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Understanding the role of artificial intelligence in banking

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A research proposal submitted to the Faculty of Commerce, Law and Management, University of the Witwatersrand, in partial fulfilment of the requirements for the degree of Master of Management in the field of Digital Business

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LIST OF ACRONYMS

Table 1: List of acronyms and abbreviations

ACRONYMS	DESCRIPTION
AI	Artificial Intelligence
CIB	Corporate and Investment Bank
ML	Machine Learning
NLP	Natural language processing
RBB	Retail Business Bank

CHAPTER 1. INTRODUCTION

This chapter provides an overview of the objectives of the study and emphasises their importance. It gives background information about the research subject being addressed, describes the study's boundaries, and lists the main terms that will be utilised throughout.

1.1 The purpose of the study

The purpose of this qualitative study is to investigate the role of artificial intelligence (AI) in banking and how it influences the way South African banks conduct business, offer advice, and engage with customers. The study will take a two-pronged approach: first, it will examine the potential applications of AI in banking. Secondly, to explore the biases, dangers, and benefits of AI use in banking institutions and its contribution to productivity, efficiency, credibility, and the eradication of legacy systems. As a case study, this study will concentrate on the big five banks in South Africa, namely, Nedbank, Absa, First National Bank, Standard Bank, and Capitec.

1.2 Context of the study

The slow processes at banking institutions, sometimes known as banks, are becoming the centre of disruption as technology advances (Gigov & Poposka 2017). The competitive environment in South Africa is changing, and along with it, so are the preferences and experiences that customers seek. Banks were among the first businesses to integrate technology into their operations, using mainframe computers to store financial information (Davies, 2019). Since AI's theoretical and technological underpinnings were created in the 1950s, it is not a brand-new area of research in contemporary technology. There is much debate over the precise definition of AI, with some definitions referring to it as "imitating intelligent human behaviour" (Kok et al., 2009). Since AI is a broad concept, a specific collection of technologies that make up AI has not been identified by prior research. NLP, robotics, speech recognition and expert systems are listed as the domains of AI by Haton (2006). Machine learning, natural language processing (NLP), speech recognition, bots and intelligent virtual assistants, expert systems, optical character recognition, and robotic process automation are all included in the AI stack, according to a survey conducted by Infosys

in 2017. According to Financial Brand research from 2017, the banking sector now has the perfect conditions for the expanded use of AI due to the rapid development of big data, accessibility of cutting-edge technologies (such as machine learning and cloud computing algorithms), increased competition, expanded governance, and raised customer expectations. That argument, however, merely extols the immense potential of AI for banking organizations. Only 23% of respondents to a 2017 Infosys survey of 250 financial services organizations confirmed that AI was being used in their companies. With 47% of respondents stating that AI was required for the organization to fulfill its goals, the study also revealed that the AI technologies being utilised were living up to their expectations. Banks are investing heavily in new and emerging technology solutions, some of the technologies where big investments are being made globally are in machine learning (ML), Artificial Intelligence (AI) and Big Data Analytics to execute activities such as loans, deposit transactions, asset management and investments. Organizations have invested billions of dollars in startups that use AI to provide their customers and the market with AI technologies and applications Metz (2016).

The five South African large banks have the benefit of holding a sizable part of the bank market, unlike the new digital banks that are rising in South Africa. They will need to discover efficiencies in their legacy operations to pay for the necessary digital transformation if they want to keep this advantage (Camarate & Brinckmann, 2017).
The transformation of the banking industry is complex, costly and poses operational risks to the institutions if it is not done correctly (Davies, 2019). The availability of real-time information is pivotal in facilitating big transactions that require a credit decision instantaneously. Previously, banks were limited by information scarcity, the only factors that contributed to the approval or decline of a credit application was based solely on past financial activities such as loan repayment history, this type of criteria impacted the quality of the decisions made and they excluded people with no financial credit history. Cuesta et al. (2015) proposed that banks must transform the way they operate to respond to the changing needs of customers, and to remain competitive. For banks the algorithm created can offer assessments that leverages various dimensions and give depth. Studies globally have shown how algorithms inform judgements in numerous industries, such as predictive justice, medical diagnostics, fraud detection, facial recognition, access to higher education, and job searching (Fliche & Yang, 2018).

Emerging technologies like AI have recently demonstrated that they are progressively crucial to the expansion of banking systems. With AI, banks should be able to offer creative solutions, which has long been a crucial part of their marketing strategies (Furst et al.,1998). According to research by Berger and Bouwman (2013), there is a link between a bank's productivity and the technologies it uses. ML, predictive analytics, NLP, deep neural networks, and voice recognition are just a few of the AI technologies that have had an impact on the banking industry, according to (Gartner, 2017). As a result of these advancements, banking companies now provide new services and products that boost productivity while cutting down on operational time. Five instances of how AI is affecting banking are highlighted in a (Infosys, 2017) study:

1. Digital assistants that are intelligent helps to improve customer service;
2. Decisions about lending made using data anticipate and stop defaulters;
3. Fraud detection using pattern recognition and machine learning;
4. Recognition of speech and images for biometric identification; and
5. Through digital platforms, AI enabled services and financial analytics.

In order to guarantee that AI products are developed and utilised with proper respect to ethical principles and human rights (Brand, 2022; Unesco, 2023), a number of international guideline documents propose a human-centric approach to the development and use of AI in society. These international agreements include several important tenets, including accountability, privacy, fairness, and transparency (explainability) (Siau & Wang, 2020). While some governments are utilising AI to provide public services, there aren't enough regulations or legal protections in place to guarantee ethical AI use in government. Numerous projects are underway all across the world to control AI usage, or at the very least to provide some principles for responsible AI. There is a race to regulate AI in addition to the rush to create new applications for AI. The risks connected with the government's unrestricted use of AI are significant and should be reduced in the absence of suitable AI rules. Legal clarity on the appropriate application of AI is also necessary. The European Commission, for instance, used this method when it released a proposed AI regulation in 2021; before to that, however, policy papers with ethical principles were issued. 132 Austria (CC BY 3.0) Creative Commons Attribution 3.0, 2022.

Since AI is frequently discussed in professional settings, several non-academic articles have been produced about its risks and biases. Many AI systems, such as facial recognition, rely on machine learning algorithms that are trained with labeled data. It has recently been shown that algorithms trained with biased data have resulted in algorithmic discrimination (Bolukbasi et al., 2016; Caliskan et al., 2017). The academic research on this topic is still in its early stages, nevertheless. More importantly, most of the research on this topic concentrated on developed nations.

1.3 The research problem

The purpose of this research was to investigate the role of AI in banking and how it influences the way South African banks conduct business, offer advice, and engage with customers. There is extensive research on the use and benefits of AI in banking across global countries, like the adoption of AI-based pilot projects for applications in customer care, fraud detection, and credit vetting algorithms (Biallas & O'Neill, 2020). AI applications can help banks in several ways: by enhancing banking services, enhancing transaction security, detecting fraud in real time, and introducing chatbots for improved customer care (Gartner, 2017). The role it plays in the South African banking industry has, however, only recently been the subject of a few study papers. Nevertheless, there are still different rates of acceptance and dissemination of AI technology in the banking sector, despite this potential. Banks that have begun using AI have seen benefits for their staff, including an improvement in working capacity, effectiveness, and employee quality (Saithibvongsa & Yu 2018).

Since then, many African nations have advanced in their use of the internet and artificial intelligence (AI) to enhance their services, including Tanzania, Mozambique, the Democratic Republic of the Congo (DRC), Lesotho, Ghana, and South Africa (Burns, 2018; Jacob, 2016). One of the African nations, South Africa, is experiencing financial sector disruption and innovation as well as an increase in the number of The South African banking sector has not yet fully adopted AI; banks are working to increase productivity and efficiency, leaving employees uncertain about the security of their jobs (Gumede, 2017; Habib, 2002; Hlatshwayo, 2017). According to estimates, South African banks will save money by implementing AI solutions (African Independent, 2019). Most banks have started utilising chatbots to improve customer service. Manning (2018). One of the most widely used technological tools across

many industries is artificial intelligence (AI) chatbots. The data demonstrates that banks—including those in South Africa, our area of focus—are already utilizing AI to enhance their services. Therefore, a qualitative investigation is required to ascertain the role of AI in the banking sector, as no study to date has investigated the full South African traditional banking sector. Therefore, this study is critical as it aims to assist bank leadership in understanding how the existing transformation implementations contribute to the role of AI adoption and will further provide insight into how banks can prepare better and bring about frameworks and governance that accelerate AI adoption.

1.4 Research questions

1. What role does AI currently play in South African banking?
2. How has the use of AI in decision-making impacted the efficiency and profitability of the banks?
3. How can AI be used to expand financial inclusion in the banking industry?

1.5 Significance of the study

The study adds to the growing body of knowledge on AI in organisations. It fills the gap in how to use the concept in an organisational context. The findings will contribute to the development of environments that enable workers in developing nations to use AI-based technologies. In terms of its broader significance, this study will add to the conversation about the challenges of AI and shed light on how banks handle biasness in technology, by providing better understanding on how the use of technologies such as AI in banking contribute to better customer experience.

The existing literature examines the challenges and opportunities of AI in banking and utilization of artificial intelligence in the banking sector (Ghandour, 2021; Fares et al., 2022).

1.6 Delimitations of the study

1. The research looks at the role of AI, from a perspective of internal processes and customer experience.

2. The study looks into the variables that affect how biased AI algorithms are, however it does not propose detailed procedures or case studies that deal with AI discrimination.
3. This study does not include other divisions of the bank, such as corporate and investment banks (CIB), and insurance.
4. This report does not cover South Africa's newest digital banks. New banks have a unique positioning of not having aged architecture and traditional business models, lean architecture and new technologies.

1.7 Definition of terms

1. **Artificial intelligence (AI):** A computer machine's capacity to mimic aspects of intelligence, including speech recognition, vision, natural language processing, algorithms, and problem-solving.
2. **Big data Analytics:** the use of advance techniques to analyse large volumes of high velocity, complex and variable data to provide insights.
3. **Decision-making:** AI decision making is when data processing – like analyzing trends and suggesting courses of action – is done either in part or completely by an AI platform instead of a human to quantify data to make more accurate predictions and decisions
4. **Digital financial inclusion** involves the deployment of the cost-saving digital means to reach currently financially excluded and underserved populations with a range of formal financial services suited to their needs that are responsibly delivered at a cost affordable to customers and sustainable for providers.

1.8 Assumptions

1. It is assumed that all participants provided clear insights on their experiences as organizational leaders in Information Technology.
2. Should the participants wish to waiver certain information, due to sensitivity or other considerations, this matter will be raised.

1.9 Proposed study outline

The objective of the study, the setting of the research, the research challenge, and the significance of the study—along with what will not be covered—are all presented in Chapter 1 of this report. The words used in the report and the suppositions made about this study are also defined in this chapter.

In Chapter 2, the theoretical review is presented, and the concepts of AI in banking are defined. The chapter also reviews previous literature four themes around AI: (i) the challenges and benefits of AI in banking, (ii) AI in banking, (iii) AI decision making and (iv) digital financial inclusion. The chapter also defines a theoretical model for IT adoption and visual conceptual framework.

The method used to carry out the research is described in full in Chapter 3. There is discussion of the research method, the research design, the data collection techniques, the demographic and sample, and the research instrument. The method of data collecting, data analysis, and interpretation, study limits, applicability and reliability, respondent demographics, and ethical considerations are also included.

CHAPTER 2. Literature Review

2.1 Introduction

The purpose of this chapter is to look at the theoretical framework underpinning the study. The second part of this chapter is to introduce the literature review beginning with describing and discussing the concept of artificial intelligence, decision making in AI and digital financial inclusion, including prior research studies discussing the role of AI in banking the last section will entail concluding remarks on the prior studies and highlight key propositions for this study.

2.2 Theoretical Foundation

The study will adopt Unified Theory of Acceptance and Use of Technology 2 (UTAUT2) because it provides a general framework that can be used to explain in detail the consumer's behavioural intentions to use technology (Cai et al., 2021). UTAUT2 is a theoretical framework that aims to understand and explain individuals' adoption and use of technology in various contexts. It has been determined that the UTAUT model has strong explanatory capabilities (Zhou et al., 2020). When it comes to intention and behaviour, it surpasses the constraints of the TAM (Jeon et al., 2020). Since its acceptance, it has been applied to both consumer and organisational contexts. UTAUT has been applied in a variety of contexts, such as the acceptability of technology, mobile learning, mobile banking, and restaurant self-service (Jeon et al., 2020; Mtebe & Raisamo, 2014; Venkatesh et al., 2012).

The application of AI-integrated customer relationship systems in Indian enterprises was examined by Chatterjee et al. (2021). Their conclusions backed up the models' underlying assumptions and other external CRM variables. In their assessment of the usage of AI in higher education Chatterjee and Bhattacharjee (2020), found that attitudes are influenced by perceptions of risk, the adoption of support, and the expectation of effort. Cao et al. (2021) expanded the model by developing an integrated artificial intelligence acceptance-avoidance framework that incorporates both positive and negative factors that influence managers' attitudes and behaviour toward using AI. Studies have demonstrated that technology has a detrimental effect Agogo & Hess (2018).

A popular theory for analysing the adoption of technology is the Unified Theory of Acceptance and Use of Technology (Al-Qaysi et al., 2021). This theory develops the collaboration theory by Brown et al. (2010) by analysing how technology functions during the adoption process and afterwards (Venkatesh et al., 2011). The approach seeks to clarify how people utilize technology and behave while using it voluntarily (Venkatesh et al., 2003). Performance expectancy, effort expectancy, social influence, and facilitating situation are the four factors that determine whether someone will use technology (Venkatesh et al., 2003). The four exogenous components in the revised UTAUT model, according to Dwivedi et al. (2019), represent technological attributes (such as effort expectancy and performance expectancy) as well as contextual attributes (facilitating conditions and social influence). Previous research found that the classic UTAUT model was capable of accounting for a sizable portion (70%) of the variation in customers desire to use technology. However, it has been determined that the classic UTAUT model is unsuitable to investigate AI since it solely focuses on the employment of functional approaches and is unable to describe the intricate processes involved in the adoption of AI (Gursoy et al., 2019). By measuring the performance and user satisfaction of technology while utilising the UTAUT model, numerous research has narrowed their focus (Montesdioca & Maçada, 2015). In conclusion therefore, it can be said the impact of these technologies on people must be evaluated, and for purposes of this study the UTAUT2 model will be adopted as it brings in those factors.

Gursoy et al. (2019) assessed the UTAUT2 model to gauge customer interest in using AI gadgets. They discovered that anthropomorphism, hedonic incentive, and social influence all had an impact on the performance and effort expectations, which in turn had an impact on emotions and the propensity to use technology. Six factors, including societal factors and enabling circumstances, have an impact on the operation management sector's adoption of AI (Grover et al., 2020). Based on these findings by Grover et al. (2020), the following constructs from UTAUT2 will be studied: performance expectancy, behavioural intention, hedonic motivation, price value and actual use. Performance expectancy, facilitating conditions, hedonic motivation, and price value are dependent variables and actual use is the dependent variable that will be studied, behavioural intention is the mediating variable. Performance expectancy,

price value, hedonic motivation have all been proven to have a positive impact on behavioural intention in previous studies.

2.3 Artificial Intelligence

2.3.1 *Defining of Artificial Intelligence*

Hassani et al. (2020) mention that the first time AI was stated was in 1956 at a technology conference. "Can machines think?" It was a question Alan Turing posed in 1959, and since then, various AI applications have had variable degrees of success. When businesses like Microsoft, Facebook, Google, and IBM started making significant investments in ML and AI for use in the commercial sector, it is thought that the popularity of AI technology exploded. According to research, there are various definitions of AI.

Gartner's (2017) attempt to provide a thorough definition of AI for usage in practice is as follows: "technology that appears to replicate human performance, generally by learning, arriving at its own conclusions, seeming to understand difficult content, participating in natural conversations with people, boosting humans' cognitive performance or replacing humans in the execution of non-routine jobs." In contrast to the research-oriented and theoretical perspectives, the pragmatic definition of AI focuses on how AI is applied in real life environments. It can therefore be said that AI is not only an application or set of technologies, but a continually evolving frontier of emerging computing capabilities (McCorduck, 2004; Meyer, 2011).

2.3.2 *Benefits and drawbacks of Artificial intelligence*

The research paper by Mahalakshmi et al. (2021) explored how AI and ML is being adopted in various financial services sectors and their effects on staff, financial experts, and business organizations to produce competitive intelligence. The study asserts that the adoption of AI and ML transforms the way financial services are provided to customers. The findings of the study reveal how large corporations that use AI and ML can detect accurate market forecasts, prevent fraudulent transactions in banks and improve risk management (Mahalakshmi et al., 2021). It further emphasised that AI and ML in banks deliver superior customer experience, reduce

waiting queues, and provide personalised banking. The study concluded that the likely results of AI and ML in financial services will be better informed and tailored products and services, productivity increases internally, upskilling of the workforce, and cybersecurity.

To understand the benefits and limitations of AI in banking, Grewal et al. (2021) conducted a review of the existing body of knowledge. This research examines the imbalance in the body of previous literature. In this paper, the authors specifically enhance and advances existing research on artificial intelligence (AI) by (i) concentrating on both B2B and B2C areas, and (ii) considering AI's negative aspects, providing a framework for expressing the positive and negative aspects of AI across both fields. Furthermore, the authors also examine B2C settings and the bright side of AI to provide appropriate contrasts and better illustrate how AI affects (a) B2B context and (b) the dark side of AI. A key finding from the study is that AI has the potential to provide significant benefits and is generally accepted by both practitioners and scholars. However, the dark side of AI is less discussed and less understood, which can be an opportunity for future studies to expand on the topic more. The authors also look at B2C contexts and the positive aspects of AI to offer appropriate differences and better illustrate why AI affects (a) negative aspects of AI and (b) the B2B context. A significant finding of the research is that both practitioners and academics generally agree that AI has the prospect of bringing about significant benefits. Because the bad things about AI are less well-known and understood, there may be room for more research on this topic in the future.

Understanding customers adoption intentions towards AI mobile banking is a strategic imperative, Lee and Chen (2022) conducted a study to examine the relationship between task-technology fit (TTF), perceived cost, perceived risk, and trust (organism), all of which have an impact on customers' adoption of AI mobile banking apps (response).In order to assess the model in this study, a total of 451 responses were gathered using a convenience non-probability sampling method. The partial least squares method was used to analyze the data. The findings from this study show that through TTF and trust, anthropomorphism and intelligence improve users' readiness to embrace mobile banking apps. However, more anthropomorphism raises the perceived cost for users. Additionally, there are negligible impacts of IQ and anthropomorphism on perceived risk. And lastly, the study gives practical advice for

banks aiming to employ AI to retain users as well as theoretical contributions for the adoption of AI-based mobile banking apps.

Omoge et al. (2022) sought to investigate the effects of technology usage and acceptance of AI-enabled CRM systems on consumer buying behaviour via the mediation of customer satisfaction and service quality in their paper entitled “Disruptive technology and AI in the Banking Industry of an Emerging Market”. The paper also investigates the detrimental effects of technology outages, which is not well researched in Nigeria and the study was focused on Nigerian banks. A quantitative survey where 400 respondents across ten different banks in Nigeria that examined how they see the usage of technology in the banking industry. While the research finds that technology usage has positive and direct effects on service quality, customer satisfaction and consumer buying behaviour, service quality was found not to have a significant effect on consumer buying behaviour. The study also establishes that technology downtime has a moderating effect on technology usage, consumer buying behaviour and customer satisfaction in the banking context.

Rodrigues et al. (2022), this was a quantitative study that incorporated both cognitive mapping and the decision-making trial and evaluation laboratory method (DEMANTEL). The paper sought to create a model for analyzing how cybersecurity, digitalization, and AI can be applied to the banking industry. The study's findings deepen our understanding of the subject and identify specific determinants, which should give banking decision-makers the knowledge they need to defend themselves against possible future computer technology threats. In this way, the framework suggested can be used at both the corporate level and the branch level.

Toesland (2022) wrote an article to understand what AI is being used for in African banks. The research consisted of multiple data sources and interviews with executives from Absa Bank (Retail and Business Bank division) to get their views on AI. Christine Wu (Managing Executive – Customer Value Management), views artificial intelligence as an important enabler of the journey to a new banking model that is truly responsive to customer needs. The study also shared the AfDB announce an approved grant of over $16 mil was approved to support the creation of AI backed systems to process customer complaints for the national banks of Ghana and Rwanda. In customer services, where clients want a response quickly that fully addresses their issues, any tools that can speed up the process will save valuable staff time and improve customer

satisfaction. The key finding made is AI has been long hailed as a major transformative technology for the banking sector, is now firmly in the sights of African banks, the article further reveals that some banks in Africa are experimenting with AI to improve fraud identification systems, to better understanding consumer needs, and reducing risk to enable efficiency in day-to-day-operations.

Buchanan (2019) conducted a research review, the aim of the study was to (1) review AI in finance using current practitioner, policy, and academic related AI literature; (2) describe four ways that AI is transforming the financial services sector; and (3) comprehend why artificial intelligence has the potential to redefine and improve the current finance industry. The study's findings indicate, firstly, that the world's economic ecosystem will continue to become more complex because of AI. Secondly, the use of AI in the financial services sector is still in its infancy. As it becomes more prevalent, however, it will also present new issues, such as moral, ethical, economic, and societal obstacles. Thirdly, there are four ways that AI is transforming the financial services sector: (1) fraud detection (how AI is used to prevent criminal funds from entering the financial sector); (2) financial chatbots; (3) predictive modelling; and (4) policy issues and regulatory. Lastly, the results back up the cynical idea that AI projects may become harder to do as computing power and data availability grow. According to Sithole (2018), AI in South Africa has the potential to boost economic growth by an average of 38 percent by 2035, and by 2025, the country's market value is expected to have increased by more than US$35 billion (ZAR 519 210 799 585) (Accenture,2018).

"Banking artificial intelligence is a technology that makes inferences and decisions that used to require direct human involvement," writes Latimore (2018, p.2). Because AI has been adopted and is widely used in the banking industry, the sector has been operating effectively and efficiently during the Fourth Industrial Revolution. An assumption can be made that without the use of AI in this sector, the banking sector would still be perceived as non-effective and efficient in catering to customer needs and offering the right services. Lately, AI has been applied in data analytics, report generation, and robotic process automation, among others (Kochhar et al., 2019). The reason one can assume that AI is reshaping the banking industry can be attributed to the digital era as it causes banks to adapt in all segments that were previously regarded as their profitable engagement (Mirkovi et al., 2019). Alzaidi (2018) says that

the use of AI in banking has made things easier and made them work better. This is because AI is usually used in personalized financial services, data-driven lending decision underwriting, and voice-assisted banking.

The banking industry is experiencing changes because of AI that affect the efficiency of non-client-facing offices, how services are provided, and how sales and expenses are incurred (Marous, 2018). Banks are currently utilizing AI to create customized goods and services for customers, detecting transactions that don't match up that could hurt business efficiency as AI intelligence lowers human error (PwC, 2018). It took some time before people began to realize the true power of AI. Elon Musk, the founder of Tesla, and Stephen Hawking are two prominent investors and physicists who are continuing the conversation about the potential for AI innovation. Most people agree that if AI is used for good, it could change the course of human history in a big way, even though the discussion sometimes gets into doomsday scenarios.

2.3.3 *Proposition 1: AI is a transformative technology that is changing the way banks operate and interact with customers.*

2.4 AI decision making

2.4.1 *AI decision making*

Algorithms assist in guiding decisions in many areas, such as facial recognition, medical diagnostics, fraud detection, predictive justice, job search and access to higher education (Fliche & Yang 2018). Less than 10% of large businesses used ML or other types of AI five years ago, but today, 80% of them use the technology (Ghosh et al., 2019). Such examples demonstrate that the use of AI now goes beyond simple automation, but that Intelligence is progressively being used to enhance decision-making decisions at all levels, including higher leadership. Examples include Amazon changing its recruitment processes to incorporate algorithms or Walmart utilising AI for decisions regarding product offerings (Meissner & Keding 2021). In executive-level meetings, for example, Salesforce utilizes its own AI tool, Einstein, to assist leaders in making critical data-driven decisions. The innovative founder and CEO of Salesforce, Marc Benioff, claims that with Einstein’s guidance, the organization's decision-making

processes have undergone a complete transformation. The top management team's discussions about the performance of various areas, products, or commercial opportunities have become far less politicized and less driven by personal or political agendas thanks to Einstein's recommendations.

For managing credit risk, the use of AI in global countries has looked beyond just repayment history, credit scoring and behavioural scoring are the techniques that help organisations decide whether to grant credit to consumers who apply to them Thomas (2000). Decisions on the evaluation of credit risk are crucial to financial institutions success in the lending sector because mistakes can result in significant losses (Adel et el., 2010). Models for calculating credit scores are based on operation research or statistical techniques, that are converted into credit scoring models. There are many gaps and challenges that AI introduces when it is implemented incorrectly or following a decision tree that is inconsistent, many of the challenges also have a moral and ethical character, including those related to the employees, economy, and consumers in terms of privacy, fairness, justice, discrimination, bias, deskilling, surveillance, and a host of other thorny issues (Floridi et al., 2018; Fjeld et al., 2020).

2.4.2 *AI decision making theory*

Townson (2020) wrote an article to unpack how AI can improve the fairness of bank loans, in the blog post his key findings were, banks are being forced to reconsider an unfavourable reality about the loan industry as they use AI algorithms for credit judgments more and more. Furthermore, Townson elaborate on the long history of biases against groups that possess legal protections, including racial, gender, and sexual identity, these biases can be seen in how the banks decide who gets credit and on what conditions. One of the key highlights in the article is, the use of AI algorithms in determining credit judgments rather than depending on human judgment is an obvious solution. Another key finding is that banks are increasingly using AI to identify and correct historical patterns of gender discrimination in raw data, which banks can now compensate for changes in this data by purposefully changing it to provide an artificially higher probability of approval. According to one lender mentioned in the article, women would need to make 30% more money than men on average to qualify for loans of a comparable size. This discovery prompted banks to develop a neutral model, which continues to have a differential impact on protected and non-protected

classes. Financial institutions frequently develop a second, "adversarial," Intelligence model to test its ability to forecast protected-class prejudice. If the adversarial challenger is effective in identifying any protected trait, the original model is corrected. If two borrowers share similar risk ratings, mortgage lenders cannot treat them differently, whether the decision is made by a human being or an artificial neural network. In the past, these problems would have been resolved by trying to manually alter the parameters of the original model. But now, we can utilise AI to strengthen the influence of factors that promote equity and weaken the influence of factors that promote bias Townson (2020).

Pietronudo et al. (2022), sought to understand if AI could solve the problem of managing innovation as academics and practitioners were hopeful of this assumption. The literature on this topic is fragmented and needs to be systematically reviewed to guide future research. The findings of the literature review were that AI is not a tool that uniformly optimizes innovation management and decision making, but rather, is best understood as a multifaceted solution, with intended and unintended rationalizing influences, in search of problems to solve. Furthermore, for purposes of this literature review, innovation management was described as a decision-making process. The study highlights possible dangers in algorithmic chaos; however, the current body of literature believes AI has the potential to minimize the company turmoil that surrounds innovation management. In conclusion, researchers and industry professionals are hopeful that artificial intelligence will be able to manage innovation. A comprehensive review of the topic's existing literature is necessary to help direct future research.

Sadok et al. (2022) did an examination into the potential role of AI as a catalyst for altering established models of risk and credit analysis. The paper sought to understand the following: (i) the literature on artificial intelligence and its possible negative impact on the economy; (ii) the role that big data plays in this type of analysis; as well as (iii) the socioeconomic effects of using AI for credit analysis. The research considered that, although credit scoring may appear to be a technical topic, it influences how credit is distributed among economic actors. To determine whether to approve or deny loans, the study needed to focus on the creation of AI-based rating models for credit default risk management. The findings from the research showed that credit score projections can now be based on more variables than are typically included in standard statistical models thanks to big data. This begs the question of whether big data and AI-based forecasts could open up loans to people or businesses who were previously

disqualified according to conventional statistical modelling. This translates into optimistic predictions for economic growth at the macroeconomic level.

Decision making with AI, according to the studies reviewed above, is reimagining business processes from the bottom up. McKinsey (2020, p2) predicts that 70% of businesses will use AI technology by 2030. The benefit of AI use in decision making is assumed to provide insights that can aid people in making wiser business decisions. Therefore, after feeding it with data, the AI presents you with potential choices. Some decisions can even be made by it automatically, but only if the human gives it permission.

For retailers, small and medium-sized businesses (SMEs), and corporate clients, AI-first banks have created simplified lending journeys that use expanded automation and near-real-time analysis of customer data. They accomplish this by sorting through various structured and unstructured data that has been gathered from both traditional sources (like credit reports, tax returns, and bank transaction history) and new ones (like location data, telecom usage data, utility bills, and more) (McClintock, 2021). Given that employee skills are what drive AI, training is necessary because high-end AI skills cannot be learned quickly, (Ping & Ying 2018).

2.4.3 *Proposition 2: The use of AI in decision making has the potential to improve business outcomes and increase operational efficiency.*

2.5 Financial inclusion in sub-Saharan Africa

2.5.1 *Financial inclusion in Sub-Saharan Africa concept*

Despite recent advancements, sub-Saharan Africa still has low levels of financial intermediation and inclusion. Over the period of 1995 to 2013, with the aid of reforms, the depth and coverage of financial systems in sub-Saharan Africa have greatly improved as assessed by the conventional financial development indicators, such as

the ratios of broad money to GDP and private sector credit to GDP (Kasekende, 2010). However, on average, Sub-Saharan African nations continue to have weaker financial systems than their counterparts in other developing nations. Only 20% of the population has a bank account, compared to 92% in advanced economies and 38% in non-advanced economies, in terms of financial inclusion.

The area is underbanked in part because of underinvestment, inadequate infrastructure, and relatively low financial literacy levels. According to Peric (2015), discussions about how to make sure that those at the base of the pyramid start making money are increasingly being centred on digital financial inclusion. Non-banks and banking entities are collaborating to increase financial inclusion for underprivileged groups and those who are financially excluded by employing digital financial approaches (Peric 2015). The traditional banking sector, which was founded in the Industrial Revolution based on paper and the physical circulation of money, is changing because of the fourth industrial revolution (Alameda, 2020). Lopes and Pereira (2019) say that industry 4.0 technologies like distributed ledgers, AI, machine learning, and cognitive computing can be used to improve new traditional banks.

2.5.2 *Digital financial inclusion*

Studies examining how AI affects digital financial inclusion in Africa are scarce. There are however some articles available globally that can be reviewed to expand on the body of knowledge. This section will focus on prior research on digital financial inclusion and AI (Mhlanga, 2020, Ravikumar et al., 2021; Toesland, 2022).

In the paper, Industry 4.0 in Finance: The Impact of Artificial Intelligence (AI) on Digital Financial Inclusion, In Mhlanga 2020) investigations of the effect of artificial intelligence on digital financial inclusion, reports and articles from peer-reviewed publications were analyzed conceptually and based on the data, the findings are, firstly, AI significantly affects digital inclusion in areas such as risk evaluations, management, availability of customer assistance, chatbot applications in helpdesk fraud detection and cyber security. Secondly, on the risk component, AI is revolutionizing financial inclusion by extensively implementing automated risk detecting algorithms, measurement, and management. According to the report, this makes it possible for disadvantaged populations to obtain banking services that were previously unavailable to them owing to risk aversion, this includes women, young

people, and small companies like smallholder farmers. Finally, the paper recommends the adoption and increased usage of AI tools and apps by governments, non-banks, and banks to make it simpler for those who have previously been unable to engage in the formal financial market to do so.

By offering customers intelligent banking services in a better, quicker, and more affordable manner, traditional banking has the potential to close the digital inclusion gap, according to Ravikumar et al. (2021). The study's goal was to examine the role of AI in helping promote financial inclusion in India. To that end, it gathered theoretical and factual evidence from reports, journals, and websites. According to the study's key findings, only 29% of Indian household members had banking services in 2010, and by 2017 that number had increased to 69%. However, this statistic is quickly disproved because the study also revealed that 31% of those who had access in 2017 were not banked. Furthermore, the study highlights that there are limitations to financial inclusion. These limitations include things like distance, expensive operational costs, inappropriate products, and enormous dormant accounts. Lastly, the study showed that traditional banking systems do not accommodate people who have no credit history in accessing finance.

To reduce unneeded offerings that customers are not interested in, banks are now using AI to personalize functions to fit everyone’s unique needs (African Independent, 2019). According to Kaya (2019), most banks have begun utilizing chatbots to improve customer service (Manning, 2018). AI One of the most widely used technological tools in a variety of business sectors is the chatbot. Additionally, with the help of AI, financial organisations can offer personalized banking through chatbots and AI assistants that use natural language processing to offer immediate, self-help customer service and AI to develop personalized financial advice (Alameda 2020; Paul 2019).

2.5.3 *Proposition 3: The use of AI can help banks to expand their reach and offer new products and services, which can bridge the gap in financial inclusion.*

2.5.4 *Opportunities and Challenges of AI in Banking*

The ability to process large volumes of data quickly has been made possible by the exponential growth of digital technology over time (Tiberius & Hirth 2019).

Ghandour (2021) conducted a systematic literature review (SLR), to provide insights on the literature of the opportunities and challenges concerning the use of Artificial Intelligence (AI) in the banking sector. Fourteen papers were found to have satisfied the planned inclusion and quality criteria after the study selection process. There was about, 17 000 research papers that seem to be blatantly irrelevant and thus were excluded from the final submission review. The findings surprisingly revealed that: (i) the SLR accomplished its goal of investigating the AI opportunities and challenges in the context of the banking sector, across various disciplines like finance, customer service, fraud, governance and compliance etc. the key findings show that AI is enabling banks to transform their business processes and operation; however in the same breath the findings show there are obstacles that can prevent the effective application and operation of AI in the industry.

These include, potential disinterest, skill shortage, privacy violations, and prohibitive implementation costs. (ii) in the banking industry, AI has a strong business case, for example the findings show that banks can use predictive analytics and machine learning to predict financial crises. There is an increased use of big data analytics, to better understand customers. The findings confirmed more challenges like, with extensive financial automation capabilities, unemployment concerns also rise. Also, because there is no obvious "human touch" in customer service, AI could also have a negative impact on customer relationship management, and that the to enhance cybersecurity and privacy protection in banking, regulatory agencies and the banking industry must continue to work together. In conclusion the study aligns with those of previous studies and reveal that, AI can assist banks with innovation, better decision-making, and more effective problem-solving for complicated issues. However, there are several dangers that must be avoided if the benefits presented by AI are to be fully utilised in the banking industry.

The findings are limited; although there is a substantial body of research on the opportunities and difficulties presented by AI in the banking industry, most of the studies that are now available are descriptive and based on secondary data sources. Future research should therefore use rigorous empirical investigation approaches to provide verifiable information about AI prospects and problems in the banking industry (Ghandour, 2021).

2.6 Conclusion of the Literature Review

For many years, banks have continuously changed how their customers experience them by incorporating the most recent technological advancements. In the 1960s and 1970s, banks introduced ATMs and computerized, card-based payments. The widespread use of 24-hour internet banking began in the 2000s, and in the 2010s, mobile-based "banking on the go" began to catch on. AI has contributed to hours of automation and digital transformation narratives that even now it has a firm footing in banking to be known as a technology that facilitates / orchestrates strategic decision-making processes. There is still a gap in literature about the full contribution of AI in banking, and as a result biases associated with some of these algorithms are not validated nor expanded to grow the knowledge book of work.

Research indicates that variations in loan acceptance and limited financial accessibility are not solely attributable to algorithmic fairness or partialities, but also to the fact that low-income and minority populations have comparatively less credit history data points. Differences in credit misallocation and credit access are caused by this information gap. A person's score will be lowered by a "thin" credit history since lenders value more information over less. Small offences, including missing payments, can, nevertheless, significantly harm a person's credit score.

Another problem is fake data; in the US, ratings for minorities are roughly 5% less likely to forecast default risk than scores for non-minority borrowers, and 10% less likely to indicate default risk than scores for higher-income borrowers. It is more difficult to determine a person's creditworthiness if they have very little credit history, have taken out a few loans, and own a few credit cards. Better algorithms or models do not address the issue of financial exclusion and credit misallocation; instead, this lack of precision results in inequality in access to financing.

By taking advantage of regulatory arbitrage and being subject to additional regulations for risk management and consumer protection, shadow banks have increased their market share in the refinancing market compared to the purchase loan market. Since there is no complete legal framework offering remedies, computerised credit scoring is on the rise, and current efforts to address these concerns fall short.

AI has the capabilities to improve business operations and make the lives of customers in banking easier. While there are some perceived fears related to job losses and growing divide of access in finance, there are also views that these limitations in AI can be expanded on / solved by defining AI models correctly in the business. Africa has a slow adoption of AI; one can even argue that digital financial inclusion is making AI adoption slow as many customers are un-banked and accessing FinTech services to bridge the transactional gap for themselves.

Ghosh et al. (2019) emphasized that “To scale the benefits of AI-innovations, companies need to stop thinking of AI tools and applications as standalone solutions. As systems evolve, so must the IT workforce. Companies need multidisciplinary talent that can bridge infrastructure, development tools, programming languages, AI, and machine learning.” Therefore, it is crucial that a study like this be carried out in South Africa to ascertain the drivers behind bank senior leaders increasing the adoption of AI, and the likelihood of achieving the theorized benefits. This study will identify the variables that must be considered when persuading banks to embrace AI, which has a significant potential for growth by testing these propositions:

List of propositions

2.6.1 *Proposition 1*

AI is a transformative technology that is changing the ways banks operate and interact with customers.

2.6.2 *Proposition 2*

The use of AI in decision making has the potential to improve business outcomes and increase operational efficiency.

2.6.3 *Proposition 3*

The use of AI can help banks to expand their reach and offer new products and services, which can bridge the gap in financial inclusion.

CHAPTER 3. Research Methodology

3.1 Research Approach

Research approaches are strategies and procedures that in-depth describe the collection, processing, and interpretation of data. The major objective is to choose the methodology that should be used for the proposed investigation (Cresswel, 2018). There are two methods of conducting research: quantitative research, which is constructed with numbers and is organized with open-ended and closed-ended questions, and qualitative research, which is typically constructed with words rather than numbers. Lastly, a mixed method approach integrates qualitative and quantitative techniques (Cresswel, 2018).

For the purpose of the study a qualitative approach was undertaken because the researcher seeks to get a deeper insight into the phenomena. A qualitative approach's fundamental tenet is to make it possible to obtain understanding of people's experiences (Leech & Onwuegbuzie 2007). A considerable potential for showing complexity is also present in the fundamental depth that qualitative data frequently include (Leech & Onwuegbuzie 2007).

3.2 Research Design

According to Schindler (2019), a research design is "a framework for gathering data that satisfies objectives and responds to questions." The research design of a study directs methods in a specified way. The type of study design used is one that is empirical in nature. While non empirical studies rely on existing literature, modelling, and philosophical and conceptual analysis to create new information, empirical investigations allow new knowledge to be created from the data that has been acquired (Saunders, Thornhill, & Lewis, 2009).

An inductive approach to theory development is what the study followed, it is beneficial for acquiring a deeper knowledge of a phenomenon while investigating the advantages and risks of AI adoption in traditional institutions Ritchie et al. (2013). This approach enabled the researcher to draw conclusions from a real-world environment, which results in the creation of a thorough empirical theory (Saunders et al., 2009).

3.3 Population and Sample

3.3.1 *Population*

Schindler (2019) defines "population" as "persons, events, or records that contain the needed information to address the study topic." The people who were part of the study are junior to executive-level managers in the Retail Business Bank (RBB) of Standard Bank, Absa, FNB, Capitec, and Nedbank who have worked there in the past three years or are working there now. The banks are classified as the top five in the country and have been in existence for many years, thereby fitting the profile of traditional banks in South Africa with legacy systems to change and transform. Standard Bank, a leading South African bank, has been investing in AI and cutting-edge technology since 1862. Absa Group Limited, formerly Barclays Africa Group Limited, offers banking and insurance products in Africa. FirstRand Limited, the parent company of First National Bank, offers retail banking services and digital solutions. Nedbank, a division of Nedbank Group Limited, has a long history and offers retail, business, investment, and wealth management services. These banks are committed to innovation and customer experience to improve operational efficiency and customer satisfaction. According to bank data as of June 1, 2023, Nedbank, FNB, Standard Bank, and Absa collectively maintain a sizable market presence. Nedbank boasts more than 7 million retail banking clients and an exceptional operating income of about R55 billion each year. On the other hand, FNB reported an operational profit of over R61 billion and attracted over 8 million clients. With its extensive network across Africa, Standard Bank boasts a customer base of over 9 million clients in South Africa, amounting to an operating profit of R84 billion annually. In a similar vein, Absa generates an impressive R68 billion in operational income annually while serving a remarkable client base of over 10 million retail banking customers.

3.3.2 *Sample and sampling method*

Sample, also known as a sampling frame, is the act of picking some individuals or things from a larger group (Scott & Morrison, 2007). The method used for this study is a non-probability sampling method, specifically purposive sampling. A non-probability sampling approach was used, consisting of a combination of purposive and snowball sampling methods (Greener, 2008). To a certain degree, this approach was used to

target those groups where there is a higher likelihood of getting responses that are relevant and useful for the study. The participants were selected based on seniority, as well as experience in emerging technology strategy implementation in the banks.

Feedback was obtained from four major banks namely, Standard Bank, Nedbank, Absa and FNB the sample size of the study comprised of 12 Executive Heads, representing various departments in Group Technology and RBB (Retail and Business Bank), it is believed that these insights will provide diverse views and opinions on the role of AI in banking. The participants were targeted via LinkedIn in a form of an inbox message to get contact details to arrange formal appoints. The researcher has also previously worked for one of the banks and utilised her relationships to get participants.

Table 1: Profile of potential respondents by division

Business Unit	Participants	Banks
Group Technology	4	Absa and Standard Bank
Retail Business Bank	3	Absa, Nedbank and Nedbank
Wealth Investment	2	Absa and FNB
Strategy	1	FNB
Corporate	2	Nedbank and Standard Bank

3.4 Research Instrument

Semi-structured interviews were used as the research tool for this study, and the interviews were conducted utilising the interview questions provided in Annexure A. A semi-structured interview is necessary to enable for the provision of extra information and / or for the clarification of the answers given. Before the interview, participants received an interview guide with an explanation of the questions to manage their expectations. This guided their responses, as they could contextualise them based on the section of the question. The researcher made use of two instruments to capture the data, a notepad to write the notes and a recording on Microsoft teams.

3.5 Procedure for data collection

The primary data collection method that was adopted in this study was face-to-face or online (Microsoft teams and zoom) interviews with respondents. The researcher provided the respondents with an option to choose to have the interview virtually or face-to-face meeting. The process was as follows:

1. The researcher inboxed the identified participants (the researcher's customers) on LinkedIn to introduce them to the study and outline the purpose of the study.
2. The identified people were invited to take part in the study by way of an interview.
3. Participants who accepted to take part in the study were scheduled for interviews by the researcher.
4. To make sure the participants were familiar with and at ease answering interview questions, questions were emailed to them in advance of the interview.
5. The interviews were set for 20 - 30 minutes, after the interview, the participants were asked by the researcher to recommend their colleagues for the study.
6. The researcher began the data gathering process by contacting the suggested participants.

3.6 Data analysis strategies and interpretation

In this study, the analysis adhered to the thematic-analysis process as outlined by Barun and Clarke (2006), with the goal of identifying patterns and themes in the analysis of qualitative data. Assumptions, bias, and subjectivity of the researcher should be disclosed up front in qualitative research Fabio et al. (2012). This is because qualitative analysis heavily relies on the researcher's analytical and integrative skills, as well as personal understanding of the social context where the data is collected (Bhattacherjee, 2012).

The thematic process has six steps as outlined below:

1. Familiarity with the data:

There is an orthographic transcript of the interview tapes (Braun & Clarke, 2006). Otter.ai, a piece of software that automatically converts speech recordings to text, was used to transcribe the interviews. For example, where participants repeated words or made speech faults, they were shown within square brackets to aid simpler interpretation during the analysis stage. Punctuation and comments were also added to make analysis easier. Following transcription, depending on the study questions, perceptions of the qualitative data were recorded.

2. Generation of initial codes:

The qualitative data were initially coded using the Atlas.ti program. The data were analysed using a thematic approach, which allowed the first set of codes to appear from the data that had been gathered (Saunders et. al., 2009). To achieve alignment, these duplicates were later organized into themes. Notes were taken on the initial themes and the patterns that were observed.

3. Reviewing of themes:

The codes that were found were arranged into themes. The initial categorisation was determined by the research questions; however, the codes were sorted depending on the presence of themes and patterns.

4. Definition of themes:

The information contained in each theme was examined. The emerging themes were examined, along with their validity, to make sure they had been sufficiently refined and that a plot could be developed around them.

5. Writing of report:

A write-up of the emerging information was done, with the intention to narrate the observations and the researcher's interpretations.

3.7 Possible limitations and challenges of the study

1. The study is limited to the qualitative method, due to time constraints.
2. The study lacks external validity as it is based on the big four banks
3. The context of the organisation might not be replicable with other organisations and industries.
4. Only senior leaders were included in the sample; the viewpoints of lower-level employees in the organization were not considered.

3.8 Transferability and dependability

3.8.1 *Transferability*

A qualitative study's external validity is evaluated, as well as if the data required to answer the research questions, to determine the study's validity (Denzin & Lincoln, 2011). An interview guide was employed to ensure uniformity in the data collecting procedure, which contributed to the process of data collection being largely homogeneous. Although there is no one interpretation technique for qualitative data, the transferability of this study will benefit from the data analysis procedure.

3.8.2 *Credibility*

The internal validity of the study is a factor in the validity of qualitative research (Denzin & Lincoln, 2011). A pilot study with one participant was conducted before the full-scale research in this study to boost credibility, and the validity was assessed with the supervisor.

3.8.3 *Dependability*

The reliability of the findings determines how reliable the findings are (Denzin & Lincoln, 2011). Like how a thorough thematic analysis will be conducted to establish the results' validity, section 3.6 of this paper details the methods involved in ensuring reliability. These procedures could be used by researchers in the future who want to replicate this study. However, it should be mentioned that the current situation and the background of this subject are prone to change, which could affect the replication of this study.

3.9 Ethical considerations

The researcher has the responsibility to make sure that ethical considerations are adhered to (Schindler, 2019).

To ensure that the research will be conducted in an ethical manner, the following process will be adhered to:

1. The researcher will obtain ethical clearance from the University's Ethics Committee.
2. All participants will be requested to provide consent to participate in the study.
3. The researcher will not associate any responses with any respondent's name therefore ensuring the respect for privacy and anonymity.
4. The research objectives will be explained to ensure transparency is adhered to.
5. The researcher will not discriminate against anyone but allow the correct type.
6. While the research is in process, data will be stored in a password protected laptop that is the researchers property and only person with access.
7. If at any point during the interview the participant would like to withdraw, they will be granted and steps to update this information will be taken.
8. All interview feedback is anonymous and will not be classed by name

CHAPTER 4. Presentation of Findings

4.1 Introduction

In this chapter, the results of the conducted qualitative research are analysed. This chapter begins with a background on the participants and information of Nedbank, Standard Bank, Absa and FNB, hereon referred to as big four banks. The conclusions detailed in this section reflect the themes that emerged from the participant observations. The analysis was conducted using the thematic qualitative method covered in section 3.6 of this study. A phenomenological investigation was conducted to understand the role of AI in banking. Phenomenology aims to map outcomes that demonstrate how individuals comprehend their environment, their experiences, and how they perceive and comprehend them (De Vos et al.,2011). A structural premise used in phenomenology research aims to bring people's views and experiences from their own viewpoints (Lester, 1999). The goal of phenomenology, according to Neubauer et al. (2019), is to describe how people have experienced a situation and how they relate their experiences to it. By gaining a thorough grasp of people's experiences, perceptions, and the culture around them, the phenomenological approach seeks to reconcile theory and reality (Neuman & Robson, 2014). Interviews were conducted with executives from various banks in the banking sector to evaluate the various interpretations they give to artificial intelligence (AI) in banking and how it affects their day-to-day activities. The findings are outlined using this analysis method relative to the propositions presented in Chapter 2.

4.2 Background Information

4.2.1 *Background on Banks*

In the context of this research study, the goal is to understand the role of AI in banking, with a focus on four well-known banks in South Africa: Nedbank, FNB, Standard Bank, and Absa. Each of these banks has a distinct position and market presence, making them some of the biggest financial organizations in the nation. Insights into the acceptance, implementation, and impact of AI technologies within the South African financial sector will be gained by looking at the role of AI in these banks.

With roots dating back to 1862, Standard Bank is one of the largest and oldest banks in South Africa. The bank, which is a member of the Standard Bank Group, has operations in numerous African nations and is well-known in the corporate and investment banking industries. To increase operational effectiveness, risk management, and customer service, Standard Bank has significantly invested in AI and other cutting-edge technology.

A noteworthy provider of financial services, Absa Group Limited, formerly Barclays Africa Group Limited, offers a wide range of banking and insurance products. Absa is renowned for its customer-centric strategy and cutting-edge solutions and operates in various African nations. To understand client behaviours, enhance risk assessment outcomes, and provide individualized banking experiences, the bank has adopted AI and data analytics.

One of the biggest financial services organizations in South Africa, FirstRand Limited, is the parent company of First National Bank, also known as FNB. FNB has a substantial presence in the retail banking industry and offers a variety of financial goods and services to customers that are individuals, companies, and corporations. FNB has won praise for its creative approach to banking, which makes use of technology and digital solutions to improve client ease and accessibility.

One of the biggest banks in South Africa, Nedbank, has a long history that dates to 1831. It runs as a division of the renowned financial services company Nedbank Group Limited. Retail banking, business banking, investment banking, and wealth management are just a few of the numerous financial services and products that Nedbank provides. To improve customer experiences and increase operational efficiency, the bank has a strong commitment to innovation and has been at the forefront of embracing new technology.

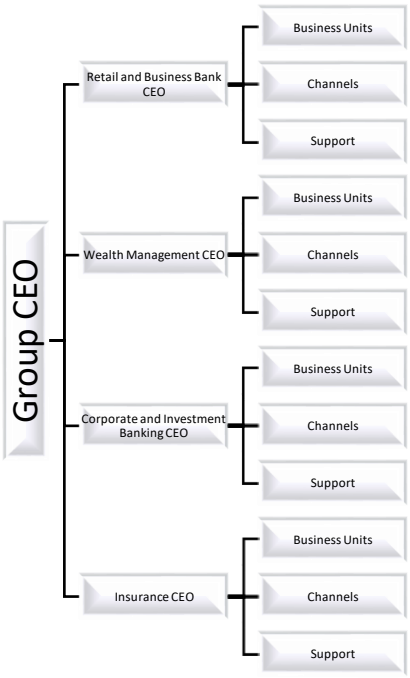


Figure 1: Banking Organisation structure

- Business Units:
  - Everyday banking: Regular banking service, this business unit is a combination of personal loans, credit cards, savings and investments, and transactional accounts.
  - Vehicle Asset Finance: Vehicle finance that is available to individuals, approved dealerships, and suppliers.
  - Home Loans: Finance loan called bond for residential and commercial properties.
- Channels:
  - Physical Channels: Regional offices, branches and self-service terminal networks
  - Virtual Channels: Voice and digital enablement (including digital self-service channels)
  - Customer Value Management: Creation of consumer value propositions for all retail clients
  - Change and Transformation: Portfolio of strategic change programs, compliance and risk management
- Support functions:

  Each business division has their own CIO, CFO, Risk Management, Compliance, Human Resources and Operations

4.2.2 *Background on the participants*

This section presents background information on the participants of the big four banks organisations. All the interviews were conducted via Microsoft teams. Due to the mutually agreed-upon confidentiality with the participants, their identities from herein will be referred to as P1, P2, P3, etc. The information on the interview subjects is shown in Table 1 below. It was observed that all participants have had exposure and experience in strategy formulation and big technology implementation in the organisation; the respondents are also of executive and managing executive seniority level in the organisations. The average tenure is six years, which is an indication of strong institutional knowledge and experience. It can be noted that male participants dominate the representation, but this does not impact the results of the study. From a race perspective, the participants are predominantly spread between African black and African white people, from an organisational structural perspective, the participants are spread across different business divisions and the support areas within RBB to represent broad views.

Table 2: Participant information

Code	Gender	Race	Tenure	Division	Job Level
P1	Male	African	4 years	Group Technology	Executive
P2	Male	African	10 years	Retail Business Bank	Executive
P3	Female	White	9 years	Retail Business Bank	Executive
P4	Male	Indian	7 years	Corporate Investment Bank	Head
P5	Male	Indian	4 years	Insurance	Head
P6	Female	Chinese	10 years	Corporate Investment Bank	Head
P7	Male	African	2 years	Insurance	Executive
P8	Male	White	4 years	Insurance	Executive
P9	Male	White	15 years	Wealth Bank	Executive
P10	Male	White	8 years	Wealth Bank	Executive
P11	Male	African	15 years	Group Technology	Executive
P12	Female	African	1 year	Group Technology	Head

4.3 Research questions

1. What role does AI currently play in South African banking?
2. How has the use of AI in decision-making impacted the efficiency and profitability of the banks?
3. How can AI be used to expand financial inclusion in the banking industry?

4.4 Thematic analysis process

The analysis was conducted using the thematic analysis process depicted in figure 3 below.

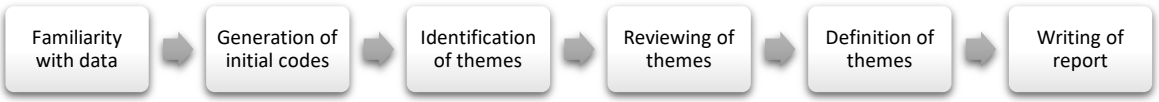


Figure 2: Thematic analysis steps

4.4.1 *Familiarity with data*

To enable the analysis, the data was prepared in text format. Based on the research questions, initial reactions to the findings are noted and summarised below.

1. **Initial Impressions**: What role does AI currently play in South African banking.

The senior leadership that was interviewed rallied behind the bank's intentional use of AI. Participants mentioned that AI is used to enable customer service and support for clients. Chatbots and virtual assistants enabled by AI manage consumer inquiries, deliver quick replies, and make tailored suggestions. By utilising AI technology, their banks can speed up response times, provide tailored services, strengthen security, and foresee client wants. This might result in improved client happiness, improved productivity, and ultimately stronger client relationships in the banking industry. Although the function is described as adding value to the banks, it didn't seem like everyone knew who was overseeing the strategy. In fact, the apparent

misunderstanding of custodianship may be a sign that two of the banks' AI strategies are not yet mature, as custody should be crystal clear and understood by everyone. The participants were of the view that their automated technologies help consumers with common activities like checking their balances, seeing their transaction histories, and managing their accounts, freeing up human agents to attend to more intricate or specialized client needs.

2. **Initial Impressions:** How has the use of AI in decision-making impacted the efficiency and profitability of the banks?

Participants mentioned the role of AI in scenario modelling and predictive analytics in the banking industry. Predictive analytics and scenario modelling in the banking sector both heavily rely on AI. By analysing massive volumes of data and simulating many situations, AI helps banks develop intricate and dynamic scenario models. To predict various scenarios and their possible effects on the banking industry, AI algorithms may evaluate historical and real-time data, market trends, economic indicators, and other pertinent aspects. This aids banks in decision-making, risk assessment, and strategy development for many scenarios. Large and varied datasets may be analysed by AI algorithms to find patterns, correlations, and trends. AI uses previous data to generate predictions about the future via predictive analytics. AI models may be used by banks to predict market trends, consumer behaviour, credit risk, and other important factors. With the help of these predictive insights, banks are better equipped to proactively spot opportunities, control risks, and streamline their workflows and decision-making procedures. In the banking industry, credit scoring and risk assessment have been revolutionised by AI-driven predictive analytics. AI algorithms may provide more accurate credit ratings and determine the possibility of default or other credit risks by examining previous data on borrower behaviour, economic indicators, and other pertinent aspects. This helps banks properly manage credit portfolios and make more informed lending decisions. Banks can make better forecasts, optimize decision-making, and advance strategic objectives thanks to AI-driven scenario modelling and predictive analytics. Banks may get useful insights, spot opportunities, reduce risks, and boost their competitiveness in the banking sector by utilising the power of AI.

3. **Initial Impressions:** How can AI be used to expand financial inclusion in the banking industry.

Participants mentioned the importance of providing tailored services for underserved segments and the use of AI for financial inclusion in the banking industry. Some of the sentiments shared revolved around providing tailored services for underserved segments and promoting financial inclusion, which are important goals that they recognize can be achieved through the application of artificial intelligence (AI). One of the banking participants mentioned that their banks' use of AI-driven solutions enables them to remove pre-existing constraints, increase financial access, spread financial awareness, and enable people and communities to take more active roles in the economy. For those who might not have access to conventional brick-and-mortar branches, AI-powered mobile banking applications can offer easy and accessible financial services. Mobile banking makes banking services more available to a larger audience by enabling users to carry out a variety of transactions, check balances, make payments, and access other financial services through their cellphones. Banks may expand their services to underprivileged communities, rural areas, and remote locations where physical banking infrastructure may be constrained by utilizing AI technology. For those who may have previously been shut out of the traditional banking system, AI's capacity to enable anytime, anywhere access to banking services promotes financial inclusion and improves access to essential financial resources.

4.4.2 *Generating initial codes*

During the second phase, the researcher started to read and become familiar with the data, developing ideas about what was in the data and what was exciting about it (Braun & Clarke, 2006). Coding breaks down a lot of data into tiny, meaning-filled pieces (Maguire & Delahunt, 2017). According to (Braun & Clarke, 2006), participant replies were coded into as many distinct themes as they did. Research questions served as a guide for creating the initial code. There were no predetermined codes because the open coding procedure was used. The emerging themes from the transcripts were used to create the codes. The method was carried out with the research topics in mind; hence, a theoretical approach was used. For simplicity of analysis, all codes relevant to proposition one have been compiled into a single table.

The initial codes created are shown in Figure 3. Before determining themes, these were first sorted by research questions to uncover relevant ideas.

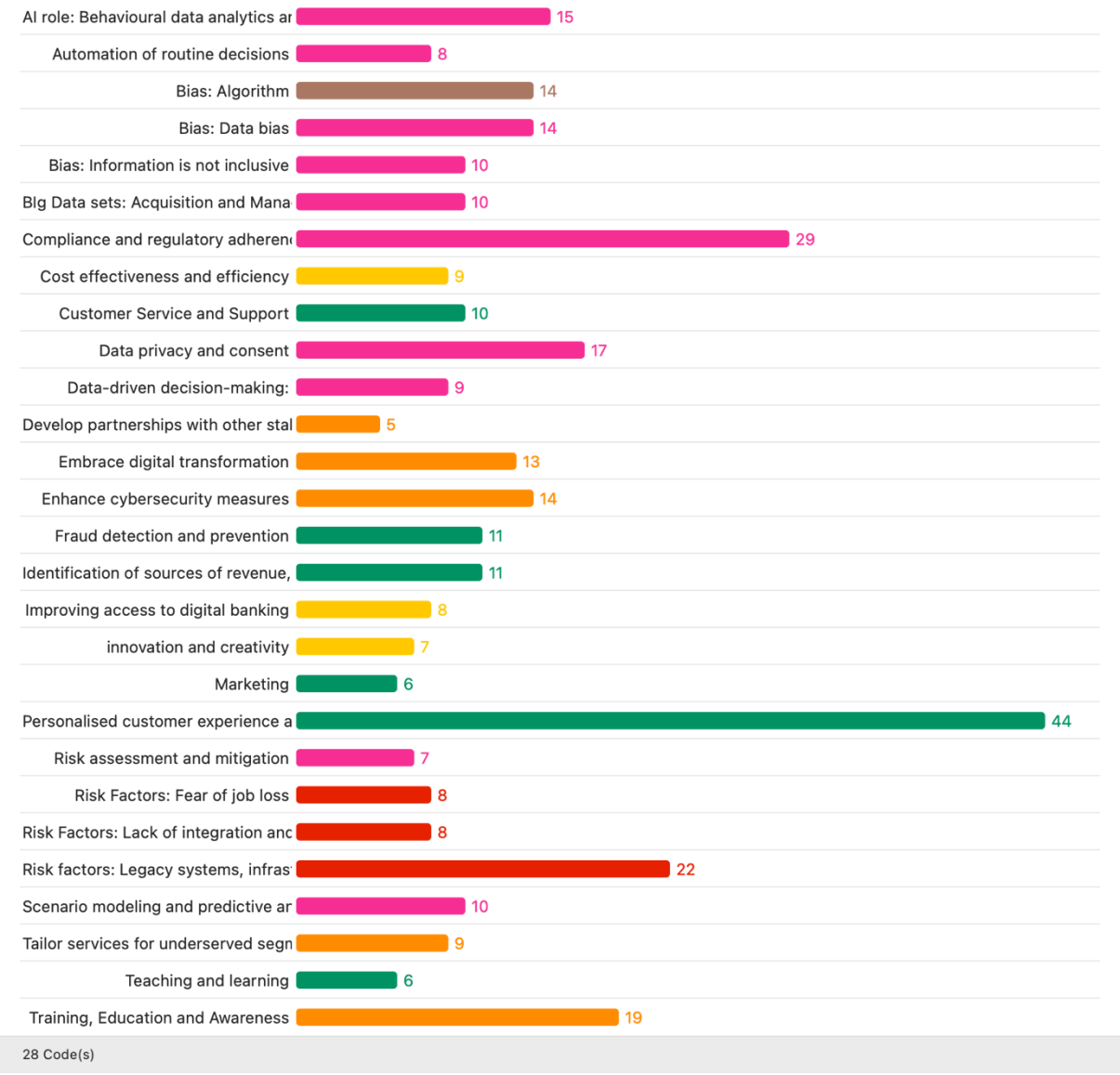


Figure 3: Initial codes to categories

353 open codes were generated from the coding process, many of which contained repetitions and similarities. It can be seen that numerous initial codes were generated and that there were a lot of duplicates. As a result, the codes were divided into primary and secondary codes. The 28 groups into which the identified codes were divided include (1) AI: Behavioural data analytics and customer profiling, (2) Automation of routine decisions, (3) Bias: Algorithm, (4) Bias: Data bias, (5) Bias: Information in not inclusive, (6) Big Data sets: Acquisition and Management of big data, (7) Compliance and regulatory adherence, (8) Cost effectiveness and efficiency, (9) Customer service

and support, (10) Data privacy and consent, (11) Data-driven decision making, (12) Develop partnerships with other stakeholders, (13) Embrace digital transformation, (14) Enhance cybersecurity measures, (15) Fraud detection and prevention, (16) Identification of source of revenue, (17) Improving access to digital banking, (18) Innovation and creativity, (19) Marketing, (20) Personalised customer experience and improving products and services, (21) Risk assessment and mitigation, (22) Risk factors: fear of job loss, (23) Risk Factors: Lack of integration and acceptance of AI in the banks, (24) Risk factors: Legacy systems, infrastructure and socio-economic status, (25) Scenario modelling and predictive analytics, (26) Tailor services for underserved segments and financial inclusion, (27) Teaching and learning, (28) Training, Education and Awareness. These categories are depicted in Figure 3 above.

4.4.3 *Identification of themes*

Following the initial code generation and identification, related codes were put into categories and, in some cases, subcategories based on emergent trends, resulting in patterns that created themes. In this phase, all the possibly pertinent coded data extracts are sorted and compiled into themes (Braun & Clarke, 2006). The definition of a "theme" is a pattern that encapsulates something important or distinctive about the data and research question (Maguire & Delahunt, 2017). Themes that play a prominent part in the study may be relevant given the context of the investigation (Cassell & Symon, 2004). Some of the themes that were found were related to the study's three key research questions. It should be noted that some of the codes were moved into already-existing categories because they had some similarities.

4.4.4 *Reviewing of themes*

During this phase, the researcher analysed, changed, and developed the preliminary themes that were identified in step 3 and classified the 28 categories in accordance with the themes. It was helpful to compile all the information related to each theme at this time (Maguire & Delahunt, 2017). Definitions of themes can be changed and improved indefinitely; themes shouldn't be regarded as complete until all the data has been looked through and the coding has been checked at least twice (Cassell & Symon, 2004). The below network diagrams were used to validate the category classifications.

4.4.5 *Definition of themes*

The selection of the final themes considered how prevalent each topic was. The following themes were finally determined to be important: (1) The role of AI in banking, (2) Adoption of digital technology, (3) Data bias factors, (4) Decision making processes, (5) Factors that promote acceptance of AI in the banking industry. Figure 4 depicts a thematic map that shows the connections between the themes that were found.

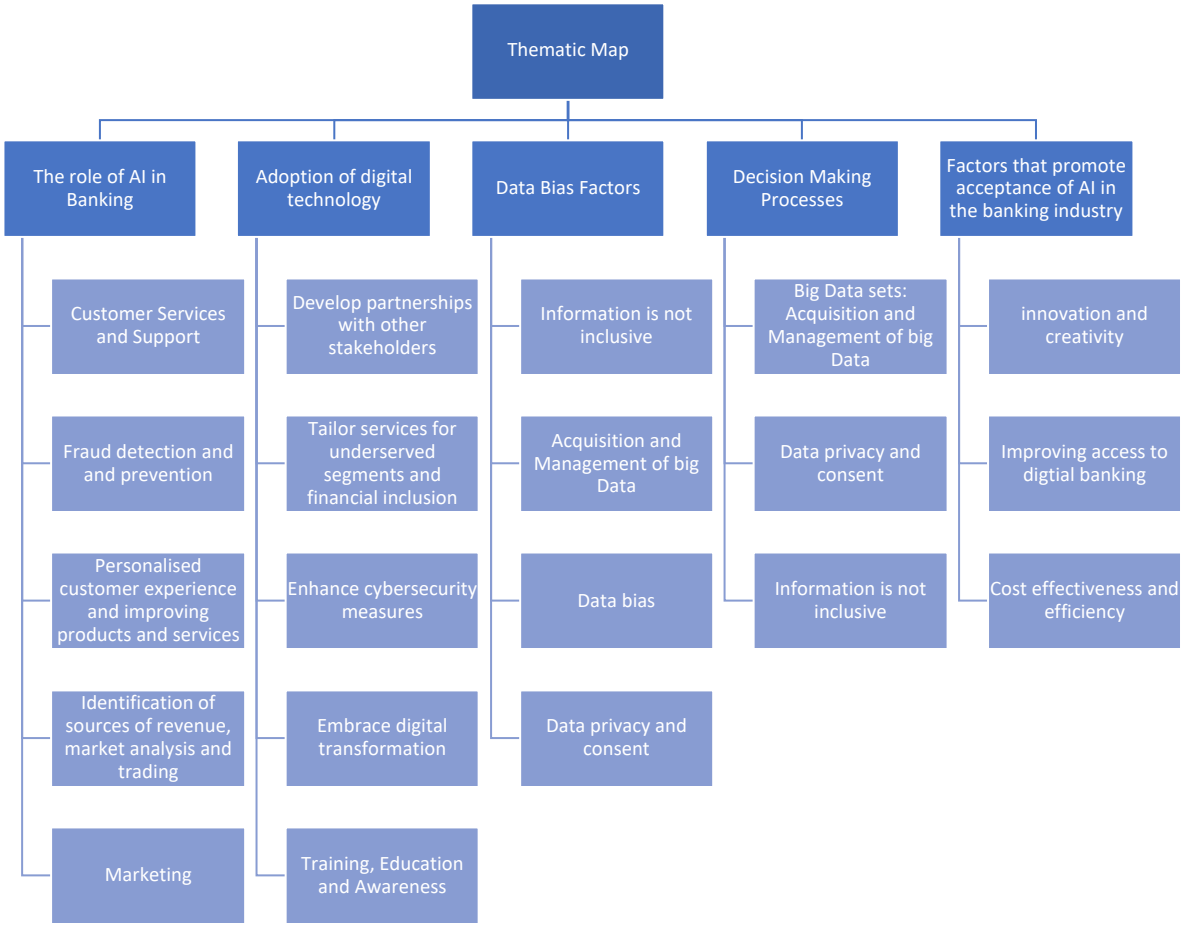


Figure 4: Thematic Map

4.5 Results pertaining to proposition 1.

AI is a transformative technology that is changing the ways banks operate and interact with customers.

A phenomenological investigation was conducted to understand the role of AI in banking. Phenomenology aims to map outcomes that demonstrate how individuals comprehend their environment, their experiences, and how they perceive and comprehend them (De Vos et al., 2011). A structural premise used in phenomenology

research aims to bring people's views and experiences from their own viewpoints (Lester, 1999). According to Neubauer et al. (2019), the goal of phenomenology is to describe how people have experienced a situation and how they relate their experiences to it. By gaining a thorough grasp of people's experiences, perceptions, and the culture around them, the phenomenological approach seeks to reconcile theory and reality (Neuman & Robson, 2014). Interviews were conducted with executives from various banks in the banking sector to evaluate the various interpretations they give to artificial intelligence (AI) in banking and how it affects their day-to-day activities. The use of AI in the banking industry has made banking operations hassle-free and impactful because AI is usually used in tailored financial services, data-driven loaning decisions, underwriting, and voice-aided banking (Alzaidi, 2018). For instance, the back offices will now focus on important tasks, such as strategic management, as most of the manual work will be reduced (Rickli, 2018). It can be argued that for banks to remain competitive, they are supposed to become more agile and innovative to be able to provide current and potential customers with simplified versions of services at any time (Mirkovi & Luki, 2015). These factors contribute to how organisational structure, business processes, and employees will be adjusted to transform as administrative positions and routine jobs will no longer be necessary. Moreover, AI has a deep impact on specific departments in the bank, which automatically leads to organisational restructuring (Manning, 2018). South Africa, as a developing country, currently has 17 registered banks. However, for these banks to remain relevant and competitive in the new technological era, they should rethink how they operate (Modiba et al., 2020).

> *"Yeah, I mean, fintechs have led the way with it. And banks are also you know, doing that. I mean, they're sitting on a lot of data and internally, but then also now partnering with external providers to get access to third party data to enhance the credit lending models." P11*

Participant 2 alluded to the importance of developing partnerships with other stakeholders to promote the adoption of artificial intelligence in the banking industry and the importance of embracing digital transformation in the banking industry. What was observed from the interviews is that, embracing digital transformation in the

banking sector has various benefits, including enhanced client experiences, operational efficiency, cost savings, and the potential to remain ahead of the competition in a continuously changing market. Banks must have a complete digital strategy and constantly adjust to shifting client expectations and technological improvements. Equally so, the participants also argued that, in some cases, AI can be a tool that can be used to identify new sources of revenue, market analysis, and trading in the banking sector. In the banking industry, using AI to find new income streams, analyse the market, and streamline trade processes may be quite effective.

> *"This is an opportunity for Africa to grow and develop. It is said that AI, if harnessed correctly can add billions in a year in revenue on the continent. I mean, billions of dollars of not talking less. And and but if we don't make sure that we are ready, it's billions that we'll never have." P6*

Large amounts of client data, transaction histories, and market trends may be analysed by AI algorithms to find possible prospects for income generation. AI may assist banks in creating new goods and services that are in line with consumer wants and enhance income streams by recognising client preferences and habits and developing market trends. To deliver real-time market research and insights, AI can evaluate enormous volumes of market data, including financial news, social media trends, and economic indicators.

To help banks make educated investment decisions, recognise possible dangers, and take advantage of market opportunities, AI algorithms can find patterns, correlations, and anomalies in market data. Banks may get insightful information, make data-driven choices, and enhance trading and income-generation operations by utilising AI technology. By seeing new market possibilities, reducing risks, and providing individualised services to consumers, AI helps banks stay competitive in the fast-paced banking sector. Participants mentioned that AI can improve marketing strategies for the banking sector. AI can improve banking industry marketing plans. Banks may improve their marketing strategies, improve client targeting and personalisation, better allocate resources, and increase the overall efficacy of marketing efforts by utilising AI technology. In the banking industry, this may result in higher client acquisition, retention, and loyalty rates. Through the interview I identified

that, the use of AI in banking has enhanced compliance, physical security, risk management, general banking services, and the ability to detect and prevent fraud. The negative implications of artificial intelligence in the financial sector, however, include joblessness, cyberattacks, and data manipulation. Most research participants believed that using artificial intelligence is advantageous for both clients and employees, which boosts productivity and revenues.

4.6 Results pertaining to proposition 2

The use of AI in decision making has the potential to improve business outcomes and increase operational efficiency.

4.6.1 *Development of customised products and services*

Currently, banks are using AI to develop customised products and services for customers, detecting mismatching transactions that might harm business productivity as AI intelligence reduces human error (PwC, 2018). Furthermore, a data analysis application is being utilised to get information about customers that helps to review their details, work profiles, and income to evaluate customers' worthiness to access some facilities through the Automated Teller Machine (ATM) (Vedapradha & Ravi, 2018). Nedbank (2020) states that through AI, Nedbank created the "Super App," which provides customers with products and services that match their lifestyles while providing bank-grade security and safe and secure payments. The "Super App" is "a multitude of apps aggregated into one," which permits businesses and customers to do their business through the digital application (app). P3 used examples of how big e-commerce organisations are getting value for money when it comes to their recommendation engines, which allow the organisation flexibility in meeting the customers at their preference point with the right offers for them.

> *"Now, Amazon does a great job in recommendation engines. Yes, because they've invested for 15 years. For 15 years. They've invested deliberately in bowling that recommendation engine, they didn't build a commerce business, and then decided to become an AI business. They built an AI business led by commerce." - P3*

The use of AI and integrating it with tools like Salesforce to improve marketing strategies and create personalised offers for customers are some of the improved business outcomes that were identified by the researcher. AI can improve the banking industry's marketing plans, and in so doing, it may improve their marketing strategies, improve client targeting and personalisation, better allocate resources, and increase the overall efficacy of marketing efforts using automated solutions that are specific to customer needs and wants. In the banking industry, this may result in higher client acquisition, retention, and brand loyalty.

4.6.2 *Efficiency*

The researcher observed that the role of AI in the automation of routine decisions involves repetitive decision-making and adherence to rules, such as compliance checks, loan underwriting, and credit rating, which is an opportunity for banks to be automated by AI. The belief is that this increases effectiveness, decreases mistakes, and frees up human resources to concentrate on harder and more valuable jobs.

> *"I've seen AI accelerate or reduce the amount of time it takes from gathering insight to actually actioning It benefits of identifying different revenue streams, that would have probably taken a human with their own biases, because, you know, when you when you analyse data, as a human being, you're going to analyse it with a certain narrative in mind." P12*

It is the discovery of the researcher with these interviews that AI can analyse enormous volumes of data, spot patterns, and quickly and accurately come up with judgments or suggestions by employing machine learning algorithms. The banking industry may gain several advantages from AI automation of regular decisions, including higher productivity, better risk management, improved customer service, and improved compliance. Some of the participants, however, felt that banks could streamline operations, generate cost savings, and provide consumers with better services while preserving accuracy and regulatory compliance by leveraging AI technology.

The researcher, though, further identified some of the dangers that AI could introduce to decision-making, which, in some cases, shows that big data may not be inclusive. The use of historical data to train AI systems may reveal prejudices and inequities that

already exist in society. The AI model may learn and reinforce these prejudices, resulting in biased outputs if the data largely comprises demographic groups or sustains discriminatory behaviours. The observation is that it is then necessary to evaluate the historical data closely and find any biases or restrictions it could have, including the methods used to obtain the data, which could be biased. The improvement point for the banks was that the final data sets could not adequately reflect the variety of the population if the techniques used to gather the data favoured or excluded groups. For instance, if financial data is mostly gathered from a certain region or socioeconomic class, it could ignore the needs and realities of disadvantaged or underprivileged people.

4.7 Results pertaining to proposition 3.

The use of AI can help banks to expand their reach and offer new products and services, which can bridge the gap in financial inclusion.

I believe that banks have a unique opportunity to utilise AI to reach the unbanked, or "bottom of the pyramid," as it is often termed. African people are overbanked and underserved. So, they may not get the same type of service from one bank to another. And this is where the use of AI could assist with that. There are unique cases in South Africa, such as stokvels, and had the management of those stokvels been provided various products and services that suited their needs, those LSM would be big contributors to the economy and profitability of the banks. With AI, one of the participants said, “I think AI can play a component in that area, and I do believe that it is an opportunity for banks to better service these various LSMs, and it's just a matter of time before we start seeing the application of it in the marketplace.” Other mentioned the importance of providing tailored services for underserved segments and financial inclusion using artificial intelligence in the banking industry.

> *“Providing tailored services for underserved segments and promoting financial inclusion are important goals that can be achieved through the application of artificial intelligence (AI) in the banking industry.” P8*

The banking sector may provide inclusive and accessible financial services that are suited to the demands of underserved sectors by utilising the potential of AI. With the

use of AI-driven solutions, banks can remove pre-existing constraints, increase financial access, spread financial awareness, and enable people and communities to take more active roles in the economy. I believe that banks have a unique opportunity to utilise AI to reach the unbanked, or the bottom of the pyramid, as it is often termed based on the interviews with different executives. African people are overbanked; some are overbanked but underserved, right? So, they may not get the same type of service from one bank to another. And this is where the use of AI could assist with that. We have unique cases in South Africa, such as stokvels, and we manage those stokvels. AI can play a role in that area; it is an opportunity for banks to better service these various LSMs, and it's just a matter of time before they start seeing the application of it in the marketplace.

> *"I'm excited about financial inclusion and access to financial services, right, in our region, right. I mean, there's a statistic that I saw that I think in about 2030, we have about 90% adoption of the smartphone in Africa. So, marry that with the potential, this technology platform that's coming up, right. So, I can have it financial assistant in my pocket. Right, I can have education in my pocket." P10*

It can be observed that when facilitated by AI, banking can be significantly more accessible. Furthermore, P10 mentioned the dangers of data bias that may be inherent in the big data sets in the banking sector. The way variables are measured or encoded in the data sets might lead to biases. One could then question the fairness of AI algorithms and their impact due to the biased recording of some traits or the absence of variables pertinent to demographic groups. An opportunity I observed is how banks may work to create more equitable and fair AI algorithms by identifying and correcting the biases that exist in massive data sets. By doing this, they can make sure that their decision-making procedures do not support discriminatory behaviours and are in line with fairness and inclusion ideals.

4.8 Summary of findings

For those who might not have access to conventional brick-and-mortar branches, AI-powered mobile banking applications can offer easy and accessible financial services. Mobile banking makes banking services more accessible to a larger audience by

enabling users to carry out a variety of transactions, check balances, make payments, and access other financial services through their cellphones. Banks may expand their services to underprivileged communities, rural areas, and remote locations where physical banking infrastructure may be constrained by utilising AI technology. For those who may have previously been shut out of the traditional banking system, AI's capacity to enable anytime, anywhere access to banking services promotes financial inclusion and improves access to essential financial resources.

Findings eluded that big data may not be inclusive. The utilisation of historical data to train AI systems may reveal prejudices and inequities that already exist in society. The AI model may learn and reinforce these prejudices, resulting in biased outputs if the data largely comprises demographic groups or sustains discriminatory behaviours. It is necessary to evaluate the historical data closely and find any biases or restrictions it could have. Additionally, the methods used to obtain the data may be biased. The final data sets could not adequately reflect the variety of the population if the techniques used to gather the data favoured or excluded groups.

The 21st century has seen substantial technical innovation, which has impacted fields like managerial and socioeconomic development through AI (Saithibvongsa & Yu, 2018). Because of its capacity to assist in the automation of company processes like risk mitigation, client services, customer loaning, and improvement in strategic decision-making, AI has recently gained more acceptance and demand in the banking industry (Agarwal, 2019). A business improvement to the inclusion of the unbanked and underserved is that as customers become more tech-savvy, they expect the bank to provide them with flawless experiences, thus requiring the banks to be deliberate in their digital marketing and personalisation strategies. Therefore, seamless experiences like mobile banking, e-banking, and real-time money transfers have made customers' lives easier (Rashmi & Nirmal Raj, 2020). The front (conversational banking), middle (anti-fraud), and back (underwriting) offices of banks have undoubtedly managed to save costs. Additionally, AI has made it possible for clients to interact with businesses without friction, enabling 24-hour customer care, retail banking services, as well as back and middle offices for investment banking and other financial services (Digalaki, 2021).

AI can assist banks in developing more precise risk assessments, recognising possible dangers, and creating effective risk mitigation measures by examining past data and seeing trends. It was also observed the belief that creditworthiness may be assessed more correctly by AI-based credit scoring algorithms as AI algorithms could give borrowers more accurate risk assessments by evaluating a variety of data and sources, such as credit history, financial documents, and market data. This aids banks in setting suitable interest rates, managing credit portfolios, and making educated lending decisions. Banks can improve the accuracy of risk assessments, automate compliance procedures, spot fraud in real-time, and proactively manage risks by utilising AI technology. In the constantly changing banking environment, these capabilities help institutions make better informed decisions, minimise financial losses, adhere to laws, and have a solid risk management framework in place.

CHAPTER 5. Discussion of Findings

5.1 Introduction

This chapter is an analysis of the research results presented in Chapter 4. From the analysis conducted, table 3 below reflects the themes that were formulated relative to the research questions and propositions.

Table 3: Research questions, propositions, and final themes

Research Question	Proposition	Themes
What role does AI currently play in South African banking?	AI is a transformative technology that is changing the ways banks operate and interact with customers.	1. AI in banking 2. Adoption
How has the use of AI in decision-making impacted the efficiency and profitability of the banks?	The use of AI in decision making has the potential to improve business outcomes and increase operational efficiency.	3. Data bias factors 4. Decision making processes
How can AI be used to expand financial inclusion in the banking industry?	The use of AI can help banks to expand their reach and offer new products and services, which can bridge the gap in financial inclusion.	5. Factors that promote acceptance of AI in the banking industry

The approach used is to emphasise the main findings from Chapter 2 and to overlay them with the findings of the empirical study. The findings are discussed in context of the propositions, which considers the research questions.

5.2 Discussion of findings

5.2.1 *The role of AI in banking*

With the help of AI, banks are increasingly customising services to each customer's unique demands and eliminating those that they know their clients won't use (African Independent, 2019). According to Kaya (2019), as digitalisation has advanced and computers can now apply knowledge without human intervention, AI is changing how banks operate. As a result, one of the banks' needs for enhancing and expanding consumer services has been an increase in digitalisation and data analysis (African Independent, 2019). With the use of data analytics and machine learning, banks are increasingly preparing their services and delivery models for the future (Fintech News, 2020). Due to the protection of personal information, banks have been shunning traditional banking, which has boosted account access security and decreased cybercrime (African Independent, 2019).

The participants reported that AI in their banks occurs when tasks that were usually done by humans are automated. Although some participants pointed out the drawbacks of having AI in the sector, particularly for its employees, most participants agreed that they understood what AI in the banking industry meant and how it was being used. According to published research, the banking sector will likely replace humans with AI when making choices. AI, according to Kaya (2019), refers to a computer program's ability to acquire and use knowledge without the assistance or input of a human. AI does this by just observing the general surroundings and analysing them automatically. Some of the tasks that previously required a human component would be invalidated as they are replaced by automation. This includes a lot of self-service functions that are available to employees and clients. Most answers within the interviews revolved around AI being the replacement of human intelligence by machines when making inferences and decisions (Latimore, 2018).

On the question of the advantages and disadvantages of AI, participants mentioned the impact that AI has on employment opportunities in the banking industry. Some mentioned the fear of job losses in the banking industry due to the automation and efficiency of AI. However, it is crucial to remember that while AI may have an influence on some job activities, it can also open new possibilities and improve the skills of

human workers. AI must be successfully integrated into the banking sector using a methodical strategy that combines technology adoption with upskilling and reskilling programs to keep the workforce flexible and prepared to take advantage of AI's advantages. Banks may equip their employees to successfully exploit AI technology, make informed choices, and drive innovation by investing in comprehensive training, education, and awareness initiatives. A well-trained and AI-aware staff will be better positioned to recognize opportunities, manage difficulties, and fully realize the promise of AI in the banking sector.

5.2.2 *Adoption of digital technologies*

The findings showed that artificial intelligence is being employed in banks' front, middle, and back offices for underwriting and fraud prevention (conversational banking). It is also clear that the use of artificial intelligence in banking has improved compliance, physical security, risk management, fraud, and other banking services. Unemployment, cyberattacks, and data manipulation are a few drawbacks of artificial intelligence in the financial sector, though. Most study participants felt that using AI benefits both clients and employees, which boosts productivity and revenues. However, it was unclear who oversees an organization's emerging technology strategy. According to the literature, CIO's normally carry out this task; however, a new position in the C-suite has evolved that acts as an organisation's transformation catalyst (Horlacher & Hess, 2016). The Chief Digital Officer (CDO) position is not intended to replace CIO's but to complement them instead. Misalignment between strategy and execution caused by two top executives driving transformation is possible. The findings show that each bank employs a distinct strategy; the CIO's and technical teams support the business leaders' agenda for emerging technology. The issue, as highlighted, is that the existing infrastructure necessitates purposeful IT interventions for the solutions and, if not appropriately addressed, might have a negative impact on the efforts to implement new emerging digital technology.

> *"Importance of developing partnerships with other stakeholders to promote the adoption of artificial intelligence in the banking industry. Artificial intelligence (AI) training, education, and awareness are critical in the banking sector to support the effective implementation and exploitation of AI technology." P1*

The lack of custodianship for an emerging technology strategy has no clear answer, which is an indication of the maturity of the different banks' operating models. Moreover, this results in misalignment due to a lack of a central role connecting the dots. The business leaders who are responsible for the adoption of emerging technologies strategy for their products have a robust product monoline focus, which perpetuates silos in the execution of digital solutions. The organisations in pockets have C-suite roles that looks after digital enablement, these roles though support the business-led agenda, thereby opening the organisation up to potential gaps in execution. According to literature, the journey toward digital transformation must begin with the establishment of distinctive governance that promotes cooperation and transparency in change projects (Chanias, 2017).

The formation of a digital transformation strategy is only part of the challenge; the difficulty comes with execution. Successful implementation requires an understanding of customer needs and the underlying processes that support the implementation (Loonam et al., 2018). The study shows that the banks are faced with an execution challenge with the strategy. To close this gap, the banks introduced different strategic programs: Absa has "Bedrock," Nedbank has "Digital First," Capitec has "Digital Future," and Standard Bank has "Digital Transformation." These initiatives aim to increase execution speed, execution governance, and strategic alignment across business verticals. The benefits of these programs will be the successful management of how changes are implemented throughout the various divisions and support the strategy's implementation.

5.2.3 *Data bias factors*

The significance of large-scale data management and data acquisition was brought up by the participants. To minimise data bias and ensure the reasonable and moral application of artificial intelligence (AI) in the banking industry, big data management and acquisition are crucial. Massive data collection and administration are necessary to combat data bias and ensure that AI-driven decisions in the banking industry are fair, inclusive, and consistent with ethical norms. By employing large and diverse data sets, banks may develop robust AI models, decrease prejudice, customise customer experiences, and make more reasonable and equitable decisions while providing their clients with financial services.

Another major advantage of utilising AI in banking, according to other studies, is the provision of impartial judgments. However, as (Jain & Kumar Padney, 2019) alluded to, AI cannot be ignored when assessing and managing risks. Various loan providing applications and digital banks utilise ML algorithms to investigate customisable alternatives and loan eligibility. The algorithms recognise and assess risky situations and establish the first indications of potential problems and threats in the future. According to (Das et al., 2015) the two ideas are useful for combating financial fraud and apprehending offenders. The risk of fraud in e-commerce and online transactions is rising along with the number of online platforms. In addition, as one of the participants said, the fraud detection system may look at the client's location and behaviour thanks to this AI-based technology. If something is discovered to be out of order or a security mechanism, this further contradicts the spending pattern. According to the views of (Davenport & Ronanki, 2018), AI and ML play a key role in banks as they aid in the assessment of financial crimes like money laundering. By identifying suspect activity, it also lowers investigation expenses and workload.

> *There are dangers of data bias that may be inherent in the big data sets in our sector. - P2*

Biases may result from the measurement or encoding of variables in the data sets. The biased recording of some qualities or the lack of relevant variables for specific demographic groups may affect how fair AI systems are. By locating and eliminating biases present in enormous data sets, banks may seek to develop AI algorithms that are more egalitarian and fairer said participant 9. By doing this, businesses may make sure that their decision-making processes adhere to the principles of fairness and inclusion and do not foster discriminatory behaviours.

Participants raised the possibility of bias being built into the data sets' algorithms. Big data may be biased by nature because of earlier data collection methods, social prejudices, or systemic inequities. The use of AI algorithms in banking may result in biased outcomes if these biases are not appropriately handled. When diverse and representative data sets are collected, the impact of biased or discriminatory data is lessened, enabling AI algorithms to draw conclusions that are unbiased and fair. To

overcome bias in algorithms and data sets, banks need to be proactive and persistent in their efforts. By promoting diversity, openness, and ethical standards across the data lifecycle, banks should lessen prejudice and aim toward just and impartial AI-driven decision-making processes in the banking industry.

5.2.4 *Decision making processes*

Participants believed that using AI to speed up decision making and automating the process is helpful.

> *"Generating decisions based by AI functions without human invention speeds up making informed decisions because manually sorting through large amounts of workflow to find relevant information may be time-consuming." P9*

When large amounts of data are broken down into smaller, more manageable amounts, AI then outperforms human capital, opening new prospects and increasing efficiency because those little, more manageable data will be used for decision-making (Colson, 2019). To handle the high amounts of information, conduct account services, answer commonly asked inquiries, and process financial requests, banks have used chatbots. Banks regularly struggle with huge volumes of call center queries and e-mails from consumers (Chan et al., 2019). Figure 6 below shows how huge volumes of data (big data) are entered into machines and systems that break down the information into summarised data, allowing humans to now make judgments using analytics applications, spreadsheets, and dashboards for decision-making (Colson, 2019).

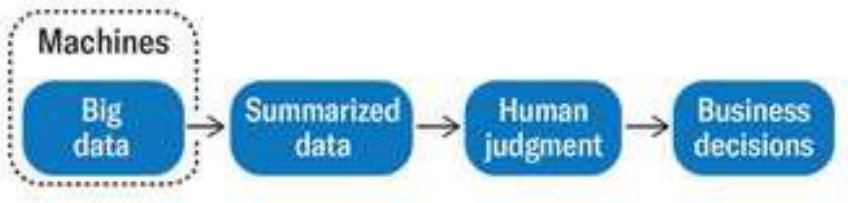


Figure 5: What AI driven decision-making looks like

Currently, AI is employed to make decisions in critical situations where human specialists are not required. In some cases, the collaboration of AI systems with human specialist's results in a joint conclusion that is stronger than if it were made

separately (Zhang et al., 2020). Participant 6 mentioned that banks now have the advantage of using automated computers for decision-making thanks to AI, which gives them an analytical perspective and eliminates human errors, enabling management to make well-informed decisions that are beneficial for the organisation. Along with supplying analytical data, AI also fixes issues that would not have been found and makes precise bank financial status predictions possible (Beaulieu, 2021). Through the secure processing of payments and the reduction of errors, AI and ML are enhancing the transparency and security of the financial system. As regulatory standards related to knowing your customer and anti-money laundering are met, payment protection is improving. In a word, financial organisations and institutions are reducing operating costs while opening a variety of growth and revenue options.

5.2.5 *Factors that promote acceptance of AI in the banking industry*

The number of consumers at banks that already use AI in their daily operations is higher than that at banks that do not. According to participant 10, the implementation of various cutting-edge AI technologies has attracted more clients to their bank and promoted corporate expansion. AI systems are designed to accommodate users of all ages. Most young and senior people can conduct transactions on their own without going to the bank in person. Additionally, a bank will have an advantage over rival banks when it offers a variety of services that are convenient for customers. Fast-reacting banks have a better chance of establishing a competitive edge to keep up with the competition among banks (Lee, 2020).

> *"In some cases, big data may not be inclusive. The utilisation of historical data to train AI systems sometimes reveals prejudices and inequities that already exist in society. The AI model may learn and reinforce these prejudices, resulting in biased outputs, if the data largely comprises demographic groups or sustains discriminatory behaviours. It is necessary to evaluate the historical data closely and find any biases or restrictions it could have. Additionally, the methods used to obtain the data may be biased." P4*

If the methods used to collect the data favour or exclude specific groups, the final data sets might not accurately reflect the diversity of the community. For instance, if financial data is mostly collected from a particular region or socioeconomic class, it

may disregard the requirements and realities of underprivileged or disadvantaged individuals. The experiences of end-users, or customers, have improved because of the usage of AI in the banking sector. Since customers can complete all transactions from the comfort of their homes, there are no longer any lines in banks to serve them. Customers used to visit the branch for various transactions, but recently, everything has become decentralised due to digitalisation, and customers no longer go to the bank.

The researcher found that using AI "decongests the branches, therefore reducing the number of workers required to visit the branches while simultaneously servicing several clients." With this insight, the use of AI in banking and creating inclusivity encourages staff to work with several clients simultaneously, saving time and enhancing the value for the clients. Employee burden has also decreased based on the discoveries made during the interviews because of the banks' reduced congestion. Previous studies have found that banks with customers who are happy with the bank's products and services have significant organisational profits (Asimah et al., 2018). Currently, between the fourth quarter of 2020 and the first quarter of 2021, employment in the finance sector was registered at 215,000 (Statistics South Africa, 2021).

CHAPTER 6. Conclusion and Recommendations

6.1 Introduction

This chapter will present the conclusion based on the research questions introduced in Chapter 1. Recommendations have been made, including suggestions for future research. The purpose of this qualitative study is to investigate the role of artificial intelligence (AI) in banking and how it influences the way South African banks conduct business, offer advice, and engage with customers. The approach to the study is two-fold, firstly to discover the role AI can play in banking. Secondly, to explore the biases, dangers, and benefits of AI use in banking institutions, and its contribution to productivity, efficiency, credibility, and eradication of legacy systems. According to the literature, digital transformation involves more than just adopting emerging technologies within the bank; it also considers additional factors that ultimately threaten the entire ecosystem and business model. Making technology changes without also changing the operating model or business model was a trap that many traditional banking institutes fell into, and thus contributed to the so-called automation failure.

Currently, the South African banking industry is using AI in different aspects of the business. The assumption was made that AI is being used in the industry for different purposes, which has an advantage to the management, employees, and their customers. However, it is debated that AI has negative influences in the banking industry if not managed properly. Therefore, before initiating a digital transformation, it is imperative to understand the current organisational landscape. In contrast to developing a plan for a new bank, in an existing organisation, the journey toward digital transformation must include the development of a practical and workable solution. The organisation must prioritise its use of its limited financial resources to digitise itself considering its current situation and acknowledged limitations. If an organisation decides to totally replace the legacy systems and develop new ones, the transformation journey will look very different. Even so, businesses still require technology to fully modernize their processes. The older architecture that is already in place and is essential to the organisation's existing duties presents a difficulty for the older banks. As a result, the transformation agenda becomes challenging because it requires taking their cost, complexity, and skill sets into account. Traditional banks go

through a process of updating or replacing the outdated systems while altering the business strategy to stop this.
The interviews with the different banking executives have also alluded to the understanding that AI technology can improve the banking customer experience, but challenges include ensuring data security and privacy, teaching AI models to understand banking terminology, and ensuring customer adoption. It is crucial then for Banks to invest in education initiatives and UX design to deliver an intuitive chat interface. AI's potential to revolutionize the industry is significant, but it also requires addressing customer adoption and ensuring the chat interface is easy to use.

6.2 Conclusions regarding research questions

South African banks have shown resilience despite challenges such as inflation, floods, power outages, and geopolitical unrest. Their strategic themes include cost reduction, customer satisfaction, and digitization. Generative AI has the potential to transform the financial sector by improving fraud prevention, automating administrative tasks, and enhancing productivity through co-pilots. Generative AI can also improve credit scoring models by adding data from social media activity, online purchasing trends, and wearable device sensor data. It can also enhance customer experiences by providing 24/7 customer service and creating new interfaces like natural language interfaces. However, there are drawbacks like algorithmic bias and data privacy. Legal frameworks for responsible AI in government should focus on constitutional law and contextualize AI in the AI space. Future studies should explore algorithmic effect assessments and comparative research to create ethical AI systems across national borders. Comparative research and collaboration in creating regulatory frameworks may be beneficial as AI cannot distinguish across national borders. But in addition to its advantages, generative AI has drawbacks that need to be resolved to guarantee ethical and responsible use. The possibility of algorithmic bias is a serious worry. Discriminatory practises may unintentionally be perpetuated by algorithms used to create insights if diversity and inclusion are not taken into consideration during their construction. To reduce this danger, banks must give fairness and transparency top priority when developing algorithms.

Additional crucial factors to consider while applying generative AI in banking are data privacy and security. Banks must follow industry best practises and privacy laws to

guarantee that consumer data is protected and kept private. Finding the right balance between protecting sensitive data and using data to gain insightful insights is crucial.

6.2.1 *The use of AI for solving problems*

AI is referred to in literature as the set of programming instructions that causes computers to behave and act like robots (Donepudi, 2017). The literature review showed that AI is a multidimensional concept, notwithstanding the possibility of slight discrepancies between academics and practitioners about some elements that ought to be included in AI. It includes elements like learning, thinking, solving problems, perceiving, and using language. When applied to the banking sector, large banks, especially those at the forefront, can use AI to offer more individualised customer service, maintain a competitive edge, and include operations throughout the banking system, such as in the back offices (Walch, 2021). For the information about their customers to be secure and safe, the banks must make sure that the AI systems they are installing are safe, have validations, and have security controls. Clients will gain confidence in the bank as a result, increasing their business with the institution.

6.2.2 *AI use in driving business outcomes vs outputs*

AI is currently being used to make decisions in high-stakes scenarios that do not only require human experts. In these scenarios, the combination of AI systems and human experts produces a joint decision outcome that has more strength than when separated (Zhang et al., 2020). Thanks to AI, banks now have the advantage of using automated machines in decision-making, which provides them with an analytical perspective that allows management to make informed decisions that are best for the company and eliminates human errors. Besides providing analytical information, AI also resolves problems that would have been identified and facilitates the accurate prediction of the financial status of the bank (Beaulieu, 2021). the use of robots, quick and efficient decision-making using AI systems, improved efficiency, and improved information security as various AI systems are used. Banks are adapting computer software to curb fraudulent practices and offer virtual assistants to clients through the implementation of AI. Current findings suggest that AI is helping the management in the hiring process, as they are now using developed systems to facilitate the recruitment and selection processes. The banking industry in South Africa is

digitalising its systems by applying AI to provide decisions about loan providers, credit scores, opportunities for investment, and interest rate scores (SovTech, 2019). Although there are different applications, such as social and instant messaging, banking-related applications are among the most downloaded in South Africa (Columinate, 2016). However, on a practical level, both the literature and the interviews with the managers indicated that AI has been used to benefit both the employees and the clients.

6.3 Recommendations

The recommendations presented in this section serve as practical and actionable steps that banking institutions can take to overcome these challenges and maximise the benefits of AI. They are based on an understanding of the current landscape, industry trends, and the experiences shared by participants in the research study.

6.3.1 *Defining digital transformation*

There is a need for strategic alignment within the organisation as it relates to the understanding of digital transformation. The alignment on the definition of what is regarded as "digital" is the first point of departure for the banks. The adoption of new technology ought to be strategically connected to the strategic intent and aligned to the transformation agenda, thereby creating a connection between the business model, business operation, and the digitisation agenda. Technology remains a key enabler for the digital transformation of the bank, but the distinction between digitisation, digital-led transformation, and transforming the entire business model needs to be well understood. The different participants shared their narrative views of their environments; however, across those insights, the real gap was the understanding of what digital is and what it is meant to achieve for banks. The researcher’s belief is that once a clear definition of digital transformation is understood and alignment is achieved, the different transformation programs that the banks have currently will benefit from understanding and using technology for its intended use as per the definitions that were sought out.

6.3.2 *Architectural strategy*

The banks have already experienced the value of traditional AI, scaling many initiatives into production to automate complex processes, increase productivity, and accelerate results and outcomes in specific use cases around fraud detection and data and analytics. Now comes the potential of future AI applications and numerous open-source options that will reveal even greater potential opportunities for AI in banks to extract and produce new forms of value and richer insights from existing data to service banking organisations. To do this efficiently, the banking architectural strategy needs to be defined on how to scale, keep up with future trends, and decouple from legacy code that will affect the performance of big data modules. So, banks would need to define the future state architecture and provide a clear road map on how the current and future states will converge, incorporating the strategic programs that were launched to accelerate execution. The current legacy modernisation initiatives will work in the short term, but as the digital transformation journey matures, the need for newer, agile technology will proliferate. Digital technology is a critical component of the transformation of the organisation, although it is not the only one. As the organisation changes the business model to create new revenue streams, the supporting architecture will need to be mobilised to meet the identified strategic priorities for the banks when it comes to adopting new technologies.

6.3.3 *Re-skilling of the workforce*

As some participants pointed out, their departments are now using AI to boost efficiency. The interviewees described AI as already existing and inevitable. Through the participant interviews, the researcher discovered that the participants were knowledgeable about AI and its use in the banking industry. One of the conclusions was that AI is not meant to replace workers but rather to assist them in doing their jobs more effectively and productively while diverting their attention from repetitive tasks. As a result, it is advised that banking institutions create intentional learning programs for all staff on fundamental digital capabilities. The dexterity gap can be closed by concentrating on both technical and non-technical skills. Digital skills ought to be a requirement whenever new hires are being considered.

6.3.4 *Empowering customer control*

As most participants mentioned POPIA and other consent measures that need to be adhered to by banking institutions and the governance that governs these for compliance, my recommendation is for banking institutions to provide customers with greater control over their data and empower them to manage their privacy preferences. This can be achieved through user-friendly interfaces that allow customers to easily access, modify, or delete their personal data, as well as control the types of data they are willing to share. Offering options for selective data sharing and granular consent settings can help build trust and enhance customer confidence in the responsible use of AI technologies. Regular communication and education initiatives should be undertaken to inform customers about their data rights and how their information is being utilised to deliver personalised experiences while maintaining their privacy. By prioritising customer experience in the use of AI and ensuring data privacy and consent, banking institutions can foster stronger customer relationships, build trust, and differentiate themselves in the competitive landscape.

6.4 Limitations

The research sample size was limited to the big four traditional banks and did not include newer banks that have fintech and no architectural legacy. Although the big banks make up the big parts of the South African economy by earnings, number of customers and staff nuances would exist in most business units that may influence the generalisation of the findings. The study is also based on a single technology skill set and industry exposure and fails to consider the nuances in different contexts. Furthermore, it is the impression of the researcher that digital maturity, architectural complexity, skills, leadership, and strategy would all need to be taken into consideration when analysing other organisations undergoing emerging technology adoption projects, programs, / transformations.

6.5 Suggestions for further research

The following areas have been identified for further research:

1. When researching this topic, there were no readily available frameworks to support the uptake of emerging technologies like AI by a legacy institution. The development of this would be used to guide organisations that go through this process.
2. It would be interesting to study the impact of the adoption of emerging technologies like AI in an organisation that is changing its business model at the same time and validate whether that has any impact on the successful implementation of the digitisation strategy.
3. A broader study into different operating models that result in the successful implementation of AI strategies, coupled with guidelines on effective operating models for digitally transformed organisations.
4. How effective decision-making can act as an enabler for the inclusion of the unbanked and underserved.
5. An understanding of the real cost of incremental legacy modernisation in organisations adopting AI and other emerging technologies.

References

African Independent. (2019) .4 Ways automation is revolutionising the banking sector.African Independent. https://www.africanindy.com/technology/4-ways-automation-isrevolutionising-the-banking-sector-31761509

Agarwal, P. (2019). Redefining Banking and Financial Industry through the application ofComputational Intelligence. In 2019 Advances in Science and EngineeringTechnology International Conferences (ASET) (pp. 1-5). The Institute of Electricaland Electronics Engineers.

Agogo, D., & Hess, T. J. (2018). “How does tech make you feel?” a review and examination of negative affective responses to technology use. *European Journal of Information Systems*, 27(5), 570–599. https://doi.org/10.1080/0960085x.2018.1435230

Ajzen, I. (1991). The Theory of Planned Behavior. Organizational Behavior and Human Decision Processes, 50, 179-211.

Al-Qaysi, N., Mohamad-Nordin, N., & Al-Emran, M. (2021). Developing a comprehensive theoretical model for adopting social media in higher education. Interactive Learning Environments, 1–22. https://doi.org/10.1080/10494820.2021.1961809

Alameda, T. (2018). Data, AI and financial inclusion: the future of global banking. Responsible Finance Forum , 2020. https://www.bbva.com/en/data-ai-and-financial-inclusion-the-future-of-global-banking/

Alzaidi, A. A. (2018). Impact of artificial intelligence on performance of banking industry inthe Middle East. International Journal of Computer Science and Network Security,18(10).

Asimah, E. D., Kong, Y., Nyarko, F. K., & Beraud, D. J. (2018). The effect of time management on productivity in financial institutions: A case study of Ghana

Commercial Bank. International Journal of Management Sciences and Business Research, 7(2).

Beaulieu, D. (2021). How AI can create a competitive advantage in Business? Paldesk.https://www.paldesk.com/how-artificial-intelligence-can-create-a-competitiveadvantage-in-business/.

Berger, A. N., & Bouwman, C. H. S. (2013). How does capital affect bank performance during financial crises? Journal of Financial Economics, 109(1), 146–176. https://doi.org/10.1016/j.jfineco.2013.02.008

Bhattacherjee, A. (2012). Social Science Research: Principles, Methods, and Practices, pp. 113 – 129. Californian: University of California Scholar Commons.

Brand, Dirk. (2022). Responsible Artificial Intelligence in Government: Development of a Legal Framework for South Africa. JeDEM - eJournal of eDemocracy and Open Government. 14. 130-150. 10.29379/jedem.v14i1.678.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. Qualitative research in psychology, 3(2), 77-101.

Saunders, M., Thornhill, A., & Lewis, P. (2009). Research methods for business students (5th ed.). London: Prentice Hall.

Braun, V. and Clarke, V. (2006) Using thematic analysis in psychology. Qualitative Research in Psychology, 3 (2). pp. 77-101.

Brown, S. A., Dennis, A. R., & Venkatesh, V. (2010). Predicting Collaboration Technology Use: Integrating Technology Adoption and Collaboration Research. Journal of Management Information Systems, 27(2), 9–54. https://doi.org/10.2753/mis0742-1222270201

Brynjolfsson, E., & McAfee, A. (2012). Race Against the Machine: How the Digital Revolution is Accelerating Innovation, Driving Productivity, and Irreversibly

Transforming Employment and the Economy. In Google Books. Brynjolfsson and McAfee. https://books.google.co.za/books?hl=en&lr=&id=6O-MBAAAQBAJ&oi=fnd&pg=PT13&dq=Race+against+the+machine:+How+the+digital+revolution+is+accelerating+innovation

Buchanan, B. G. (2019, March 27). Artificial intelligence in finance. Zenodo. https://zenodo.org/record/2612537#.YvFLrS0RpEI

Burns, S. (2018). M-Pesa and the ‘market-led’ approach to financial inclusion. Economic Affairs, 38(3), 406-421.

Cai, L., Yuen, K. F., Xie, D., Fang, M., & Wang, X. (2021). Consumer's usage of logistics technologies: Integration of habit into the unified theory of acceptance and use of technology. Technology in Society, 67, 101789.

Cao, G., Duan, Y., Edwards, J. S., & Dwivedi, Y. K. (2021). Understanding managers’ attitudes and behavioural intentions towards using artificial intelligence for organizational decision-making. Tec novation, 106, 102312. https://doi.org/10.1016/j.technovation.2021.102312

Cassell, C., & Symon, G. (2004). Essential guide to qualitative methods in organisational research. Sage.

Chan, C., Chow, C., Wong, J., Dimakis, N., Nayler, D., Bermudes, J., Raman, J., Lam, R., & Baker, M. (2019). Artificial intelligence applications in financial services asset management, banking and insurance. Marsh and McLennan Companies.

Chanias, S. (2017). Mastering digital transformation: The path of a financial services provider towards a digital transformation strategy. Paper presented at the 25th European Conference on Information Systems, Portugal.

Chatterjee, S., & Bhattacharjee, K. K. (2020). Adoption of artificial intelligence in higher education: a quantitative analysis using structural equation modelling.

Education and Information Technologies, 25(5), 3443–3463. https://doi.org/10.1007/s10639-020-10159-7

Chatterjee, S., Ghosh, S. K., & Chaudhuri, R. (2020). Knowledge management in improving business process: an interpretative framework for successful implementation of AI–CRM–KM system in organizations. Business Process Management Journal, ahead-of-print(ahead-of-print). https://doi.org/10.1108/bpmj-05-2019-0183

Colson, E. (2019, July 8). What AI-Driven Decision Making Looks Like. Harvard Business Review. https://hbr.org/2019/07/what-ai-driven-decision-making-looks-like

Cresswel, J. W., & Cresswel, J. D. (2018). Research Design (5th ed.). SAGE Publications Inc.

Cuesta, C., Ruesta, M., Tuesta, D., & Urbiola, P. (2015). The digital transformation of the banking industry. Digital Economy Watch. BBVA Research Digital Watch. https://www.researchgate.net/publication/291357544_The_digital_transformation_of_the_banking_industry

Das, S., Dey, A., Pal, A., & Roy, N. (2015). Applications of Artificial Intelligence in Machine Learning: Review and Prospect. International Journal of Computer Applications, 115(9), 31–41. https://doi.org/10.5120/20182-2402

Davenport, T., Guha, A., Grewal, D., & Bressgott, T. (2019). How Artificial Intelligence Will Change the Future of Marketing. Journal of the Academy of Marketing Science, 48(1), 24–42. Springer. https://doi.org/10.1007/s11747-019-00696-0

Davenport, T., & Ronanki, R. (2018). Artificial Intelligence for the Real World. http://blockqai.com/wp-content/uploads/2021/01/analytics-hbr-ai-for-the-real-world.pdf

Davies, C. (2019, January 22). How should the finance world deal with legacy technology? International Banker. https://internationalbanker.com/technology/how-should-the-finance-world-deal-with-legacy-technology/

Davis, F., & Davis, F. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. MIS Quarterly, 13, 319-340.

Denzin, N. K., & Lincoln, Y. S. (2011). The Sage handbook of qualitative research. United Kingdom: Sage.

De Vos, A. S., Delport, C. S. L., Fouché, C. B., & Strydom, H. (2011). Research at grassroots: A primer for the social science and human professions. Van Schaik Publishers.

Digalaki, E. (2021). The $450B opportunity for the applications of artificial intelligence in the banking sector & examples of how banks are using AI. Businessinsider.https://www.businessinsider.com/the-ai-in-banking-report-2019-6?IR=T

Donepudi, P. K. (2017). Machine learning and artificial intelligence in banking. Engineering International, 5(2), 83-86.

Dwivedi, Y. K., Hughes, L., Ismagilova, E., Aarts, G., Coombs, C., Crick, T., Duan, Y., Dwivedi, R., Edwards, J., Eirug, A., Galanos, V., Ilavarasan, P. V., Janssen, M., Jones, P., Kar, A. K., Kizgin, H., Kronemann, B., Lal, B., Lucini, B., & Medaglia, R. (2019). Artificial Intelligence (AI): Multidisciplinary perspectives on emerging challenges, opportunities, and agenda for research, practice and policy. International Journal of Information Management, 57. https://doi.org/10.1016/j.ijinfomgt.2019.08.002

Fabio, H., Hartung, P.J., Mcllveen, P., McMahon, M and Watson, M. (2012). First steps in journal article writing. Cape Town. Juta.

Fintech News. (2020). How will artificial intelligence change the banking industry? Fintech news. https://www.fintechnews.org/how-will-artificial-intelligence-changethe-banking-idustry/

Fishbein, M., & Ajzen, I. (1977). Belief, attitude, intention and behaviour: An introduction to theory and research, 27(2), 123-156.

Fliche, O., & Yang, S. (2018a). Artificial intelligence: Challenges for the financial sector. https://acpr.banque-france.fr/sites/default/files/medias/documents/2018_12_20_intelligence_artificielle_en.pdf

Fliche, O., & Yang, S. (2018b). Artificial intelligence: Challenges for the financial sector. https://acpr.banque-france.fr/sites/default/files/medias/documents/2018_12_20_intelligence_artificielle_en.pdf

Furst, K., Lang, W., & Nolle, D. E. (1998). Technological Innovation in Banking and Payments: Industry Trends and Implications for Banks. Quarterly Journal, Office of the Comptroller of the Currency, 17(3). p.23. https://www.semanticscholar.org/paper/Technological-Innovation-in-Banking-and-Payments%3A-Furst-Lang/31a8b2900ebc090786f36d907750c6b2713e937b

Gartner. (2017, May 11). Gartner's Cool Vendors in AI for Banking and Investment Services. http://blogs.gartner.com/moutusi-sau/2017/05/11/gartners-cool-vendors-in-ai-for-banking-and-investment-services/

Ghandour, A. (2021). Opportunities and Challenges of Artificial Intelligence in Banking: Systematic Literature Review. TEM Journal, 10(4), 1581–1587. https://doi.org/10.18421/tem104-12

Ghosh, B., Wilson, H. J., Burden, A., & Daugherty, P. R. (2019a, May 9). Taking a Systems Approach to Adopting AI. Harvard Business Review. https://hbr.org/2019/05/taking-a-systems-approach-to-adopting-ai

Ghosh, B., Wilson, J. H., Burden, A., & Daugherty, P. R. (2019b, May 9). Taking a Systems Approach to Adopting AI. Harvard Business Review. https://hbr.org/2019/05/taking-a-systems-approach-to-adopting-ai

Gigov, I. S., & Poposka, K. (2017). Digital transformation of the banking sector in republic of macedonia: State the opportunities for further advancement. Economic Development/Ekonomiski Razvoj, 19(3). https://scholar.google.com/citations?view_op=view_citation&hl=en&user=YTPhJrwAAAAJ&citation_for_view=YTPhJrwAAAAJ:Y0pCki6q_DkC

Greener, D. S. (2008). Business Research Methods Vol. 1. London: Ventus Publishing.

Grewal, D., Guha, A., Satornino, C. B., & Schweiger, E. B. (2021). Artificial intelligence: The light and the darkness. Journal of Business Research, 136, 229–236. https://doi.org/10.1016/j.jbusres.2021.07.043

Grover, P., Kar, A. K., & Dwivedi, Y. K. (2020). Understanding artificial intelligence adoption in operations management: insights from the review of academic literature and social media discussions. Annals of Operations Research. https://doi.org/10.1007/s10479-020-03683-9

Gumede, W. (2017, 5 March). New technological revolution will leave Africa behind. SABCNews. http://www.sabc.co.za/news/a/2d258200404b746eb853f96b78d177f4/Newtechnological-revolution-will-leave-Africa-behind%E2%80%99-20170503

Gursoy, D., Chi, O. H., Lu, L., & Nunkoo, R. (2019). Consumers acceptance of artificially intelligent (AI) device use in service delivery. International Journal of

Information Management, 49, 157–169. https://doi.org/10.1016/j.ijinfomgt.2019.03.008

Habib, M. (2002). Mine clearance techniques and technologies for effective humanitarian demining. Journal of Conventional Weapons Destruction, 6(1), 17.

Hassani, H., Silva, E. S., Unger, S., TajMazinani, M., & Mac Feely, S. (2020). Artificial Intelligence (AI) or Intelligence Augmentation (IA): What Is the Future? AI, 1(2), 143–155. MDPI. https://doi.org/10.3390/ai1020008

Hlatshwayo, M. (2017). Technological changes and manufacturing unions in South Africa:Failure to formulate a robust response. Global Labour Journal, 8(2).

Horlacher, A., & Hess, T. (2016). What does a Chief Digital Officer do? Managerial tasks and roles of a new C-level position in the context of digital transformation. Paper presented at the 2016 49th Hawaii International Conference on System Sciences (HICSS).

Infosys. (2017). Five Ways in Which AI Is Changing Banking as We Know It | Infosys. Www.infosys.com. https://www.infosys.com/insights/ai-automation/Pages/five-ways-in-which-ai.aspx

Jacob, F. (2016). The role of M-Pesa in Kenya's economic and political development. In Kenya After 50 (pp. 89-100). Palgrave Macmillan.

Jain, A., & Kumar Pandey, A. (2019). Modelling And Optimizing of Different Quality Characteristics In Electrical Discharge Drilling Of Titanium Alloy (Grade-5) Sheet. Materials Today: Proceedings, 18, 182–191. https://doi.org/10.1016/j.matpr.2019.06.292

Jain, A., & Pandey, A. K. (2017). Multiple Quality Optimizations in Electrical Discharge Drilling of Mild Steel Sheet. Materials Today: Proceedings, 4(8), 7252–7261. https://doi.org/10.1016/j.matpr.2017.07.054

Jeon, H. M., Sung, H. J., & Kim, H. Y. (2020). Customers' acceptance intention of self-service technology of restaurant industry: expanding UTAUT with perceived risk and innovativeness. Service Business, 14(4), 533-551.
Jeon, H. M., Sung, H. J., & Kim, H. Y. (2020). Customers' acceptance intention of self-service technology of restaurant industry: expanding UTAUT with perceived risk and innovativeness. Service Business, 14(4), 533-551.
Kaya, O. (2019). Artificial intelligence in banking. Deutsche Bank Research.

Kok, J., Boers, E., Kosters, W., Van Der Putten, P., & Poel, M. (2009). Artificial intelligence: Definition, trends, techniques and cases. https://www.eolss.net/Sample-Chapters/C15/E6-44.pdf

Kreger, A. (2023, March 20). *Council Post: the Future of AI in Banking*. Forbes. https://www.forbes.com/sites/forbesbusinesscouncil/2023/03/20/the-future-of-ai-in-banking/?sh=97526e65ed5e

Latimore, D. (2018). Artificial Intelligence in banking. Oliver Wayman.

Leech, N. L., & Onwuegbuzie, A. J. (2007). An array of qualitative data analysis tools: a call for data analysis triangulation. School psychology quarterly,22(4), 557.

Lee, I. (2020, October 23). Competitive Advantages of Implementing Artificial Intelligence in Banking. Www.ironmountain.com. https://www.ironmountain.com/blogs/2018/competitive-advantages-of-implementing-artificial-intelligence-in-banking

Lee, J.-C., & Chen, X. (2022). Exploring users' adoption intentions in the evolution of artificial intelligence mobile banking applications: the intelligent and anthropomorphic perspectives. International Journal of Bank Marketing, 40(4), 631–658. https://doi.org/10.1108/ijbm-08-2021-0394

Leech, N. L., & Onwuegbuzie, A. J. (2007). An Array of Qualitative Data Analysis tools: a Call for Data Analysis triangulation. School Psychology Quarterly, 22(4), 557–584. https://doi.org/10.1037/1045-3830.22.4.557

Lester, S. (1999). An introduction to phenomenological research. Stan Lester Developments,Taunton.

Loonam, J., Eaves, S., Kumar, V., & Parry, G. (2018). Towards digital transformation: Lessons learned from traditional organisations. StrategicChange, 27(2), 101-109.

Lopes, J., & Pereira, J. L. (2019). Blockchain Projects Ecosystem: A Review of Current Technical and Legal Challenges. Advances in Intelligent Systems and Computing, 931, 83–92. https://doi.org/10.1007/978-3-030-16184-2_9

Maguire, M., & Delahunt, B. (2017). Doing a thematic analysis: A practical, step-by-stepguide for learning and teaching scholars. The All Ireland Journal of Teaching andLearning in Higher Education, 9(3).

Mahalakshmi, V., Kulkarni, N., Pradeep Kumar, K. V., Suresh Kumar, K., Nidhi Sree, D., & Durga, S. (2021). The Role of implementing Artificial Intelligence and Machine Learning Technologies in the financial services Industry for creating Competitive Intelligence. Materials Today: Proceedings, 56(4), 2252–2255. https://doi.org/10.1016/j.matpr.2021.11.577

Makridakis, S., 2017. The forthcoming artificial intelligence (AI) revolution: Its impact on society and firms. Neapolis University Institutional Repository, 90, pp.46-60.

Manning, J. (2018). How AI is Disrupting the Banking Industry. International Banker.https://internationalbanker.com/banking/how-ai-is-disrupting-the-banking-industry/

Manning, J. (2018, July 4). How AI Is Disrupting the Banking Industry. International Banker. https://internationalbanker.com/banking/how-ai-is-disrupting-the-banking-industry/

Marous, J. (2018). To succeed with AI in banking, you must first invest in humans. The Financial Brand. https://thefinancialbrand.com/72561/banking-artificial-intelligenceai-human-training-future-of-work/.

Meissner, P., & Keding, C. (2021). The Human Factor in AI-Based Decision-Making. MIT Sloan Management Review, 63(1). https://www.proquest.com/docview/2600353769

Mhlanga, D. (2020). Industry 4.0 in Finance: The Impact of Artificial Intelligence (AI) on Digital Financial Inclusion. International Journal of Financial Studies, 8(3), 45. https://doi.org/10.3390/ijfs8030045

Mirkovic, V., & Lukic, J. (2015). Mobile banking is an innovation in the financial sector. Economic Vistas, (2-3), 297–310.

Modiba, M. M., Kekwaletswe, R. M., & Komati, M. D. (2020). IT capability framework for digital transformation in South African financial service providers. International Journal of Computer & Organization Trends (IJCOT), 10(2).

Momani, A. M. (2020). The unified theory of acceptance and use of technology: A new approach in technology acceptance. International Journal of Socio technology and Knowledge Development (IJSKD), 12(3), 79-98

Montesdioca, G. P. Z., & Maçada, A. C. G. (2015). Measuring user satisfaction with information security practices. Computers & Security, 48, 267–280. https://doi.org/10.1016/j.cose.2014.10.015

Mtebe, J., & Raisamo, R. (2014). Investigating students' behavioural intention to adopt and use mobile learning in higher education in East Africa. International Journal of Education and Development using ICT, 10(3).

Neubauer, B. E., Witkop, C. T., & Varpio, L. (2019). How phenomenology can help us learn from the experiences of others. Perspectives on Medical Education, 8(2), 90-97.

Neuman, W. L., & Robson, K. (2014). Basics of social research. Pearson Canada.

PwC. (2018). The potential impact of Artificial intelligence in the Middle East. PwC Middle East.

Rashmi, R., & Nirmal Raj, V. K. (2021). A study on the implementation and the impact of artificial intelligence in banking processes. Asian Journal of Management, 12(1), 47-54.

Rickli, J. M. (2018). The economic, security and military implications of artificial intelligence for the Arab Gulf Countries. EDA Insights.

Ritchie, J., Lewis, J., Nicholls, C. M., & Ormston, R. (2013). Qualitative research practice: A guide for social science students and researchers. London: Sage.

Ritchie, J., Lewis, J., Nicholls, C. M., & Ormston, R. (2013). Qualitative research practice: A guide for social science students and researchers. London: Sage.

Saithibvongsa, P., & Yu, J. E. (2018). Artificial Intelligence in the computer age threatens human beings and working conditions at workplaces. Electronics Science Technology and Application, 5(2).

Saithibvongsa, P., & Yu, J. E. (2018). Artificial Intelligence in the computer age threatens human beings and working conditions at workplaces. Electronics Science Technology and Application, 5(2).

Saunders, M., Thornhill, A., & Lewis, P. (2009). Research methods for business students (5th ed.). London: Prentice Hall.

Schneider, A. (2013, May 19). When companies become prisoners of legacy systems. The Wall Street Journal. Retrieved

from97https://deloitte.wsj.com/cio/2013/10/01/when-companies-becomeprisoners-of-legacy-systems/

Scott, D. and Morrison, M. (2007). Key Ideas in Educational Research. (1st ed). United Kingdom: Continnum-3PL

Statistics South Africa. (2021). Statistical Release Quarterly Labour Force Survey. Statistics SA. https://www.statssa.gov.za/publications/P0211/P02111stQuarter2020.pdf

Vedapradha, R., & Ravi, H. (2018). Application of artificial intelligence in investment banks. Review of Economic and Business Studies, 11(2), 131-136.

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User Acceptance of Information Technology: Toward a Unified View. MIS Quarterly, 27(3), 425-478

Nedbank. (2020). Nedbank launches a tech-based solution that revolutionises the way South Africans shop and sells. Www.nedbank.co.za. https://www.nedbank.co.za/content/nedbank/desktop/gt/en/news/nedbankstories/nedb

Omoge, A. P., Gala, P., & Horky, A. (2022). Disruptive technology and AI in the banking industry of an emerging market. International Journal of Bank Marketing. https://doi.org/10.1108/ijbm-09-2021-0403

Peric, K. (2015). Digital financial inclusion. Journal of Payments Strategy & Systems, 9(3), 212–214. https://www.ingentaconnect.com/contentone/hsp/jpss/2015/00000009/00000003/art00001

Pietronudo, M. C., Croidieu, G., & Schiavone, F. (2022). A solution looking for problems? A systematic literature review of the rationalizing influence of artificial intelligence on decision-making in innovation management.

Technological Forecasting and Social Change, 182, 121828. https://doi.org/10.1016/j.techfore.2022.121828

Raisch, S., & Krakowski, S. (2021). Artificial Intelligence and Management: The Automation–Augmentation Paradox. Academy of Management Review, 46(1), 192–210. https://doi.org/10.5465/amr.2018.0072

Ravikumar, T., Suhashini, J., Murugan, N., & Rajesh, R. (2021). Banking on Artificial Intelligence to Bank the Unbanked. Annals of the R.S.C.B, 25(5), 129–132. https://www.annalsofrscb.ro/index.php/journal/issue/view/29

Rodrigues, A. R. D., Ferreira, F. A. F., Teixeira, F. J. C. S. N., & Zopounidis, C. (2022). Artificial intelligence, digital transformation and cybersecurity in the banking sector: A multi-stakeholder cognition-driven framework. Research in International Business and Finance, 60, 101616. https://doi.org/10.1016/j.ribaf.2022.101616

Sadok, H., Sakka, F., & El Maknouzi, M. E. H. (2022). Artificial intelligence and bank credit analysis: A review. Cogent Economics & Finance, 10(1). https://doi.org/10.1080/23322039.2021.2023262

Thomas, L. C. (2000). A survey of credit and behavioural scoring: forecasting financial risk of lending to consumers. International Journal of Forecasting, 16(2), 149–172. https://doi.org/10.1016/s0169-2070(00)00034-0

Tiberius, V., & Hirth, S. (2019). Impacts of digitization on auditing: A Delphi study for Germany. Journal of International Accounting, Auditing and Taxation, 37, 1020288.

Toesland, F. (2022). More African banks turn to AI. African Banker, 57, 38–39. https://www.proquest.com/trade-journals/more-african-banks-turn-ai/docview/2639039359/se-2

Townson, S. (2020, November 6). AI Can Make Bank Loans More Fair. Harvard Business Review. https://hbr.org/2020/11/ai-can-make-bank-loans-more-fair

Van den Berg, M., & Pather, K. (2023, May 26). *SA Banks and Generative AI*. Www.ey.com. https://www.ey.com/en_za/financial-services/sa-banks-and-generative-ai

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. MIS quarterly, 425-478.

Venkatesh, V., Thong, J. Y., & Xu, X. (2012). Consumer acceptance and use of information technology: extending the unified theory of acceptance and use of technology. MIS quarterly, 157-178.

APPENDIX A: RESEARCH INSTRUMENT

Dear Participant,

My name is Maggie Matsie, I am a Masters student at the University of the Witwatersrand Business School in Johannesburg. Part of my studies require me to undertake a research project. The purpose of this study is to understand the benefits and dangers of artificial intelligence in banking under the supervision of Dr Emmanuel Quaye. The objective of this study is to investigate the role AI can play in banking and how it influences the way banks transact, advise, and interact with their customers in South Africa.

As a key IT decision maker, you are invited to participate in a virtual interview, which will take approximately 20 - 30 minutes.

This research project will not put you at risk or compromise your personal information in any manner. Your participation will be anonymous and no personal information will be requested from you. There are no costs involved for you to participate in this study. Your participation is voluntary, and you may at any point during the interview withdraw from it. There will be no penalties.

Please let me know if you require any further information, my email address is 1831489@students.wits.ac.za. I look forward to your response as soon as is convenient.

Yours sincerely
Maggie Matsie
082 7170508

Participant Consent Form

Understanding the benefits and dangers of the role artificial intelligence plays in banking

Maggie Matsie

I…….…….. agree to participate in this research project. The research has been explained to me and I understand what my participation will involve.

I agree that my participation will remain anonymous	YES	NO
I agree that the researcher may use anonymous quotes in his research report	YES	NO
I agree that the interview may be audio recorded	YES	NO
I agree that the researcher may take photos of me (But not my face)	YES	NO
I agree that the information I provide may be used anonymously by other researchers following this study	YES	NO

…… (signature)

…… (name of participant)

…… (date)

APPENDIX B – INTERVIEW GUIDE

Standard Participant Questions

1. Please state your role at Bank X.
2. What is your job level in the organisation?
3. How many years have you worked in Bank X?
4. What is the division and functional area that you work in?
5. Have you ever been involved in the development of an AI strategy at Bank X?

Current role that AI plays

6. What is your understanding of artificial intelligence in banking technologies?
7. To what extent is AI being used in your bank?
8. How do employees' skills influence the level of AI adoption in the bank
9. What do you think are the advantages and disadvantages of using AI in banks?
10. How has employee performance been affected since the implementation of AI in the bank?

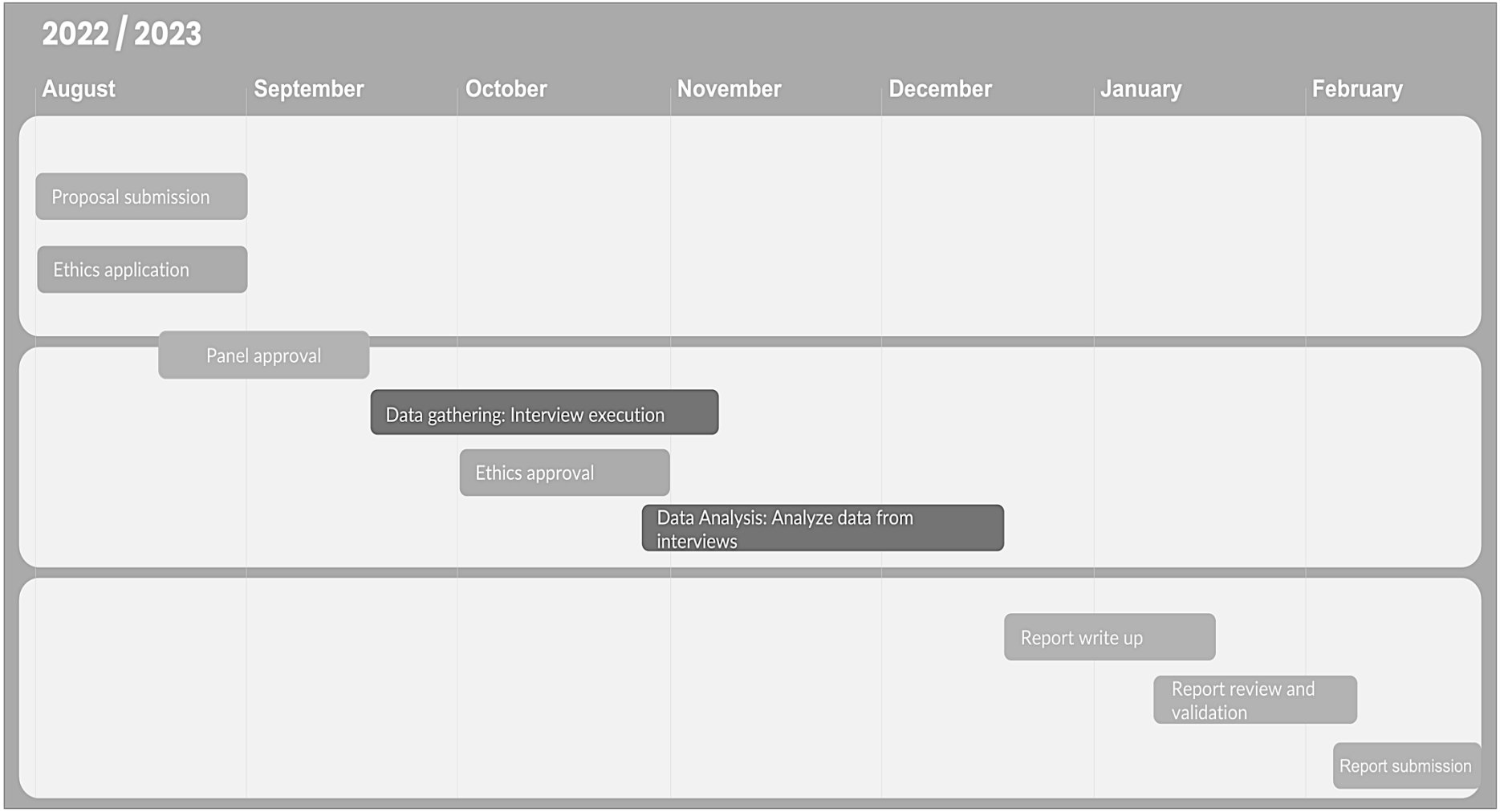
AI decision-making

11. In what ways do you think AI cam improve operational efficiency in banks?
12. Why is the credit scoring scorecard important in the bank?
13. How do you mitigate algorithmic aversion?
14. How do you think banks can ensure the ethical use of AI in decision-making?

AI and financial inclusion

15. How do you think AI can help banks expand their reach?
16. How does the bank plan to increase access and adoption of digital channels?
17. What potential benefits do you see for financial inclusion in the use of AI?
18. How does the use of AI impacts on service delivery or product offerings?

APPENDIX C – PROPOSED SCHEDULE AND TIMES



APPENDIX D: CONSISTENCY TABLE

RQ #	State Research Question or Objective	Prop/hyp #	State Proposition or Hypothesis	Data collection detail	Data analysis method
1	RQ 1 – What role does AI currently play in South African banking?	1.1	P1 - AI is a transformative technology that is changing the way banks operate and interact with customers.	Interview guide questions 6, 7, 8, 9,10	Thematic analysis
2	RQ – 2 How has the use of AI in decision-making impacted the efficiency and profitability of banks?	2.1	P2 - The use of AI in decision making has the potential to improve business outcomes and increase operational efficiency.	Interview guide questions 11,12,13,14	Thematic analysis
3	RQ – 3 How can AI be used to expand financial inclusion in the banking industry?	3.1	P3 - The use of AI can help banks to expand their reach and offer new products and services, which can bridge the gap in financial inclusion.	Interview guide questions 15, 16, 17, 18	Thematic analysis

RQ #	State Research Question or Objective	Prop/hyp #	State Proposition or Hypothesis	Data collection detail	Data analysis method

APPENDIX E: EMERGING THEMES

Code	Groundedness	Density	Themes	Number of Groups
AI role: Behavioural data analytics and Customer Profiling	15	1	Decision Making Processes	1
Automation of routine decisions	8	2	Decision Making Processes	1
Bias: Algorithm	14	1	Data Bias Factors	1
Bias: Data bias	14	2	Data Bias Factors	1
Bias: Information is not inclusive	10	2	Data Bias Factors	1
Blg Data sets: Acquisition and Management of big Data	10	3	Data Bias Factors	1
Compliance and regulatory adherence	29	2	Decision Making Processes	1
Cost effectiveness and efficiency	9	1	Factors that promote acceptance	1
Customer Service and Support	10	3	Role of Artificial Intelligence in Banking	1
Data privacy and consent	17	2	Data Bias Factors	1
Data-driven decision-making:	9	1	Decision Making Processes	1
Develop partnerships with other stakeholders	5	1	Adoption of digital technologies	1
Embrace digital transformation	13	2	Adoption of digital technologies	1
Enhance cybersecurity measures	14	2	Adoption of digital technologies	1
Fraud detection and prevention	11	4	Role of Artificial Intelligence in Banking	1
Identification of sources of revenue, market analysis and trading	11	3	Role of Artificial Intelligence in Banking	1
Improving access to digital banking	8	2	Factors that promote acceptance	1
innovation and creativity	7	1	Factors that promote acceptance	1
Marketing	6	3	Role of Artificial Intelligence in Banking	1
Personalised customer experience and improving products and services	44	5	Role of Artificial Intelligence in Banking	1
Risk assessment and mitigation	7	1	Decision Making Processes	1
Risk Factors: Fear of job loss	8	1	Risk factors	1
Risk Factors: Lack of integration and acceptance of AI in the banks	8	1	Risk factors	1
Risk factors: Legacy systems, infrastructure and socio-economic status	22	2	Risk factors	1
Scenario modeling and predictive analytics	10	1	Decision Making Processes	1
Tailor services for underserved segments and financial inclusion	9	1	Adoption of digital technologies	1
Teaching and learning	6	2	Role of Artificial Intelligence in Banking	1
Training, Education and Awareness	19	2	Adoption of digital technologies	1