-based risks. To this end, I have interviewed informants from the American banking sector, who provided valuable data.

the document to enable them to remain anonymous for disclosure and confidentiality of information purposes.

1.5 Research Definitions

For purposes of this study:

1. Digitisation can be described as the conversion of physical or paper-based information into electronic format using technology (Watson, 2001), while Parviainen, Tihinen, Kääriäinen and Teppola (2017 p.64) refer to it as the "conversion of analogue data (esp. in later use images, video, and text) into digital form."

2. Digitalisation or digital transformation is defined as "changes in ways of working, roles, and business offering caused by adoption of digital technologies in an organisation, or in the operation environment of the organisation. This refers to changes at several levels, including the following:
    - Process level: adopting new digital tools and streamlining processes by reducing manual steps;
    - Organization level: offering new services and discarding obsolete practices and offering existing services in new ways;
    - Business domain level: changing roles and value chains in ecosystems;
    - Society level: changing society structures (e.g., type of work, means of influencing decision making)" (Parviainen, Tihinen, Kääriäinen and Teppola ,2017 p.64).

3. Risk management/Enterprise risk management is defined 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"(Committee of Sponsoring Organisations, 2004, p. 2)

4. Teece, Peteraf and Leih (2016, p18) defined capabilities/ dynamic capabilities as “the firm’s capacity to innovate, adapt to change, and create change that is favourable to customers and unfavourable to competitors. Dynamic capabilities can be thought of as falling into three primary clusters:
    - identification, development, co-development, and assessment of technological opportunities (and threats) in relationship to customer needs (the “sensing” of unknown futures)
    - mobilization of resources to address needs and opportunities and capture value from doing so (“seizing”); and
    - Continued renewal (“transforming” or “shifting”).”

1.6 Structure of the Research Report

The rest of the report is structured as follows:

- Chapter two provides the argument highlighted in current academic literature.
- Chapter three outlines the research questions to be answered.
- Chapter four outlines and motivates the research methodology used in this study.
- Chapter five introduces the results of the research conducted.
- Chapter six reviews and analyses the results in chapter five and considers the learnings of the literature review conducted in chapter two.
- Chapter seven concludes the research by discussing the main findings of the research, implications to management, limitations of the research and provides recommendations for future research.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

The purpose of this study is to understand the impact of digitisation on how risk is managed in financial institutions, particularly banks, as technology evolves. The objective of this literature review is to discuss the major construct in the research objectives, that is, digitisation and the risk introduced through its deployment.

This chapter presents the relevant theory on the evolution of risk management as well as on banking and provides an understanding on the importance of risk management in a digitally transforming banking sector. This study discusses the risk management capabilities necessary as the banks digitise and the imperative of managing risk arising from this technological disruption aims to contribute to the existing body of knowledge, particularly to the South African literature which is limited, especially when looking at risk management as it relates to digitisation.

The chapter commences with the transformation of banking and moves to the evolution of risk management from its traditional sense to where it is today in terms of Enterprise Risk Management (ERM). Within the risk management literature, the process or manner in which risk is managed, the roles of the three lines of defence responsible for risk management within organisations are also deliberated and the three theories; institutional, agency and resource dependence theory related to the way risk management is implemented. The final section of this chapter concludes on the impact of digitisation on how risk is managed within the banking sector and the suitable theory that aligns to this study.

2.2 Transformation of Banking

The banking of the past comprised of a bank branch where customer could only interact or transact with the bank during specific working hours: the bank staff assisted customers with processing payments, viewing bank balances and or making withdrawals from the branch. Adalarasu and Padmaavath (2015) referred to that type of banking as traditional banking, which was centred on the bank branch and interactions with customers taking place within the branch. The traditional banking

method made use of various distribution channels with the main channels being bank tellers within bank branches and Automated Teller Machines (ATMs). According to Zimmermann and Koerner, (1999) the cornerstone of the traditional retail banking business model were cheque accounts and the long-term relationships that customers had with their banks were centred around this product.

However, the evolution of technology and introduction of digital banking changed the way people do banking today; it placed the customer at the centre of the banking. Customers are no longer limited to prescribed branch operating hours to do their banking; however, interactions with the bank take place anywhere 24/7 via different electronic platforms such as internet or mobile banking applications. According to Adalarasu and Padmaavath (2015) products are now developed to suit the customer's needs using digital platforms to deliver products and services simpler, better and faster. On the other hand, Westerman, Tannou, Bonnet, Ferraris and McAfee (2012) suggest that the introduction of digital banking has changed the bank and customer's relationship, in that, banks are making use of social media and predictive analytics to implement better products and services. As technology improves and banks digitise, customers' preferences and expectations change as they now want a personalised banking experience, fostering a shift from product centric offering to a more customer-centric offering (Sia et al., 2016).

2.2.1 Digitalisation in Banking

Digitalisation but also referred to as digital transformation as defined in Chapter 1, is a key strategy for many organisations from various sectors, including banking. While digitisation has been in banking for many years, the use of the internet and mobile applications in order to perform bank transactions has enhanced the speed of change in the banking sector (Barty, Ricketts, Kirk, Green, Stubbs, O'Sulivan & Berg, 2015). Today millions of people use their mobile phones for their day-to-day banking requirements, this is in contrast to the past when people did not use their phones. This is evident in the change in customer's needs over the years as well as the evolution of banking to meet those needs (Bandara, 2016). This strategy of digitalisation or digitisation through innovation is important for banks to remain relevant, competitive and sustain their growth (Kohli & Johnson, 2011), while according to Ganguly (2015) in order to maintain customer relevance and

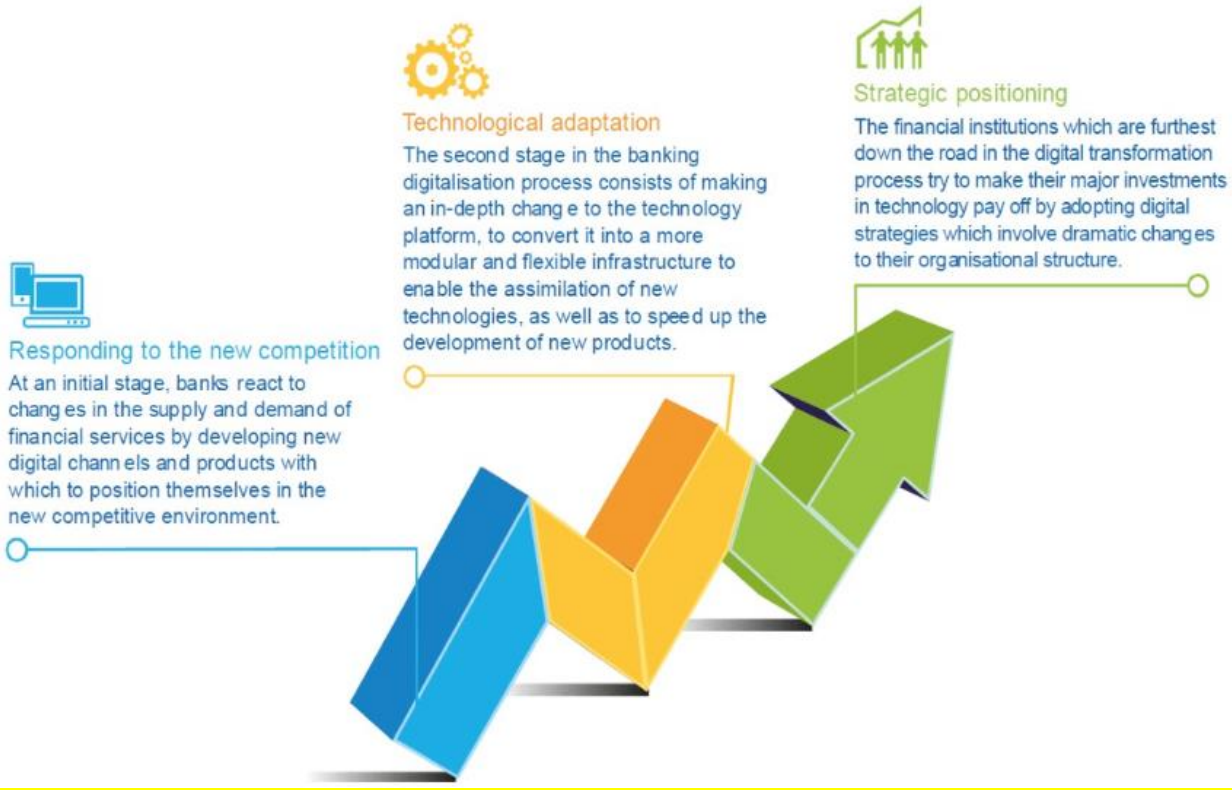
sustainable growth in the banking sector, a customer centric digital transformation approach is key.

Digital is a key strategy for many organisations, and it can also be seen in the African banking sector. According to McKinsey (2018), there is a growing preference for digital banking in Africa, with 40% of the surveyed customers, in the articles preferring digital banking and banks, making use of technology to drive costs down. In terms of European banks, Olanrewaju (2014) indicated that digital transformation will increase revenue by 30% while reducing the costs by 20-26%, resulting in efficiency and profitability.

While there are different approaches to digital transformation or digitalisation, Cuesta, Ruesta, Tuesta, and Urbiola (2015) described three main phases as:

- Responding to new competition;
- Technological adaption; and
- Strategic positioning.

Figure 1: The Digital Transformation Process in Banking



Source: (Cuesta et al., 2015, p4)

I. Reaction to the new competition

Technology advancements have accelerated threats of new entrants to in the banking sectors and according to Omarini (2017), FinTech's are viewed as competitors to traditional banks, especially in the payments processes as they provide similar types of offerings. As a response to the competition, banks are developing digital products in the payments space (Dapp, 2015) and in some instances, have formed partnerships or acquired some FinTechs. Evidence of this in South Africa was the acquisition of SpanScan by Africa's largest bank by assets, Standard Bank (Tech Central, 2016). SpanScan is a mobile payment solution that is used to make and receive payments electronically without the need for a bank cards, cash or electronic funds transfer (Tech Central, 2016).

II. Technological adaptation

The traditional banking model was or is still run on large, complex and silo technology infrastructure, and according to Cuesta et al. (2015), to digitalise there is a need for integrated and flexible technologies that can allow faster product development. However, this transition from old legacy systems requires banks to remodel their technology infrastructure (Adalarasu & Padmaavath, 2015). Digitisation of processes is needed at all levels of the bank to foster efficiency, and the use of algorithms and analytics to offer personalised and customer centric products and services (Cuesta et al., 2015).

III. Strategic positioning

Banks need to strategically position themselves to explore external opportunities that digitisation brings while exploiting internal opportunities to increase efficiency and productivity that may result in better customer service and reduced costs (Cuesta et al., 2015). Digitalisation or digital transformation can be defined as changes in ways or work, roles and business offerings at four levels, that is: process, organisation, business and society through adaptation of digital technologies in the organisation's operational environment (Parviainen, Tihinen, Kääriäinen & Teppola, 2017).

The digital transformation of banks represents both opportunities and challenges for traditional banks, including the risks or threats that these opportunities present. While the finance industry has adopted digital technology to improve operational efficiency and enhance customer experience, the use of technology comes with security risks (Yang Hsu, Sarker & Lee, 2017) and thus risk management is increasingly becoming important to manage these threats.

The benefits of the digital world are that organisations are able to access and share information easily and faster, as a result, this can help them assess market performance and product as well as customers' feedback (Bennis, 2013). The board of directors and senior management are responsible for adequate and effective processes to identify, assess, monitor, manage and report types of risks inherent to the bank (South African Reserve Bank, 2012; Basel Committee on Banking Supervision, 2015). Hence the aim of this study is to understand the impact of digitisation on risk management in financial institutions, particularly banks, as technology evolves and the risk management capabilities that are required to manage this.

2.3 Risk Management

2.3.1 The Evolution of Risk Management

Risk is defined as the effect of uncertainty on the organisation's objectives that could have a positive or negative impact in the future, while risk management is defined as "coordinated activities to direct and control an organisation with regard to risk" (International Organization for Standardization, 2009, 3.2 Risk Management). Risk management has evolved over the years, from the focus of single risk types to an integrated view; it was from the 1990s that the academic literature started focusing on the integrated view (Aebi, Sabato, & Schmid, 2012).Traditionally, organisations used to manage risk in silos, focusing on specific risk types such credit and market risk (Hoyt, & Liebenberg, 2015). This would be seen in organisations where, for example, the treasury function focused on liquidity and financial risks, the operations function focused on operational risks such as compliance, information technology was concerned with security and systems risks while the third line of defence, the

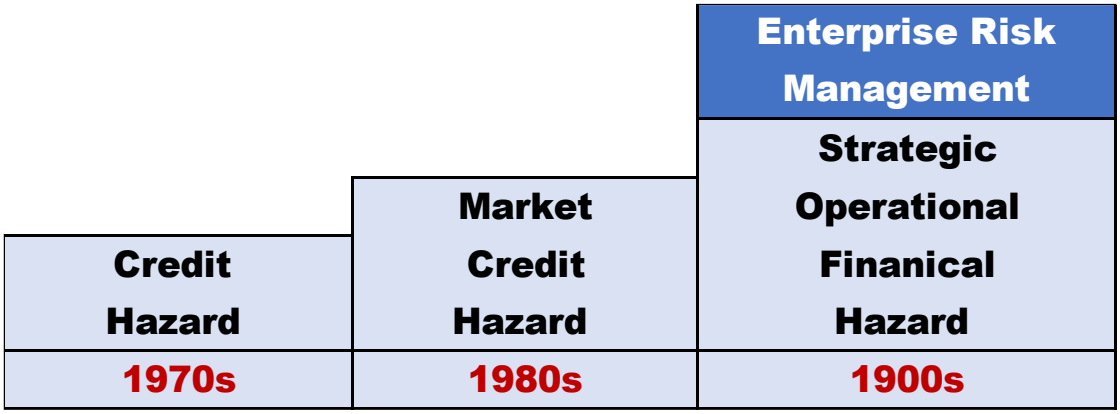
internal audit function focused on assessing risks related to inadequate internal controls (Shenkir & Walker, 2011).

With the change in the business landscape, macro and microenvironments due to digital disruption, globalisation and the geopolitical environment in which businesses operate, organisations need manage emerging risks as some threaten businesses. (Shenkir & Walker, 2011). The silo approach to managing risk is no longer sufficient in keeping up with the rapid changes in the business world. As a result, this, amongst other reasons, brought about enterprise risk management that initially began in the financial services and insurance industry in the early 1990s (Shenkir & Walker, 2011). The move to an integrated risk management approach is supported by the Basel Committee of Banking Standards (BCBS), citing managing risk in silos is no longer relevant in today's business environment; there is a greater need for business lines to share information, including on risks and risk mitigation. The risk management process should focus on more than just traditional risks, such as credit, market, liquidity but also include risks such as reputational, cyber and legal risk (Basel Committee on Banking Supervision, 2019).

The corporate scandals of the early 2000s that led to the collapse of global companies such as Enron and WorldCom and the 2008/2009 global financial crisis, among others, gave impetus for enterprise wide risk management. These led to the global development of corporate governance guidelines and standards, highlighting the need for risk to be managed enterprise wide (Rae, Subramaniam, & Sands, 2008).

Enterprise risk management focused on enterprise wide risk that has evolved from credit and hard risk to include in the 1990s financial, strategic, and operational risks. Enterprise risk management has shifted from managing risk individually or separately to a more holistic approach of managing risk as a portfolio (Eckles, Hoyt & Miller, 2010). Figure 2 below shows the evolution of risk management into enterprise risk management.

Figure 2: Evolution of Risk Management into Enterprise Risk Management



Source: Adapted from (Shenkir & Walker, 2011, p. 6)

Numerous definitions of enterprise risk management have been documented over the years. According to Dickinson (2001) "enterprise risk management is a systematic and integrated approach to the management of the total risks that a company faces" (p. 360). While Farrell (2015, p. 625) defined it as "the discipline by which enterprises monitor, analyse, and control risks from across the enterprise, with the goal of identifying underlying correlations and thus optimising the risk-taking behaviour in a portfolio context."

Despite the different definitions from various authors, the most cited definition within academic literature is the definition provided by the Committee of Sponsoring Organisations (COSO) (2004) which defined enterprise risk management 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" (Committee of Sponsoring Organisations, 2004, p. 2) Figure 3 below shows the layers that make up the COSO framework.

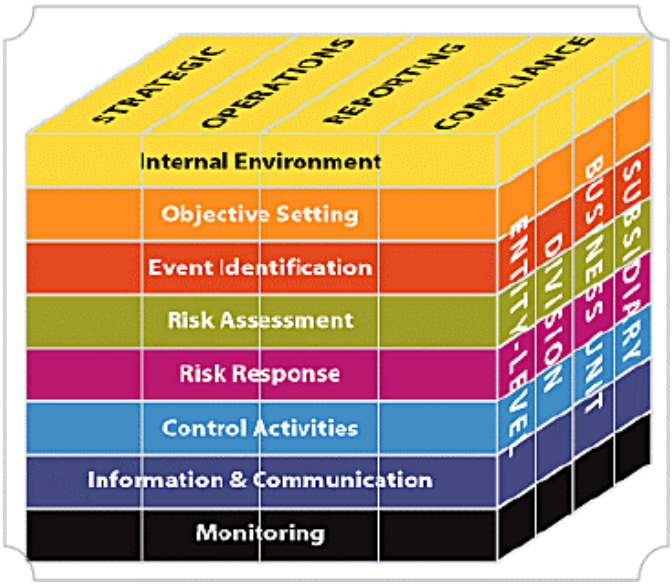
The ways in which risk was managed previously is no longer applicable today, due to changing risks. Financial and human resources and other different sets of skills are required to manage this risk that is fuelled by digital disruption, new competition such as Fintechs, innovation, big data, internet of things, changes in data privacy laws, automation, artificial intelligence, block chain, continued cyber risks, and

robotic processes. Risk management is now the responsibility of all individuals within an organisation (Shenkir & Walker, 2011) and not only the risk management department.

Figure 3 of the COSO ERM framework shows risk management as a multidimensional activity that can happen at all levels of an organisation (subsidiary, business unit, division and entity level) with four organisational objectives (strategic, operational, reporting and compliance) that management aims to achieve and execute internally, including objective setting, event identification, risk assessment, risk response , control activities, information & communication and continuous monitoring of these eight activities to ensure the objectives of the organisation are met "(Committee of Sponsoring Organisations, 2004).The risk management process is a continuous loop that includes risk identification, assessment, response and monitoring forms part of the eight activities within the ERM framework.

There are serval standards and frameworks used by organisations to manage risk and those include, among others, the COSO ERM framework, Basel guidelines and ISO standards mentioned. However, the ERM literature is still young and feedback on the adoption of ERM is mixed, evidencing its early stages of adoption (Eckles, Hoyt & Miller, 2010).

Figure 3: COSO Enterprise Risk Management Framework



Source: (Committee of Sponsoring Organisations, 2004, p5)

2.3.2 The Three Lines of Defence Model

As risk management evolved, so did the banking sector regulations and acts to include the manner in which risk should be managed. The Banks Act of 1990 in South Africa clearly outlines that the board of directors of a bank are ultimately responsible and may appoint sub-committees to ensure there are adequate and effective processes to identify, assess, monitor, manage and report types of risks inherent to the bank (South African Reserve Bank, 2012). The Basel Committee on Banking Supervision outlined the role and responsibilities of stakeholders responsible for managing risk in an organisation, referring to the “Three Lines of Defence” model (Basel Committee on Banking Supervision, 2015). While management of risk within an organisation is the responsibility of all; however, the board of directors are ultimately responsible. The banking supervision aligns to management of risk in an integrated way as businesses evolve, information sharing on market developments, risk and risk mitigation across the lines of defence is becoming more critical (Basel Committee on Banking Supervision, 2015 & 2019). The lines of defence are as follows:

1. First line of defence are the business units that are responsible and accountable for continuous management of risks. They identify, assess and reports on risks.
2. The second line of defence comprises of independent risk functions such as compliance that plays an oversight role by promoting, monitoring and reporting the risk activities performed by first line.
3. Third line of defence is the internal audit function that provides independent and objective assurance on the adequacy and effectiveness of the bank’s internal controls.

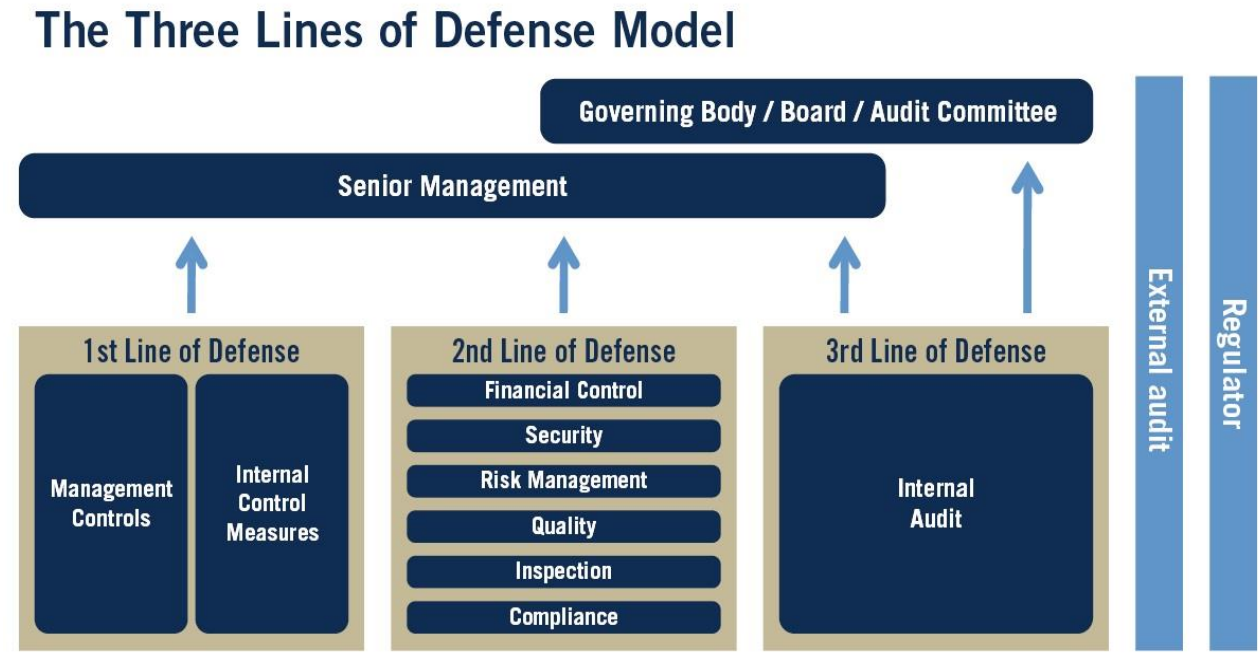
These “Three Lines of Defence” support the enterprise wide management of risk instead of the silo approach and this is a model also supported by the Institute of Internal Auditors (IIA) as a key enabler to enterprise risk management (The Institute of Internal Auditors, 2013). Figure 4 below provides an overview of the role and responsibility of each line of defence to promote coordination among functions and minimise duplications.

The Basel Committee on Banking Supervision (2015)'s corporate governance guidelines for banks does not only refer to risk management but the overall corporate governance of the bank in order to achieve strategic objectives of the bank; it outlines the:

- Responsibility of the board and its composition;
- The corporate culture and values underpinning the organisation;
- The identification, monitoring and controlling of risk;
- Oversight of senior management that would refer to the Chief Executive Officer (CEO) and any appointment sub-committees;
- Effectiveness of a risk management headed by a Chief Risk Officer (CRO)
- An independent Internal Audit function known as the third line of defence.

The rapid growth of technology comes with increased risks for banks, an even greater need for the three lines of defence to have the right skills and competencies to manage risk introduced through digital. While, according to Basel Committee on Banking Supervision (2019), in the past the material loss of risks was insignificant in isolation, as risk is integrated there is material loss that organisation could face if they don't manage risk holistically.

Figure 4: Three Lines of Defence Model



Source: (The Institute of Internal Auditors, 2013).

2.4 Theories in relation to Risk Management

2.4.1 Contingency and Institutional Theory

Risk management is a complex concept; hence the reason why different organisations develop their own unique frameworks to fit their organisations (Coetzee & Lubbe, 2013). There are three contingency characteristics that influence how risk and controls are managed within an organisation; that is; the size, culture and industry within which it operates (Jokipii, 2010). These characteristics which could be internal or external in nature are also aligned to institutional theory.

The process of institutionalism occurs at two levels of an organisation; that is, externally and internally within the organisation (Selznick, 1996). While the application of contingency and institutional theory together provides for better understanding of roles satisfied by coordination and control practices (Gupta, Dirsmith & Fogarty, 1994) in relation to risk management. In light of the three lines of defence we have seen that the management of risk embodies coordination and collaboration of different levels of management from first lines, being business units to all the way to Internal Audit being an independent and objective assurance provider.

2.4.2 Agency Theory

Agency theory is another theory that was considered for this study as it focuses on the relationship between a principal and an agent. A principal employs an agent to perform certain tasks within the organisation, including delegating some responsibilities and decision-making authority (Balago, 2014). In the banking field, the principal could be seen as the shareholders and the board of directors as the agent that will execute certain tasks on behalf of the shareholders. The board may delegate to the Chief Executive Officer (CEO), sub-committees and senior management, the operation of day to day activities of the bank. The CEO and the senior management team are tasked with managing the bank to create value for all stakeholders. This also includes employing adequate and effective risk management processes to protect the stakeholder's value.

However, Beasley, Branson, and Pagach (2015) identified three theories that describe how risk is implemented in an organisation: institutional theory, agency theory and resource dependency theory.

- Institutional theory suggests that the organisation's board or directors and senior management implement risk management to comply with or as result of external requirements such as complying with regulation. As a result, risk management is performed as a symbolic gesture that complies with the minimum requirements and provides limited value.
- Agency theory, as explained in paragraph 2.4.2, suggests the risk maturity in the management of risk resulting from the agency relationship that exists between the shareholder and senior management.
- Resource Dependence Theory, unlike institutional theory, suggests that risk management is implemented to assist the board in being proactive in identifying, understanding, monitoring and controlling risk to provide strategic value to the organisation in order to meet is strategic objectives

Based on the theories above, to enable organisations, including banks, to derive value from risk management as looked at from a cost versus benefit analysis, they must implement risk management in relation to the resource dependency theory.

Risk management is a core competency of the bank and critical to the organisation's success. Therefore, it is important to understand whether the implementation of risk management in the South African banking sector aligns with the three theories (institutional theory, agency theory or resource dependence theory), It is also crucial to understand the efficiency of the board of directors and senior management in ensuring effective risk management in the organisation.

2.5 The Importance of Risk Management

Managing risk in organisations is important in order to add value (Eckles, Hoyt & Miller, 2010). In the early days of finance research, risk management was a topic that was debated broadly, although under perfect market conditions it was considered irrelevant (McShane, Nair & Rustambekov, 2011). However, today's

business exists in an ever-changing environment, aided by technological advancements, digitisation, global trade and financial markets that are complex. There has been a growing number of organisations adopting enterprise risk management to improve their risk management capabilities especially after the 2008 global financial crisis (Eckles, Hoyt & Miller, 2010).

It is widely known that the world of banking includes financial and non-financial risks and it can be argued that since the 2008/2009 financial crisis, this has led to a continuously growing need for financial institutions to have adequate risk management processes, structures and frameworks. As banking transactions bear risk, it is important to have appropriate risk management processes to identify measure, regulate and manage risk (Županović, 2014).

Risk forms part of every decision made by senior management in an organisation, thus making risk management part of good governance and leadership to ensure adequate management of the organisation at all levels (International Organization for Standardization, 2018). It is therefore important for senior management to have the right skills and capabilities to manage risk introduced through digitisation.

There have been challenges with the effectiveness of risk management versus the cost. McShane, Nair and Rustambekov (2011) postulated that after the 2008 financials crisis the effectiveness of risk management, which was adopted by leading financial services institutions, came into question. When appropriate incentives and objectives are not in place, the risk management practices meant to protect the organisation from risk could be detrimental, leaving the organisation vulnerable to greater risk. Hence McShane, Nair and Rustambekov (2011) suggested the 2008 financial crisis could have been as a result of failed risk management practices.

2.6 Impact of Digitisation

From the literature reviewed, it is evident that risk management practices that were used traditionally are not adequate to the deal with the risks today due to the evolution of technology (International Organization for Standardization, 2018). Organisations that have embraced digitisation have experienced improved process efficiencies, significant cost reduction and often increased customer satisfaction

(Markovitch, & Willmott, 2014). These benefits are evident across industries. Often, organisations are using this to obtain an advantage over competitors (Neumeier, Wolf, & Oesterle, 2017). As much as digitisation is being viewed as the next industrial revolution, many organisations are not fully digitised to maximise on the benefits delivered by this (Carcary, Doherty, Conway, & Crowley, 2017). However, where digitisation is implemented, the risk management approach cannot remain the same and it too must be enhanced to add greater value.

2.7 Conclusion

The literature reviewed highlight very limited academic knowledge on risk management in relation to the digital evolution, especially from a South African perspective. However, there are frameworks, regulations and codes such as ERM, ISO and Basel standards, among others, that provide guidelines and can be adapted to a local context. The chapter discussed how risk management has evolved to enterprise risk management today and the inclusion of the three lines of defence that are a key enabler to managing risk enterprise wide. The three theories above showcase how the complexity of an organisation could also add to its risk management processes, since it is not a one size fits all.

In summary, leaders who form part of the three lines of defence in the 21st century, are required to navigate through very risky business environments; understanding and managing risk is critical to the success of today' s organisations. Organisations face many risks, including cyber risk that threatens their success and potentially decreases stakeholder value. This complexity to business increases risks emerging from digital disruption, innovation, technology, and Big Data that requires organisations to relook at their business models, strategy and markets (Shenkir & Walker, 2011).

Digital disruption and digitisation have brought ever-increasing demands for tailor-made products and services, resulting in more risks. If organisations do not keep up with technological changes, market share and profits could be impacted (Shenkir & Walker, 2011). The role of enterprise risk management is that of identifying, assessment and monitoring of actions to mitigate risks; with the value add being that of providing business with information to make decisions (Hopkin, 2018). In a

digitised organisation, risk management activities become more complex and effective approaches need to be explored to continue to deliver ERM value. There is extensive literature that suggests that a standard approach to digitisation of any organisation, business unit or process should follow a generic approach. However, a more precise approach may be more suitable, the more complex an organisation. Further to this, information requirements for digitisation need to be clearly understood. Digitisation of banking risk management practices is fundamental to the future of risk management (Härle, Havas & Samandari, 2016). If applied correctly, it can optimise the organisations' value (Arena, Arnaboldi & Azzone, 2010).

Digitisation has impacted banks' risk management practices and traditional risk management practices are no longer adequate. A different set of skills and competencies that includes the understanding of business, risk and technology skills are required to manage risk introduced through digitisation or digitalisation. For some organisations, the impact has been positive, with increased efficiencies and customer satisfaction while reducing costs. However, cyber security breaches have threatened the sustainability of some organisations. Leaders have to deal with complicated and an endless list of risks that move rapidly. Risk management is now a core competency for many senior leaders and risk needs to be managed in an integrated manner instead of a silo approach. For organisations to manage risk introduced through digitisation, a holistic and integrated capability among the three lines of defence is needed now more than ever.

CHAPTER 3: RESEARCH QUESTIONS

3.1 Introduction

The aim of this study is to understand the impact of digitisation on how risk is being managed in financial institutions particularly banks, as technology evolves with the deployment of digitisation. This is a means to evaluate the impact of digitisation or digitalisation on risk management capabilities within the banking sector, and the effectiveness of three lines of defence (management). While there is very limited academic literature on risk management in relation to the digitisation especially from a South African perspective, however the literature reviewed is combined with the research objectives, and the following questions were used. These research questions were formed from the research objectives and literature review to allow for an understanding on the impact of digitisation on risk management in the banking sector and possibly what risk management capabilities are required to manage that risk.

The overall research objective is to determine the current risk mitigation practices used by banks related to the increasing digitisation of their offerings. This research objective is supported by the following research questions.

Research question 1

How is the concept of digitisation understood by business managers, assurance and risk management practitioners within the banking sector in South Africa?[2]

This research question seeks to determine the level of understanding of the term digitisation among the participants of the study.

Research question 2

How do management structures in banking organisations manage risk arising from digitisation and risk management frameworks that exist within their organisations?

[2] This question was also applied to the interviewees from a global bank also based in America.

This research question seeks to determine management's knowledge and understanding of risk management frameworks used within their organisations to manage risk arising from the deployment of digitisation?

Research question 3

How has digitisation impacted the finances, processes and resources aligned to the risk management capabilities of banking institutions?

This research question seeks to determine the level of impact on the bank's processes, resources and finances upon deploying digitisation, if the bank has the required skills and how risk is managed.

3.2 Conclusion

The above research questions support the actionable interventions that can be proposed to augment and strengthen the risk management practices related to the digitisation of the banking sector in a South African context.

CHAPTER 4: RESEARCH METHODOLOGY

4.1 Introduction

This chapter discusses the research methodology and design chosen for this study. The research aims to understand the impact of digitisation on how risk is being managed within the banking sector in South Africa as a result of digitisation. A qualitative and exploratory study was appropriate for this type of research, it allowed the researcher to gain a deeper understanding of the impact and the risk management capabilities required in a digitised environment. The basis of this research's methodology, design and interview questions were formed from the research objective and the literature reviewed in Chapter 2 and data was collected using semi-structured, face-to-face interviews. The research methodology guided the process of collecting and analysing data to ensure there were no biases on the research problem being addressed (Zikmund, Babin, Carr & Griffin, 2013).

The layout of this chapter starts with a description of the research methodology and design and its suitability for this study. The population is described, followed by the sample selected, unit of analysis and the measurement instrument used in the study. The final part of this chapter provides a view of how data was gathered and analysed, the study's limitations and how validity and reliability were achieved using this research process.

4.2 Research Design

A qualitative study was adopted for this research, and this choice of methodology was relevant for the outcomes and conclusions that were derived from this study (Ritchie & Lewis, 2014). The researcher used qualitative research methods to understand complex phenomena and their contexts (Ritchie & Lewis, 2014) for a topic where there was minimal information (Creswell, 2013). As observed in Chapter 2, some aspects of risk management, as it relates to digitisation or digitalisation, are unexplored. A qualitative research method was best suited for this type of study as it comprised of probing and listening techniques that were used to gather insights from participants on their understanding of the phenomena (Creswell, 2013).

Saunders and Lewis (2018) defined exploratory research as a process a researcher can use to discover information on a topic that is not well understood, in order to gain insights. While Strauss and Corbin (1990) defined qualitative research as research that does not make use of statistical methods or quantification to produce findings. Qualitative research methods comprised of semi-structured interviews, and Myers (2013) identified interviews as a crucial component to the gathering of data. For the purposes of this research, a qualitative, exploratory method was deemed most suitable for this study and Saunders and Lewis (2018) supported this by stating that exploratory research is well-matched with qualitative research such as interviews. This method assisted the researcher gain insights, understand participant's reasons and motivations on the research topic and those insights were used to develop themes (Park & Park, 2016) and (Choy, 2014). Choy (2014), Saunders and Lewis (2018) and Park and Park (2016) all seem to support that exploratory research either uncovers new phenomena or assists the researcher in gaining new insights on a research problem that might already exist.

As discussed in Chapters 1 and 2, banking has evolved with rapid technological changes and this has significant implications on how risk is being managed. With the evolution of technology, digital risk has emerged as one of the top risks organisations are concerned about (McKinsey & Company, 2017). Given the evolution of risk and technology that has enabled concepts such as digitisation and digitalisation, the role of risk management is critical to the survival of the organisation. A qualitative and exploratory method was used to again insight on the risk management capabilities required as a bank digitises their processes or embark on a digital transformation. Considering the above, a qualitative and exploratory research methodology was most appropriate for this study (Creswell, 2013) in comparison to a quantitative study that does not allow for in depth insights by using interviews.

Creswell and Miller (2000) suggested that a quantitative research approach tends to generalise findings whilst independent from the concept, but a qualitative approach emphasises the study of the phenomenon based on the views and insights of the participants, including the ability for participants to share those insights based on their environment and experiences. This further supported the reason for choosing a qualitative research method and not a quantitative approach.

A deductive approach adopted for this study enabled the researcher to gain better knowledge, clarify the problem and come up with new concepts (Saunders & Lewis, 2018). The aim of the research was to understand the impact of digitisation on how risk is being managed within the banking sector and evaluate the risk management capabilities required by banks that have deployed digitisation, especially since the banking sector is undergoing digital transformation. Saunders and Lewis (2018) explained that inductive reasoning starts with a set of observations and measures from patterns identified and repeated occurrences, and then moves to formulate hypotheses from the analysed data. For purposes of this study, a deductive approach would be suitable; there is limited information on the topic and this approach allowed the researcher to start with the premise on the topic and work towards a conclusion based on the information obtained throughout the study.

A mono-method, cross sectional research design was selected due to the qualitative and exploratory nature of this study (Zikmund et al, 2013) and while data was collected through interviewing participants at a point in time a cross sectional research design was deemed most appropriate (Saunders & Lewis (2018). Fourteen interviews were conducted with heads or business managers and/or risk managers and/or assurance providers of major South African banks and a global bank.

4.3 Population

The population of this study comprised of leaders, mostly from the South African banking sector and with a few from a global bank in the United States of America (USA). Zikmund et al. (2013) defined a population as a group of people who share common characteristics. The South Africa banking sector is one of the biggest on the African continent; it is home to the top five banks in the continent by assets (Miaschi, 2018) making the population suitable for this study to get rich insights. A suitable population for this study would have been all financial services organisations within South Africa; however, due to time constraints, the focus was on the banking sector within the financial services industry. The details of the banks have been anonymised and for the purposes of this study, will be referred to as Bank A, Bank B, Bank C, Bank D, Bank E and Bank F. A university professor from the USA, working in the area of technology and information security, was included since he had provided consulting services to the banking sector. Despite a formal request first

done via telephone to the Head of Operations at Group Internal Audit, followed by an email, Bank F declined the request to participate in the study, citing that it is the against the bank's policy to participate in academic research projects. Subject matters experts in the field of risk management and technology who service the banking sector were also not interviewed as they had cancelled interview meetings numerous times, until the time ran out.

The population sampled included Chief Audit Executives, Chief Operating Officers, Heads of Departments, Senior Managers, from across the major banks in South Africa, a university professor, an American university and a global bank who were either responsible for or provided services to the banking sector during this digital era. The interviews for all the major banks in South Africa were conducted at their head offices in Johannesburg and for the global bank from Bloomington, Indiana State in the USA.

4.4 Sampling

A non-probability sampling technique was used as there was no pre-determined universe and access to a full population of Heads of Business, Risk Managers and Assurance providers in the South African banking sector. Saunders and Lewis (2018) suggested that when a researcher is unable to obtain a complete list of the population, a non-probability sampling technique can be used, making it the appropriate method for this study. The researcher considered sampling as an important part of the research process, with it being critical to the validity and findings of the study (Acharya, Prakash, Saxena, & Nigam, 2013). For this study, two non-probability sampling techniques were used: purposive and snowball sampling techniques. Samples of a qualitative study tend to be purposive instead of random (Saunders & Lewis, 2018), and initially the researcher used her judgement to select a suitable sample of respondents from the major banks in South Africa that had deployed digitisation, based on the positions, knowledge and experience in their organisations.

Furthermore, the researcher made use of professional relationships and networks within banking sector as well as professional media platforms as such LinkedIn, in order to access the initial respondents. LinkedIn was mainly used to obtain names

of subject matter experts working in consulting firms. Initial respondents also provided links or referrals to additional respondents who were able to provide further insights (Acharya et al., 2013). Snowball sampling then became beneficial in getting access to additional respondents.

Qualitative study samples are smaller than those of a quantitative nature (Marshall, 1996) a sample of 14 individuals that included the field of business, risk management made up of directors, executives, senior managers or managers represented across the business units and/or three lines of defence within the organisation to gain insights from the various levels of business. Although, the researcher would have liked to have interviewed at least three respondents from each bank working at first, second and third lines of defence that proved difficult due to the unavailability of some of the respondents.

The sample size was deemed sufficient since, for qualitative research, six to twelve interviews are seen as an ideal sample size that enables development of meaningful themes and useful interpretations (Guest, Bunce & Johnson, 2006) and after a number of interviews a saturation point is met. For this study, a saturation point was evident at interview number 13.

4.5 Unit of Analysis

The unit of analysis was selected during the preparation phase of this study which was important in determining focus areas for the data gathering process. Saunders and Lewis (2012) defined unit of analysis as objects being researched and the level at which the study is performed. While Blumberg, Cooper, and Schindler (2008) defined the five different units of analysis common in design research as; individuals, organisations, divisions, departments and general groups. For the purposes of this study, the unit of analysis was organisations focusing on the impact of digitisation on how risk is managed in those organisations.

These included Chief Audit Executives, Chief Operating Officers, Executives, Heads of Business, senior managers and professors that are responsible for or work with digitisation programmes in order understand how they collectively, with risk practitioners, manage risk as one of the key strategies to increase performance. The

respondents were selected according to the three lines of defence made of heads of business as first line or various risk practitioners as either second line (e.g. compliance and operational risk) or third line (e, g internal audit) as defined in Chapter 2.

4.6 Measurement

A qualitative, semi-structured approach was used and also considered that this approach was subjective by nature, affected by a number of biases that included interviewer, interpreter and response bias that might have taken place during interviews and analysis of data (Zikmund et al, 2013). In response to the biases, a semi- structured interview schedule guided the researcher on how to conduct open-ended and face-to-face interviews (McCraken, 1988). Furthermore, to ensure validity and reliability, a set of standardised interview questions were designed for interviews with the three lines of defence from the major banks. Twelve (12) interview questions were designed in relation to the research objective, literature review and research questions in Chapters 2 and 3 respectively.

The research questions were designed, with the research from Chapter 2 and intended to understand the impact of digitisation on how risk is managed and to evaluate the risk management capabilities required to manage risk. To allow for additional open and flexible feedback or insights, the questions were open-ended.

4.7 Pilot Interview

A pilot interview was conducted in July 2019 with one selected candidate from Bank D. The interview was used as a means to assess whether the questions were understood by the participants and whether they meet the research objectives. (Saunders & Lewis,2018). From the pilot interview, the researcher gained valuable insight that was helpful for the interview process. The insights gained included making minor adjustments to the manner in which questions were asked and the interview style. Feedback from the interview was discussed with the supervisor and adjustments made for the interview process. During the pilot interview process, the researcher noted instances where the participant did not necessarily answer the questions and that became one of issues that the researcher had to look out for

during interviews and ensure that where questions are not directly answered, the researcher repeated the questions to get a clearer answer. The pilot interview benefited and helped prepare the researcher for the fuller data collection process with all the interviewees.

4.8 Data Gathering Process

The data was collected using semi-structured interviews from the major banks in South Africa and a global bank. These interviews were sourced through personal and professional networks, including the use of professional media platform LinkedIn. There were 14 interviews in total; 12 face-to-face interviews at the offices of the participants and two skype interviews where two participants were located in New York City in the United States of America. The researcher preferred face-to-face interviews since according to Saunders and Lewis (2018) they minimised non-response bias for an exploratory study. Although face-to-face interviews were preferred and the majority of the interviews held for this study were face-to- face, the process catered for alternative means as a result of distance or unforeseen circumstances, and this was done for two interviews when the researcher was in Bloomington City in the USA and the participants were in New York City.

The participants were contacted via email that included the title of the topic, an overview, objective of the study and a brief background on the researcher and her connection to the topic, requesting their participation on the study. Two participants from Bank B and Bank C required further information on the study and requested a call prior to agreeing to participate to assess if they were the right fit for the study. Clarification was provided to the participants by means of calls and the researcher also used that opportunity to confirm the participant's availability after agreeing to participate in the study.
Upon agreement and based on the participants' availability, the researcher was able to schedule interview sessions through email. The email included the purpose, consent form and scope of the interview.

To ensure an insightful interview, the researcher started with an introduction as guided by the interview schedule, then explained the purpose of the study and elaborated on the confidentiality of the interview in relation to the interviewee and the

organisation to assure the interviewee that data collected was treated as confidential and in an ethical manner. An interview guide was used by the researcher to ensure that the interviews were neutral and consistent, that could result in improved overall quality of the research process (Denzin & Lincoln, 2005). The consent form was also explained in terms of the study and voluntarily participation, of which the interviewees were free to withdraw from the interview at any time, all interviewees were asked to sign the consent form (see Appendices 1, 2 and 3).

On average the interviews took 40 minutes; with the longest running for almost 60 minutes, and the shortest for about 16 minutes. All interviewees were asked for permission to allow the researcher to record the interview using a voice recorder. None of the respondents objected to being recorded. The researcher took notes of key points, during the interview, also making use of probing techniques to extract additional information. Blumberg, Cooper and Schindler (2008) suggested the use of probing techniques to extract additional information and knowledge from the respondents. To enable a natural flow of the interview, the researcher adjusted the questions where the respondent had answered them before. For the interview with the university professor, the questions were adjusted while maintaining the core message to acquire their perspective on how they viewed the banking sector as it related to how digitisation had impacted the way risk is managed. At the end of the interview, the researcher thanked the respondents while the respondents wished the researcher well on the project and offered to provide any clarification should additional questions arise.

The transcribing of voice recorded interviews to written format was outsourced to a transcriber and to ensure accuracy of what was transcribed, the researcher listened to the recordings and reviewed the transcripts. The handwritten notes, transcriptions and voice recordings formed part of the data collected and used for analysis for this study.

4.9 Analysis Approach

The data was collected using semi structured telephonic and face to face interviews. There was consistency in the manner in which interviews were recorded (Saunders & Lewis, 2012) since this can influence the way the researcher interprets the data

(Zikmund et al., 2013). As such, content analysis was utilised to ensure objective interpretation. All interviews were recorded using an IOS application that recorded and transcribed feedback from respondents to enable the researcher to pay attention during the interviews in order to gain the required insights. The researcher reviewed and analysed the transcripts from the application and noticed errors, and to ensure accuracy and complete transcripts the transcribing of the interviews was outsourced to an experienced transcriber. Qualitative data analysis method was used to understand a complex phenomenon that required clarity of thought (Strauss & Corbin, 1990). It was important for the researcher to select the correct approach to gather the right data. To ensure that the researcher understood the respondents' feedback during interviews, the researcher asked probing questions to clarify and to gain insights.

For analysis of the data, a technology-based analysis tool such Atlas.ti was used for purposes of coding the data collected and forming groups or categories from the data coded. The analysis was also defined and refined further through an iterative process Saunders and Lewis (2018) of reviewing the codes and linking them to the right groups. To further ensure consistency the researcher mapped interview questions to the research questions as shown in Table 1.

Table 1: Consistency Matrix

Research Questions	Section in Literature	Interview Questions
		1. What is your role and area of responsibility in your organisation? 10. Does your organisation have a dedicated Chief Digitisation Officer with a defined role and responsibility?
Research Question 1: How is the concept of digitisation understood by	2.2 Transformation of banking	2. How long have you been in this particular role, and within your organisation?

business managers, assurance and risk management practitioners within the banking sector in South Africa?		3. In your opinion, how would you describe digitisation in general in banking?
Research Question 2: How do management structures in banking organisations manage risk arising from digitisation and risk management frameworks exist within their organisations?	2.3 Risk management	5. How important is risk management in the digital era of banking? 6. What risk management framework is used in your organisation, and do you believe that is relevant to manage digital risk?
Research Question 3: How has digitisation impacted the finances, processes and resources aligned to the risk management capabilities of banking institutions?	2.2 Transformation of banking 2.3 Risk management 2.5 Importance of risk management 2.6 Impact of digitisation risk management	4. How has digitisation impacted your area of responsibility and/or that which you may support? 7. How would you describe the impact digitisation has had in the manner which risk is managed in your organisation from a financial, process and resource perspective? 8. In your view, what are the skills and capabilities required to manage risk introduced through digitisation? 9. Do you believe that business managers, risk managers and

		assurance providers in your organisation have the skills and capabilities required to manage risk introduced through digitisation? 11. Has sufficient financial provision been made for digitisation within the organisation? 12. What is the likely impact of digitisation in your organisation on employee numbers, business efficiency and competitive advantage?

During the analysis process the researcher listened to the recordings multiple times and referred back to the written notes to assess her own understanding. The coding of the transcriptions was based on the patterns identified and the literature review that consisted of in-depth review of transcribed data where insightful units of analysis were identified, to ensure the coding was correct and appropriate (Attride-Stirling, 2001). The reiterative process of reviewing the data collected and transcribed formulated into categories, and those code and categories were developed as per the themes identified.

The coding process was completed, and queries run based on codes and categories including where there were possible relationships. That was done to determine the frequency of codes and categories as per themes identified. Each transcription was reviewed through an iterative process to ensure the accuracy of the coding and categorisation process (Attride-Stirling, 2001).

4.10 Limitations

This research provides valuable insights on the impact of digitisation on how risk is managed, and possible risk management capabilities required as a result of digitisation in the banking sector. However, qualitative research is subjective by nature and therefore at risk of being affected by a number of biases (Saunders & Lewis, 2018). For this study, the following limitations were noted:

- Banking environments are highly regulated and commonly have company confidentiality agreements with employees, and as such, participants might not be able to disclose key information pertinent to this study. This may have inhibited the formulation of key insights and findings.
- Geographic bias as a result of a majority of the individuals based in Gauteng, represented the sample.
- Although qualitative findings can be replicated and sometimes generalised to theory (Yin, 2003), this is not representative of the entire population of the financial services industry in South Africa, given the small sample size.
- Since the findings were from the banking sector, they cannot be extrapolated to a different industry/sector but rather a limited number of banks located in Gauteng (Saunders & Lewis, 2018).
- The interviewer is not an expert in interviewing, and this could have impacted the way questions are asked, including leading questions and the results of the data collected.
- The fact that the researcher worked in the banking sector might have cautioned the participants to be guarded in their responses.
- Some of the banks might have partially or are in the processes of implementing digitisation, which might impact the extent of the participants' responses.

4.11 Conclusion

A qualitative and exploratory research design was chosen for this study which allowed the researcher to gain a deeper understanding on the impact on digitisation on how risk is managed and of risk management capabilities required in a digitised environment.

The unit of analysis focused on the organisations made of the lines of defence or individuals that were responsible for managing risk introduced through digitisation or digitalisation. While the data was gathered using semi-structured interviews that were either face-to-face or telephonic. Reliability and validity were an important aspect for this study. This was done through the use of an interview guide that comprised of standardised, non-leading open-ended questions designed to minimise researcher bias.

CHAPTER 5:RESULTS

5.1 Introduction

This chapter discusses the results of the study as they relate to the research questions presented in Chapter 3. Fourteen interviews were conducted across the South African banking sector, one global bank in the USA and an organisation. The data was collected using semi-structured face to face and telephonic interviews, and the outcome of the results was based on the findings of the data collected and analysed. To ensure consistency between the data collected, research questions, interview questions and the method used to analyse the data, the researcher used a consistency matrix (refer to Table 1).

5.2 Presentation of the Sample

For this study, two non-probability sampling techniques were used; that is, purposive and snowball sampling techniques to select 14 participants. The sample included 11 participants from the major banks in South Africa, two from a global bank and a university professor who consults within the banking sector in the USA. These participants formed part of the three lines of defence within their organisations with the exception of the university professor. They were all deemed to have the relevant knowledge to manage risk introduced through digitisation, based on their years of experience and knowledge. This sample enabled the researcher to gain an understanding of the impact of digitisation on how South African banks manage risk while getting a view of the USA banking sector, in order to identify if any major differences exist between the local and foreign banking sectors.

Twelve interviews were face-to-face interviews at the offices of the participants and two were skype/telephonic interviews with the participants located in New York City in USA. The sample consisted of 10 males and four females, who held executive or senior management positions within their organisations and had 5 (36%) from first line, 4 (29%) from second and third line and one (6%) participant that did not fall under the three of lines of defence within an organisation. Refer to Table 2 for a list of participants.

Table 2: List of Participants

Participants	Bank/ Organisation	Designation	Years with Organisation	Line of Defence
Participant 1	Bank C	Head of Operational Risk	4.5 years	Second Line
Participant 2	Bank C	Head of Strategy and Transformative Change: Group Internal Audit	5 years	Third Line
Participant 3	Bank C	Head of Technology, Cyber and Fraud Risk	16 years	First Line
Participant 4	Bank B	Head of Information Technology (IT) Risk	2 years	Second line
Participant 5	Bank B	Chief Audit Executive	7 months	Third Line
Participant 6	Bank D	Systems Business Owner – Capability Lead	10 years	First Line
Participant 7	Bank D	Head of Support Services: Group Internal Audit	13 years	Third line
Participant 8	Bank A	Head of Fraud Risk	9 years	Second line
Participant 9	Bank A	Chief Operating Officer: Group Internal Audit	10 years	Third line
Participant 10	Bank A	Chief Information Officer	11 years	First line
Participant 11	Bank A	Head, Digital Client Experience	15 years	First line
Participant 12	Bank F	Director of Technology Services	8 years	First line
Participant 13	Organisation G	Professor: Chair of Cyber Security Program	8 years	N/A
Participant 14	Bank F	Vice President: IT for Prime Services	6.5 years	Second line

Overall, the interviews took 7 hours 57 minutes, with the longest and shortest interviews taking 58 minutes and 15 minutes 54 seconds respectively. Refer to Table 3 for summary of interview duration.

Table 3: Duration of Interviews

Details	Duration
Number of interviews	14
Shortest interview time	15 minutes 54 seconds
Longest interview time	58 minutes
Overall time of interviews	7 hours 57 minutes

5.3 Research Question 1

How is the concept of digitisation understood by business managers, assurance and risk management practitioners within the banking sector in South Africa?[3]

This research question seeks to determine the level of understanding of the term digitisation among the participants. Digitisation and digitalisation or digital transformation are complex phenomena that are commonly mistake for meaning or referring to the same thing. While they are technically different as seen in the definitions documented in Chapter 1. Digitisation refers to conversion of paper base to digital, while digitalisation refers to the change or transformation of an entire value chain in the way things are done at an organisational, process and business level among other things. Therefore, it was imperative to establish what participants perceived digitisation to be.

Overall, participants had a good understanding of what digitisation is. The participants answered the question using their own views and experiences, including providing examples of what they saw as digitisation within the banking sector. A few participants expressed that digitisation is not necessarily a new concept, but it is a

[3] This question was also applied to the interviewees from a global bank also based in American.

concept that has been in existence for a number of years that started out as automation of processes.

"So, digitisation, we've been at it for 30 years. Digitisation is just about making the stuff that was on paper into the digital form" (Participant 5).

"But here's an interesting part in short. This thing is not new. In 2000 I started working in manufacturing. And we were going through our own digitisation. Replacing people with robots that were responsible for making the parts. That was already 10 years ago. No, more than 20 years ago" (Participant 10).

From the 14 participants interviewed, seven of them (refer to Table 4) had a very good understanding of the concept of digitisation, including being able to almost give a text book definition.

"To me just very generically it's kind of whatever you move from some analog or hard copy or some type of physical approach to doing record keeping to using other computerised and digitised products and services. So that could be locally. It could be in the cloud. But basically, it's moving from an analog format to a digital format." (Participant 13).

"So, I think in its simplest form it is taking manual processes and putting them into digital processes. So, converting paper processes into computer-based processes" (Participant 6).

Table 4 captures each participant's level of understanding that the which was analysed by the researcher when coding research interviews. An interesting element noted by the researcher during analysis was that majority of the participants did not differentiate between digitisation and automation and digitisation and digitalisation/ digital transformation except for one participant.

"Digitisation is just about making the stuff that was on paper into the digital form. People talk a lot about digitisation. That is not what we are doing now. At the moment, it is digital transformation and that is what digitalisation is. The way I best described this last year when I had clients at [name of company] …. Digital transformation or

digitalisation is about taking those human manual hand-offs and eliminating them and making this as straight through as possible" (Participant 5).

"Now people are talking more and more about artificial intelligence and all those things I think it is really just part of digitisation really. Like, automation I see as part of that digitisation". (Participant 7).

Table 4: Participant's Understanding of the term Digitisation

Participant No	Level of Understanding of term digitisation	
	Very well understood/ described	Good understanding described
1	X	
2		X
3	X	
4	X	
5	X	
6	X	
7	X	
8		X
9		X
10		X
11		X
12		X
13	X	
14		X
Total	**7**	**7**

Two themes emerged from the data collected relating to Research Question 1; these are: efficiency and customers' offerings. The participants linked these to the deployment of digitisation as they were describing what digitisation is and were able to explain the value that their organisations and customers have derived from digitisation and/or digitalisation.

5.3.1 Efficiency

Most of the participants referred to efficiency as one of the main drivers of digitisation along with cost reduction. The banking sector, both locally and globally, has seen a massive adoption of digital technologies in order to become efficient, reduce costs and improve customer service to be better and faster. This was evident, through the data collected, in the majority of the participants' responses.

"*So, the more you digitise, the leaner you become and the less reliant you are on people, on branches, on cumbersome processes. So that introduces efficiency and through efficiency you curtail costs and then you become cost efficient and effective" (Participant 2)*

"We will be able to do stuff a lot faster and a lot better. I mean, from a risk perspective as I said there are people who have designed AI technology that can look at potential risks that might be happening and it writes a report automatically in a matter of minutes that would have taken a fraud investigator maybe three hours. You can get a machine that does that fraud investigation quicker and identify those fraud activities quicker, which can save the bank money faster and better" (Participant 6).

5.3.2 Customer Offerings

The majority of participants mentioned that the evolution of technology has led to changes in customers' preference, such as how they prefer to bank. Digitisation has enabled their organisations to provide product offerings via mobile applications that enable customers to perform banking transactions anytime from anywhere instead of traditional channels of going to a bank branch. Participants indicated that through digitisation, they have been able to convert data into digital format that introduced efficient ways of servicing customers, by collecting data that can be used to extract value and improve product offerings.

"It's about how the clients want to do business, so whether it's consumers or corporate clients do they still want to use manual ways of engaging the bank or do they want to use funky new applications or channels to engage and doing it in a safe way and doing it quicker and more efficiently. I think a lot of the old manual type processes and controls are very slow and it doesn't give the service levels that the clients demand" (Participant 3).

"The biggest learning for me was that it is about making banking services available everywhere, either directly through technology or through seamless integration with technology, even though there is manual intervention there. Understanding that this emerging trend, or type of customer just wants to experience products that were traditionally offered in a branch network for instance, they want to experience those anywhere, anytime. The way to make that happen is through digital channels". (Participant 7).

5.3.3 Conclusion of Research Question 1

The results from Research Question 1 seems to indicate that business managers, risk management practitioners and assurance providers within the banking sector appears to have a good understanding of the concept of digitisation; however, most of them do not seem to differentiate between digitisation and digitalisation. Participants also seem to understand the internal benefits of digitisation that come through efficiency resulting in cost savings and better customer service. There was no difference noted from the level of understanding of the term digitisation between participants from South Africa and those from the USA.

5.4 Research Question 2

How do management structures in banking organisations manage risk arising from digitisation and what risk management frameworks exist within their organisations?

This research question seeks to determine management's knowledge and understanding of the risk management frameworks used within their organisations to manage risk arising from the deployment of digitisation. Hence it was important to establish in Research Question 1 the participants' level of understanding of the concept of digitisation.

The majority of participants knew the risk management frameworks used within their organisations and its importance, while most indicated that their organisations used the enterprise risk management framework, one participant from the USA referred to

the ISO standards. However, while they acknowledged their risk management framework as relevant, they believed that the way it was applied needed to be changed from the traditional sense of managing risk in a silo approach but to a more integrated way through combined assurance and employment of IT or technical skills.

"What we are moving towards is a lot more of using the ERM framework with combined assurance" (Participant 4).

"The people reference the best practice frameworks and all that stuff, the enterprise risk management framework, generally the three lines of defence model is followed that's a relatively well accepted model. I guess how it has been applied changes maybe from bank to bank and even in our bank it is evolving actually" (Participant 3).

"So, I think they are looking at the fact that three lines of defence sometimes reinforce silos even though the intention was to drive coordination and collaboration. So now there needs to be more of a drive to say everyone is equally accountable for a sound risk management framework. So, whether you're first line or second line, especially first line, they need to understand whatever strategies they are pursuing, they need to understand the risks inherent to those strategies and what they are doing about them" (Participant 7).

It was also interesting to note the very few participants who did not know what risk management framework was used in their organisations, still saw risk management applied in its traditional sense of having a separate function to manage risk.

"So, while risk management is absolutely critical, it's so critical that it's basically become its own function to ensure its standard across the bank, as opposed to each individual team, managing it themselves, and then leaving room for error" (Participant 14).

Risk management emerged as a key theme linked to Research Question 2 from the data collected. This was supported by several group categories such as; combined assurance, data management, emerging risks, frameworks and traditional risk management. However, from the five group categories, data management and

emerging risks were the most dominant among the participants while combined assurance was seen as a modern way in which risk should be managed that is integrative and collaborative.

5.4.1 Emerging Risks

Participants also mentioned that the digitisation is introducing new risks such as cyber risk that was not considered as a traditional risk like credit risk. Two participants from Bank A also mentioned how their organisation had revised their ERM framework to now consider technology/cyber risk as a key risk like credit and market risk for it to get the right level of attention.

"So, ours is called enterprise risk management framework at the back of bringing all sorts of best practice into play. I think in terms of digitisation we take it so seriously that we have elevated the technology risk and we call it now 'principal risk' where it used to just fall under operational risk in our enterprise management framework. We are taking it so seriously that it sits neck on neck with the other five principal risks. So, it felt like it was buried underneath some of the risk types in operational risk and it's so important in terms of where the bank is going from a digitisation perspective that we have elevated it" (Participant 1).

"That process is different, so we also have to look at it differently. Also understand emerging risks that come with this level of digitisation. We are not just worried about credit anymore. There is cyber security risk and we need to make sure that there is the right focus in the holistic risk profile of an organisation. It is no longer just about the risks we used to audit in the past" (Participant 7)

"If I look back in 2010 and we didn't have a very complex attacks on digital channels, but if you look at the threat landscape for digital channels, it has completely shifted. The attacks are becoming very sophisticated and they're moving with the times. So as much as we are becoming advanced in terms of our digitisation strategy, unfortunately the attackers, the criminals as well are getting very advanced" (Participant 8).

However, from the data collected, there were contradictory views from two participants who felt that the current frameworks are obsolete or not fit to manage risk introduced through digitisation, including the three lines of defence risk management model.

"For me, they are obsolete. Any risk framework that's written more than 5 years ago is no longer relevant. And actually, what will happen is just think about the world of artificial intelligence and machine learning. You actually need coded risk models that evolve with new information that gets placed with them all the time" (Participant 10).

I don't believe in the three lines of defence model at all in any shape or form. I am trying to convince my colleagues that it's the right way to go because in the previous role the first line of defence was the supervisor who checked the output of the human now the computer is doing everything. So that's the first line, the second line is the supervisor… So, I don't believe there is a place for risk management and in the function in the digital area in the good old-fashioned way of risk assessments" (Participant 4)

"We could just have first and third. The thing is there will always have to be an independent assurance provider. So, whether it is second line collapsing into first or second line collapsing into third. I mean there is talk of it happening" (Participant 9).

5.4.2 Data Management

The majority of participants indicated that to manage risk introduced through digitisation data and the use of technology such as robotics, is fundamental.

"The intent is to bring in robotics into audit. The intent is to use much more data science and I am not talking about Computer Audit Techniques (CATS), we know CATS. We need to take that to the next level, so it is real data science starting to get into the predictive side of things. On the back, is also the robotics stuff. My third thing is a very big focus on cyber because we're a digital bank" (Participant 5).

"I am talking the third line here. So, our ability to use big data or data analytics is fundamentally aligned to the quality of data we have, the data maturity that we have in the organisation. So, the ability to audit robots is directly dependent on the extent to which we have robots in our bank. So, from that point of view and this is purely the service that you provide to the organisation and that's one perspective" (Participant 2).

5.4.3 Conclusion of Research Question 2

The results from Research Question 2 indicate that participants are generally aware of the risk management frameworks used within their organisations, with the majority using the ERM framework. While the majority deem those frameworks to be relevant to manage risk from digitisation, they acknowledged that risk can no longer be managed in its traditional sense, but a lot more collaboration is required through combined assurance. There is also an emerging risk linked to digitisation that is cyber risk where big data and current technologies such as robotics are the foundation to managing digital risk. A few participants believe that the three lines of defence risk management framework is no longer relevant in this digital era.

5.5 Research Question 3

How has digitisation impacted the finances, processes and resources aligned to the risk management capabilities of banking institutions?

This research question seeks to determine the level of impact on the bank's processes, resources and finances upon deploying digitisation, and if the bank has the required skills to manage digital risk.

Three big themes emerged from the participants interviewed namely; skills, financial implications linked to costs and employees. From the data collected below were the group categories linked to each of the key themes identified in relation to Research Question 3.

Financial Implications:

- Cost

    - Employee cost;
    - Initial set-up cost of digital; and
    - Cost vs benefit of going digital.
- Losses
    - Losses from cyber breaches.

Skills:

- Adaptability;
- Analytical;
- Lack of skills;
- Soft skills; and
- Technical skills.

Employees:

- Human intervention;
- Increase employee numbers;
- Reduced employee numbers; and
- Upskilling employees.

From the key themes identified, only key categories are discussed below where there was a strong theme from the participants and any contradictory elements identified. Refer to Appendix 5 for the thematic map of the Atlas ti coding results linking codes to group categories and then ultimately to key themes discussed under each research question.

5.5.1 Financial Implications

5.5.1.1 Costs

A very strong theme that emerged from participants interviewed on the impact of digitisation on how risk is managed in the banking sector, was the financial implications whether it be the financial benefits that the organisation derived from a cost reduction through automating processes or the high initial set-up cost that the bank incurred to digitise. An element to note when coming to the impact on employee

numbers were the contrasting views, with some participants saying digitisation is increasing employee cost through an additional number of employees or the need to hire expensive, technically skilled resources while others saw reduction in employee costs through a decrease in employee numbers, particularly in areas where processes were digitised.

"So, from a financial perspective, to do this continual auditing, continual management, continual control monitoring is not cheap from a system perspective you need a cheque book to do it. Over the long-term, you are going to save 100% because the guy who gets there second needs to pay twice as much because he's built legacy. So, the sooner you can do it, the better" (Participant 4).

"So R700 million was for exit costs and we have taken the first half of that. We have invested about 300 million in the first half of the year bringing in different skills of engineers, data scientists and cloud engineers to drive digitisation" (Participant 10).

"Obviously, the new entrants will erode market share, they will erode revenue and the legacy historical banks will start struggling. From a cost perspective, the old technology stacks come with the costs. So, as you can move away from these legacy stacks you can actually become a lot more cost effective..." (Participant 3).

Furthermore, an interesting point was made by Participant 1 citing first line sees risk management or second and third line as a grudge purchase that costs the organisation money and are not willing to invest in the same amount of resources in second and third line as they would in first line.

"I believe and maybe this links to an interesting conclusion for you in looking at risk and digitisation together, on that particular one it's sad because remember the business is willing to invest in resource and expertise for themselves. Second line and third line is always a grudge buy or grudge purchase and for us to convince the bank that we also need similar resources to be able to manage the risk that they have introduced, it's going to take a bit longer" (Participant 1).

5.5.1.2 Losses

The negative side of digitisation was echoed by the majority of the participants on how, even though the banks are able to make money, they are also experiencing losses relating cyber-attacks, not to mention the cost verses benefit of actually implementing advanced risk management solutions that are not necessarily cheap.

"If I look back in 2010 and we didn't have a very complex attacks on digital channels, but if you look at the threat landscape for digital channels it has completely shifted. The attacks are becoming very sophisticated and they're moving with the times. So, as much as we are becoming advanced in terms of our digitisation strategy, unfortunately the attackers, the criminals as well are getting very advanced" (Participant 8).

"There was a case recently where a bank in… I think it is Capital One, where millions of customers' information for credit cards… I think it was a month ago, was stolen. they only picked up this issue three months later because… and the only way they picked it up was because a different hacker said, guys are you aware that somebody has hacked your systems and taken this information?" (Participant 6).

"So, we wind up with a pretty bright estimate for how much these attacks are costing on average. And it's really ranged over the years. From in the low millions to 10's of millions per breach, depending on the survey that you look at. The trend lines are good. You can say it has a good estimate of total losses. Pretty much breaching on 6 trillion by 2022 or something like that. So anyway, they're going up [pause] if there anywhere in the ball park, then this is the way that criminal networks are fundraising these days" (Participant 13).

5.5.2 Skills

5.5.2.1 Adaptability and Technical Skills

Another strong theme shared by participants was the lack of skills and the type of skills required to manage risk introduced through digitisation. The majority of the participants shared that analytical, technical skills such as IT and the ability for employees to adapt to rapid change is critical to managing risk introduced through digital and an optimal employee would be one that has a combination of business

and technology skills. In terms of skills, several participants indicated that second and 3rd line have limited skills to manage digitisation, let alone the capability to do so.

"Yes, how AI works and that sort of thing. Our risk people need to go through that training as well so that they can also think like a fraudster. That is one of the skills that I think is required because us as business owners we are also going and learning these new tech skills and so on to improve how we think about how to service customers, internally and externally. I think risk people also need to go through that same thing" (Participant 6).

"Over the past couple of years, there has been a move towards hiring IT risk managers. Previously, there would just be operational risk managers and because a lot of the risks that the digitisation process introduces are IT related" (Participant 7).

"In this world, given the pace of change, you need [pause] the critical skill for me is inquisitive mind. Because what was the rule book yesterday is not the rule book today. So, I would say critical skill is a critical mind and the capability I would argue is adapting to change. Because I think the pace of change, your ability to adapt is critical" (Participant 11).

"I think in general the third line knows a little. I don't know if they know how to differentiate [pause]. I don't know if they differentiate what good and bad is at times because for them it's just text out of a book. This is what the policy says. What does it mean by that? They don't know because they're so dependent on some policies and other policies and procedures helping them that they don't have to make those decisions" (Participant 12).

"We have a hard time finding people with business knowledge, because we're using technology. But when we find technology people with business knowledge, they are so much more successful than the ones that don't have it, because now the business speaks their language and technologists speak theirs. If you have technologists that can speak both, you know, they're so much quicker to understand and adapt" (Participant 14).

5.5.3 Employees

From all the participants there was a consensus that employees were affected by digitisation whether it be from the skills required, increase or decrease of employee members due to the digitisation of processes, employees were a key theme that was affected by digitisation in one way or another. Several participants indicated that digitisation will result in the reduction of employees leading to cost savings.

"Ultimately, they are going to come down, the reality is that it's going to come down and what you are going to have is you are going to have machines doing a lot more of normal day stuff because if you think about the stuff that you do in an audit" Participant 2).

"The reality is as things get more automated less people will be required to do the actual execution of the process because it's automated" (Participant 3).

"Automation will impact on employee numbers. It will reduce employee numbers, especially repetitive tasks that can be automated. It will drive efficiencies. It will drive more throughput" (Participant 5).

"I think we probably need fewer people, but a different skill set. You know, if you've automated a lot of the work, you can cover so much with very few people, but for you to get to that point, you must have really competent developers, competent auditors who will feed the developers the right logic to build into whatever it is that they're building. I guess, in the initial stages, yes lots of resources, but over time we should see the demand for the type of resources we currently have decline and have the more digital skills increase" (Participant 7).

"So, most organisations are going to shed in my opinion between 30 to 50 % of jobs in 5 years. And through a combination of reduction in numbers but also skills mismatch. The skills mismatch will net off the number because as some go like IT retrenched end of last year, we had to also hire more people because of the skills mismatch" (Participant 10).

However, in contrast, other participants saw an increase in employee' numbers and/or an increase in cost since the type of skills required are expensive resources. This was most notable from participants that are in second line, third line or areas where a number of processes were not fully digitised.

"From how we manage risk and how we did that we went and created a unit called engineering services, which yes it runs tech and cyber and all those things, but over and above it we have also created a fourth Chief Risk Officer (CRO) in the bank, who is called the tech CRO. So, we take this very seriously and with that came a whole host of risk people that she then needed to have below her. So, financially you feel it, these people then also have to serve the different business. So, it replicates that cost in the businesses to a large extent" (Participant 1).

"What people haven't realised yet is you need less people who cost a lot more money. So, if you think about it, you can employ three people at R400 000 a year to do manual stuff, to automate and run a risk area and to get someone to build these things automatically, manage it and understand the inter linkages you are not going to get him for R1.2 million. So, people haven't quite understood the fact that you need less, but it costs you a lot more from a people perspective because you need different skills" (Participant 4).

"This is so interesting for me because these functions, including internal audit, we grow. We keep growing" (Participant 7).

"What I have seen is a steady increase in staff in financial banks. It's been rather stagnant in the last several years, but it still continues to climb" (Participant 12).

"So, you see very estimates around AI as in particular in digitisation and what it's going to do. Some really think that it's going to be the end of white-collar jobs. Or at least redistribution of them. The numbers are actually interesting in the States. For these types of jobs, some for sure are going overseas but a lot of it is actually being redistributed within North America which has been an interesting thing that nobody really had predicted would happen" (Participant 13)

5.5.4 Conclusion of Research Question 3

Three themes; financial implications, skills and employees emerged in relation to Research Question 3. The impact of digitisation on how risk is managed with regards to finances confirmed that it is costly to manage risk associated with digitisation. New risks emerging have led to cyber-attacks that have resulted in financial losses. In addition, the impact on resources has seen a call for different skills sets that are more technical, analytical and must be able to adapt to rapid change as the technology evolves. From an employee perspective, while other participants saw a decrease in employee numbers that came with cost savings, participants from second and third line areas have not yet digitised fully, are seeing an increase in numbers proving risk management to be costly.

The majority of the participants indicated that second and third line did not have skills to manage risks arising from digitisation. While employees' numbers seemed to be reducing in first line, they were increasing in second and third line where digitisation was not yet matured. In section 5.3.1, process efficiency was discussed as impacting the way in which organisation can manage risk better. More speedily and effectively.

5.6 Conclusion

Chapter 5 discussed the results of the study in relation to the three research questions from the data collected using semi structured face to face and telephonic interviews. Fourteen interviews were conducted across the banking sector in South Africa, one global bank in the USA and an academic institution. The data was analysed using the Atlas.ti analytical tool inductively where codes were identified, grouped into code categories and key themes such as efficiency, customer offerings, financial implications, skills, risk management, and impact on employees. There was no significant difference in the results of South African participants and the American participants in terms of major comparable or contrasting views. The USA participants also raised similar challenges to those faced by the South African participants in terms skills, cost, efficiency, employee numbers, etc.

Furthermore, there were no significant differences between the three lines of defence from the results, except for their views on employee numbers where most

participants from first line saw a reduction in employee numbers as a result of digitisation while for second and third line this resulted in either increased employee numbers or cost due to acquisition of technical skills that are costly. The majority of the participants confirmed that technical and analytical skills are critical to manage risk introduced through digitisation along with the ability to adapt to change. A few participants responded that the manner in which risk is managed needs to change, including being more collaborative, while others did not believe in the current risk management frameworks and deemed them obsolete, including the three lines of defence risk management model. The collective view of participants acknowledged that:

- Risk management is critical, especially with emerging risks such as cyber risk
- Digitisation has brought efficiency; better customer offerings; and
- A combination of business and technological skills would be an ideal resource that would be able risk introduced through digitisation.

However, there are financial implications in the form of process automation and employee cost that an organisation will occur, including suffering losses from cyber-attack breaches. The aim of the following chapter is to discuss the results in relation to the literature review discussed in Chapter 2.

CHAPTER 6: DISCUSSION OF RESULTS

6.1 Introduction

The focus of Chapter 6 is to evaluate the interview results produced in Chapter 5 from the 14 semi-structured interviews conducted with executives or senior managers against the literature review discussed in Chapter 2 to either disprove, validate or extend the existing literature. The process of disproving, validating or extending was done through comparing or contrasting the results that were identified from the data collected.

This was performed according to the research methodology design discussed in Chapter 4 and the aim of the study was to evaluate the impact of digitisation on how risk is managed in the banking sector where they have introduced digitisation and the skills and/or capabilities required to manage digital risk.

The research findings from Chapter 5 are discussed in alignment to the literature review from following sections in the Chapter 2:

- Transformation of banking;
- Risk management;
- Theories relating to risk management;
- Importance of risk and
- Impact of digitisation.

This Chapter focuses the discussion on the three research questions below:

1. How is the concept of digitisation understood by business managers, assurance and risk management practitioners within the banking sector in South Africa?
2. How do management structures in banking organisations manage risk arising from digitisation and what risk management frameworks exist within their organisations?
3. How has digitisation impacted the finances, processes and resources aligned to the risk management capabilities of banking institutions?

The results of this study aim to contribute to the existing literature and practice on the impact of digitisation on how risk is managed in the South African banking sector.

6.2 Discussion of Results of Research Question 1

The aim of Research Question 1 was to determine the level of understanding of the term digitisation among the participants interviewed across the three lines of defence. Interview question 3 aimed to assess the participants' understanding of digitisation while interview question 2 gave insights into how long the participants had been with the organisation. An understanding of the term digitisation was fundamental to the ability to manage risk associated with digitisation, as you cannot manage what you do not understand.

From a literature perspective, Parviainen, Tihinen, Kääriäinen and Teppola (2017) and Watson (2001) described digitisation as transformation of physical or paper-based information to electronic or digital. Overall, the participants had a good understanding of the term digitisation, indicating that it is the conversion of physical data to an electronic format. Literature reviewed also suggested that digitisation has been implemented in banking operations for many years, however, what is different now is the use of internet and mobile applications to perform banking transactions (Barty et al, 2015). Two participants also raised the point that digitisation has been in existence for many years with the change being technology that enables it and the rate of change

Cuesta et al. (2015) cite digitisation as a process needed within banks, to foster efficiency and offer customer centric products and offerings. This was also echoed by the majority of participants where the key themes related to Research Question 1 was efficiency and customer offerings.

6.2.1 Efficiency

According to Yang Hsu, Sarker and Lee (2017), the finance industry embraced digital technology to improve operational efficiency while Cuesta et al. (2015) emphasise a need to exploit internal opportunities to increase efficiency and productivity that can

result in improved customer service and reduced costs. The majority of the participants, especially those from first line, mentioned that the automation or digitisation of internal processes has led to reduced cost and better customer offerings. The results from the participants validated the literature discussed in Chapter 2 when coming to the description of digitisation

6.2.2 Customer Offerings

The banking industry has changed over years from traditional banking where customers could only interact with the bank during specific trading hours (Adalarasu & Padmaavath, 2015) to a banking industry that has evolved with technology and customers who can now interact with the bank 24/7 from anywhere using mobile applications or the internet. The majority of participants spoke to the changed banking process and interactions with customers that has been enabled by technology and moved from product to customer centric product offerings, enabling them to serve customers simpler, better and faster. Digitisation has contributed to the change in customer needs over the years and the ability to meet those customer needs through digital means (Bandara, 2016).

Over and above this, a key finding was noted, where the majority of the participants did not differentiate between digitisation and digitalisation or digital transformation. While the two concepts might have some similarities, however the definitions, they are different. Very few participants identified the difference between digitisation and digitalisation/digital transformation but rather used them interchangeably. In literature, the concepts are defined differently, according to, Parviainen, Tihinen, Kääriäinen and Teppola, (2017) described digitisation as the transformation of physical or paper-based information to electronic or digital while digitalisation is the transformation of how the organisation operates, its roles, product and service offerings caused by adoption of digital technologies and these changes are seen at:

- Process level where processes are automated, using digital tools and manual interventions reduced;
- Organisation level where new services are offered, and old services revised into new ways; and

- Society level where structures are changed, including the type of work and how decision making is influenced.

6.2.3 Conclusion of Findings on Research Question 1

Research Question 1 aimed to determine the level of understanding of the concept of digitisation among the participants interviewed across the three lines. Based on the definition sourced in the literature, the feedback of the participants was comparable to the literature definition. The participants had a good understanding of the concept of digitisation validating the findings against that appearing in the literature. Across the three lines of defence the executives or senior managers did understand the concept of digitisation including the benefits that came with digitisation, which are, operational efficiency and improved customer offerings. An interesting finding noted was how the majority of the participants did not differentiate between digitisation and digitalisation, while very few participants explained the difference between the two concepts. Furthermore, based on the analysis of the data obtained, there was no difference in results from South African participants and those from the USA.

6.3 Discussion of Results of Research Question 2

Research Question 2 focused on determining management's knowledge and understanding of the risk management frameworks used within their organisations, to manage risk arising from the deployment of digitisation. Enterprise risk management or risk management is defined 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" (Committee of Sponsoring Organisations, 2004, p. 2).

The research was aimed at evaluating whether risk management was considered important within their organisation and what risk management frameworks were used to manage risk arising from digitisation. The Basel Committee on Banking Supervision refers to the three lines of defence as a model to manage risk within the

banking sector in an integrated way, as businesses evolve with information sharing on market developments, risk and risk mitigation across the lines of defence is becoming more critical (Basel Committee on Banking Supervision, 2015). According to COSO's enterprise risk management framework, the risk management process is a continuous loop that includes risk identification, assessment, response and monitoring. This continuous loop of the risk management process is also supported by Nocco and Stulz (2006) as seen on Figure 5.

Figure 5: Risk Management Process

Source: Researcher's own (Theory adapted from Committee of Sponsoring Organisations, 2004 and Nocco & Stulz, 2006)

The three lines of defence model of managing risk supports the enterprise wide management of risk instead of the traditional manner of managing risk in a silo approach and a key enabler to enterprise risk management (The Institute of Internal Auditors, 2013).

To effectively manage risk, the Basel Committee on Banking Supervision refers to the three lines of defence as a model to manage risk holistically within an organisation. The Basel Committee on Banking Supervision (2015) refers to the lines of defence as follows:

- First line of defence are the business units that are responsible and accountable for continuous management of risks. They identify, assess and reports on risks.
- The second line of defence comprises of independent risk functions such as compliance that plays an oversight role by promoting, monitoring and reporting the risk activities performed by the first line.
- Third line of defence is the internal audit function that provides independent and objective assurance on the adequacy and effectiveness of the bank's internal controls.

From the data analysed and obtained from the interviews, participants understood and acknowledged the importance of risk management within their organisation and this was supported by Eckles, Hoyt and Miller (2010) suggesting that managing risk within an organisation is important to add value to an organisation. The participants saw risk management as part of good corporate governance, to protect the organisation from threats in order to ensure sustainability and achievement of the organisation's objectives. According to the International Organization for Standardization (2018) risk forms part of decision making, making risk management part of governance and leadership ensures adequate management of risk at all levels within the organisation. Banking transactions bear risk and as such it is important for a bank to have appropriate risk management processes that can identify, measure, regulate and manage risk (Županović, 2014).

This aligns Beasley, Branson and Pagach (2015) 's resource dependency theory that suggests that risk management is implemented to proactively identify, understand, monitor and control risk in order to provide value to meet strategic objectives. From the data collected, the findings aligned to the resource dependence theory instead of institutional theory that Beasley, Branson and Pagach (2015) referred to as the organisation's senior management implementing risk management to comply with regulations.

The majority of participants were familiar with the risk management framework used within their organisations, with most of them utilising the enterprise risk management framework. From the USA perspective, they also referred to ISO standards while none of the South African participants made mention thereof. The findings supported

the literature surveyed regarding the use of an enterprise wide risk management framework in order to manage risk holistically. According to Rae, Subramaniam and Sands (2006) corporate governance guidelines and standards were developed globally, citing the need to manage risk in an integrated fashion, especially after the early 2000s corporate scandals and global financial crisis.

Furthermore, participants referred to the three lines of defence risk management model as the structure used within their organisations to respond to risk. It was interesting to note that there were few participants who did not know the risk management framework utilised by their organisation. This is despite the Basel Committee on Banking Supervision indicating that risk management is the responsibility of all employees, with the board of directors having ultimate responsibility (Basel Committee on Banking Supervision, 2015, 2019). This is also supported by Shenkir and Walker (2011) citing risk management is not only the responsibility of risk functions within an organisation.

However, despite the majority of the data supporting the enterprise risk management framework and the three lines of defence model, there were different results that challenged the relevance of the enterprise risk management framework referring to it as obsolete as well as the three lines of defence model. In his study McShane, Nair and Rustambekov (2011) also challenged the effectiveness of the risk management framework adopted by financial services, citing they could have been one the reasons for the financial crisis problem since there are no appropriate structures in place. The same risk management practices meant to protect the organisation could end up exposing them to far worse risks.

Furthermore, several participants challenged whether the second and third line had the skills and capability to manage risk introduced through digitisation. Yang, Hsu, Sarker and Lee (2017) suggested that even though banks have grown accustomed to adopting new technology, risk management's adoption of technology has largely been limited to spreadsheets and web pages used to capture risk data, instead of using technology to create real value and improve risk processes and new risk initiatives that add value to their organisations. The findings support the literature that risk management could be lagging behind and not using the available technology to find better ways to manage risk.

6.3.1 Emerging Risks

From the results discussed in Chapter 5, two themes were identified linking to Research Question 2, these are emerging risks and data management. The International Organization for Standardization (2018) indicates that the traditional method of managing risk is not adequate to manage today's risk. As the technology evolves, more risks are emerging. Shenkir and Walker (2011) suggest that with digital disruption, globalisation and geopolitical environment in which business operate in the business landscape, macro and microenvironment have changed resulting in new risks that need to be managed daily.

Digital risk has emerged as of one of the top risks that has introduced new risk types and business models that include digital channels (McKinsey & Company, 2017). Although digital technology has brought operational efficiency and enhanced customer experience, this also came with security risks (Yang Hsu, Sarker & Lee, 2017) further highlighting the importance of sound risk management. The rapid adoption of various digital technologies has resulted in customers interacting with their banks digitally through the internet, cell phones, and smart devices, however in the banks attempt to respond to this phenomenon, they are finding it difficult to manage digital threats and opportunities (Sia, Soh, & Weill, 2016).

6.3.2 Data Management

In order to manage risk arising from digitisation, data and the use of technology such robotics were fundamental. This finding was supported by literature when Bennis (2013) indicated that the benefits of the digital world is the ability to access and share information easily and faster, that can help organisations assess market performance, product and customers' feedback. Organisations face a number of risks, including cyber risk, that threaten their success and potentially decreases stakeholder value. This complexity to business increases risks emerging from digital disruption, innovation, technology, and Big Data that requires organisations to relook at their business models, strategy and markets (Shenkir & Walker, 2011).

6.3.3 Conclusion of Findings on Research Question 2

The findings for Research Question 2 were partly supported by the literature review. The participants' collective view was that risk management is fundamental to the achievement of the organisation's strategic objectives. The enterprise risk management framework was the most widely used among the majority of the participants. Insights from the data collected saw participants recognise the need to manage risk in an integrated or holistic manner from the traditional methods of a silo approach. However, some participants referred to the risk frameworks as obsolete and the three lines of defence risk model as no longer relevant in the digital era. Data management was seen a fundamental tool to managing risk arising from digitisation with the use of big data and analytics.

6.4 Discussion of Results of Research Question 3

Research Question 3 sought to determine the level of impact on the bank's processes, resources and finances upon deploying digitisation, if the bank has the required skills to manage the risk introduced through digitisation. In Chapter 5, three big themes emerged relating to skills, financial implications linked to costs and employees, refer to Table 5 for categories and themes identified. From the data collected through face-to-face or telephonic interviews, to the researcher reviewing the transcripts and using Atlas ti to code results and linking the group categories and themes identified for Research Question 3.

Table 5: Research Question 3 Group Categories and Themes

Themes	Financial Implications	Skills	Employees
Group Categories	Employee costs	Adaptability	Human intervention
	Initial set-up costs	Analytical	Increased employee numbers
	Cost vs. benefit	Soft skills	Decreased employee numbers
	Losses from cyber breaches/attacks	Technical	Upskills of employees

		Lack of skills	

6.4.1 Financial Implications

Digitisation has a positive and negative financial implication to organisations. Positive financial implications are associated with the cost savings derived from streamlined processes that might have resulted in reduced employee numbers. The negative financial implications are costs associated with digitisation through automation processes to introduce efficiencies, initial set-up cost and resource costs for additional employees required or the technical skills sets that are expensive.

These implications are not only from a South African perspective but are seen in the African context and globally. There is a growing preference for digital banking in Africa with 40% of the surveyed customers in the article preferring digital banking while banks make use of digital technology to reduce costs (McKinsey, & Company, 2018). From a European perspective, it is estimated that digital transformation will increase revenue by 30%, while reducing the cost by 20-26%, resulting in efficiency and profitability (Olanrewaju, 2014).

As banks digitise or digitalise, they need to relook at their processes, including their current IT infrastructure that is run on large, complex and silo technology on legacy systems. For organisations to digitalise, integrated and flexible technologies are needed, to allow for faster product development (Cuesta et al, 2015). Adalarasu and Padmaavath (2015) suggest the remodelling of the technology infrastructure in order to transition from old legacy systems. However, this remodelling of the IT infrastructure is costly as seen in the case of the implementation of the SAP system for one of South Africa top banks and largest bank in the African continent, which took several years and billions of rands. In 2015, the financial sector experienced an 80% increase in theft using malware; 21 million fraud attacks and 45 million rob attacks resulting in the financial sector topping the list in terms of average cost of cybercrime losses suffered to total $28 billion (Camilo, 2016).

6.4.2 Skills

As banks embrace digital technology, risk management is being impacted and needs to transform to remain relevant. For risk management functions to remain relevant, the implementation of innovative technology and processes is no longer optional, but rather a necessity to be able to manage risk introduced through digitisation (Watson, 2018). However, a set of specialised skills that are limited such as analytical, technical and the ability for employees to adapt to rapid change is critical in managing risk introduced through digital. An optimal employee would be one that possesses a combination of business and technology skills. In terms of skills, several participants indicated that second and third line have limited skills to manage digital, let alone the capability to do so.

6.4.3 Employees

The findings in relation of the theme employees, related to the increase or decrease employee numbers that has either resulted in cost savings or increased expenses. Automation of processes that has led to less human intervention and these have been discussed under section 6.41 and 6.4.2 including the literature that either supports or disproves the findings. Upskilling of employees will be fundamental to bridging the lack of skills needed to manage risk introduced through digitisation.

6.4.4 Conclusion of Findings of Research Question 3

Research Question 3 aimed to determine the level of impact on the bank's processes, resources and finances upon deploying digitisation and if the bank had the required skills to manage the risk introduced through digitisation. The findings for Research Question 3 were supported by the literature review. The participants' collective view was that digitisation has brought about positive and negative financial implications, a need to a specialised skillset that comprises of technical/hard and soft skills. The ability for employees to adapt to change as the technology evolves was also perceived to be a key skill that is required.

6.5 Conclusion

This chapter discussed the research findings of this study. The impact of digitisation on how risk is managed in financial institutions, particularly banks, was identified as operational efficiency, improved customers offerings, financial implications, skills, risk management and employees.

Research Question 1 aimed to determine the level of understanding of the term digitisation among the participants interviewed across the three lines of defence. The answers and the results indicated that the participants had a good understanding of the term digitisation even though the majority did not draw a distinction between digitisation and digitalisation.

Research Question 2 focused on determining management's knowledge and understanding of the risk management frameworks used within their organisations, to manage risk arising from the deployment of digitisation. The participants' collective view was that risk management is fundamental to the achievement of the organisation's strategic objectives. The enterprise risk management framework was the most widely used among the majority of the participants. Insights from the data collected saw participants recognise the need to manage risk in an integrated or holistic manner from the traditional methods of a silo approach. However, some participants referred to the risk frameworks as obsolete and the three lines of defence risk model as no longer relevant in a digital era

Research Question 3 aimed to determine the level of impact on the bank's processes, resources and finances upon deploying digitisation and if the bank had the required skills to manage the risk introduced through digitisation. The findings for Research Question 3 were supported by the literature review. The participants' collective view was that digitisation has brought about positive and negative implications, a need for a specialised skillset that comprises of technical and soft skills.

CHAPTER 7:CONCLUSION AND RECOMMENDATIONS

7.1 Introduction

The evolution of technology and introduction of digital has transformed the world of banking. Customers are now at the centre of product offerings and can perform banking transactions 24 hours a day, seven days a week, using various platforms such as the internet and mobile banking applications. However, the evolution of technology has had significant implications on the management of risk that has resulted in the emergence of digital risk as one of the top risks that the banking sector is facing (McKinsey, & Company, 2017).

According to Vijaykumar and Nagaraja, (2012), these risks include unknown financial implications of opportunities and threat, and they are more complex and challenging to identify, assess and manage. From a security perspective, while the banking sector has adopted new technologies to manage risk , it seems as though risk management function's adoption of technology has largely been limited to spreadsheets used to capture risk data, instead of using technology to create new processes and risk initiatives that add value to their organisations and improve the manner in which risk is managed (Yang, Hsu, Sarker, & Lee, 2017).

7.1.1 Research Background and Objectives

This study aimed to:

- Review literature related to risk management within the digitisation era where studies on risk management of digital banking are at a formative phase;
- Gain a deeper understanding of the prevailing risk management practices in the increasingly globalised South African banking sector; and
- Based on the existing praxis and increasing pitfalls inherent within the constantly evolving digitised banking landscape, this research seeks to propose practical interventions that will further contribute to the risk management scholarship within the South African context.

This chapter concludes the research findings on the impact of digitisation on how risk in managed in the financial instructions particularly banks. It discusses their implications to business, proposes a Digital Risk Management Competencies Model from findings discussed in Chapter 5 and 6, provides recommendations for managing risk in a digital context and highlights the limitations in this research study and suggesting areas for future studies.

7.2 Research Findings

This aim of this research as discussed in Chapter 1 was to determine the impact of digitisation on how risk is managed in financial institutions. This explorative and qualitative study achieved the research objective using three research questions discussed in Chapter 3. The results of the study were presented in Chapter 5, discussed in Chapter 6 and findings also discussed in this chapter. Key themes identified throughout the study on the impact of digitisation on how risk is managed in the banking sector were:

- Operational efficiency;
- Improved customer offerings;
- Specialised skills sets required and the lack thereof;
- Importance of risk management in the digital era;
- Positive and negative financial implication of digitisation; and
- Changes in the employee numbers.

The Digital Risk Management Competency Model was constructed using the combination of constructs and themes identified from the data collected from 14 participants. The data were analysed in Chapter 6, either validating or disproving the literature discussed in Chapter 2.

7.2.1 Explanation of the Digital Risk Management Competency Model

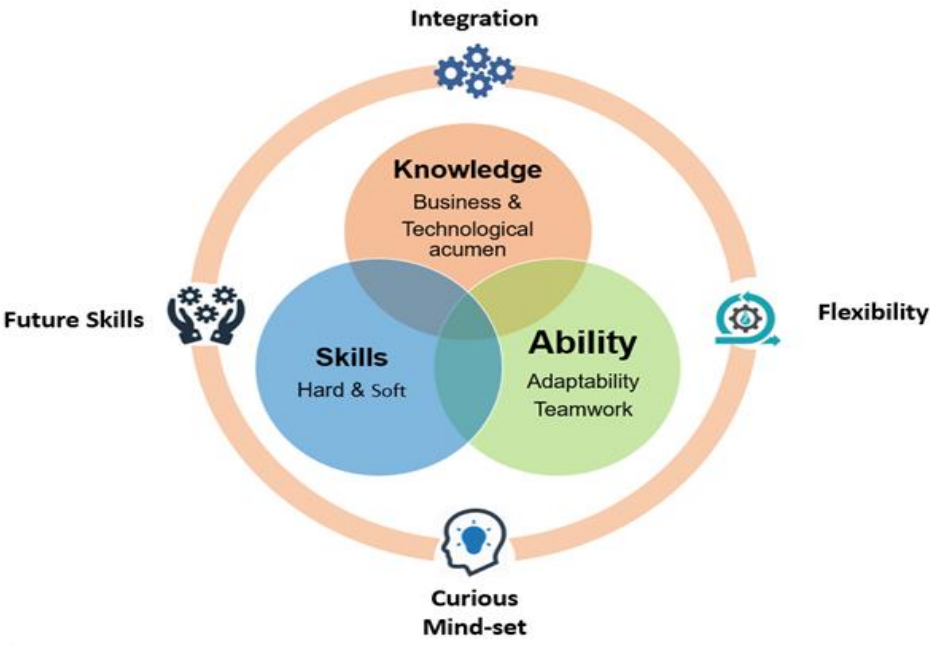
There are three competencies that are critical to the management of risk introduced through digitisation namely; skills, knowledge and ability. These competencies have been identified in the data analysed and form the foundation upon which they can be

used to manage risk introduced through digitisation. The competencies comprise of subset of key skills highlighted on Table 6.

Table 6: Competencies

	Skills	Knowledge	Ability
Competencies	Hard - Technical (IT skills) - Analytical (Critical & problem solving)	Business acumen	Adapt to change
	Soft - Interpersonal - Communication - Adaptability	Technological acumen	Teamwork

Figure 6: Digital Risk Management Competency Model



Source: (Researcher's own)

From the data collected and analysed, it was evident that risk needs to be managed in an integrated fashion and these three competences are needed in organisational resources, to manage risk emerging from digital technologies. All three competencies are critical to the management of digital risk. Findings from the data collected revealed that a combination of hard and soft skills is essential. Having the business and technological acumen of the organisation is essential to managing

digital risk. Another key competency is the ability for resources to adapt to change as technology evolves.

7.3 Implications for Business

The result of this study provided suggestions on the impact of digitisation on how risk is managed in the banking sector. Insights on the impact of digitisation were derived from data collected through the 14 interviews conducted. Below are recommendations for business, based on the insights obtained.

- *Risk Management*

  Risk management has become fundamental to the banking sector. It is no longer a tick box exercise that can be performed to satisfy external requirements or regulation, but it is key to the survival and achievement of the organisation's objectives. Traditionally, organisations used to manage risk in silos, focusing on specific risk types such as credit and market risk (Hoyt, & Liebenberg, 2015), The bank's board of directors should strive towards managing risk in an integrated fashion that is enterprise wide, ensuring the future second and third line also have access or funding to acquire digital technologies that will assist them in managing digital risk instead of continuing to use spreadsheets.

  However, it should be noted that the deployment of advanced technologies is a costly exercise, and cost versus benefits should be analysed, and money invested where the most value will be derived. Senior management should look at elevating technology risk to a principal risk in the same breath as credit and market risk. From the data collected, most banks with the exception of one are still reporting technology risk under operational risk, even though banks are reporting material losses from cyber security breaches or attacks, even more reason why technology risk should be elevated to a principal or key risk.

- *Cyber Risk*

  Following the risk management section above, cyber is a top risk within the financial services industry. It is the reason why management should seek better ways of managing risk through technology, including the use of big data and predictive analytics

- *Skills*

  As technology evolves, different skillsets are required and in the case of digitisation, a combination of hard and soft skills is required. South Africa is a scarce skills country, however, for the South African banking sector to remain relevant and competitive, a plan is needed on how to acquire the skills externally or upskill individuals. Since the South African banking has also adopted some of the digital technology to improve efficiency and customer service, these changes come with risks that need to be managed differently and as a result, different skillsets required.

  As such, when resourcing departments are looking for ways to manage risk, consideration should be given to a combination of hard (technical, analytical) and soft (communication, interpersonal and adaptability) skills, while adaptability forms part of soft skills it is critical in an ever-changing world aided by technology.

7.4 Limitations to the Research Study

Due its explorative and qualitative nature, this study is subjective and is at risk of being affected by several biases (Saunders & Lewis, 2018). Furthermore, there are limitations to the generalisability of the results. For this study, the following limitations are noted:

- *Researcher bias*

  A key risk to a qualitative study is the introduction of assumption and biases by the researcher which may affect the results. In addition, the researcher was not an expert on interviewing, and this could have impacted the way questions were asked, including leading questions. The researcher acknowledged the potential biases that may affect the results and applied the interview guide and consistency matrix discussed in Chapter 4 to minimise this risk.

- *Confidentiality*

  Banking environments are highly regulated and commonly have company confidentiality agreements with employees, and as such, participants might not be able to disclose key information pertaining to this study that may have inhibited the formulation of key insights and findings. The researcher sought to address

this by offering participants confidentiality for their participation, of which the researcher was also bound by. In addition, third parties that provided editing and transcribing services were also made to sign confidentiality agreements to ensure confidentiality of the information shared by the participants.

- *Geography and generalisability of results*
  Due to the majority of South Africa's top banks' head offices being based in Johannesburg; the sample was largely represented by participants based in Johannesburg with the exception of the participants from the USA. Although qualitative findings can be replicated and sometimes generalised to theory (Yin, 2003), this is not representative of the entire population of the financial services industry in South Africa. Given the small sample size, and since findings are from the banking sector, those findings cannot be extrapolated to a different industry/sector but rather a limited number of banks located in Gauteng (Saunders & Lewis, 2018).

- *Conceptual Limitations*
  Some of the banks might have partially or were in the processes of implementing digitisation, which might impact the extent of the participants'' responses and with the researcher working in banking sector, this might have caused some participants to be guarded in their responses.

7.5 Suggestions for Future Research

Research on the impact of digitisation on how risk is managed in financial instructions is limited and still in its infancy stages. Based on the findings discussed in Chapters 5, 6 and 7, below are a number of areas for future studies:

- *Suitability of the current Risk Management Frameworks for a South Africa Context*
  Risk management frameworks that currently exist, such as the enterprise risk management framework and the ISO standards, have been in existence for some time and even though these frameworks are reviewed and updated from time to time. A study is required to assess whether these frameworks are suitable for in the South African context that is facing challenges around the adoption of

technology, access to internet and the lack of skills required to manage digital risk.

- *Effectiveness of the Three Lines of Defence*
  There were participants who raised concerns around the effectives of the three lines of defense risk management model in a digital era where certain processes will be or have been digitised. As the technology evolves and technology is being used to manage risk faster than humans can, the questions remains what will be the relevance of having checkers checking checkers especially where the cost verses benefit of this model might not be clear and cost of running the three lines of defense model is costly.

- *Skills and Competencies*
  With the rapid changes in technology and its adoption by the banking sector there are more complex and challenging risks emerging that are difficult to identity, measure and control. What are the skills and/or competencies required for the future lines of defence to manage digital risk effectively. More advanced technological tools than spreadsheets are required. Some of these competencies have been proposed in the Digital Risk Management Competency Model, however these should be tested experimentally to determine the combination of these competencies and its effectiveness.

7.6 Conclusion

The objective of the research was to determine the impact of digitisation on how risk is managed in financial institutions and possibly identify the skills and or capabilities required within the banking sector to effectively manage risk introduced through digitisation. Fourteen interviews were conducted across the banking sector in South Africa, one global bank in the USA and an organisation. The results were discussed in Chapters 5, 6 and 7 and findings of those results analysed to compare, validate or contrast the literature reviewed in Chapter 2. Within the context of the participants interviewed, the findings revealed that there is good understanding of the term digitisation, although a number of participants did not draw a distinction between the digitisation and digitalisation. The role of risk management was perceived as fundamental to good governance.

The findings revealed the impact of digitisation on how risk is managed in banks and bringing about automation or streamlining processes that have resulted in operational efficiencies. However, there are financial implication to banks in order to run an effective risk management model. These models are costly, and with the lack of skills, mostly in the second and third line needed, to manage risk arising from digitisation this is proving to be difficult. The findings were combined, and the digital risk management competencies proposed. The model may be useful to senior management within the banking sector as they seek the required skills and/or capabilities needed to manage digital risk. This study also contributes towards the existing body of knowledge particularly, to South African literature which is limited from a risk management lens as it relates to digitisation.

REFERENCE LIST

Acharya, A. S., Prakash, A., Saxena, P., & Nigam, A. (2013). Sampling: Why and how of it? *Indian Journal of Medical Specialities, 4*(2), 3–7.

Adalarasu, B., & Padmaavath, Y. P. (2015). The next generation banking: Cyber transformation. *International Journal of Marketing Management, 1*(1), 88–99.

Aebi, V., Sabato, G., & Schmid, M. (2012). Risk management, corporate governance, and bank performance in the financial crisis. *Journal of Banking & Finance, 3*6(12), 3213-322.

Andaleeb, S. S., Rashid, M., & Rahman, Q. A. (2016). A model of customer-centric banking practices for corporate clients in Bangladesh. *International Journal of Bank Marketing, 34*(4), 458-475.

Arena, M., Arnaboldi, M., & Azzone, G. (2010). The organizational dynamics of enterprise risk management. *Accounting, Organizations and Society*, *35*(7), 659-675.

Attride-Stirling, J. (2001). Thematic networks: An analytic tool for qualitative research. *Qualitative Research*, *1*(3), 385-405.

Balago, G. S. (2014). A conceptual review of agency models of performance evaluation. *International Journal of Finance and Accounting*, *3*(4), 244-252.

Bandara, H. M. H. (2016). Digital banking: Enhancing customer value. Paper presented at the 28th APB Anniversary Convention, Colombo, 123-133. Retrieved from http://www.apbsrilanka.org/2016_convention_articles/#

Barty, J., Ricketts, T., Kirk, P., Green, A., Stubbs, R., O'Sulivan, L., & Berg, K. (2015). Digital disruption: UK banking report. *Independent Banker, 65*(12), 74–76.

Basel Committee on Banking Supervision, (2015). *Corporate governance principles for banks*. Retrieved May 21, 2019 from https://www.bis.org/bcbs/publ/d328.pdf

Basel Committee on Banking Supervision, (2019). *The Basel framework*. Retrieved September 20, 2019 from https://www.bis.org/basel_framework

Beasley, M., Branson, B., & Pagach, D. (2015). An analysis of the maturity and strategic impact of investments in ERM. *Journal of Accounting & Public Policy, 34*(3), 219-243.

Bennis, W. (2013). Leadership in a digital world: Embracing transparency and adaptive capacity. *MIS Quarterly, 37*(2), 635–637.

Boniface, M., Taylor, S., Calisti, M., & Innovate, M. (2017, May). *Digital innovation networks*. Retrieved May 21, 2019, from https://eprints.soton.ac.uk/412760/1/Digital_Innovation_Networks_Overview_v1.0.pdf

Business Tech. (2019, May 21). *Absa launches WhatsApp banking in South Africa: Here's how it works*. Retrieved from https://businesstech.co.za/news/banking/257799/absa-launches-whatsapp-banking-in-south-africa-heres-how-it-works/

Blumberg, B., Cooper, D. R., & Schindler, P. S. (2008). *Business research methods* (2nd European ed.). New York: McGraw-Hill Irwin.

Camilo, M (2016). Cybersecurity: Risks and management of risks for global banks and financial institutions. *Journal of Risk Management in Financial Institutions, 10*(2), 196-200.

Carcary, M., Doherty, E., Conway, G., & Crowley, C. (2017, September). Transforming to a digital enterprise-An empirical investigation. *In R. P. Dameri & R. Spinelli (Eds.), Proceedings of the 11th European Conference on*

Information Systems Management (pp. 27-36). Reading: Academic Conferences International Limited.

Choy, L. T. (2014). The strengths and weaknesses of research methodology: Comparison and complimentary between qualitative and quantitative approaches. IOSR *Journal of Humanities and Social Science, 19*(4), 99-104.

Coetzee, G. P., & Lubbe, D. (2013). The risk maturity of South African private and public sector organisations. *Southern African Journal of Accountability and Auditing Research, 14*(1), 45-56.

Committee of Sponsoring Organisations. (2004). Enterprise risk management: Integrated framework executive summary. Retrieved on 25 May 2019 from https://www.coso.org/Documents/COSO-ERM-Executive-Summary.pdf

Creswell, J. W. (2013). Research design: *Qualitative, quantitative and mixed method approaches.* Lincoln, Nebraska: Sage Publications.

Creswell, J. W., & Miller, D. L. (2000). Determining validity in qualitative inquiry. *Theory into practice, 39*(3), 124-130.

Cuesta, C., Ruesta, M., Tuesta, D., & Urbiola, P. (2015). *The digital transformation of the banking industry*. Retrieved from https://www.bbvaresearch.com/wp-content/uploads/2015/08/EN_Observatorio_Banca_Digital_vf3.p

Dapp, T. F. (2014, November 11). *Fintech – The digital (r)evolution in the financial sector: Algorithm-based banking with the human touch.* Retrieved September 22, 2019, from http://www.dbresearch.com/PROD/RPS_EN-PROD/PROD0000000000451941/Fintech_The_digital_%28r%29evolution_in_the_financia.pdf

Denzin, N., & Lincoln, Y. (2005) *The Sage handbook of qualitative research*. California: Sage Publications.

Dickinson, G. (2001). Enterprise risk management: Its origins and conceptual foundation. *Geneva Papers on Risk & Insurance - Issues & Practice*, 26(3), 360-366.

Eckles, D. L., Hoyt, R. E., & Miller, S. M. (2010). The impact of enterprise risk management on the marginal cost of reducing risk (Working Paper Series No, 11-15). Philadelphia: Haub School of Business.

Ernst and Young, & Institute of International Finance. (2008, November). *Ninth annual EY/IIF global bank risk management survey: Accelerating digital transformation - Four imperatives for risk management.* Retrieved from https://assets.ey.com/content/dam/ey-sites/ey-com/en_gl/topics/banking-and-capital-markets/ey-ninth-annual-iif-bank-risk-survey-accelerating-digital-transformation.pdf

Farrell, M., & Gallagher, R. (2015). The valuation implications of enterprise risk management maturity. *Journal of Risk & Insurance, 82*(3), 625–657. https://doi-org.uplib.idm.oclc.org/10.1111/jori.12035

First National Bank. (2019, May 21). *FNB accolades.* Retrieved from https://www.fnb.co.za/downloads/about-fnb/awardsAndAccolades/FNB-SA_Brandaccolades_2019.pdf

Ganguly, A. (2015). Optimization of it and digital transformation: Strategic imperative for creating a new value delivery mechanism and a sustainable future in organization. *European Journal of Business and Innovation Research, 3*(2), 1–13. https://doi.org/10.1017/CBO9781107415324.004

Guest, G., Bunce, A., & Johnson, L. (2006). How many interviews are enough? An experiment with data saturation and variability. *Field Methods*, *18*(1), 59-82.

Gupta, P. P., Dirsmith, M. W., & Fogarty, T. J. (1994). Coordination and control in a government agency: Contingency and institutional theory perspectives on GAO audits. *Administrative Science Quarterly*, *39*(2), 264-284.

Härle, P., Havas, A., & Samandari, H. (2016, July). *The future of bank risk management.* Retrieved from https://www.mckinsey.com/business-functions/risk/our-insights/the-future-of-bank-risk-management

Hopkin, P. (2018). *Fundamentals of risk management: understanding, evaluating and implementing effective risk management*. London: Kogan Page Publishers.

Hoyt, R. E., & Liebenberg, A. P. (2015). Evidence of the value of enterprise risk management. *Journal of Applied Corporate Finance*, *27*(1), 41–47.

Jokipii, A. (2010). Determinants and consequences of internal control in firms: a contingency theory-based analysis. *Journal of Management & Governance*, *14*(2), 115-144.

Kohli, R., & Johnson, S. (2011). Digital transformation in latecomer industries: CIO and CEO leadership lessons from Encana Oil & Gas (USA) Inc. *MIS Quarterly Executive, 10*(4), 141–156. Retrieved from http://search.ebscohost.com/login.aspx?direct=true&db=bth&AN=67793220&site=ehost-live

Markovitch, S., & Willmott, P. (2014, May). *Accelerating the digitization of business processes*. Retrieved from https://www.mckinsey.com/business-functions/mckinsey-digital/our-insights/accelerating-the-digitization-of-business-processes

Marshall, M. N. (1996). Sampling for qualitative research, 13(6), 522–525. Retrieved

From https://academic.oup.com/fampra/articleabstract/13/6/522/496701/Sampling or-qualitative-research

McCracken, G. (1988). *Qualitative research methods: The long interview*. Newbury Park, CA: Sage Publications. https://doi.org/10.4135/9781412986229

McKinsey & Company. (2017, December). *The future of risk management in the digital era.* Retrieved on May 15, 2019 from: https://www.mckinsey.com/business-functions/risk/our-insights/the-future-of-risk-management-in-the-digital-era

McKinsey & Company. (2018, February). *Roaring to life: Growth and innovation in African retail banking.* Retrieved September 26, 2019 from: https://www.mckinsey.com/industries/financial-services/our-insights/african-retail-bankings-next-growth-frontier

McShane, M. K., Nair, A., & Rustambekov, E. (2011). Does enterprise risk management increase firm value? *Journal of Accounting, Auditing & Finance, 26*(4), 641-658.

Miaschi, J. (2018, July). *The biggest banks in Africa*. Retrieved on 15 September 2019 from https://www.worldatlas.com/articles/the-biggest-banks-in-africa.html

Myers, M. D. (2013). *Qualitative research in business and management* (2nd ed.). California: Sage Publications.

Neumeier, A., Wolf, T., & Oesterle, S. (2017). *The manifold fruits of digitalization: Determining the literal value behind*. In Proceedings of the 13th International Conference on Wirtschaftsinformatik (pp.484-498). Augsburg: University of Augsburg.

Nocco, B. W., & Stulz, R. M. (2006). Enterprise risk management: Theory and practice. *Journal of Applied Corporate Finance, 18*(4), 8–20.

Olanrewaju, T. (2014). *The rise of the digital bank*. Retrieved from http://www.mckinsey.com/Insights/Business_Technology/The_rise_of_the_digital_bank?cid=DigitalEdge-eml-alt-mip-mck-oth-1407

Omarini, A. (2017). The digital transformation in banking and the role of FinTechs in the new financial intermediation scenario: The wave of digitalization in banks. *International Journal of Finance, Economics and Trade, 1*(1), 1–6.

Park, J., & Park, M. (2016). Qualitative versus quantitative research methods: Discovery or justification? *Journal of Marketing Thought*, *3*(1), 1-8.

Parviainen, P., Tihinen, M., Kääriäinen, J., and Teppola, S. (2017). Tackling the digitalization challenge: how to benefit from digitalization in practice. *International Journal of Information Systems and Project Management, 5*(1), 63–77.

Rae, K., Subramaniam, N., & Sands, J. (2008). Risk management and ethical environment: effects on internal audit and accounting control procedures. *Journal of Applied Management Accounting Research*, *6*(1), 11.

Ritchie, J., & Lewis, J. (2014). *Qualitative research practice: A guide for social science students and researchers*. London: Sage Publications. https://doi.org/10.4135/9781452230108

Saunders, M. N., & Lewis, P. (2012). *Doing research in business and management: An essential guide to planning your project*. London: Pearson Education.

Saunders, M. N., & Lewis, P. (2018). *Doing research in business & management: An essential guide to planning your project* (2nd ed.). Pearson.

Shenkir, W. G., & Walker, P. L. (2011). Enterprise risk management: Frameworks, elements and integration. Retrieved May 25, 2019, from http://www.imanet.org/PDFs/Public/Research/SMA/ERM_Frameworks,%20Elements,%20and%20Integration.pdf

Selznick, P. (1996). *Institutionalism" old" and" new". Administrative Science Quarterly*, *41*(2), 270-277.

Sia, K. S., Soh, C., & Weill, P. (2016). How DBS Bank Pursued a Digital Business Strategy. MIS Quarterly Executive, 15(2), 105–121. https://doi.org/10.1108/00251741111183852

South African Reserve Bank, (2012). Banks Act, 1900 (Act no 94 of 1990). Retrieved on 20 September 2019 from https://www.gov.za/sites/default/files/gcis_document/201409/35950rg9872gon1029.pdf

Strauss, A., & Corbin, J. (1990). Basics of qualitative research. London: Sage Publications.

Tech Central. (2016, December 12). *Standard Bank acquires SnapScan maker*. Retrieved on May 15, 2019 from https://techcentral.co.za/standard-bank-acquires-snapscan-maker/70630/

Teece, D., Peteraf, M., & Leih, S. (2016). Dynamic capabilities and organizational agility: Risk, uncertainty, and strategy in the innovation economy. *California Management Review, 58*(4), 13-35.

The Institute of Internal Auditors. (2013*). The three lines of defense in effective risk management and control.* Retrieved on May 25, 2019 from https://na.theiia.org/news/Pages/IIA-Launches-Global-Review-of-Three-Lines-of-Defense.aspx

The International Organization for Standardization. (2018). *Risk management: Guidelines* (ISO No.: 31000). Retrieved September 15, 2019 from https://www.iso.org/obp/ui/#iso:std:iso:31000:ed-2:v1:en

Vijayakumar, A. N., & Nagaraja, N. (2012). Internal control systems: Effectiveness of internal audit in risk management at public sector enterprises. *BVIMR Management Edge*, *5*(1), 1- 8.

Watson, M. (2018, November). *Should risk management rein in digital or help accelerate it?* Retrieved on 11 May 2018 from: https://www.ey.com/en_gl/banking-capital-markets/should-risk-management-rein-in-digital-or-help-accelerate-it

Watson, R. T. (2001). Introducing MISQ Review: A new department in MIS Quarterly. *MIS Quarterly*, *25*(1), 103–106.

Westerman, G., Tannou, M., Bonnet, D., Ferraris, P., & McAfee, A. (2012). The digital advantage: How digital leaders outperform their peers in every industry. MIT Sloan Management Review. Retrieved September 25, 2019 from https://www.capgemini.com/wp-content/uploads/2017/07/The_Digital_Advantage__How_Digital_Leaders_Outperform_their_Peers_in_Every_Industry.pdf

Yang, S. O., Hsu, C., Sarker, S., & Lee, A. S. (2017). Enabling effective operational risk management in a financial institution: An action research study. *Journal of Management Information Systems*, *34*(3), 727-753.

Yin, R. (2003). *Case Study Research: Design and Methods.* Thousand Oaks:Sage Publications

Zikmund, W. G., Babin, B. J., Carr, J. C., & Griffin, M. (2013). *Business research methods*. Boston: Cengage Learning.

Zimmermann, H.-D., & Koerner, V. (1999). Emerging industrial structures in the digital economy: The case of the financial industry. *Conference paper of the 1999 Americas Conference on Information Systems*, 115–117. Retrieved from https://aisel.aisnet.org/amcis1999/

Županović, I. (2014). Sustainable risk management in the banking sector. *Journal of Central Banking Theory and Practice, 3*(1), 81-100.

APPENDIX 1: INVITATION LETTER

To whom may it may concern,

I would like your assistance with my MBA research or referral to key individuals in your organisation that would be able to share valuable and practical insights. My topic is titled “The Impact of Digitisation on Risk Management in Financial Institutions”.

The study aims to understand the impact that digitisation has had on:

- The management of risk in South African Financial Institutions (specifically banks);
- Effectiveness of risk management as perceived by the three lines of defense;
- The impact from a financial, process, resource and skills perspective; and
- Whether organisations have the resources and capabilities to effectively manage digital risk?

Should you require further details, find attached my motivational letter or feel free to contact me.

Consideration of my request will be highly appreciated.

Regards,

Molebogeng

076 262 8686

APPENDIX 2: CONSENT FORM

Dear Participant,

My name is Molebogeng Masakona, a student at the University of Pretoria's Gordon Institute of Business Science and completing my research in partial fulfilment of an Masters Degree in Business Administration (MBA). I am conducting research on "The Impact of Digitisation on Risk Management in Financial Institutions" in South Africa. The study aims to understand the impact that digitisation has had on the management of risk in South African Financial Institutions specifically banks and the effectiveness of risk management as perceived by management.

The interview is expected to last about an hour; your participation is voluntary, and you can withdraw at any time without penalty. The interview will be audio recorded for my benefit to ensure that I do not lose any key points, the recording is also voluntary, and you may choose not to be recorded. All data will be kept confidential and reported without identifiers.

Should you have any concerns or questions, please feel free to contact me or my supervisor on the details below:

Molebogeng Masakona
25279859@mygibs.co.za
076 262 8686

Dr Len Konar
Len.Konar@orcaservices.co.za
010 590 7979

Participant's Name:_____

Signature: _____

Date: _____

Researcher's Name: Molebogeng Masakona

Signature: _____

Date: _____

APPENDIX 3: INTERVIEW GUIDE

The interview will start with the researcher thanking the participant for his or her time, then proceed to introducing herself and provide a brief background on purpose of the meeting. The researcher will explain the interview process including explaining the voluntary and confidentiality of the of the process. The researcher will also seek consent to tape the interview for record purposes and explain that it is voluntary.
Should the participant give consent to proceed, then the researcher will start with questions. In an event that participant does not give consent, the researcher will once again thank the participant for his or her time and conclude the meeting.

Interview Questions:

1. What is your role and area of responsibility in your organisation?
2. How long have you been in this particular role, and within your organisation?
3. In your opinion, how would you describe digitisation in general in banking?
4. How has digitisation impacted your area of responsibility and/or that which you may support?
    - Probe if it is a negative or positive impact; and
    - If so, why?
5. How important is risk management in the digital era of banking?
6. What risk management framework is used in your organisation, and do you believe that is relevant to manage digital risk?
7. How would you describe the impact digitisation has had in the manner which risk is managed in your organisation?
    - Probe the impact from a financial, process and resource perspective.
8. In your view, what are the skills and capabilities required to manage risk introduced through digitisation?
9. Do you believe that business managers, risk managers and assurances providers in your organisation have the skills and capabilities required to manage risk introduced through digitisation?
10. Does your organisation have a dedicated Chief Digitisation Officer with a defined role and responsibility?
11. Has sufficient financial provision been made for digitisation within the organisation?

12. What is the likely impact of digitisation in your organisation on employee numbers, business efficiency and competitive advantage?

APPENDIX 4: ETHICAL CLEARANCE LETTER

Gordon Institute of Business Science
University of Pretoria

22 July 2019

Molebogeng Masakona

Dear Molebogeng

Please be advised that your application for Ethical Clearance has been approved.

You are therefore allowed to continue collecting your data.

Please note that approval is granted based on the methodology and research instruments provided in the application. If there is any deviation change or addition to the research method or tools, a supplementary application for approval must be obtained

We wish you everything of the best for the rest of the project.

Kind Regards

GIBS MBA Research Ethical Clearance Committee

APPENDIX 5: THEMATIC MAP

Research Question	Number of Codes per group	Code Groups/ Categories	Themes
RQ 1	7	Process automation	Efficiency
RQ 1	5	Operational efficiency	
RQ 1	6	Customer benefits	Customer Offerings
RQ 1	2	Accessibility	
RQ 1	2	Convenience	
RQ2	6	Frameworks/Standards	Risk Management
RQ2	5	Data Management	
RQ2	3	Traditional Risk Management	
RQ2	2	Combined Assurance	
RQ2	1	Digital Risk	
RQ3	10	Cost	Financial Implications
RQ3	3	Losses	
RQ3	4	Adaptability	Skills
RQ3	4	Technical skills	
RQ3	3	Analytical skills	
RQ3	2	Lack of skills	
RQ3	1	Soft skills	
RQ3	2	Huma intervention	Employees
RQ3	2	Decreased employee numbers	
RQ3	2	Upskilling	
RQ3	1	Increased employee numbers	