Exploring artificial intelligence in the South African banking industry

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Remarks

The reader is reminded of the following:

- The American Psychological Association (APA) reference and editorial format, which is prescribed by the publication manual (7th edition), was use in this dissertation. This practice is in line with the policy of the Human Resource Management Programme of the North-West University (Potchefstroom) to use the APA guidelines and writing style in all scientific documents as from January 1990.
- This full dissertation is submitted in a format of *two research articles (Chapters 2 and 3).* The editorial style specified by the South African Journal of Human Resource Management guidelines (which agrees largely with the APA style) is used, but the APA guidelines were followed in referencing and constructing tables.

Dedication

This dissertation is dedicated to my parents Mr Ernest M and Mrs Dorothy Darangwa, who have been my greatest supporters, encouragers, and prayer warriors during my studies. You are truly a blessing to me!

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- My deepest gratitude goes to my supervisor, Prof Jan Visagie, for his patience, love, guidance, support, incredible leadership, and faith in me; it meant a lot to me. For always being there and for believing in me, thank you. You are a true professional and I have no doubt that your expertise has stirred me to perform at my best. I appreciate you very much.
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- To my dearest family and friends, thank you for always being there for me when I needed you the most. You are really family and friends for life!
- My father Ernest M. Darangwa for leading by example. I would like to express my gratitude for all the consistent support and for believing in me.

Above all, the Almighty who has made this journey possible. Indeed, you are the promise keeper and way maker.

Declaration

I, Vongai Praise Darangwa, hereby declare that “Exploring artificial intelligence in the South African banking industry” is my own work. The views and opinions expressed in this work are those of the author and relevant literature references are shown in the references.

I also declare that the content of this research project will not be handed in for any other qualification at any other tertiary institution.

VONGAI PRAISE DARANGWA AUGUST 2021

Abstract

Title: Exploring artificial intelligence in the South African banking industry

The introduction of artificial intelligence in the banking industry in South Africa has influenced how banks should function and how they operate. The digital advancements in the banking industry are implemented for the sole purpose of trying to remain competitive, make profits, efficiency, and better customer services. The implementation of artificial intelligence systems and robots posed more beneficial for banks, for the management, employees and customers. These artificial intelligence systems include chats, algorithms creation, cloud computing and data capturing.

Managers are responsible for managing organisations effectively by training and re-skilling employees, and with all these digital advancement changes in the work environment, organisations need effective guidelines and tools. There have been many studies conducted on artificial intelligence in banking internationally, but no extensive research has been done in South Africa regarding this phenomenon.

The purpose of this research project was to explore artificial intelligence in the South African banking industry and to gain an understanding regarding the influence artificial intelligence has on the banking industry. The research approach that was followed in this study was qualitative and phenomenological. Semi-structured interviews were conducted with 12 research participants.

A purposive sampling method was followed during data collection. A tape recorder was used to capture the data during the interviews. Thematic analysis was employed to analyse and interpret data. The results indicated that artificial intelligence in banks is being used in back (underwriting), middle (anti-fraud) and front offices (conversational banking). It is also evident that artificial intelligence in banking has helped to improve customer service, general banking services, risk management, fraud, cyber security, compliance and physical security. However, unemployment, cyber-attacks and manipulation of data are some of the negative side effects of artificial intelligence in the banking industry. Most research participants

agreed that artificial intelligence benefits the employees and clients, which increases efficiency and profits. Recommendations for future research and practice were made.

Keywords: artificial intelligence, automation, banking, performance, skills, unemployment

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Chapter 1: Introduction

There is a significant technological advancement and improvement in the 21st century and this has influenced areas, such as managerial and socio-economic development through artificial intelligence (Saithibvongsa & Yu, 2018). In recent years, artificial intelligence (AI) has become increasingly accepted and in demand in the banking industry because of its ability to help in automation of business operations such as risk mitigation, clients services, customer loaning and improvement in strategic decision-making (Agarwal, 2019). Customers expect the bank to give them a seamless experience as they become more tech-savvy. Hence, customers' lives have been made easier by seamless experiences such as mobile banking, e-banking, and real-time money transfers (Rashmi & Nirmal Raj, 2020). Undoubtedly, banks have managed to reduce costs from the front (conversational banking), middle (anti-fraud) and back (underwriting) offices. Apart from this, AI has allowed frictionless experiences among customers, thus 24/7 services, retail banking services and also back and middle offices of investment banking and other financial services (Digalaki, 2021).

Therefore, this chapter focuses on exploring artificial intelligence in the South African banking industry. This chapter includes the problem statement, the research objectives, the outline of general and specific objectives, and subsequently the research design and division of chapters.

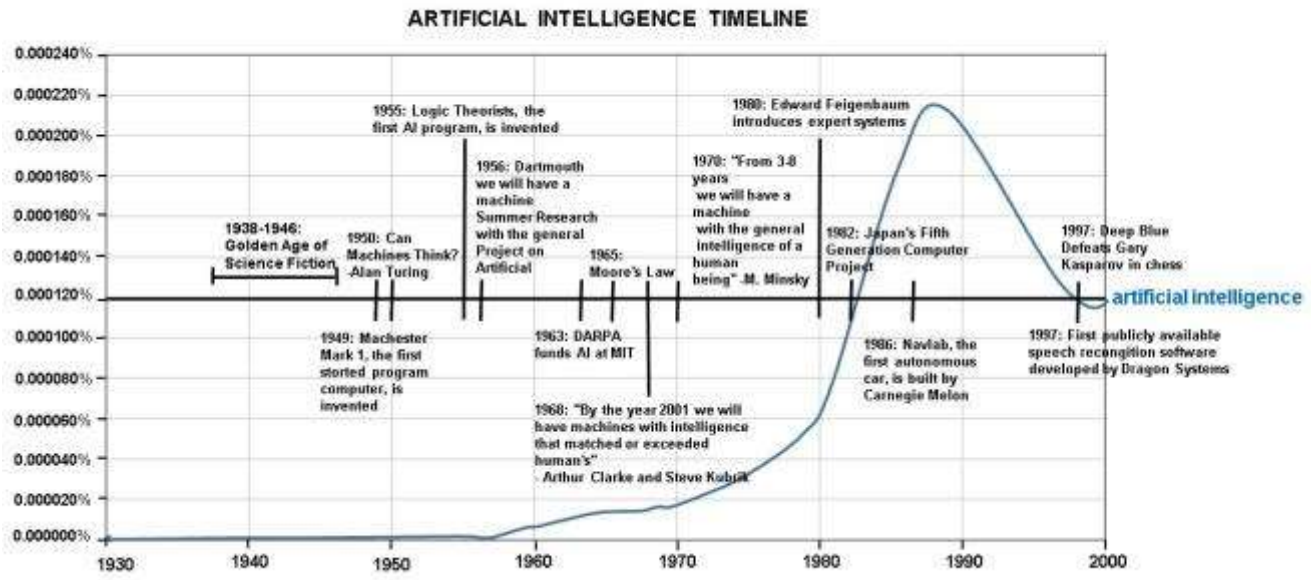
1.1 Problem Statement

South Africa is currently facing challenges of steady technology, economic growth and political dropouts, for example politics have a major role in private and public sector businesses, which then influences in the level of digital transformation (Modiba & Kekwaletswe, 2020). John McCarthy, "The father of Artificial Intelligence", describes artificial intelligence as "… the science and engineering of making intelligent machines, especially intelligent computer programs. It is related to the similar task of using computers to understand human intelligence, but [artificial intelligence] AI does not have to confine itself to methods that are biologically observable" (McCarthy, 2007, p. 2). Verma (2021, p. 402) furthermore states that "artificial intelligence is a branch of computer science which believes to give machines human resemblance to facilitate human tasks in a better way".

According to Rajesh et al. (2018), during the past decades, AI has evolved, and robotics has emerged as one of the most used tools in artificial intelligence. More specifically, organisations have restructured their way of business operation, as well as their product purchase and selling criteria consistent with the AI era. For example, sales can be predicted by finding customers who are likely to say yes to a product or service (Marcelletti, 2019). AI was founded in 1956, and it has made advancements over the past 50 years in areas like algorithms, machine learning and integrating statistical analysis, to mention but a few (Kumar & Bhatt, 2013). AI is traced back from philosophy, fiction and imagination, which led to inventions in areas such as electronics and engineering (Buchanan, 2005). Figure 1 shows how AI has flourished over the years, from 1957 to 1974 as computers could store more information and became more efficient. Machine learning algorithms were also developed, and individuals became better at determining which algorithms to use for a given task. In the 1980s, algorithms were able to provide advice to non-experts in any field. Due to an increase in workflow, from the 1990s to 2000s, which we now call "big data", computer storage could not manage to store all the information, which led to the increase in the use of AI as computers alone were not sufficiently substantial (Anyoha, 2017).

Figure 1

Artificial Intelligence Timeline



Source**:** Anyoha, 2017

Regardless of the businesses applying digital transformation and innovation, workforce expectations have changed because people are making use of computerised devices to help them work faster and to assist them in accessing information (Snedeker, 2018). Consequently, these adaptations to AI have produced different ways of managing businesses and employment patterns (Makridakis, 2017). We are currently living in the era of "cloud computing" and "big data", where any amount of huge data can be processed through AI (Verma, 2021). According to Aali and Eghbali (2021, Definition of cloud computing, para. 1), "cloud computing is a model for easy access and on demand network (e.g. networks, servers, storage, applications) application and service) that can be provided quickly and with minimal management effort or service provider interaction".

According to Watton (cited in Abramovich, 2018), 15% of worldwide organisations are already making use of AI; among these are whole banks, for example, Wells Fargo, JPMorgan Chase, Citibank, Bank of America (Some, 2019), and 31% of these organisations are planning to make use of AI. Moreover, some companies such as PayPal have reduced the fraud rate by 0.32% because of using an automated learning system, which has allowed for analysis of transactions in real-time (Stanley, 2018). Banking is an industry that handles financial activities for customers, such as customers' cash, credit, and safeguarding its customers' extra cash and credit as they offer different accounts, such as savings and cheque accounts (Amadeo, 2021). The Bank of America has developed a chatbot, Erica, which is an AI-enabled tool that helps with financial guidance to its customers through using voice and text messages, and transactional services will also be tracked, for example customer behaviour and their preferences (Maskey, 2018). Chatbots are computer programs that can imitate human-like conversations through voice commands or text chats. These chatbots are self-service and always very friendly, as they never have bad days since they act as virtual assistants to customers (Luo et al., 2019). Developing countries have adopted the use of AI, where countries with the highest potential of AI include Kenya 51.9%, Morocco 50%, Egypt 48.7%, and Nigeria 45.7%. In this regard, South Africa has an estimated potential of automation at 41% (Saithibvongsa & Yu, 2018). Banks are currently using AI to better their customer service, operations, reduce fraud, improve financial forecasting and increase security (Misra, 2020).

In South Africa, AI has the potential of increasing the economic growth rate by an average of 38% by 2035 (Sithole, 2018) and it is also projected that the country would have increased its

market worth by over US$35 billion (ZAR 519 210 799 585) by the year 2025 (Accenture, 2018). AI has managed to replace jobs that were usually done by humans, for example in manufacturing and transportation, thus allowing people to focus on other duties, such as strategic planning (Ahmed, 2018). The adoption of AI in banks has led to the replacement of daily repetitive tasks, empowering employees to centre their attention on project-based tasks. However, for employees to centre on project-based tasks, management should be able to reskill and reorganise work, as AI will be involved (Mallari, 2019).

Although AI has many benefits in the workplace, such as easy access to information, getting work done faster, allowing flexibility, economic growth and reduction of fraud, these have benefitted the developed countries more, where the unemployment rate is low and technologically advanced. In developing countries such as South Africa, the benefits have been more detrimental due to the high unemployment rate, social imbalances, eliminating organisational identity and eliminating human knowledge and skills (Lee, 2018). While AI has its advantages, the dangers associated with it cannot be ignored. One of the main disadvantages of AI is that it results in the loss of jobs, and therefore a rise in the unemployment rate. According to Chomanski (2018), technological unemployment refers to employees being replaced by computers. For instance, at present, Standard Bank and Nedbank have projected to retrench 1,200 and 3,000 employees, respectively, in a bid to digitalising their retail and business banks (Fin24, 2018; Timeslive, 2019). Without a doubt, when machines and robots replace the workforce, some interpersonal skills and knowledge will be more valued. These skills include critical thinking, interpersonal self-reliance and team work (Doyle, 2020).

Some skills will become obsolete as technology progresses because new skills will be required to become productive (World Bank Group, 2016). For instance, higher-order cognitive and soft or socio-emotional skills will be required (Ra et al., 2019). Businesses with relatively low-talented employees will be affected negatively by the evolution of AI, and those with exceptionally talented employees will be part of the transformation process (Masayuki, 2016). In the same way, the Futurescape report of 2019 states that due to a lack of human talent, two million jobs in AI in the Internet of Things, cybersecurity and blockchain will not be fulfilled by 2023 (Moolman, 2020). Statistics South Africa (2021) show that the approximated current unemployment rate for the first quarter of 2021 is at 32.6%. Clerks,

accountants, desk officers and manual workers might be replaced by the development of robotics and AI (International Bar Association, 2017).

Developing nations usually employ unskilled and semi-skilled employees. However, some industries from these countries are likely to replace these employees with AI as they would prefer the use of machines over a cheap labour force, thus leading to an increase in unemployment (Ford, 2016). AI has resulted in conflicts in real working environments on how employees relate to each other. It has also created the perception that human knowledge and skills are not necessary anymore. When an organisation does not have a culture of experimentation, it will slow the progress of AI in the organisation even if the employees lack technical skills (Businesstech, 2019). Considering that machines are increasingly replacing humans in the workplaces, the wages of employees are projected to drop since machines will do most of the work. Arguably, most of the salaries of employees suddenly drop below the acceptable level and lead to social imbalance (Mannino et al., 2015). In contrast, Muro et al. (2019) mention that salaries are likely to increase for the highly compensated employees, leading to wage growth for high-income occupations' positive employment. Employees in organisations might then be demotivated to work, being less satisfied with their work when there is no relationship or interaction with the machines that they use (Qureshi & Syed, 2014). According to Armstrong (2018), the world is becoming more connected than before, increasingly making employees feel isolated and feeling the need for human interaction.

AI is affecting employee engagement within the workplace, where employees are no longer motivated to take accountability, work with other co-workers or for the organisation and which previously led to the success of the organisation (Anitha, 2014). According to Hughes et al. (2019), employee engagement is when an employee is attached, motivated and passionate about the organisation, leading to them caring about their jobs. When employees are not engaged, this has a negative impact on talent management strategy and the aftermath reveals a decrease in productivity, customer service and ethical behaviour due to a lack of workforce engagement (South African Board for People Practices [SABPP], 2014). A lack of workforce engagement has led to an overall decrease in organisational engagement and overall employee performance (Saithibvongsa & Yu, 2018). Positive employee performance results in extrinsic and intrinsic rewards that enable employees to meet organisational objectives. Resultantly, team-co-worker, leadership and training and development will not be maximised if employee engagement is not maximised (Anitha, 2014). This suggests that

companies in South Africa should implement changes management that accompany AI and help employees to understand that AI will help to increase productivity and reduce routine jobs (Businesstech, 2019).

Therefore, considering the above discussion, the purpose of the study was to explore AI in the banking industry in South Africa. While the topic explored AI, this study primarily focused on the adverse effects that AI will have on the banking industry in South Africa.

Research questions

The current study will endeavour to ask the following questions:

Article 1 - Unveiling the level of AI application in the banking industry:

- How is AI in banking conceptualised in the literature?
- To what extent are AI applications used in the banking industry in the North West Province of South Africa?
- Does the level of employee skills influence the level of adoption of AI in the banks?
- Does AI influence the change in job descriptions of employees in banks?
- What recommendations can be made for future research and practice?

Article 2 - Evaluating the influence of AI in the banking industry:

- How does AI application in the bank impact the employees?
- What advantages and disadvantages do you think come along with using AI in the banks in the North West Province?
- What is the influence of AI on employee performance in the banks?
- What recommendations can be made for future research and practice?

1.2 Expected Contribution of the Study

1.2.1 Contribution to the Individual

The study will help individuals to develop themselves because of the technology development that is taking place. It will set clarity on how individuals feel about AI in the banking industry. The study will also educate employees that humans can never be in competition with machines, but instead, they can work together and be effective.

1.2.2 Contribution to the Organisations

The study will clarify that adopting AI in the workplace is one of the decisions that must always be made by organisations to ensure profitability. In addition, an increase in overall effectiveness in service delivery will be maximised. The findings of this research will help to guide processes that are implemented in the banking industry and how to address new technology to the organisation without affecting them.

1.2.3 Contribution to the Industrial/Organisational Literature

The contribution of the study to industrial literature will be useful because it will explore AI in the banking industry. AI is an important topic that is being studied in current literature as it has an impact on the current and future work of humans. Little research has been done on AI in the banking industry in South Africa. Therefore, this study will help managers and their employees to be able to reskill, restructure and accept change management within the organisation.

1.3 Journals

The Journal of Employment Relations was used as a basis and the two articles were prepared and written specifically for the journal. The articles meet their standard of source references and layout.

1.4 Research Objectives

The research objectives are divided into general and specific objectives.

1.4.1 General Objectives

The general objective of this study was to explore AI in the South African banking industry in the North West Province.

1.4.2 Specific Objectives

Article 1 – Unveiling the level of AI application in the banking industry:

- To conceptualise AI in the banking industry, according to literature.
- To investigate the extent to which AI applications are being used in the banking industry in the North West Province.

- To determine if the level of employee skills influences the level of AI adoption in the banks.
- To investigate if AI will influence the change in job descriptions of employees.
- To provide recommendations for future research and practice.

Article 2 – Evaluating the influence of AI in the banking industry:

- To investigate the impact of AI on employees in the banking industry in the North West Province.
- To investigate the advantages and disadvantages that result from using AI in banking in the North West Province.
- To determine the influence of AI on employees' performance in the banking industry.
- To provide recommendations for future research and practice.

1.5 Research Methodology

Research methodology provides the steps and process that will be used for the research study to gain information. The focal point of this section will be on describing the research approach, research strategy, literature review, research method, research setting, entree and establishing the researcher's roles, sampling, data collection methods, recording of data, data analysis, strategies employed to ensure quality data, reporting, and ethical considerations.

1.5.1 Research Approach

The research followed a qualitative research method. Qualitative research attempts to describe how people feel about the world around them, by getting to understand people's beliefs, attitudes, behaviour, and interactions. The data generated is non-numerical (Pathak et al., 2013). Qualitative research explores problems, issues that need to be solved, as well as hears those voices that have been silenced and is able to identify variables that need to be measured (Creswell & Poth, 2018). A study that was done by Kumar (2014) mentions that in terms of information gathering, qualitative research is very flexible, unlike quantitative research which is more structured as a method and is rigid, as expected results are produced that are reliable and can be validated.

Qualitative research was relevant to this study as it aimed to give an in-depth understanding of people's attitudes and behaviours towards AI. According to Ghauri and Gronhaug (2002),

qualitative research is used to study the social and behavioural sciences of individuals in groups and organisations, as human beings act differently towards different things because of the different meaning that the things will have for them. In quantitative research, this distinguishing feature is not seen, because the researcher's perceptions and interpretations do not occupy an important place in the study (Maxwell, 2012).

In trying to explore AI in the banking industry, a phenomenological study was followed. Phenomenology attempts to map results that show how participants understand the world around them, experiences and how they perceive them and understand those (De Vos et al., 2011). With phenomenology research, a structural assumption tries to bring perceptions and experiences of individuals from their own perspectives (Lester, 1999). According to Neubauer et al. (2019), phenomenology aims to describe how individuals have experienced a situation and how the individuals attach the experiences to it. The phenomenology approach tries to match theory and reality by getting an in-depth understanding of the information of people's experiences, their perceptions and the culture around them (Neuman & Robson, 2014). Managers from different banks in the banking industry were interviewed, thus the different meanings they attach to AI in banking were assessed and how they influence their everyday lives.

1.5.2 Research Strategy

The research used interpretive descriptive, as new information was generated (Struwig & Stead, 2001). According to Sreejesh et al. (2014), the descriptive research design is when a set of questions are pre-made to specific participants in a pre-established sequence. The researcher went into the field, having a framework of what was studied and how it was done (De Vos et al., 2011). The interpretive descriptive method allowed participants to describe what their feelings, thoughts and behaviours are with regard to the current study, which includes AI in the workplace (Maree, 2007).

1.5.3 Literature Review

A detailed literature review is a summary from various authors that support the research study, for instance academic and professional journals articles, books, web-based resources (Rowley & Slack, 2004). To acquire sufficient information regarding constructs of the study, which include AI in banking, information on employee performance and employee

engagement job security, and unemployment was gathered. The main reason was to obtain relevant data from different sources that are related to the study. These articles were obtained from relevant sources and textbooks which were published between 1990 to date. The information which was used for the study was obtained from the internet, such as Google Scholar, and the databases such as Emerald, June, EbscoHost, Sabinet Online and SAE Publications. Some of the journals to be consulted included the Journal of Innovation Economics and Management, Evolution of Al, Al cognition for social human-robot interaction: An implementation, and Argumentation in AI.

1.6 Research Method

1.6.1 Research Setting

The setting of this research was based on the banking industry in South Africa. The research was carried out among the South African banks in the North West Province. The managers were informed beforehand about the details of the date, time and the venue of the interviews on the bank premises. The management provided a suitable private place for the interviews to be conducted. Participants were interviewed individually to get their full attention and have independent responses. The participants were provided with written consent forms to ensure that their information would be protected and would not be misused for any reasons beyond that stated above.

1.6.2 Entree and Establishing the Researcher's Roles

Permission was requested from the EMS ethics committee to conduct the study. After that, the researcher sought permission in person to meet with the bank manager and discuss the purpose of the study and ethical considerations. After that, a formal e-mail was sent to the bank manager stating the purpose of the study and the ethical considerations. When permission was granted from the management, a consent letter was given to the participants in the bank to conduct research, which requested their permission to participate. This e-mail stated the objectives and the importance of the research that was to be done. To protect the identity of the banks and the anonymity of the participants, the consent letter form the banks is not included in this document.

According to Richie et al. (2005), a facilitator's role is where the researcher enables the participants to share their stories, experiences and their perspectives. The researcher is an

electronic transcriber, data analyser and report writer, and the researcher is supposed to remain objective throughout the study. In addition, the results are to be reported scientifically and objectively (Richie et al., 2005).

1.6.3 Sampling

According to De Vos et al. (2012), a sample is a selected small representative portion of the population. Non-probability sampling was used for this study. Non-probability sampling refers to the fact that the probability of a person being chosen as a participant is unknown, but the researcher will select based on their judgement (Struwig & Stead, 2001). The sampling method that was used for this study was purposive sampling. Purposive sampling is when particular people and settings are chosen to represent a sample because they can provide relevant information based on the judgement of the researcher (Maxwell, 2012). Purposive sampling is composed of elements that contain the characteristics, representative or typical attributes of the population that serve the purpose of the study best (Grinnell & Unrau, 2010). Purposive sampling is used for the identification and selection of information that will be rich and which will be of importance to the study (Palinkas et al., 2015). The fact that the sample was small also made it easier to use qualitative research, where interviews were done with the targeted population that was selected purposively.

Data collection was governed by data saturation. Therefore, the sample size was (N=12). Banks in the North West Province were used, and this was chosen based on purposive sampling as they provided the researcher with relevant information. Only bank managers were interviewed as they are at low risk. This was also based on one of the many South African banks which closed one of its branches in the province which led the researcher to investigate more on banks in the province.

To be included in this study, participants were expected to meet to following requirements:

- Participants were supposed to be employed at one of the banks in the North West Province.
- Participants were able to communicate in English.
- Participants permitted interviews to be voice-recorded.

The sample size of the population was estimated at 12 (N=12) with the breakdown of two managers per bank, thus for Bank A, Bank B, Bank C, Bank D, Bank E, and Bank F.

1.6.4 Data Collection Methods

In qualitative research design, the most popular method of collecting data is interviews (De Vos et al., 2011). Semi-structured, Zoom meeting interviews were used for this study. According to Crabtree and Miller (1999), semi-structured interviews are guided, centred and open-ended communication events that are conducted by the researcher and the interviewee and that happen outside daily life. Semi-structured interviews allow for the freedom of structure, wording and order, thus allowing the researcher to ask any question that is relevant to the study (Kumar, 2014). According to De Vos et al. (2011), semi-structured interviews enable the researcher to investigate and describe past and present experiences, which contribute towards reaching the goal of the study. This type of interview describes a subject in detail to broaden the interviewer's knowledge about the specific subject and provide historical information (Creswell & Poth, 2018). The researcher made use of semi-structured interviews, which allowed them to have control in the line of questioning (Creswell & Poth, 2018). The researcher formulated the interview questions based on previous studies. It was thought that other types of interviews, such as structured and unstructured interviews, do not allow the researcher the freedom to enquire about participants' responses, and in unstructured interviews, the respondent drives the conversation, hence they might divert the research aim (Thomas, 2011). The researcher explained to the participants the meaning of AI in banking before interview questions were asked.

To avoid yes or no answers, the questions were asked as follows:

- What is your understanding of AI in the banking system?
- To what extent is AI being used in the banking industry within the North West Province (basic tasks or advanced services that would typically require a human component)?
- How do employees' skills influence the level of AI adoption in the banks?
- How does AI influence the change in job descriptions of employees?
- What is the impact of AI on employees in the banking industry in the North West Province
- What do you think are the advantages and disadvantages of using AI in the banks?

- How has employees' performance been affected since the implementation of AI in the banks?
- Can you provide any recommendations on how artificial intelligence can work simultaneously with humans?

1.6.5 Recording of Data

The respondents gave their permission for the researcher to use recordings through written consent forms. While the interviews took place, the researcher made use of a digital voice-recorder or laptop to record the actual interview taking place to ensure that the core of the study was captured truthfully and to ensure quality. The researcher and supervisor will have access to the digital voice-recorder to ensure that no one has access to participants' information. The recorded data was transferred from the voice-recorder onto a Microsoft Excel spreadsheet where it was analysed. The Excel spreadsheet was password-protected, as well as the laptop that was used. To ensure that the data would not be lost, the voice-recordings, together with the transcribed data from the participants, were stored on a flash disk as a backup.

1.6.6 Data Analysis

Thematic analysis is a type of qualitative analysis that was used for this study. Thematic analysis is the process of identifying patterns or themes within qualitative data (Maguire & Delahunt, 2017). It aims to provide the study with interpretations as it provides a systemic element to data analysis (Alhojailan, 2012). Qualitative research needs interpretations, thus thematic analysis is capable of drawing, detecting and identifying variables among employees (Creswell & Poth, 2018). In the deductive thematic analysis, a structure or fore-ordained system is utilised to analyse information. The researcher has their structure or hypotheses on the information, and after that, utilises these to analyse it (Braun & Clarke, 2006). The following steps were followed:

Step 1: Familiarising yourself with the data

Researchers familiarised themselves with the depth and breadth of the content (Braun & Clarke, 2006). According to Braun and Clarke (2006), researchers should read through the entire data set at least once before beginning coding, as ideas and identification of possible

patterns may be shaped as researchers become familiar with all aspects of their data. Information was transferred onto an Excel spreadsheet.

Step 2: Generating initial codes

In this second phase, the researcher began to read and familiarise herself with the data, having ideas regarding what is in the data and what is intriguing about them (Braun & Clarke, 2006). Coding reduces lots of data into small chunks of meaning (Maguire & Delahunt, 2017). According to Braun and Clarke (2006), responses from participants were coded in as many different themes as they fitted, being uncoded, coded once, or coded as many times as deemed relevant by the researcher.

Step 3: Searching for themes

The third phase began when all data had been initially coded and collated. Sorting and collating all the potentially relevant coded data extracts into themes are done in this phase (Braun & Clarke, 2006). A theme is a pattern that captures something significant or unusual about the data and research question (Maguire & Delahunt, 2017). Considering the background of the study, themes that play a significant role may be relevant to the study (Cassell & Symon, 2004).

Step 4: Reviewing themes

During this phase, the researcher reviewed, modified and developed the preliminary themes that were identified in Step 3. At this point, it was useful to gather together all the data that was relevant to each theme (Maguire & Delahunt, 2017). It is possible to modify and refine definitions of themes forever; themes should not be considered final until all of the data have been read through, and the coding scrutinised at least twice (Cassell & Symon, 2004).

Step 5: Defining and naming themes

Researchers refine and determine the specifics of each theme and identify what is of interest to them and why; furthermore, identifying what each story theme tells (Braun & Clarke, 2006). According to King (2004), themes cannot be finalised if any sections are relevant to the research question but were not included. If they are not very clear, outside experts can be consulted to have modifications if needed.

Step 6: Writing the analysis

At this final stage, the researcher was ready to give a final report after all the themes have been established (Braun & Clarke, 2006). The researcher made a composed provision with a systematic analytical approach which includes extricating abundant interview answers obtained from participants. The researcher reported all data gathered and applied logically with a companion to peer review articles. According to Aronson (1994), a valid argument can be built by the researcher if they choose themes by referring back to literature; when this is done, the research has merit.

1.6.7 Strategies Employed to Ensure Quality Data

To promote quality data in a study, four criteria were considered, namely credibility, transferability, dependability and conformability.

Credibility: The goal was to illustrate that inquiry was conducted in such a manner that the subject has been identified and described accurately (Shenton, 2004). A qualitative researcher should state the parameters by being able to place boundaries around the study.

Transferability: This refers to the degree to which the results can be used in other contexts and settings with other people (Korstjens & Moser, 2017). In a qualitative study, the researcher can provide information that is rich and which is easy to evaluate. It can present certain problematic areas in search of establishing transferability because the numbers in a qualitative study are limited (Sutton & Austin, 2015). The researcher therefore referred back to the original framework to show how data collection can be guided. However, the researcher tried and ensured transferability by richly describing the context and setting of the research in case other researchers want to replicate this study.

Dependability: This refers to the stability of the researcher's findings over some time (Korstjens & Moser, 2017). The researcher assumed questioning of the research process, which would constitute whether the process was logical, well-documented and audited (Korstjens & Moser, 2017). The researcher attempted to account for the change of conditions chosen by the study, which included the design by a refined understanding of the study.

Conformability: The degree to which a researcher's findings can be confirmed by other researchers (Korstjens & Moser, 2017). The similarity will guarantee to catch the first idea of objectivity. This was done by not concentrating on the researcher's perspective but instead on translating the gathered information itself (Korstjens & Moser, 2017). The researcher remained objective by not giving individual tendencies a chance to impact the information but rather for the findings to reflect the interpretations.

1.6.8 Reporting

Themes and sub-themes were extracted from the data collected, as results were retrieved from direct quotations from participants. The reporting of the study was guided by clarity and understanding of interpreted data and simplicity and craftsmanship from the researcher. Experiences from detailed descriptions from participants provided a clear picture to the reader of the data collected, thereby making it feasible for the reader to draw derivations (De Vos et al., 2011).

1.6.9 Ethical Considerations

Participation in the research was voluntary, as participants gave consent to take part in the study. According to Henn et al. (2006), participants should receive a detailed description of the purpose of the study beforehand and participate with the right to withdraw from the study.

The researcher was responsible for the confidentiality of the participants' information. A cover letter with the researcher's particulars was provided, as well as the purpose of the study. To maintain confidentiality, the cover letter also provided ways in which participants' information would remain confidential. Access to information about participants was restricted to researchers who were directly involved, and if any information provided could identify them, the information remains confidential to directly involved researchers. The interviews were also done in private to avoid any disturbances. When beliefs, attitudes, opinions and records are shared with others without the owner's consent, there is an invasion of privacy (Fouka & Mantzorou, 2011).

This study aimed to support the respondents of this study in a professional manner. All participants were given fair treatment, regardless of their race or the bank for which they

work. The researcher made sure that day-to-day activities of the participants were not disrupted as data collection took place.

1.7 Chapter Layout

The chapters in this dissertation are presented as follows:

Chapter 1: This chapter looks at the proposal of the study that was conducted.

Chapter 2: Research Article 1: Unveiling the level of AI application in the banking industry.

Chapter 3: Research Article 2: Evaluating the influence of AI in the banking industry.

Chapter 4: The last chapter of this study provides conclusions, limitations and recommendations for both articles and it gives a summary of what was derived from the study.

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Chapter 2

RESEARCH ARTICLE 1

UNVEILING THE LEVEL OF ARTIFICIAL INTELLIGENCE (AI) APPLICATION IN THE BANKING INDUSTRY

Abstract

Background. Artificial Intelligence (AI) has a huge impact on the banking industry, which has led to banks changing the way they operate. To curb fraudulent practices, banks are applying innovations to their practices to obtain transparency and for the improvement of the bank's efficiency (Lagarde, 2018). Due to the increase in the amount of data processing in banks, there has been an increase in AI adoption as there is a lot of content handling of information (Krasadakis, 2018).

Problem Statement. The South African banking industry is confronted with many AI challenges, mainly those relating to employees' perceptions, fear of replacement and a lack of employee skills.

Objectives. The general objective of this study was to explore AI in the South African banking industry.

Specific Objectives. (i) To conceptualise AI in the banking industry, according to literature. (ii) To investigate the extent to which AI application is being used in the banking industry in the North West Province. (iii) To determine if the level of employee skills influences the level of AI adoption in the banks. (iv) To investigate if AI will influence the change in job descriptions of employees. (v) To provide recommendations for future research and practice.

Research Method. A qualitative research method was used and twelve (N=12) participants in the banking industry were included. Different bank managers in the North West Province were selected for this research. A sample size of 12 participants was used and was subject to saturation, thus, two managers per bank in the North West Province.

Main Findings. The main finding in this article states that participants understood what AI is in the banking industry, the extent to which AI is been used and that employee skills affect AI adoption.

Keywords: artificial intelligence, banking industry, employee skills, fear, job descriptions, machines, replacement, robots

2.1 Introduction

Artificial intelligence (AI) is reshaping the banking industry because of the digital era causing banks to adjust in all segments that were previously recognised as their profitable engagement (Mirković et al., 2019). According to Latimore (2018, p. 2), "Banking artificial intelligence is a technology that makes inferences and decisions that used to require direct human involvement". The banking sector has been working effectively and efficiently in the Fourth Industrial Revolution era due to the adoption of AI since it is of great importance in the sector. Lately, AI has been applied in report generation, data analytics and robot process automation, among others (Kochhar et al., 2019).

The use of AI in the banking industry has made banking operations hassle-free and impactful because AI is usually being 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 the simplified version of services at any time (Mirković & Lukić, 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). The changes that AI is bringing have an impact on the way back offices operate, how service is delivered and how revenue and costs are incurred in the banking industry (Marous, 2018). South Africa, as a developing country, currently has 17 registered banks in the country. However, for these banks to remain relevant and competitive in the new technological era, these banks should re-look at how they operate (Modiba et al., 2020).

AI is helping banks to save money, which results in the growth of the industry. For example in America, an estimate of $1 trillion by 2030 will be saved in the banking industry by using different AI systems (Maskey, 2018). It is estimated that banks that are investing in AI human-machine interaction between 2018 and 2022 will increase their revenue by 34%, and 14% employment levels (Marous, 2018). When banks implement AI, increased employee effectiveness will generate quality results which will be speeded up by the Robot Process

Automation (RPA), leading to increased revenue (Latimore, 2018). According to the Institute of Electrical and Electronics Engineers (IEEE) Corporate Advisory Group (2017, p. 10), RPA is defined as *"*a preconfigured software instance that uses business rules and predefined activity choreography to complete the autonomous execution of a combination of processes, activities, transactions, and tasks in one or more unrelated software systems to deliver a result or service with human exception management".

2.2 Advanced Artificial Intelligence in Banking

Using AI, banks are now personalising functions to tailor-fit individual specific needs, thus reducing unnecessary services that customers are not interested in (African Independent, 2019). As explained by Kaya (2019), AI is transforming the way banks are operating as steps in digitalisation have been taken, as computers can now apply knowledge without human intervention. For this reason, an increase in digitalisation and data analysis has been one of the banks' demands in improving and increasing customer services (African Independent, 2019). Banks are now future-proofing their services and how they offer services with data analytics and machine learning (Fintech News, 2020). Banks have been moving away from traditional banking, which has increased security in accessing banking accounts and reduced cybercrime, as personal information is protected (African Independent, 2019).

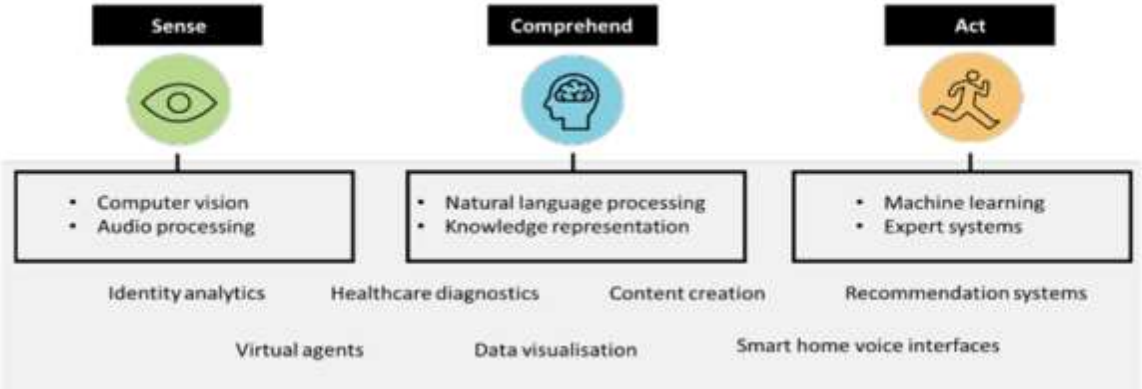
Currently, banks are using AI to develop customised products and services for customers, detecting mismatching transactions that might harm business productivity as AI intelligence reduces human error (PwC, 2018). Furthermore, a data analysis application is being utilised to get information about customers 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, whilst 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).

Accounting services, such as audits, payroll, and tax preparation are some services that AI can handle, thus leaving accounts with less time-consuming tasks to do (Finances Voices, 2018). RPA and AI in banking have allowed employees to do their daily tasks at home

because some tasks that previously requested individuals to be present at work were automated, thus giving employees the opportunity to focus on critical tasks (Investec, 2020). The way that banks have been using AI is to a lesser extent to replace jobs, but rather to detect fraudulent activities and money laundering. Others are using AI for algorithmic trading, whilst others depend on AI to develop solutions (Marria, 2020). Considering that AI can understand human emotions, expressions and tone, AI has substituted some of the tasks that were normally done by humans and thus narrowed the tasks. Figure 1 shows that since AI can understand human emotions and expressions, AI machines can sense and comprehend their environment and respond (act) to the situation (Access Partnership, 2018).

Article 1: Figure 1

Artificial Intelligence or Africa: An Opportunity for Growth, Development and Democratisation



Source: Access Partnership, 2018

2.2.1 Mismatch of Employee Skills and Knowledge

The rapid change in technology across sectors has led to employees feeling demotivated as their skills and knowledge are slowly being diminished by using robots and machines (National Network of Business and Industrial Associations [NNBIA], 2014). In the same vein, Saithibvongsa and Yu (2018) support the notion that AI will have a significant effect on the employees as workers' foundation of skills and knowledge is diminished. It reveals that through AI there will be a huge change in organisational employment structures (Gray, 2016). Davies et al. (2011) write that previous skills will be replaced with sense-making skills, computational thinking skills and social thinking skills. However, active listening, critical thinking and social perceptiveness are skills that employees should now possess

(Crosman, 2018). Based on the ideas of Moncarz et al. (2008), every job has got specific skills that it requires, which enable the employees to complete tasks as required. In trying to build skills from within to match the advancements of AI, which includes data mining and computational thinking skills, African Bank is training interns for the specific skills that the bank needs, which include operations and technological skills (Businesstech, 2019a). Due to the advancements of AI in the banking industry, many banks face the challenge of having unskilled engineers to help with technical issues, resulting in banks not being able to fully implement AI (Fintech News, 2020).

The level of skills that employees possess is far behind AI, leading to a shortage of highly talented employees. Considering employee skills being behind AI, it can be concluded that there is a need for training, as high-end skills of AI cannot be mastered in a short time (Ping & Ying, 2018). Despite this, only 3% of bankers are investing in retraining their employees to prepare for an AI workplace as they are testing it under customer service (Marous, 2018). Employees should have information technology skills, creativity and innovative skills that allow them to switch jobs in different disciplines. There is therefore a need for investment by banks to re-train current employees because of the rapidly changing technology (Frey, & Osborne, 2014). In contrast, Marous (2018) writes that the slow adoption of AI by banks is due to the lack of the right talent to drive change. A great proportion of employees with low skills will be replaced by robots, lowering employment growth (Jung & Lim, 2020).

Sitkus (2017) states that friendly working conditions should be available to employees at a workplace since they have a close relationship with their workplace, as they spend a third of their time in this environment. Therefore, when there is a positive working environment, employees can use their skills and knowledge to reach organisational goals through facilitating strategic planning (Saithibvongsa & Yu, 2018). According to Businesstech (2019b), employees lack not only technical skills, but also a culture of experimentation, which has led to the slow progress of AI. Strider, a South African fintech company, provides banks with AI solutions for financial services, allowing access to financial education and other meaningful services through their toolbox of platforms (Access Partnership, 2018). Employees who understand AI and its technologies can adapt and be able to work in a different working environment, such as creative, production, innovation, and company culture. Understanding this phenomenon will help to explain why banks are struggling to fill crucial roles, such as data analytics and strategic specialists (Ohene-Afoakwa & Nyandongo,

2017). However, the cultural changes that come with AI require employees to acquire requisite skills to create innovative ways to work, which enable more flexibility, problem-solving and creative thoughts (Modiba et al., 2020).

2.2.2 Job Redesign in the Banking Industry

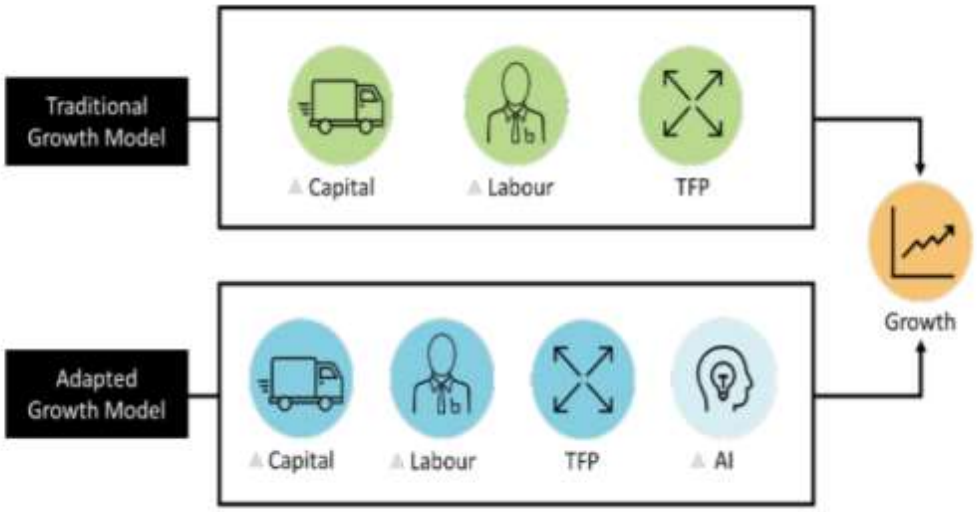
Banks now have to redesign how they do their work, how they sell, and how they communicate with their customers to improve their services (Jubraj et al., 2018). Employee roles will be redesigned as there will be more different types of skills needed than just rigid job titles (Wilson & Daugherty, 2018). Redefining of jobs will allow current jobs of employees not to disappear totally, thus permitting employees in banks to use their skills to work with machines, to teach intelligent agents new skills and to undergo self-training of AI-enhanced processes (Wilson & Daugherty, 2018). However, it is highly possible that current employees will not have the proper skills to match redefined jobs in the banking sector (Ohene-Afoakwa & Nyandongo, 2017). Change in workforce design increases freelance duties as some tasks will be outsourced, and some will remain internal (Nagele-Piazza, 2018).

Additionally, Fintech News (2020) states that for banks to achieve high-level results, there is a need for reassessment and training of employees, which will lead to the collaboration between humans and machines. Creative skills are becoming important for accountants as technology innovations advance as the quality of work will be needed (Bakhshi et al., 2015). According to Stewart et al. (2015), the required working skills have a significant role to play in banks in terms of social interaction, empathy, and creativity. For employees to take advantage of digital technologies there is a need for developing digital skills through designed policies. This means that there is a need for appropriate instruments to ensure that employees are well equipped with the necessary skills to prepare for the advances that result from digital technologies (Petropoulos, 2018). According to Krasadakis (2018), some roles and jobs will become obsolete in the long run as they will become less relevant because AI acts as a supportive tool to humans. However, more roles and jobs will be created which will focus on science and technology. Employees with specific skills are supposed to be deployed by bundling the tasks they used to do and re-bundle them with other more important tasks (Bughin et al., 2018). Employment patterns will move to be flexible and selective as there will be no need for fixed long or full-time employment (Krasadakis, 2018).

Figure 2 shows how banks used the traditional model to achieve results versus how they are operating now with the adoption of AI. Previously businesses used to have labour and capital as their factors of production, but since the introduction of AI "as a new and discrete factor of production" some jobs have been redesigned and some replaced (Accenture, 2018, p. 7)

Article 1: Figure 2

Traditional versus Adopted Growth Model



NB: ▲Indicates the Change in that factor

TFP – Total Factor Productivity

Source: Accenture, 2018

2.2.3 Artificial Intelligence in South African Banking

Banks that have started using AI have allowed positive impacts on their employees such as an increase in working ability, effectiveness, and increased quality of employees (Saithibvongsa & Yu, 2018). Many countries in Africa have since advanced in the use of the digital platform and the use of AI to improve their services and among these are Tanzania, Mozambique, the Democratic Republic of Congo (DRC), Lesotho, Ghana, and South Africa (Burns 2018; Jacob, 2016). According to Capitec Bank (2020), AI allows employees to excel in other areas; by giving employees AI -assisted tools, it helps employees to become superior with advanced skills. To illustrate, AI allows employees to focus on providing personal help to clients on the Capitec app. Since most of the work will be done by AI, except in managing and troubleshooting, AI systems will be in high demand (Manyika & Sneader, 2018). South Africa is one of the countries in Africa which are in the phases of disruption and innovation

in the financial sector, and increases in the number of technology hubs in the country (Delport, 2019). One of South Africa's leading digital banks, TymeBank, offers its customers a conversational assistant "Max", which assists customers in learning about their spending habits, how to improve their credit score using their financial profile and how to save money (Finextra, 2019). In addition, TymeBank, also known as a challenger bank, has managed to set an example in reaching out to excluded customers with their affordable products and services by leveraging digital technology (Jeník et al., 2020).

Between 2015 and 2017, FirstRand Group has maximised skills development by approximately 240% (FirstRand Group Ltd, 2017). According to Prior (2019), Capitec Bank aims at being the leading bank in South Africa in using machine learning in retail banking. Capitec is currently augmenting humans with machines, with an aim of not replacing their employees with machines. Employees will work as supporting units for machines but there is a need to know the basic structure of the work (Wisskirchen et al., 2017). The South African banking industry has not yet been fully implemented AI; banks are working towards improving their productivity and efficiency, thus leaving employees not being sure about their job security (Gumede, 2017; Habib, 2002; Hlatshwayo, 2017). As mentioned by Standard Bank (2016, p. 19), "to prove our relevance in an increasingly digital world, we are actively embracing disruption and innovation, and working with innovation partners to deliver better value for our clients".

In trying to monitor financial risks, fraud and money laundering, First National Bank (FNB) launched "Manila" an artificial intelligence solution that gathers data of customers from multiple sources, for instance their spending activities, to help with the decision-making process (Lourie, 2020). The adoption of AI solutions in South African banks is estimated to reduce costs in banks (African Independent, 2019). To increase customer service, most banks have started using chatbots (Manning, 2018). AI Chatbots have become one of the most popular technological tools used in many business sectors. According to Moyo (2017), Absa introduced chatbots to gain market share and manage and improve customer services. Recently, in trying to reduce physical transactions, Absa launched the Quick Response (QR) payments in markets, such as Zapper, SnapScan and Pay@, which allow customers to make payments with their authentication after scanning any QR codes (Businesstech, 2021). In 2018, Nedbank launched its first humanoid robot, "Pepper", which was programmed to recognise voices, human emotions and was able to chat with customers and answered

customers' questions (Khumalo, 2018). However, a lack of personal empathy and feeling makes some customers feel uncomfortable in letting computer programs help them make purchasing decisions (Dietvorst et al., 2018; Kestenbaum, 2018).

The above information shows that banks are already using AI to improve their services, and this includes banks in South Africa as it is our focus. Regarding that, a problem might arise if the level of AI in banks is in all sections as it affects the employees without skills and who do not perform according to the required standards.

To investigate, although AI is not extremely used in South Africa, banks are already making use of the benefits that AI brings to the industry. There is, therefore, a need for a qualitative investigation to determine the level of AI in the banking industry.

Research Objectives

1. To conceptualise artificial intelligence in the banking industry according to literature.
2. To investigate the extent AI application is being used in the banking industry in the North West Province.
3. To determine if the level of employee skills influence the level of AI adoption in the banks.
4. To investigate if AI will influence the change in job descriptions of employees.
5. To provide recommendations for future research and practice.

2.3 Research Methodology

2.3.1 Research Approach

The research followed a qualitative research method. Qualitative research attempts to describe how people feel about the world around them, by getting to understand people's beliefs, attitudes, behaviour, and interactions. The data generated is non-numerical (Pathak et al., 2013). Qualitative research explores problems and issues that need to be solved, as well as hear those voices that have been silenced and is able to identify variables that need to be measured (Creswell & Poth, 2018). A study that was done by Kumar (2014) mentioned that in terms of information gathering, qualitative research is very flexible, unlike quantitative

research, which is more structured as a method and is rigid, as expected results are produced that are reliable and can be validated.

Qualitative research was relevant to this study as it aims to give an in-depth understanding of people's attitudes and behaviours towards AI. According to Ghauri and Gronhaug (2002), qualitative research is used to study the social and behavioural sciences of individuals in groups and organisations, as human beings act differently towards different things because of the different meaning that the things will have for them. In quantitative research, this distinguishing feature is not seen, because the researcher's perceptions and interpretations do not occupy an important place in the study (Maxwell, 2012).

In trying to explore AI in the banking industry, a phenomenological study was followed. Phenomenology tries to map results that show how participants understand the world around them, their experiences and how they perceive them and understand those (De Vos et al., 2011). With phenomenology research, a structural assumption tries to bring perceptions and experiences of individuals from their own perspectives (Lester, 1999). According to Neubauer et al. (2019), phenomenology aims to describe how individuals have experienced a situation and how the individuals attach the experiences to it. The phenomenology approach tries to match theory and reality by getting an in-depth understanding of the information of people's experiences, their perceptions and the culture around them (Neuman & Robson, 2014). Managers from different banks in the banking industry were interviewed, thus the different meanings they attach to AI in banking were assessed and how it influences their everyday lives.

2.3.2 Research Method

2.3.2.1 Research setting

The setting of this research was based among bank managers in the banking industry in the North West Province of South Africa. All interviews were conducted in a private room to avoid any disturbances, and these were done individually to allow independent responses.

2.3.2.2 Target population

The study target consisted of bank managers from the banking industry in the North West Province. Twelve people who held managerial positions in the banking industry from six different banks who had a direct link to their employees were interviewed.

2.3.2.3 Sampling

To gain access to the relevant data sources, selection and sampling were the principles used to help generate data from the selected methods. Moreover, selection and sampling helped to select a sampling strategy that was meaningful to the population in context as such qualitative research involves the sampling of practical and resource-based issues (Mason, 2002). As sampling involves the selection of a portion of the total population, non-probability sampling attempts to select participants based on judgement and already existing theoretical insights to be able to generate new valuable insights (Showkat & Parveen, 2017). The likelihood of a participant being chosen in non-probability sampling for a sample is unknown but a certain category will be used to select participants (Blackstone, 2012). Non-probability sampling was used in this research following purposive sampling. Purposive sampling, which is also known as judgemental sampling, is when the researcher makes a deliberate choice of participants due to the knowledge and experience they possess that match the qualities needed for the study (Etikan et al., 2016). Participants are chosen with a specific "purpose "to represent the key yardstick (Ritchie et al., 2013).

The purposive sampling method was used to choose the 12 participants who had to fit the criteria of managerial positions who oversaw the employees as they work hand-in-hand with the employees.

Participants needed to meet the following criteria for the research that was conducted: 1) participants were to be employed at one of the banks in the North West Province, 2) participants were able to communicate in English, and 3) participants who permitted interviews to be voice-recorded.

2.3.2.4 Data collection procedure

In qualitative research design, the most popular method of collecting data is interviews (De Vos et al., 2011). Semi-structured interviews were used to gather data. According to Crabtree and Miller (1999), semi-structured interviews are guided, centred and open-ended

communication events that are conducted by the researcher and the interviewee and that happen outside daily life. These interviews also allow for new information to be generated, and participants might highlight them during the interview. The researcher has the privilege to ask participants to further explain the responses to different questions (Struwig & Stead, 2001). In this study, semi-structured interviews were conducted to gain rich data on AI in the banking industry in South Africa. The researcher formulated the interview questions based on previous studies. The researcher aimed to gain in-depth information, as participants had different perceptions of AI in the banking industry in South Africa. Due to the COVID-19 pandemic, the researcher conducted the data collection through Zoom meetings. Managers were asked to elaborate on the extent of AI in the bank, and they were probed on some questions for clarification purposes and for the researcher to gain more insightful information regarding this phenomenon.

All participants were asked the following questions:
Q1. What is your understanding of artificial intelligence in the banking system?
Q2. To what extent is artificial intelligence being used in the banking industry in the North West Province (basic tasks or advanced services that would typically require a human component)?
Q3. How do employees' skills influence the level of artificial intelligence adoption in the bank?
Q4. How does artificial intelligence influence the change in job descriptions of employees?
Q5. Can you provide any recommendations on how artificial intelligence can work simultaneously with humans?

The first question was posed to understand whether the participants understood the concept of AI in the banking industry. If the participant did not understand, then an explanation was provided. This was to ensure that the questions that followed would be answered correctly.

2.3.2.5 Recording of data

A voice-recorder was used to capture each participant's response with their permission and consent. The participants remained anonymous as their identities were not disclosed. The information on the voice-recorder was password protected and later transcribed onto an Excel spreadsheet.

2.3.2.6 Data analysis

After the interviews, the researcher listened to all the responses of the participants and the data was transcribed onto the Excel spreadsheet. The data was transcribed in an Excel spreadsheet to get an insight into the overall response of the participants. Initial codes were generated and were linked to the research questions as identified above. Data was then organised according to their meaningful groups based on the initial codes (Braun & Clarke, 2006). Themes were developed for each code and meaningful themes were created from the items. The themes that were formulated were further discussed to have insightful information. The researcher ensured that there were no themes that were duplicated and that they matched with codes developed previously. The researcher, at this stage, wanted to ensure that the data gathered corresponded with the themes that were gathered on them. The themes were redefined and meaningful names were given to the themes which reflected the data collected. The researcher also made sure that the names given represented the data collected well. When the researcher identified themes that looked similar, these themes were combined to avoid too many themes on the same information. At this final stage, the researcher gave a final report after all the themes had been established (Braun & Clarke, 2006). The report was presented in a dissertation format.

2.3.2.7 Strategies employed to ensure quality data

To promote quality data in a study, four criteria were considered, namely credibility, transferability, dependability and conformability.

Credibility: The goal was to illustrate that inquiry was conducted in such a manner that the subject has been accurately identified and described (Shenton, 2004). A qualitative researcher should state the parameters by being able to place boundaries around the study.

Transferability: The degree to which the results can be used in other contexts and settings with other people (Korstjens & Moser, 2017). In a qualitative study that is being able to provide information that is rich and which is easy to evaluate. It can present certain problematic areas in search of establishing transferability because the numbers in a qualitative study are limited (Sutton & Austin, 2015). The researcher therefore referred to the original framework to show how data collection can be guided. However, the researcher tried and ensured transferability by richly describing the context and setting of the research in case other researchers want to replicate this study.

Dependability: The stability of the researcher's findings over some time (Korstjens & Moser, 2017). The researcher assumed questioning of the research process, which would constitute whether the process was logical, well-documented and audited (Korstjens & Moser, 2017). The researcher attempted to account for the change of conditions chosen by the study, which includes the design by a refined understanding of the study.

Conformability: The degree to which a researcher's findings can be confirmed by other researchers (Korstjens & Moser, 2017). The similarity will guarantee to catch the first idea of objectivity. This was done by not concentrating on the researcher's perspective but instead on translating the gathered information itself (Korstjens & Moser, 2017). The researcher remained objective by not giving individual tendencies a chance to impact the information, but rather for the findings to reflect the interpretations.

2.4 Reporting

An Excel spreadsheet was used to capture the results of the research. Using interview questions' data, themes and sub-themes were extracted and direct responses from the research questions are given. The researcher was able to use direct quotations for some of the answers that the participants used.

2.4.1 Findings

The different categories (codes), themes, and sub-themes were extracted from the interview responses and direct quotations were used to confirm results. The relevant themes and sub-themes will be discussed below. The findings consist of four tables in Table 1 for the first question. The first interview question was posed to determine if the participants understood the meaning of AI in the banking industry. The second question was reported in Table 2 where we get to understand how AI is being used in the banking industry. In Table 3 the third research question is discussed about employee skills on AI, and Table 4 contains responses to the question if AI influences change of job description. The first and second objectives were to conceptualise AI from the literature and the extent to which AI is used in the banking industry in the North West Province (basic tasks or advanced services that would typically require human component) respectively, which was already discussed in the literature review.

The general objective of this study was to unveil the level of AI in the banking industry. The specific objective of this study was 1) to conceptualise AI in the banking industry according to literature, 2) to investigate the extent to AI application is being used in the banking industry in the North West Province, 3) to determine if the level of employee skills influences the level of AI adoption in the bank, and 4) to investigate if AI will influence changes in job descriptions of employees. Through semi-structured interviews, one theme, with five sub-themes were identified from the data that was analysed for the meaning of AI in the banking industry, and three themes and six sub-themes for how AI is being used in the banking industry. How employees' skills influence the level of artificial intelligence adoption in the bank amounted to three themes and five sub-themes, and how AI influences the change in job descriptions resulted in two themes and two sub-themes.

It has also emerged that managers view AI as intelligence that is demonstrated by machines for the success and profitability of the organisation. Although AI has to lead to many jobs losses, organisations are keen to train their employees to match the skills needed for AI. To confirm the results, direct quotations, codes from different categories, themes and sub-themes were recorded and the tables below discuss these. Table 1 consists of the main themes and the sub-themes with a wide deep meaning and the original responses of the participants to every theme and sub-theme. These themes and sub-themes are discussed below**.**

Article 1: Table 1

Q1: What is your understanding of artificial intelligence in the banking system?

Theme	**Sub-theme**	**Responses**
Digitalisation	Machines	"Computers and robotics to perform some tasks which used to be performed manually"
		"Ranging branch of computer science to build smart machines that are capable of performing tasks that usually require human intelligence, this includes programming a machine to perform a task that was done by human beings"
	Robots	"Simulation of human intelligence in mechanising that is programmed to think like humans. Normally called robots"
		"A tool or system that analyses the behaviour or data and predicts the future, normally called as robots"

	Terplainer	"System called terplainer to schedule different types of leave"
	Human Intelligence	"Digitalisation of existing processes to facilitate more effective and quicker transactions for clients without involving human action"
		"The extent to which the banking industry replaces humans with technology, e.g. digital banking"

Digitalisation*:* The participants (Table 1) reported that artificial intelligence in the banking industry is when tasks that were usually done by humans are automated. The participants understood what AI in the banking industry meant and how it is being used, although a number of the participants indicated the disadvantages of having AI in the industry, especially to its employees. Literature indicates that AI in the banking industry entails the banking industry replacing humans with AI on making decisions. According to Kaya (2019), AI alludes to the capacity of computer programs to get and apply information without human mediation and contribution. AI does this by just observing the general surroundings and analyses them automatically. Some of the tasks that previously required the human component would be invalid 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).

According to the participants, AI will replace many jobs as most of them will be done by machines. Banks that are taking advantage of automation have reduced the number of errors and have become more profitable. These participants indicated that banks are now making use of *machines* such ATMs as most of the commonly used machines in the industry are *robots*. Kaur et al. (2020) state that artificial intelligence in the banking industry revolves around chatbots. As stated by the participants, robots in banks are being used to help reduce and eliminate repetitive tasks and increase the profitability of the organisation as they use *human intelligence* and are meant to function like humans. Because banks are making use of robots, the banking industry has managed to improve its customer service experience and back-office processes (Vijai et al., 2020). One of the participants indicated that their bank has implemented the system of *terplainer* to automatically schedule times that employees can go

on leave. Since banks are now using a lot of machines, digitalisation in the banking industry has been on the rise, leading to many of the tasks being processed by computers.

Article 1: Table 2

Q2: To what extent is AI being used in the banking industry in the North West Province (basic tasks or advanced services that would typically require a human component)?

Theme	**Sub-theme**	**Responses**
Decision-Making	High volumes of workflow	"Computers, robots and other machinery to add in the decision-making and working through high volumes of workflows with or without human intervention"
		"Widely used to improve in the turnaround of decision-making and to work through large volumes of data. Repetitive tasks, e.g. treatment of overdrawn accounts from thousands of accounts are sent in but with AI a decision is made whether to pay their accounts, reserve them for a date or 2/3 and a decision will be made whether a payment will be made or the debit order will be retained. Credit scoring and granting of loans decisions are done by AI"
Efficiency	Clients Action/ Customer Systems	"It is currently used to determine clients' actions and understanding the clients better by analysing clients' available information and by building better customer systems and by providing things that the clients would need according to the information or data that has already been collected or in store. Used to better a client's experience in the bank"
		"Uses of high technology in various processes within the bank, this allows efficiency and helps to fulfil customer needs at a faster pace helps us to be more effective"
		"Used to transform customer experiences. Allowing customers to take control. Machine called SST which is the self-service terminal used to print proof of payments, pay-up accounts, banking app for transfer money, update daily limits, credit estimates for loans. Biometric for security to

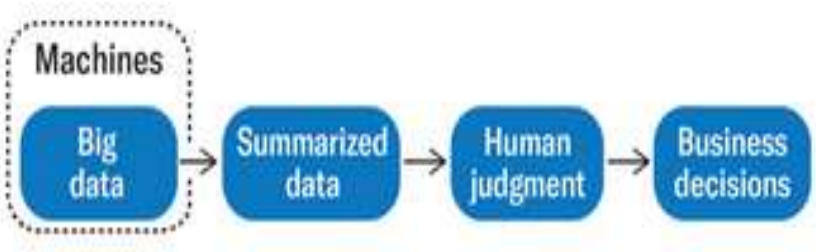
		check if you are the owner of the account"
	Talent (Intelligence)	"When we replace human capital or human intelligence with machines and systems"
	Automatic data	"The ability of a system to interact with clients on a level where clients feel they are interacting with humans instead of a computer. The clients should be able to do transactions or enquire in a manner that the client feels they were being helped by a human and being able to make decisions by themselves"
Information Security	Privacy	"Voice biometrics to authenticate clients to protect their privacy, we record clients' voice prints over a couple of calls, once it is large enough, we would use their voice to authenticate them, we can pick up who they are within 15 seconds, it helps by combating a lot of fraud, detect whether clients' daily transactions are fraudulent or not, we can keep track of them and put a hold onto their accounts, we also give them a call to check in when it comes to online banking, we can also check large transactions if it's the real owners making the transactions. The second factor authenticate when making online banking or any transaction and they send SSD messages or OTP cause it's not just easy to get into your online banking"
	Fraud	"To prevent and detect fraud, e.g. there is an algorithm in the background that a client is used to do and can easily detect a change of transactions and card gets blocked and stopped and clients will receive calls to ask if they did those transactions especially when making online transactions. The bank is linked to the Home Affairs and can provide proof if the client is legit"

Decision-Making: The participants (Table 2) feel AI functions help to speed up the process. Having to organise relevant information from *high volumes of workflow* can be time-consuming when done manually, hence making choices based on AI functions without

human invention speeds up making informed choices. When high volumes of data are reduced into manageable sizes, AI then surpasses what human capital can do, which leads to new opportunities and increased efficiency as those small manageable data will be used for decision-making (Colson, 2019). Banks often struggle with high volumes of call centre queries and e-mails from customers, hence banks have adopted chatbots to deal with the high volumes of information, to perform account services, frequently asked questions and financial requests (Chan et al., 2019). Figure 3 below shows how huge volumes of data (big data) are entered into machines and systems which break down the information into summarised data, allowing humans to now make judgements using analytics applications spreadsheets and dashboards for decision-making (Colson, 2019).

Article 1: Figure 3

What AI-Driven Decision-Making Looks Like



Source: Colson, 2019

Efficiency: Efficiency has been seen as a characteristic that all banks must possess, as indicated in Table 2, and banks are supposed to deliver to their clients at the minimum average time. According to Fraser (2017), employers are now forced to change how they operate in the sector in order to adapt to new technology. Most of the clients who use banks are busy people who have a lot of business to do. They are clients who cannot stand in long queues because of busy schedules. Banks can validate *clients' action* through AI, leading to efficiency in the delivery time. For banks to increase their customer efficiency and profitability, banks have since implemented algorithms that generate accurate results (Kaur et al., 2020).

Due to the use of different systems within the bank, for example internet banking, clients can make decisions by themselves and make transactions without human interaction. This leads to clients being able to do their business without having to visit the bank. According to

Manyika et al. (2017), if AI is not implemented in the company's production processes, they will face a lot of competition in the industry. According to the interviews, participants saw the different systems that the bank provides help employees to assist their clients effectively, knowing which information is more important as the system will have picked it up. Employers in banks are trying to implement AI to increase efficiency and productivity (Bhardwaj, 2017). Automation is said to bring efficiency, productivity and convenience in the banking industry which will be helpful to the clients (Manyika et al., 2016).

Information Security: Clients in every bank expect the bank to provide security to their funds. As a bank, clients need to trust the bank that their funds and assets are safe within the bank and outside. The banks need to ensure that the AI systems that they are implementing are safe, have validations and security control for clients' information to be secure and safe (Tegmark, 2017). In return, the clients will build trust with the bank, allowing the clients to do more business with the bank. Most people are doing cashless activities, hence the bank is responsible for the security of the assets and funds of their clients. As AI advances, cybercrime also increases, therefore, according to Hearit (2018), JP Morgan Chase and Co. spent over USD 600 million in trying to ensure that they enhance cyber security. When security is provided to the client's funds and assets with AI systems, fraud is less. Fraud in the banking industry has been on the rise, with people creating hacking systems aiming to deceive others, which include credit card fraud, securities *fraud* and bankruptcy fraud. These hacking systems have been used to obtain money, assets and property that are owned by other people. With AI, the systems can pick up any attempts to commit fraud.

As a result of general observations derived from interviews, the conclusion was made that what individuals view as AI in the banking industry is true.

The third question was to analyse whether employees' skills influence the level of AI adoption in the bank. *Technical Skills (technical - data capturing and algorithm creation), training, job description and automation* are the themes that were reported the most. Table 3 consists of main themes and sub-themes with a broad meaning and original responses of every theme and sub-theme. The themes and sub-themes are discussed below:

Article 1: Table 3

Q3: How do employee's skills influence the level of AI adoption in the bank?

Theme	Sub-theme	Responses
Technical skills	Data Capturing	"The system relies on data that was captured and if not captured correctly, it results in bad service, e.g. name not spelt correctly. We need to double-check and verify if everything was captured correctly"
		"Employees will need to be very technical people who will decide which parameters to deploy on AI to work on decisions and also to be able to probe what sort of information or systems does it need to interact to come up with the information and make a decision"
	Technical skills (Algorithms creation)	"AI needs human intervention as they are the ones who create the algorithms. Therefore, there is a need for skilled people to set up these algorithms and skilled people who collect the data that will be plugged into the algorithms. The way data is collected is very essential in how AI will be used in the bank"
		"Human input is needed because the algorithms that are built in to make these machines behave in a way that you want them to, human thoughts and mind-set are needed to design these algorithms. So this skill is needed to know how to program, to write code so that these machines act like humans"
	Educate the clients	"To educate the clients to adopt the new tech and employees to adapt to the new tech as employees with skills easily adapt to the new tech. Also, these employees can make suggestions to top management"
Hiring	Willing to learn	"If the employee does not have the skills they can hire someone. Employees should be willing to learn to various roles"
Training	Skills	"Employees' skill will influence how quickly employees can adapt to AI. Older employees are used to doing their work in a certain way and introducing AI will not take their jobs but force them to learn new skills. Employees are supposed to get

	constant training within the bank to acquire new skills. The millennials are enjoying AI whilst old people in banks are not"
	"Employees are being trained. Employees are constantly being upgraded"

Technical skills: is a theme that reported that employees (Table 3) need to possess skills to do data capturing, algorithm creation and educating clients. Having different types of skills in this Fourth Industrial Revolution is seen as vital, as the world is revolving around the technological world. Participants perceived that individuals who possess technical skills in the banking industry are very scarce, yet very valuable. According to the University of South Africa (UNISA) (2008), for employees to fit properly in their job descriptions, an analysis of their potential, skills and capabilities must be made. AI systems need employees who can *capture data* and deploy it to make valid decisions. Since the majority of the work in banks is based on data analysis which uses a lot of specialised software, employers are supposed to be information technology experts to process the data and communicate relevant information to their different stakeholders (Phillpott, 2019).

One of the participants mentioned that employees should have the desire to learn about the technical skills needed in the banking industry to stay relevant in the market. Employees need to acquire *technical skills* in *algorithm creation* to be able to make machines behave the way they want them to. Organisational change has little or no effect on employees if employees are constantly trained to stay up to date to match the advancing technology (Robbins et al., 2007). Therefore, employees should be willing to adapt to change to match the industry's needs. When employees are technically advanced, they can *assist clients* on how to use the new technology that they cannot operate themselves. Employees need to be trained to match all the clients, as clients have different technology needs and skills, and some may struggle to adapt to and use advanced systems.

Hiring: When employees are learning new skills constantly, they easily adapt to AI. These employees are not easily replaced as they will possess the relevant skills needed at that moment (Anderson, 2013). This statement proves that if employees are not *willing to learn,* they will be easily replaced, either by machines or by new employees who would possess the required skills. Silva and Lima (2017), Sivanandam, (2017), and Wadors (2016) also support

that if employees want to stay relevant in tomorrow's workforce, they should be willing to learn and upskill themselves, leaving employees with little or no choice.

Training: For every new system that the bank introduces, employees should be trained to learn the different skills needed for the systems and be able to operate the machines. Some participants highlighted that those who are digital literacy are not struggling with the constant training for the new systems being introduced but those that are technology illiterate who resist to technology struggle to adapt to the constant training. In addition, AI comes with a change in operational structures in banking which leads to existing staff being retrained and/or hiring new staff to match the required skills (Swankie & Broby, 2019). AI has led employees to train and explore different skills and not only their area of speciality (Rainie & Anderson, 2017). Based on the above responses, questions that we can ask the employer are is the employer ready and willing to retrain and *upskill* their employees to match the required skills and minimise unemployment?

The fourth question was to analyse whether AI would influence the change in job descriptions of employees. *Job description and automation* are the themes that were reported the most. Table 4 consists of main themes and sub-themes with a broad meaning and original responses of every theme and sub-theme. The themes and sub-themes are discussed below.

Article 1: Table 4

Q4: How does artificial intelligence influence the change in job descriptions of employees?

Theme	Sub-theme	Response
Job description	Retrenchment	"Banks have retrenched a lot of employees. Machines doing almost everything. Job descriptions used to be very long which included doing telemarketing when calling clients, selling them new products, follow-up but now done by machines. Helps perform better, handling complex situations, being creative and being analytical thinkers"
Automation	Repetitive Tasks	"AI does not remove humans in banks but rather takes away the repetitive tasks and have a better experience with clients" "Some of the duties shown on the job description may be replaced by artificial intelligence and a few tasks could be left

	in the hands of an employee who is a human being, forcing the employer to retrench some of the employees eventually"

Job description: *Retrenchments* in South Africa (Table 4) have been on the rise in the banking industry due to the replacement of humans by machines. Employees' roles have been changing and some have been replaced because of the systems that come with AI. Berriman and Hawksworth (2017) mention that there is a possibility in job loss increase due to AI advancements. According to the interviews, most participants believe that AI will reduce the number of employees who work in the branch as there will be a change of job description. Due to the low quality of skills in South Africa, the unemployment rate is likely to increase, especially where AI is involved, as less human capital will be needed (Fourie, 2016).

Seeing how AI has been a game-changer in the banking industry,, one of the participants mentioned that employees used to do a lot of paperwork and telemarketing, among other duties. The implementation of AI has led to better performance of their employees and they can now focus more on tasks that need creativity in strategic roles. We cannot deny the fact that AI in the banking industry has indeed taken away some of the jobs of many employees, as the future is in AI hands.

Automation: The creation of algorithms and systems in the banking industry has led to employees' daily routine duties being replaced by machines. Most of the *repetitive tasks* that employees used to do, for example telemarketing and administrative tasks, have been replaced by machines, leading to employees focusing more on strategic management. Certain routine jobs will become obsolete, as their skills will be replaced by machines, although AI is promising to bring in new job opportunities (Snell, 2018). According to Knapton (2016), Shewan (2017), and Smith (2016), these experts in digitalisation foresee automation replacing employee jobs for the next five decades. Participants indicated that although some employees still have their jobs, there will come a point when the employer has no other option than to retrench the employees, as automation will have taken their place.

2.5 Conclusion

The information above was gathered to answer the following research questions, namely:

- What is your understanding of AI in the banking system?

- To what extent is AI being used in the banking industry in the North West Province (basic tasks or advanced services that would typically require a human component)?
- How do employees' skills influence the level of AI adoption in the bank?
- How does AI influence the change in job descriptions of employees?

As mentioned above, AI is here and it is being used in their banking industry to improve productivity. During the interviews, participants mentioned that AI is here and it is inevitable. From the interviews, the researcher noticed that the participants understood the meaning of AI in the banking industry and the extent to which AI is being used. Some participants mentioned that AI is not meant to take away employee jobs but to help employees work effectively and productively and not focus on repetitive tasks. Some participants argued that AI is even creating more job opportunities for the employees working in the banking industry. However, there were mixed answers on whether employee skills influence the level of AI adoption in the banking system. Some believed that employee skills have a greater influence as AI is technical, hence the need for employees who understand technical language. Others believed that it is the duty of the company to train and upskill its employees so that the full adoption of AI systems is not difficult.

AI is being used in the banking industry for different purposes that include front and back office services. Some of the services that AI replaced are telemarketing, which was done by front-line workers, and credit score, which is now automated and has lessened the duties of back-office workers. The banking industry is now relying on AI for better services for their clients, but this has its disadvantages for the employees. The banking industry has been facing a lot of cybercrimes due to a lack of quality security, but the introduction of AI systems has led to fewer fraud cases in the industry. Clients now feel free to do their transactions anywhere as there are multiple security verifications before one can do their transactions.

Employees rely on their jobs for the survival of themselves and their families, but since AI has been introduced many employees are losing their jobs because of automation and their services become obsolete. Since the introduction of AI in the banking industry, many employees have been leaving due to the fear of losing their jobs because machines will have taken their place.

Finally, it can be concluded that the problem statement and research questions show that AI is indeed being used in the South African banking industry. The participants embraced the use of AI in the industry as they said it is helping the banks to remain competitive and remove repetitive and unnecessary tasks, allowing employees to focus more on creative and strategic roles.

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Chapter 3

ARTICLE 2

EVALUATING THE INFLUENCE OF ARTIFICIAL INTELLIGENCE (AI) IN THE BANKING INDUSTRY

Abstract

Background. Artificial intelligence (AI) in the banking industry can replace human capital in repetitive, monotonous, and cognitive tasks, but it is still not possible to replace non-routine tasks (Autor et al., 2003). For technophile employees, this has a positive effect on their daily tasks, but for some, it is seen as a threat. Although AI has many advantages in the banking sector, it has disadvantages that negatively affect the management of the bank, employees' tasks and responsibilities, as well as customers' experience with personal contact in the bank.

Problem statement. AI influences employees in their workplace.

Objectives. Explore AI in the South African banking industry.

Specific objectives. (i) To investigate the impact of AI on employees in the banking industry in the North West Province. (ii) To investigate the advantages and disadvantages that accompany using AI in banking in the North West Province. (iii) To determine the influence of AI on employees' performance. (iv) To provide recommendations for future research and practice.

Research method. A qualitative research method was used and twelve (N=12) participants in the banking industry were included. Different bank managers in the North West Province were selected for this research. A sample size of 12 participants was used and was subject to saturation. Two managers per bank in the North West Province participated.

Main findings. The main finding in this article states that managers perceive that employees have experienced AI differently as for some it has impacted them positively and for some negatively. Even though artificial intelligence brings a lot of advantages in the banking sector, it has its downside which has a negative influence on management, employees, and customers. Furthermore, the use of AI reduces bias and errors which increase employee performance.

Keywords: artificial intelligence, banking industry, job satisfaction, job security, performance management, unemployment

3.1 Introduction

The financial sector is experiencing significant growth, becoming one of the biggest spenders on AI over the years (Citi, 2018). Due to the increase in improved technology, big data and cloud computing, AI has managed to take over the banking industry as it boosts the emerging banking industry (Buchanan, 2019). AI is defined as the art of science that allows machines to perform human tasks as if they were humans by duplicating their minds in self-improvement and self-learning. It has been suggested that AI works better than humans, leaving the human factor at risk (Spacey, 2016). The banking sector has used the adoption of AI as it has become the most extensive digital wave in financial products, consumer banking and back-end operations (Deuz, 2018). Technological disruptors in the banking industry have resulted in the change in how business is done, for instance banks redefining what they offer, to whom they offer it and how they offer it. Because of this, there has been a mix of products and services offered to match the bank-client relationship (Coetzee, 2018).

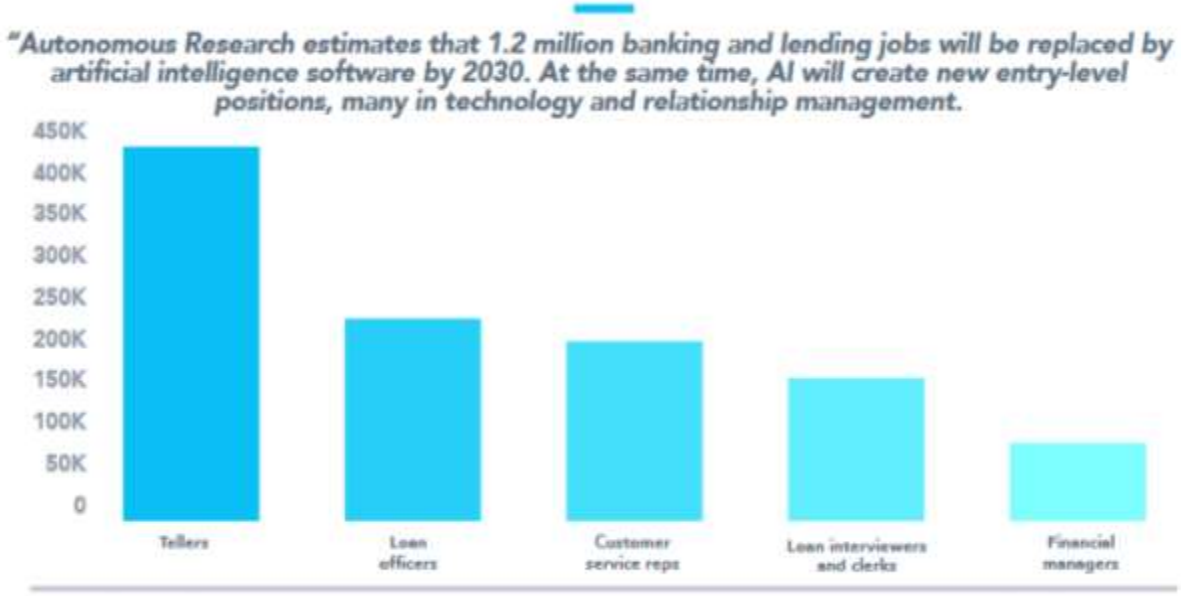
The adoption of AI has allowed business understanding through the management of large data amounts available in the company (Murugesan & Manohar, 2019). AI has therefore led to increased effectiveness in tasks that used to be handled by humans, and this has now led to increased quality and performance of employees (Saithibvongsa & Yu, 2018). As with any process automation, the integration of AI into financial services is likely to displace jobs in emerging market countries. For example, natural language processing could replace outsourced customer care services, which is an industry that employs thousands of workers in countries like Vietnam, Morocco and South Africa (Biallas & O'Neill 2020). Many financial institutions have recently implemented the elimination of jobs that were once considered stable. One of South Africa's oldest banks, Standard Bank, has shut down 91 branches and retrenched 1,200 staff in 2019 alone (South African Broadcasting Corporation News (SABCNews), 2019). First National Bank (FNB) has closed down 40 branches, reducing the number of people, employed, other finance houses are following suit if they have not already done so. This has pre-empted a backlash and protests from former and current employees (SovTech, 2019).

Deloitte (2019) postulates that banks need to approach staff training anew to prepare for the future of AI in the work situation. AI, Automation, the gig economy, Crowdsourcing and demographic shifts can have a big impact on how work is done in the future. AI goes beyond

eliminating routine tasks and cost cuts; it is about creating value for customers and meaningful work for the employees by focusing on problem-solving and creativity. This means that banks must adopt internal learning to remain competitive.

Article 2: Figure 1

How Artificial Intelligence is Reshaping Jobs in Banking



Source: Crosman, 2018

Unquestionably, AI will influence some of the current repetitive and monotonous tasks in the banking industry. It is estimated that AI will replace 1.2 million jobs; however, new positions will be created, as shown in Figure 1 (Crosman, 2018). The South African banking industry is currently functioning in an environment that is socio-economically imbalanced that has high unemployment, income inequality and poverty (South African Reserve Bank, 2018). The socio-economic imbalances in South Africa, which are unemployment, income inequality and poverty, have made the South African banks trail behind other countries in AI adoption despite Fintech trying to address the issues (Coetzee, 2019). According to a forecast by Hu (2020), there is going to be an increase in productivity in future although it will lead to high labour displacement.

3.2 Employee Perceptions of Artificial Intelligence

The application of AI in the banking sector has allowed banks to serve their customers with relevant information and products, for instance when AI systems can plan and can solve

problems (Vedapradha & Ravi, 2018). Another great advantage is that AI can quickly summarise, control and make large amounts of data helpful for the banker to make better decision-making (Hassani et al., 2020). Happy employees can fulfil their duties and be more productive and tangible organisational long-term goals will be achieved when employees are fully involved in the workplace (Doherty, 2010). According to Miller (2018), employee morale in an organisation is strongly influenced by the way management uses supplementation versus automation. Employees prefer to work with machines rather than having virtual colleagues (Lichtenthaler, 2019).

Employees who accept the use of AI in the banking system and share it with others can develop new skills and become more specialised (Ovaska-Few, 2017). All its positive and negative aspects have a significant impact on job security and the employment of staff (Jaehrling et al., 2018). Although AI in the banking industry increases staff quality, there is a fear that some jobs will go to waste and be replaced with a different kind of staff member with their unique qualification and experience (Frank et al., 2019). Both employees and employers will need to reconsider their perspective and view on AI technology, working in a flexible, open-minded work environment and accepting the potential impact of AI advances on job roles and responsibilities. Employees will have to follow a path of continuous training and keep up with technology and the great changes it brings (Bhargava et al., 2021).

3.2.1 Benefits of Artificial Intelligence in Banking

Banks use AI in many areas, such as customer service, general banking services, risk management, fraud, cyber security, compliance and physical security (Fintech News, 2020). When customers have access to AI on their mobile devices, such as mobile phones and home computers, they can do everything online, including money transfers and general banking services (Van Hove & Dubus, 2019; Wang & He, 2020). It might be true to say that banks are experimenting with the activation of credit cards using biometrics and fingerprint scanning to identity clients (Arner et al., 2015; KPMG, 2017). Fraud cases are on the rise in the banking industry due to some computer specialists misusing AI systems, leading banks to implement fraud detection systems with algorithms that predict, analyse and block fraudulent transactions (Kaur et al., 2020). Advantages of AI systems are that methods and ways can be identified to reduce fraud by implementing improved financial security in their systems (Mali & Mali, 2020).

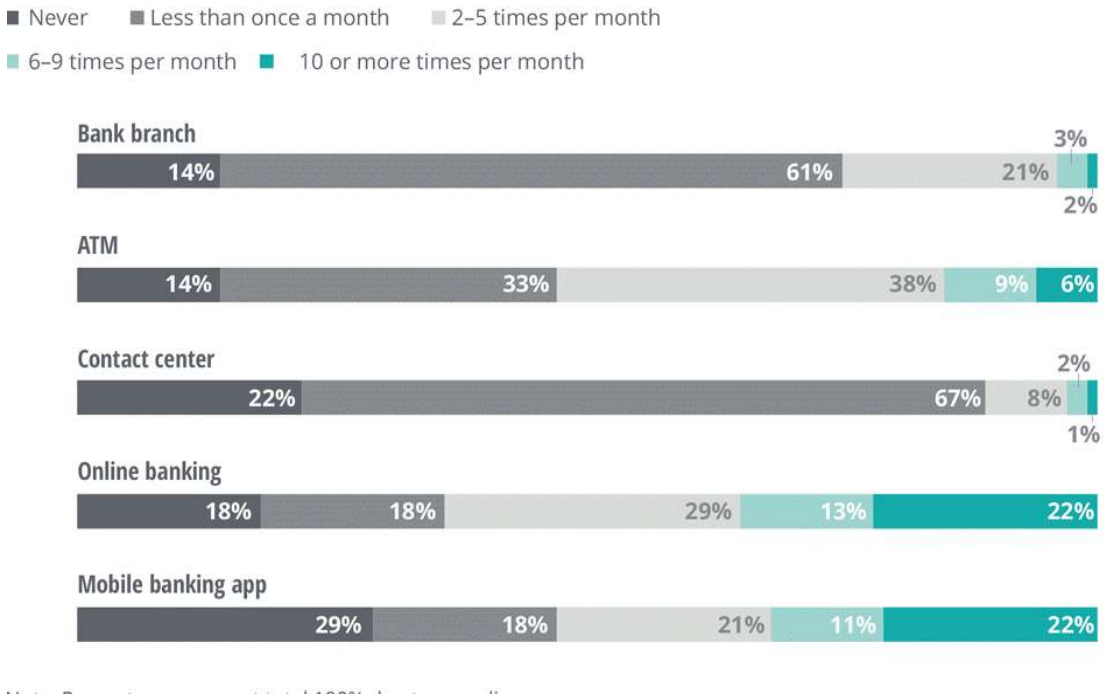
With the growing use of AI in the banking industry, the bank is increasing its efficiency in many areas. As a result AI eliminates many expenses, such as the size of the workforce and the cost of maintaining their physical branches (Hernando & Nieto, 2007). According to Kaur et al. (2020), AI in the banking industry has allowed clients to run their transactions through a window through inbound banking services, with self-service terminals, and kiosks for updates of personal information. Additionally, Hõbe (2015) states that technology in banking facilitates clients having customised and differentiated banking. Recently, AI in the banking industry has also helped banks to develop competitive policies in their value chain and also issued immediate decisions and analyses, for example on creditworthiness when a customer applies for a loan (Kunwar, 2019). The adoption of AI in the banking industry has also led to lower operating costs in many areas, resulting in increased banking profits (Sophia, 2018). Unstructured information can now be used in decision-making with advances in AI in banking, and further, financial advice on stock markets and speech-driven banking can reduce human errors (Alzaidi, 2018). Large amounts of data can be managed to increase the operational efficiency and process-driven services in banks (Fintech News, 2020).

Admittedly, AI has proven that it reduces the cost of banking services by automatically analysing customer banking behaviour and being able to provide personalised retail service (Alzaidi, 2018). AI has changed the workload of employees by removing repetitive tasks and giving them more opportunities to focus on tasks that require AI analysis for better data-driven decision-making (Chalimov, 2019). According to Schwab (2019), the advancement of AI in the banking sector has influenced the way individuals respond to technology, leading to the redesign of work and how work is done because it differs from the old traditional banking system. General bookkeeping, audit management and inventory management are some areas of the accounting profession that need managers to consider retraining their employees since their jobs will be monitored by the AI system, hence needing technical accountants (Shaffer et al., 2020). In the last decade, for example, there has been an increase in the number of Automated Teller Machines (ATMs), which has led to a decrease in customer visits to traditional banking branches. This decrease in bank visits by clients shows the independence that AI brings to the banking industry, and banking services can be done remotely (Consoli, 2005). AI is set to increase mobile transactions by 121%, reducing the number of customer visits in retail banks by a drop of 36% between 2017 and 2022 as customers will be assessing the banking information on applications (apps) **(**Pilcher, 2017).

The 2019 Deloitte Global Banking Outlook has shown how sharp the reality of declining branch visits is because many people do everything online, in other words AI has a real impact on the proportion of customers who visit a branch more than once a month. If this is how customers want to engage, it is certainly not inconceivable that we can all bank in the not too distant future with branchless organisations, and this can be attributed to AI (Deloitte, 2019).

Article 2: Figure 2

Reimagining Transformation



Note: Percentages may not total 100% due to rounding

Source: Deloitte, 2019

3.2.2 The Dark Side of Artificial Intelligence in Banking

Apart from increased security, risk management, efficiency and reduced monotonous tasks that AI brings to the banking industry, Ozili (2018) believes that there are issues about AI that need to be addressed in the banking industry, for instance unemployment, cyber-attacks and manipulation of data. Undoubtedly AI poses threats if not managed well in the banking industry and if all the systems are given the independence to behave in their own way (Davenport & Kirby, 2016). In the world of financial services there no standardised norms for

financial data, which would create significant problems in the banking industry. As a result, the use of AI increases the chances of biased information (Goudarzi et al., 2017). According to Coetzee (2019), the South African banks are currently operating in an environment where a client's information is readily available, which therefore threatens the usual role of banks, as clients' information is not difficult to access. Because of this, among other questions that might be posed, are who will be responsible for mechanical failure or if anything goes wrong that was not foreseeable (Deloitte, 2018; Sundblad, 2018). According to Old Mutual (2019), humans are emotional beings who respond to situations differently, whilst machines or software are not as they do not dwell on exceptions.

Some employees do not feel comfortable with automation, but augmentation; thus employees are more productive, produce high-quality end products and show other capabilities if they are also involved (Davenport & Kirby, 2016). As part of the employee's duties to include emotions and conscience when dealing with clients, the introduction of robotics in the industry has since eliminated human relations and interactions with clients (Barden, 2017). Saithibvongsa and Yu (2018) add that the increase of AI has hindered human relations, demolished commitment and workplace engagement among employees. Kelly (2012) supports that AI can do human tasks much better than what the human factor can do. Sadly, many jobs that were previously performed by the human factor are now performed independently and effectively by machines (Saithibvongsa & Yu, 2018). However, according to Kaplan and Haenlein (2016), there is still a need for the human factor in the workplace as AI can only perform tasks to a certain extent. With regard to automation, Jaehrling et al. (2018) mention that most case studies show that many company branches are closing as there is an increase in the number of digital customers. This has led to an increase in unemployed employees, as most of their jobs are now digitalised. When there is an increase in automated tasks and structural changes in banking, the demand for employees who can perform tasks that cannot be automated will decrease. Employment structures will change drastically, leading to a decrease in the level of the workforce needed, as tasks will be performed by robots and machines (Campa, 2014).

Employees performing tasks at the middle level will be at a high risk of getting their routine and manual jobs automated (Petropoulos, 2018). Undoubtedly, AI has affected many jobs, which include general accounting as the essential functions, such as bank reconciliations, auditing and payroll, having been automated over the years. Apart from this, AI is also

responsible for cyber-attacks that threaten the safety of personal and financial information of clients, which includes biometric data (Camillo, 2017). Some banks are now using accountants for tax advisory services to their customers, that is why unemployment levels have increased (Shaffer et al., 2020). For this reason, employees who are needed per company will automatically decrease when there is an increase in machine equipment (Webb, 2019). Even though different banks might have different choices, because AI is reshaping the banking industry, many banks are shaped by this trend (Jaehrling et al., 2018). It is projected that AI will cause a significant increase in unemployment (Barden, 2017). According to Jerry (2016), machines and robots will replace some jobs and this will affect some white-collar workers. Employees have developed a negative attitude towards AI as most employees fear losing their jobs in the process of this transformation (Winick, 2018).

Since most of South Africa's large population lives in remote areas, these people have limited access to physical banks (Coetzee, 2009). Because many live in rural areas, there is a challenge of them trusting and dealing with a technological device to access banking as they are less educated (Nedbank Ltd, 2018). In addition, Modiba and Kekwaletswe (2020) write that although financial services are available to all South Africans, urban and suburban customers tend to have more access to financial services than rural areas' customers, who have limited access.

3.2.3 The Influence of Artificial Intelligence on Employee Performance

According to Bitler (2001), banks that have implemented AI have an improved performance outcome than banks that do not adapt to it. Most business organisations, such as banks that have an improvement in the quality of their operations with AI, have recognised that broad-based quality employee performance is needed (Fasasi, 2020). Most organisations have been moving away from traditional ways of evaluating performance as it was associated with bias by employees. The use of AI has become the norm for appraisals, which reduces the high rate of errors (Matsa & Gullamajji, 2019). Berger (2003) found in their study that AI in the front and back office led to an increase in performance by employees that led to higher productivity. In addition, a study by Leckson-Leckey et al. (2011), who conducted a ten-year study on Ghanaian banks, found that banks that invested in AI increased performance significantly. According to Binuyo and Aregbeshola (2014), there is a significant relationship between AI and the performance of South African banks, as some operations require

significant investments in AI. According to Rossi (2017), the way banks respond to the opportunities and threats posed by AI has an impact on their organisational strategy, as it determines whether the bank will be able to compete in the Fourth Industrial Revolution, and how banks set their strategic goals over the next decade (Weichert, 2017).

Pawar (2019) postulates that AI offers numerous benefits to the banking industry and suggests that AI systems help management to automatically collect information from various sources, which help them to decide on performance. In addition, robust data analysis for problem-solving, talent management improvement, and rapid, agile, and continuous performance are some of the roles of AI in performance management (Ray, 2019).

Digital literacy people are exposed to technology more than the technology illiterate, and for that reason the digital literacy people are less concerned with having physical banks than the technology illiterate because they prefer human interaction (Coetzee, 2018). From a human resources perspective, managers need to work on redesigning jobs for employees who will be affected by the adoption of AI in the banking industry. Future planning is needed to allow employees to adjust to any technological advancements. This will allow AI to influence the employees positively in the development of personal and organisational achievements.

From the above information, it shows that AI has both positive and negative influences on the employees, clients and the organisation as a whole, and this include banks in South Africa as it is our main focus. Regarding that, a problem might arise if the negative influences of AI in the banking sector outweigh the benefits.

To investigate, even though AI is not extremely used in South Africa, banks are already making use of the benefits that AI brings to the industry. There is, therefore, a need for a qualitative investigation to investigate the influence of AI in the banking industry.

Research Questions

1. To investigate the impact of AI on employees in the banking industry in the North West Province.
2. To investigate the advantages and disadvantages that accompany using artificial intelligence in banking in the North West Province.
3. To determine the influence of AI on employees' performance.

4. To provide recommendations for future research and practice.

3.2 Research Design

3.1.2 Research Approach

The researcher made use of a qualitative research design to reach the objectives of this study following a phenomenological approach. The phenomenological approach tries to get an insight from managers from different banks as to how they see the influence of AI in the banking industry on their employees and the organisation. Perceptions and experiences of different individuals are gathered through this approach (Lester, 1999). The 4th Industrial Revolution is here and can never be ignored, but rather require strategies to work better. In the South African context, there is limited research that evaluates the influence of AI on the banking industry. The study addresses the research questions of employee experiences with AI in the banking industry, the influence of AI on employee performance in the bank, AI's impact on employees in the banking industry, the advantages and disadvantages that accompany using AI in the banking industry in South Africa, and recommendations for future research and practice. Therefore, this study aimed to evaluate the influence of AI in the banking industry in South Africa.

3.3 Research Method

3.3.1 Research Participants and Sampling

Different bank managers in the North West Province were selected for this research. A sample size of 12 participants was used and was subject to saturation, thus two managers per bank in the North West Province. This study made use of non-probability sampling, where the probability of being chosen is unknown (Struwig & Stead, 2001). A purposive sampling method was used to identify the participants. The identified participants were deemed fit for the analysis as they work closely with their employees. According to Maxwell (2012), purposive sampling is when the participants are in close relation with the setting and will provide rich and relevant information.

3.3.2 Data Collection

Data was collected after permission from the EMS ethics committee was obtained to conduct the study. After permission was granted from the EMS, the researcher obtained permission

from the different bank managers in the form of a consent letter which proved they were willing to participate in the study. For reasons of confidentiality and to protect the anonymity of the participants, the consent letter is not included in this article. The researcher assured the participants that the Zoom interviews would remain anonymous and that participation was voluntary. Semi-structured interviews were conducted following open-ended questions. The researcher aimed to gain in-depth information, as participants had different perceptions of AI in the banking industry in South Africa. Due to the COVID-19 pandemic, the researcher conducted the data collection through Zoom meetings.

Managers were asked to elaborate on the impact of AI on employees in the bank, and they were probed on some questions for clarification purposes and for the researcher to gain more insightful information regarding this phenomenon. All participants were asked the following questions:

Q1. What is the impact of AI on employees in the banking industry in the North West Province?

Q2. What do you think are the advantages and disadvantages that accompany using artificial intelligence in the banks?

Q3. How has employees' performance been since the implementation of AI in the banks?

Q4. Can you provide any recommendations on how artificial intelligence can work simultaneously with humans?

3.3.3 Recording of Data

The respondents gave their permission that the researcher could make use of recordings through written consent forms. While the interview took place, the researcher made use of a digital voice-recorder or laptop to record the actual interview taking place to ensure that the core of the study was captured truthfully and to ensure quality. The researcher and supervisor will have access to the digital voice-recorder to ensure that no one has access to participants' information. The recorded data was transferred from the voice-recorder onto a Microsoft Excel spreadsheet where it was analysed. The Excel spreadsheet was password protected, as well as the laptop that was being used. To ensure that the data would not be lost, the voice-recordings together with the transcribed data from the participants were stored on a flash disk as a backup.

3.3.4 Data Analysis

After the interviews were conducted, the researcher listened to all the responses of the participants and the data was transcribed onto the Excel spreadsheet. The data was transcribed in an Excel spreadsheet to get an insight into the overall response of the participants. Initial codes were generated and were linked to the research questions as identified above. Data was then organised according to their meaningful groups based on the initial codes (Braun & Clarke, 2006). Themes were developed for each code and meaningful themes were created from the meaningful items. The themes that were formulated were further discussed to have insightful information. The researcher ensured that there were no themes that were duplicated and that they matched with codes developed previously. The researcher at this stage wanted to ensure that the data gathered corresponded with the themes that were gathered on them. The themes were redefined and meaningful names were given to the themes which reflected the data collected. The researcher also made sure that the names given represented the data collected. When the researcher identified themes that looked similar, these themes were combined to avoid too many themes on the same information. At this final stage, the researcher gave a final report after all the themes had been established (Braun & Clarke, 2006). The report was presented in a dissertation format.

3.3.5 Strategies Employed to Ensure Quality Data

To promote quality data in a study, four criteria were considered, namely:

- Credibility;
- Transferability;
- Dependability; and
- Conformability.

Credibility: The goal was to illustrate that inquiry was conducted in such a manner that the subject has been identified and described accurately (Shenton, 2004). A qualitative researcher should state the parameters by being able to place boundaries around the study.

Transferability: The degree to which the results can be used in other contexts and settings with other people (Korstjens & Moser, 2017). In a qualitative study, that is being able to provide information that is rich and which is easy to evaluate. It can present certain problematic areas in search of establishing transferability because the numbers in a

qualitative study are limited (Sutton & Austin, 2015). The researcher therefore referred back to the original framework to show how data collection can be guided. However, the researcher tried and ensured transferability by richly describing the context and setting of the research in case other researchers want to replicate this study.

Dependability: The stability of the researcher's findings over some time (Korstjens & Moser, 2017). The researcher assumed questioning of the research process, which would constitute whether the process was logical, well-documented and audited (Korstjens & Moser, 2017). The researcher attempted to account for the change of conditions chosen by the study, which includes the design by a refined understanding of the study.

Conformability: The degree to which a researcher's findings can be confirmed by other researchers (Korstjens & Moser, 2017). The similarity will guarantee to catch the first idea of objectivity. This was done by not concentrating on the researcher's perspective but instead on translating the gathered information itself (Korstjens & Moser, 2017). The researcher remained objective by not giving individual tendencies a chance to impact the information but rather for the findings to reflect the interpretations.

3.3.6 Reporting

An Excel spreadsheet was used to capture the results of the research. Using interview questions data, themes and sub-themes were extracted and direct responses from the research questions are given. The researcher was able to use direct quotations for some of the answers that the participants used.

3.4 Findings

The different categories (codes), themes, and sub-themes were extracted from the interview responses and direct quotations were used to confirm results. The relevant themes and sub-themes will be discussed below. The findings consist of four tables in Table 1 for question 1 (what is the impact of AI on employees in the banking industry in the North West Province). The interview question was posed to see if the participants understood how employees feel and their experiences about the use of AI in the banking industry. The second question (what do you think are the advantages and disadvantages that accompany using artificial intelligence in the bank?) will also be reported in Table 2, and Table 3 will discuss the

advantages and disadvantages of AI. In Table 4, for the third research question (how been employee's performance since the implementation of AI in the bank?) we get to understand the level of employee performance after the implementation of Ai in the system.

Through semi-structured interviews, four themes with eight sub-themes were identified from the data that was analysed for the impact of an employee with AI, refer to Table 1. The advantages of artificial intelligence have four themes and seven sub-themes, whilst the disadvantages of AI have five themes and five sub-themes, refer to Tables 2 and 3. Lastly, three themes and four sub-themes for employee performance refer to Table 4. Refer to Tables 1 to 4 respectively where the researcher discussed it.

The participants highlighted that AI brings forth more advantages to the industry than the risk it brings. Through AI, clients can do various transactions anywhere, allowing employees to focus more on strategic roles to better their services. Although AI might lead to many job losses and manipulation of data, banks are trying to safeguard clients' information by providing a tight security system. To confirm the results, direct quotations, codes from different categories, themes and sub-themes were recorded and the tables below discuss these. Table 1 consists of the main themes and the sub-themes with a wide deep meaning and the original responses of the participants to every theme and sub-theme. These themes and sub-themes are discussed below**.**

Article 2: Table 1

Q1: What is the impact of AI on employees in the banking industry in the North West Province?

Theme	**Sub-theme**	**Responses**
Time management	Reduced stress, time and money	"Not experiencing long queues in the branch, especially month-end. Technology played a big part and reduces stress, time, money. Clients enjoying the user-friendly systems provided by the bank as they have access to it for 24 hours, e.g. ATM and SST"
	Reduced workload	"AI makes the job easier and handles tasks that require judgmental interventions where we apply our minds. Assists in prioritising work and channelling effort where

		results are more likely, e.g. having thousands of accounts but being able to see which ones can repay, thus AI helps"
		"Employees losing jobs but it has eased a lot of loads and focus on core job functions, e.g. if you are the relationship manager AI eases the job and then focuses on bringing in sales"
Job Security	Replacement	"Makes the work faster as most work will be automated but machines are taking over and fewer people will be employed. Machines work faster than humans and the banks save more money by using machines. The bank ends up making more profits but fewer people will be employed"
		"The job will be on the line as most people will be retrenched"
	Perception	"Advanced services provided by artificial intelligence caused a reduction in the number of employees at work, especially in the banking sector it has had practical implications for employees to an extent that some of the banks have closed their branches because of artificial intelligence"
	Training	"Change might be lagged, and some might face challenges though training is being done so that they know how to operate"
Employee client relationship	Interaction/ Communication	"A great experience in the banking system. Minimum interaction with the customers since they can do anything online; however, employees are losing their jobs causing retrenchment"
	Spending habits	"Employees can understand the client's needs better and you provide services directly to what they need, e.g. their spending habits that they want to build a house or they have kids. The bank then highlights specials and the client's experiences are better for their finances"

Organisational Structures	Change	"Some employees finding it difficult to use AI as some of them joined before AI introductions, e.g. the old-aged employees"

Time management: The participants (Table 1) indicated that since the introduction of AI in the banking industry, management has allowed employees to focus on more important tasks, as some tasks are taken up by automation and are time-saving. One of the respondents indicated that there are not many queries, especially at the end of the month, as the AI provides many of the answers. The respondents further indicated that technology has played a major role in reducing stress and stress levels because routine tasks are eliminated to a large extent and time can be given more productively to tasks of importance.

Literature indicates that time management is how an individual can succumb to stress to make decisions and anxiety that will be surrounding them in aiming to accomplish their goals (Kapur, 2018). According to a participant, employees would experience high levels of stress because of the workload as employees would have a lot to do, which influenced some of them not to be effective. To support this, Hashemizadeh (2006) points out that when time is managed properly for a better life, individuals will focus more on reaching the goals set individually and that of the organisation. The introduction of AI in the system has helped banks to save money and time as some of the repetitive tasks were eliminated, allowing employees to focus more on strategic tasks that require more of the human mind.

According to Fink (2010), stress is how the body responds to surrounding positive and negative demands. Therefore, when employees experience high demands of workload that is above their capacity at a given period, stress and anxiety are experienced. Besides, when individuals fail to manage their *time,* they tend to produce lower results than expected and this often leads to negative psychological effects, such as stress and anxiety (Department of Trade and Industry [DTI], 2001). However, one of the main reasons why employers implement AI in the system is because it helps to reduce production time which results in increased profits (Bhardwaj, 2017).

Job Security: Throughout the interviews, participants pointed out that employees have the *perception* that AI will take over their jobs, that is employees are working but with the fear that AI will one day replace them with machines. According to Artz and Kaya (2014), job

security is the probability or the perceived risk of individuals keeping their jobs or them ending up losing them due to different reasons.

According to the participants, especially those who feel affected, the levels of enthusiasm and dedication for the organisation has decreased because of fear of job loss. Additionally, employees fear that the introduction of AI will take over their jobs, leaving them jobless (Chartered Institute of Personnel and Development [CIPD], 2017; Musakaruka, 2017; Shewan, 2017). *Training,* as one of the sub-themes, was mentioned by a participant, saying that for some employees for them not to be retrenched because of AI, they need to be trained or retrained so that they match the skills needed to operate machines or systems. For employers, the introduction of AI in banking means an increase in productivity and they save money, whilst for employees the introduction of AI means many of them will be retrenched as there will be less job security (Hlatshwayo, 2012; Shewan, 2017).

Employee client relationship: The introduction of AI in the banking industry has reduced the interaction between employees and clients. Internet banking, mobile banking, ATMs and chatbots have been the means to communicate with the bank and doing required transactions. Some participants of the study acknowledged that the introduction of AI has led to better performance of employees. Since some of the tasks were replaced by machines, employees are now focusing on giving their clients personalised products and services That usually means clients usually do not go to the bank to do any transactions, as they do everything in the comfort of their homes. If there is positive *communication* in the organisation, it will lead to various positive influences (Riemer, 2007). A participant mentioned that the introduction of AI has allowed employees to communicate with clients according to their specific needs, not the general information.

It is clients' wish to have the best relationship with the bank, which will make them do business with the bank. Previously products and services from the bank would be advertised to every client regardless of their financial status, but since the introduction of AI clients get information that is relevant to their financial needs. Therefore, good communication and interaction with the clients produce good results. Moreover, the organisational structure is an important aspect in determining how employees communicate with their clients. (Bresnahan & Yin, 2017; Sander, 2017). Since there is less interaction between the bank and the clients, employees focus more on ensuring that they provide clients with the best products and

services. Less interaction of employees and clients when clients' expectations are exceeded should lead to client satisfaction so that they do not invest their finances and assets with other banks as they will get personalised products and services (Chidindi et al., 2014)

Organisational structures: The transformation of the banking industry has influenced the way organisations are structured. There are few employees in bank's branches as they have been decentralised and most of the tasks are now done by machines. Over the years, most employees were afraid of losing their jobs in all industries due to the introduction of AI in the system (Jezard, 2016; Rosen, 2015). The fear to adapt to change stems from the perception of employees thinking AI will affect their work relations as AI will replace their jobs (Jezard, 2016). Referring to one of the participants, "some employees are finding it difficult to use AI as some of them joined before AI introductions, e.g. the old-aged employees". Most employees who have been working in the banking industry for years have not advanced their skills, and because of this reason they fear the change to adapt to the introduction of AI. The fear to adapt to change also shows that employees are afraid to lose their jobs to machines.

Since employees work directly with clients, it is of importance for the management to monitor how their employees perceive AI adoption. How employees perceive AI will have an influence on their relationships at work and how they communicate and assist clients. Adaptation of AI in the banking industry has social, economic and political implications for employees. Employees who are not fully employed by banks or who are not permanent workers are most likely to be obsolete as most of their jobs will be automated. Most of the perceptions on AI taking over employees' jobs have negative effects on employees, causing employees to fear change as there is a possibility that they would be unemployed in the future (Soergel, 2017).

Article 2: Table 2

Q2: What are the advantages of using artificial intelligence in North West Province banks?

Theme	Sub-theme	Responses
Fraud detection	Cybercrimes	Help detect fraud because the system validates everything by scanning. Also, the Home Affairs screen to verify your fingerprints. The Home Affairs displaces the owner. Machines are 100% accurate as they reduce human error.

Customer experience	Accuracy/ Convenience	It has helped to assist clients a little quicker and no more long queues. It has assisted in protecting clients' data, accounts and has reduced a lot of fraud. AI is a lot more accurate than humans
	Decongestion	It decongests the branches, thus fewer people have to visit the branch, servicing multiple clients at the same time
	Less workload	Helps the bank grow by employees focusing on important duties rather than doing admin
Decision-making	Efficiency	Speed of decision-making, the capability of dealing with huge volumes of data, removes bias and reduces the risk for the bank
Competitive edge	Growth	AI gives banks a competitive edge over other banks as AI accommodates more clients and can do many tasks at the same time
	Saves money	Cost-cutting in terms of human capital, it saves time, customer satisfaction, e.g. internet banking on their own services is now at the disposal of clients and is very convenient at any time and at any given point

Fraud detection: Throughout the interviews, the participants (Table 2) mentioned how important AI has been to the management, employees and clients in managing and protecting clients' information from internet threats. During the interviews, it was noted that since most of the transactions are now done online, there are more chances of clients' information being exposed to hackers. To support the previous statement, the importance of cybersecurity in the banking system is that it protects clients' assets and the bank's reputation. When information is leaked the banks lose a lot of money and time when they try to recover information (Khatri, 2019). Furthermore, the use of AI has allowed employees to save their clients' information.

Cybercriminals have taken advantage of the advances in banking technology since the introduction of AI. However, AI fraud detection systems are being used to detect and prevent these cybercrimes (Soni, 2019). Siddiqui et al. (2018) also support the notion that cybercrimes, such as theft and fraud, are on the rise due to the introduction of AI in the banking industry. Therefore, the participants feel the systems of AI will reduce fraud cases in South Africa. According to Businesstech (2020), the South African banking industry

experienced increases in robbery and burglary during 2019 because of the evolution of the digital landscape. However, the use of AI systems and structures has led to a decrease of these crimes by 16%.

Customer experience: The use of AI in the banking industry has improved the experiences of end-users, which are the customers. There are no longer queues in banks to assist clients, as they can do everything in the comfort of their homes. Previously clients would visit the branch for different transactions, but lately, because of digitalisation, everything is decentralised, and clients do not visit the bank anymore. One of the participants mentioned that the use of AI "Decongests the branches, thus fewer people have to visit the branches, servicing multiple clients at the same time". AI allows for employees to work with multiple clients at the same time, which saves time and adds value to the clients. The decongestion in banks has also led to less workload for employees. Previous researchers have noticed that banks that have customers that are satisfied with the bank's products and services have high amounts of organisational profits (Asimah et al., 2018). Currently the finance sector recorded (215,000) as the highest in employment between the fourth quarter of 2020 to the first quarter of 2021 (Statistics South Africa, 2021).

The digital era keeps clients busy and they do not have time to stand in lines to be served, hence digital platforms such as internet banking and mobile banking are at their convenience. South African banks are using AI to provide systems that are beyond retail banking services, thus providing clients with 24/7 seamless customer service experiences. While AI provides clients with seamless experiences, it also boosts the organisation's revenue when they personalise products and services for customers (Chalmers, 2021). According to Simon (2018), a seamless customer experience is when customers can have access to services whether they are online or offline, whilst the branding, tone and values remain the same. When employees focus on more important tasks, they can meet personalised customers' needs. To incorporate seamless customer experiences, strategies are put in place which include:

- Prioritising the customers first;
- Being consistent in their approach of seamless customer experience; and
- Understanding the different client base.

One of the many benefits of using AI is the convenience it provides to customers by meeting their daily needs. For example, if a customer was dissatisfied with the service provided, AI platforms detect these incidences and they are easy to correct.

Article 2: Figure 3

How Artificial Intelligence is Changing Customer Experience

Source**:** Meara, 2020

Meara (2020, para. 10) distinguishes the use of AI on customer needs applications in the form of a pyramid and this is what the researcher suggests:

Starting from the base as shown in Figure 3:

- "Tell me—basic queries"—that is, the customer has a basic question (for example, "How do I change my password?" "What is my checking account balance?").
- "Do it for me", which includes facilitating account on-boarding and basic-task optimisation ("You can send an electronic request for payment to this buyer").
- "Tell me–data insights", which includes descriptive (such as report generation) and predictive analytics (cash-flow forecasts).
- At the top is "Advise me", which involves bespoke recommendations to address a specific need or resolve a specific issue (for example, "A cash shortfall is expected; here are three options to cover it").

Decision-making: AI (Table 2) systems are increasingly benefiting the decision-making process and increased efficiency in banks as it speeds up the process. According to Phillips-Wren (2012), the application of AI has affected decision-making greatly as it provides integrated systems for real applications. When there are effective decision-making processes in place, banks produce effective results. AI systems can deal with large amounts of data into small data samples. The participants agreed that AI in decision-making reduces a lot of biases as information is automated. Even though management and employees used to make decisions without AI systems, the introduction of the systems has helped greatly in producing effective results because they are ow working simultaneously with AI systems.

AI is currently being used to make decisions in high-stake scenarios that do not only need human experts. In these scenarios, the combination of AI systems and human experts produce 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 as it eliminates human errors. Besides AI providing analytical information, AI also resolves problems that would have been identified and it facilitates the accurate prediction of the financial status of the bank (Beaulieu, 2021).

Competitive edge: Banks that are currently using AI in their daily business have more customers than those that do not have it. The use of different advanced AI systems will invite more customers to the bank and will lead to the overall growth of the business. AI systems accommodate everyone from a young age to old age. Most people in the young and old age group can do transactions on their own without physically visiting the bank. In addition, when a bank provides various services which are at the convenience of customers, that bank will gain a competitive advantage over other banks. To keep up with the competitiveness among banks, those that are quick to react to AI advances have a better opportunity in gaining a competitive edge (Lee, 2018).

Article 2: Table 3

Q2: What are the disadvantages of artificial intelligence in the North West Province banks?

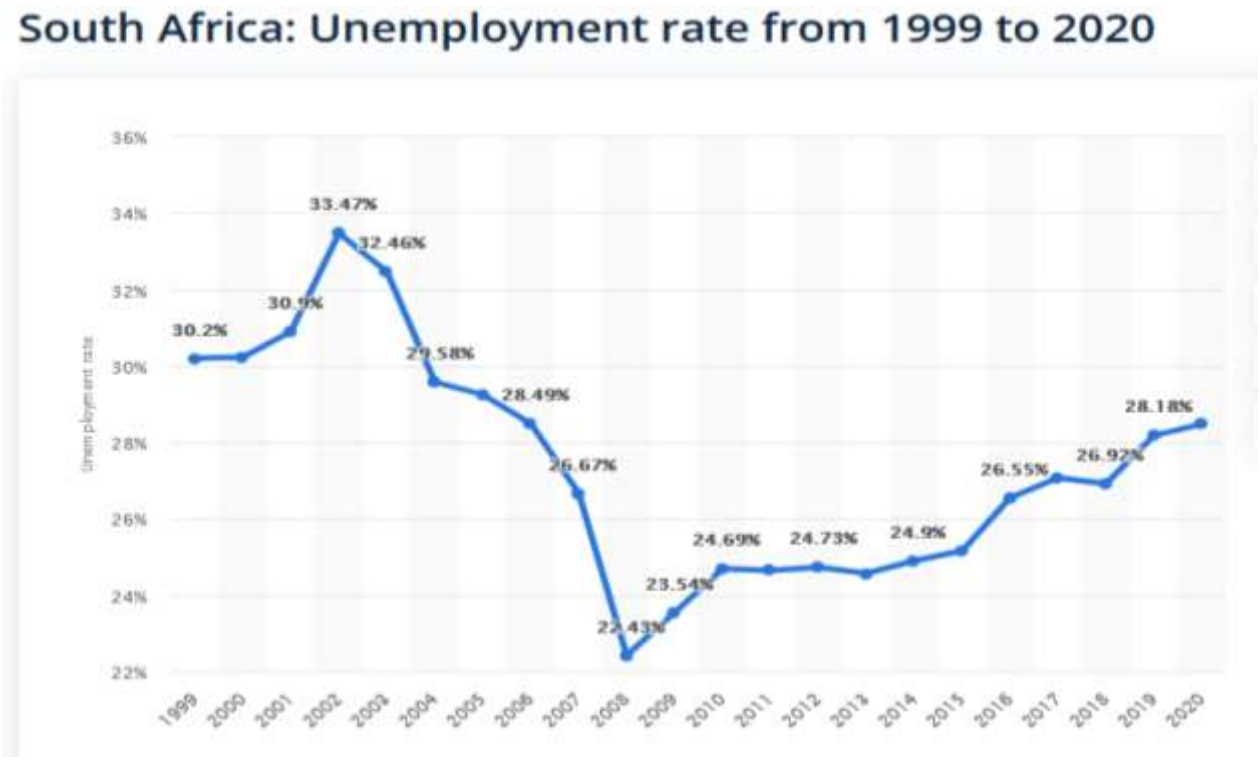
Theme	Sub-theme	Responses
Unemployment	Retrenchments	"Some roles can be taken by machines. People might be

		out-scaled in cooperate especially those people who are not into data science, AI or anything about digital platforms"
		"AI leads to unemployment as it has replaced most of the jobs"
Maintenance	Expenses	"Banks spending more money on maintaining their systems so that they are not out of service"
Customer Safety	Fear of scams	"Customers are easily scammed when they are helped by the wrong people"
Manipulation of software and machines	Computer specialist	"With some computer specialist, they can manipulate the systems and forceful where there was supposed to be human intervention, e.g. character"
Adoptability	Digital literacy vs digital illiterate	'Banks are finding it difficult to get everyone on board and some still do not trust AI and prefer human interaction".
	Young vs old	"Some clients are elderly and they struggle to use the systems"

Unemployment: From the answers (Table 3) obtained from the interviews, all participants mentioned that AI comes with a big disadvantage as it will increase unemployment as some tasks will be replaced by machines. When employees are retrenched because machines are taking over, it is called technological unemployment. Technological unemployment occurs when technological changes happen within the banking industry that causes the bank to restructure and redesign jobs, leading to some tasks being obsolete. For example, the introduction of chatbots and ATMs meant that machines could work independently with limited human intervention, thus cutting off the number of employees who worked at call centres and as tellers respectively, therefore, some employees were retrenched (Pettinger, 2013).

Article 2: Figure 4

South Africa: Unemployment Rate from 1999-2020



Source: O'Neill, 2021

The graph (Figure 4) shows the approximated 1999-2020 unemployment rate in South Africa. There has been a rapid increase in 2019 and 2020 with 26.92% and 28.18% respectively. Some of the employees became unemployed due to technological unemployment. The deadly disease which is the pandemic COVID-19 also affected a lot of employees as most of their jobs could not be done from home (O'Neill, 2021).

South Africa's unemployment rate will likely grow, especially with the poor quality of South Africans' skills and seeing as future firms will require less human labour, an unemployment rate of about 50% to 60 % will not be a big shock (Fourie, 2016). Even though employers are implementing automation to survive, it does not change the fact that automation will cause some people to be replaced. Unemployment levels will increase when robots replace most of the jobs in most activities (Osipov & Ulimova, 2013).

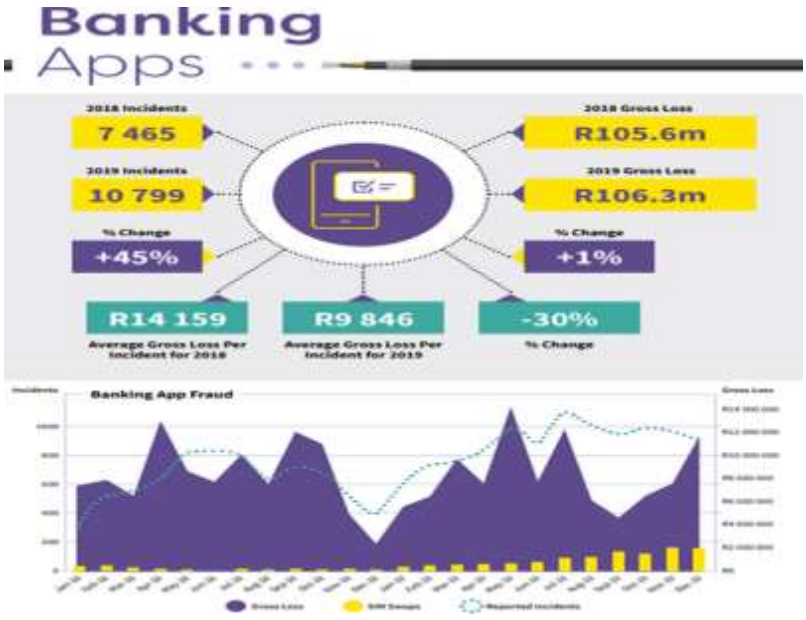
Maintenance: Taking care of the machines and replenishing (Table 3) them now and then might be costly to the organisation. One of the participants mentioned that banks might end

up spending more money in trying to make sure that machines and AI systems are always working and are not out of service. This could lead to more expenses for the bank as almost all customers are using the different systems that come with AI. To support the above statements, Osipov and Ulimova, (2013) state that if AI systems or machines break down, the cost of maintenance and repairing of machines and software is high. AI software and machines are expensive to set up and when damaged, they are costly to repair and the extra money will be used to fix the software and machines (Bhbosale et al., 2020).

Customer safety: Elderly customers are vulnerable to being scammed by strangers when they offer to assist them. Some customers are not used to using technology, hence they seek assistance to do transactions. Strangers then take advantage of assisting customers and steal from them. Some of the transactions are traceable, whilst some are not. The graph in Figure 5 shows that the most common scams in South Africa are through banking applications. The difference between 2018 and 2019 incidents shows that scams through banking applications are increasing, as 2018 has 7,465 cases, whilst 2019 had 10,799 incidents.

Article 2: Figure 5

These are the Most Common Banking Scams in South Africa



Source: Businesstech, 2020

Manipulation of software and machines: Some computer specialists are manipulating data and systems for their own good as AI software and machines do not have emotions and

character. Cybercriminals are taking advantage of the improvements being made in banks by creating biased data and cyber threats because banks were improving their security, for example in identity authentication and detection of suspicious bugs (Gilbert, 2018). When AI systems are exposed to crimes, they cause destruction and affect a lot of humans (Bhbosale et al., 2020).

According to Hewitt (2020), because the banking industry is transforming every day on the digitalisation side, the sector is at the potential of cyber-threat and according to the researcher, these are top three threat trends in the banking industry:

- **Malware**: that is when end-user devices are infected with malware for cybercriminals to get easy access to the bank's information, especially critical networks and data of the bank.
- **Social engineering**: employees are manipulated into releasing important and sensitive data to social engineers who use employees' behaviour to get information. Phishing is the most common attack in the banking industry where social engineers use texts, calls and e-mails to retrieve information from employees.
- **Data manipulation:** when important and sensitive information or data gets into the hands of the wrong person. The cybercriminal will get access to target systems and make unauthorised changes that affect the whole system for selfish gains, for example when a client's transaction is manipulated.

Willingness to adapt: Employees who are always interested in new technology adapt to new systems faster than employees who are digitally illiterate who have reduced or no knowledge of technology. Some of the younger generation adapts quicker to technology more than the elderly. The younger generation has been using technology at a tender age, hence is willing to adapt to technology that the banking industry introduces. Growing up in an environment of electrical applications from a younger age, the younger generation adapts quickly (Garside, 2014; Wakefield, 2015). According to Ismail (2017), younger colleagues are more adaptive to technology than older workers. However, we are living in the digital world where both age groups can provide services to customers when they work together.

Article 2: Table 4

Q3: How has been employee's performance since the implementation of artificial intelligence in North West Province banks?

Theme	Sub-theme	Responses
Risk reduction	Fewer errors	"Voice biometric boosts the performance and fewer errors and increases stats and quicker on calls. Made the job less tiring and making the job more enjoyable" "AI has improved on individual performance and being helped by AI fewer mistakes thus improving the performance of employees"
	Increased productivity	"Employee performance is improving overall. Employees feel some work is not on their shoulders anymore, hence more time to work on other things. Happy people produce better results" "AI is a tool that makes the job easier.AI makes employees apply more effort"
Staying Relevant	Progress	"Usually, employees are judged when they make a process go faster, e.g. write an algorithm or code which makes work to be done faster and targets are met faster. Which makes other employees to be regarded as faster"
	Measurement	"The performance will improve as they will want to stay relevant, but some tasks cannot be measured on performance as it will be done by the machines"
Job satisfaction	Quality results	"The performance has improved a lot since most of the tasks have been made easier. AI helps in many of the tasks leading to efficiency"
Connection	Value	"Connect more with clients adding some personal touch. Finding out what the clients need"

Risk reduction: Employee performance refers to the behaviour of employees in accomplishing personal and organisational goals to minimise organisational resources whilst increasing profits (Donohoe, 2019). According to one of the participants (Table 4), "AI has led to fewer errors and increased stats and quicker on calls. Made the job less tiring and

making the job more enjoyable". The introduction of AI systems has been of help to management and employees as systems detect errors. Before the introduction of AI, there used to be a lot of errors and some of them could not be traced back. These errors reduced the efficiency of employees' performance and affected the cliental base.

When a bank has a good reputation for limited errors that are made by employees, clients feel that their finances and assets are safe from cyber-attacks (Shroff, 2020). According to Osipov and Ulimova (2013), the use of AI reduces the risk of errors since as it is high in accuracy. In South Africa, with the use of AI systems, errors are minimised, lowering the overall costs to the organisation, which leads to better resource utilisation (Chalmers, 2021).

Staying relevant: Every employee wants to stay relevant in the organisation. According to one of the participants, employees now work very hard in trying to stay relevant. Some of the tasks have been replaced, meaning machines are doing most of the work, hence leaving employees to prove their relevance in the organisation as some tasks cannot be measured. Because some tasks are already automated, employees are focused to work effectively to be faster as employees and also to have a good performance review.

Job satisfaction: Employees who are satisfied with their job perform better and add value to the success of the organisation. According to a participant, "AI helps in many of the tasks leading to efficiency". Ali (2016) states that job satisfaction is when employees are very comfortable with their jobs, which leads to them to appreciate their work experience. Better customer experiences are witnessed when employees feel job satisfaction. Therefore, the bank experiences quality results from their employees, which increase efficiency generally.

Connection: The banking industry has the aim to satisfy its customers by providing the best products and services. A participant mentioned that employees now have time to find out personalised customer needs. Value is then added to both the organisation and the end-user, which is the customer, leading to better performance of employees.

3.5 Conclusion

The information above was gathered to answer the following research questions, namely

1. What is the impact of AI on employees in the banking industry in the North West Province?
2. What do you think are the advantages and disadvantages that accompany using artificial intelligence in the banks?
3. How has employees' performance been since the implementation of AI in the banks?
4. Can you provide any recommendations on how artificial intelligence can work simultaneously with humans?

As mentioned above, AI is already being used in the banking system of South Africa in the North West Province, and the management assumes that employees have different perceptions and experiences of AI. The participants mentioned that some of their employees are sceptical about the intense use of AI in the system as they fear their jobs would be replaced. During the interviews, participants mentioned that AI has become part of our daily lives, be it in business or social. Regarding the previous statement, it means that AI has a great impact on individuals. The researchers noticed that the participants do realise the different dimensions of AI in the banking system. Every participant highlighted that AI would lead to the loss of employment for many employees.

The introduction of various AI systems, software and machines has eased a lot of the workload on the employees. Employees used to do repetitive, monotonous tasks which then put a strain on the important tasks that require their creativity. In addition, before AI, employee stress levels were high as they would deal with too much work. Undoubtedly, AI saves money, time and lets employees reach their self-actualisation.

Even though there is now less employee-client relationship because of the different systems of AI that allow customers to do transactions anywhere, the less interaction has allowed employees to focus more on providing personalised products and services which invite more customers to the bank. Now customers can get access to products that suit their profiles. Furthermore, the less interaction of the parties led to restricting of the banks as fewer people are working at the bank's branches. From the interviews, the participants highlighted that since the introduction of AI, there has been restructuring of duties and the organisation as a whole. They pointed out that some employees struggle to adapt to change that comes along with AI as there has been restructuring of what they were used to in the banking industry.

Employee performance since the introduction of AI has improved, as management and employees have more time to focus on strategic tasks. The use of AI software and machines had replaced a lot of tasks, hence employees' main focus is now on monitoring the machines. However, the participants also said that since the introduction of AI, employees feel the need to perform above the set tasks to stay relevant. Errors have reduced, as AI systems pick up and monitor errors when they occur. Finally, it can be concluded that the problem statement and research questions show that AI is indeed being used in the South African banking industry. The participants embraced the use of AI in the industry as they said it is helping the banks to remain competitive and remove repetitive and unnecessary tasks, allowing employees to focus more on creative and strategic roles.

South Africa has been experiencing increased cyber-attacks in the banking industry. Cybercrimes have taken advantage of the digital advancement in the industry. These criminals have been attacking employees to get access to information as well as attaching bugs to systems. AI came with advantages which try to reduce the attacks caused by crimes. Banks have been advancing their security systems to protect the bank's legacy, employees' reputation, and customers' assets. Decision-making has also improved, as AI has reduced errors and there is little bias as compared to when there is only a human intervention in decision-making. Therefore, best results invite more customers and the customer experience also advances as the best decisions are put in place. However, there is a downside of AI in the banking industry and the main one is increased unemployment as some jobs will be replaced by machines. Millennials also are taking advantage of the advancements and they have become criminals in cyber-attacks for their own selfish benefits. Old agers have been in the industry for a long time, therefore, most of them are struggling to adapt to the changes that come with AI in the industry.

The use of AI systems has a strong and effective impact on human resource (HR) practices, which enhances the overall organisational performance, as AI applications on HR can predict and analyse information. (Matsa & Gullamajji, 2019). Finally, it can be concluded that the problem statement and research questions show that management and employees experience AI differently in the South African banking industry. The participants embraced the advantages that AI brings to the industry; however, AI also has its downside in the South African banking industry.

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Chapter 4: Conclusions, Limitations and Recommendations

4.1 Conclusion

This is the concluding chapter of the study. It will allude to the main focus and findings of every chapter. 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. The main objective of this last chapter is to draw conclusion, limitations and future recommendations based on the findings in Article 1 (Chapter 2) and Article 2 (Chapter 3). The research study focused on the South African banking industry in the North West Province, hence limitations and future recommendations will be boldly based on that.

The following conclusions serve to ratify the deductions formulated through the research findings by guiding closing arguments towards AI in the North West Province of South Africa's banking industry. The conclusions of this research study will be based on the objectives/findings of each research article.

4.1.1 Specific Objective 1: To Conceptualise Artificial Intelligence in the Banking Industry, according to Literature

The first objective of this study was to conceptualise AI in the banking industry according to the literature. The literature review indicated that AI intelligence emerged in 1956. Literature defines AI as the use of computer systems and machines that work more like humans that can replace jobs that normally required human intervention. John McCarthy, the father of artificial intelligence, describes it as "The science and engineering of making intelligent machines, especially intelligent computer programs (Kumar & Chandrakala, 2016, p. 13). Literature further describes artificial intelligence as the set of programming codes that make computers act and behave as well as turning the computer into robots (Donepudi, 2017). Although scholars and practitioners might have minor differences on aspects that should be included in AI, the literature review revealed that AI is a multifaceted concept. It comprises dimensions such as learning, reasoning, problem solving, perception, and using language.

When AI is narrowed down to the banking industry, large banks, especially those that are leading in the industry, use AI to provide better-personalised customer services, remain competitive and involve operations in the banking system, for example at the back offices (Walch, 2021). Referring to our themes and sub-themes, the findings show that most participants had the same view as some researchers, that AI in the banking industry is the improvement in the digitalisation within the banking industry. For example, 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 assistant to clients through the implementation of AI (Vedapradha & Ravi, 2018).

4.1.2 Specific Objective 2: To Investigate the Extent to which Artificial Intelligence Application is being used in the Banking Industry in the North West Province in South Africa

South African banks are currently providing their clients with a wide range of products which includes apps that allow for easy interaction with customers. However, according to a 2013 study, the South African banking industry adopted Web 2.0 technologies quite slowly compared to the US banks (Bagley et al., 2013). It is therefore strongly advised by Daniel (2020) that banks use advanced technology to reduce expenses and enhance their value propositions. Current findings suggest that AI is helping the management in the hiring processes 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 of loan providers, credit scores, opportunities for investment, as well as interest rates scores (SovTech, 2019). Although there are different applications, such as social and instant messaging, banking-related applications are among the most downloaded applications 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.

4.1.3 Specific Objective 3: To Determine if the Level of Employee Skills Influence the Level of Artificial Intelligence Adoption in the Bank

AI is technical, thus the findings highlighted that there is a need for technical skills which enable employees to operate the machines and systems. The literature also supports that the

adoption and application of AI in organisations are largely dependent on how employees advance in their skills to match the technological changes (Conti & Sulis, 2016). In addition, organisational advances in productivity are determined by the ability of the employees to advance in their skills (Brynjolfsson et al., 2017). Although AI does put forward a lot of benefits to the banking industry, management has been reluctant to upgrade employees' skills, which then affect the way they operate machines and AI systems as they lack the know-how (Ross, 2018). It is important for banks to upskill, reskill and redesign employee jobs for employees to remain relevant and provide the set of skills required.

Previous research has shown that technological advancements change now and then at a faster rate compared to how employees advance and improve their skills (Berger & Frey, 2016). It emerged from the findings that employee skills are a necessity for AI developments; however, the findings show that there is a need for employee training which helps the employees to be able to perform effectively. Therefore, the participants would often highlight that employee skills would improve if they are trained to match current technology. However, AI has led to an increase in unemployment as jobs and skills are defined to match the technological change (Castro Silva & Lima, 2017). Respondents indicated that although there is an understanding of the influence of employee level skills on AI, they did not necessarily indicate the types of employee skills that they need, except for technical skills. As shown in Chapter 2, data capturing, willingness to learn and educating clients are some of the sub-themes that generated to show how employee skills have an influence on AI adoption.

4.1.4 Specific Objective 4: To Investigate if Artificial Intelligence will Influence the Change in Job Descriptions of Employees

AI has an influence on employee job descriptions as some jobs will be replaced. According to Personnel Today (2015), technology will reshape the workforce as some of the jobs will be replaced, thus eliminating one-third of the roles. As identified by the participants of this study, the South African banking sector found that the change in job descriptions has led to some jobs being obsolete, leading to the increase in retrenchments in banks. Employees are now focusing more on tasks that require creative thinking, eliminating repetitive tasks as AI acts as a support tool to humans. It was found that, although some tasks will be eliminated, new roles and specialities are also being created by the use of AI in the industry (Krasadakis, 2018). This then proves that for banks to remain competetive, they should adopt the modern

way of operations and eliminate the traditional way if they are to remain profitable and ensure future longevity.

4.1.5 Specific Objective 5: To Investigate the Impact of Artificial Intelligence on Employees in the Banking Industry in South Africa

The use of AI in the banking industry led to two or more employees being replaced. However, the same controversial AI has also created jobs for employees which are linked to AI (Franken & Wattenberg, 2019). Looking at the findings, time management, job insecurity, employee-client relationships and organisational structures, they show that the management feels that employees have mixed feelings on how AI affects them. General structures of organisations, the connection to their environment have changed but change in mentality should be in place (Di Francescomarino & Maggi, 2020). AI leads to the change in organisational structures, processes and culture which have transformed the way banks make decisions based on AI (Franken & Wattenberg, 2019). Although artificial intelligence has helped in the time management of management and employees, the participants highlighted that this was because most of the tasks were now being done by AI systems and machines. Employees become alert and wary of the changes of AI when jobs security is threatened (Mutumba, 2018). High unemployment rates in South Africa have persistently caused challenges to the country (Maloka, 2020). In addition, the relationship of employees and customers is now less and effective as customers can now do most of their transactions with assistance. Furthermore, today's employment opportunities tend to decrease even though productivity levels will increase (Franken & Wattenberg., 2019). Banks have now changed their organisational structures to suit AI, which then influence employees negatively as they fear job losses.

4.1.6 Specific Objective 6: To Investigate the Advantages and Disadvantages that accompany Artificial Intelligence in Banking in the North West Province in South Africa

Literature and research indicate that employment in the banking sector is going to be influenced by the growing use of digitalisation in the industry. As mentioned in Chapter 3, the literature states that AI has many advantages and disadvantages in the banking industry. AI systems have helped in the reduction of fraud cases, such as cybercrimes, which were high before the introduction of AI in the banking system. Additionally, customer experiences have

improved as more accurate information is passed from employee to client, with customers also being able to do their transactions remotely. AI has led to less human interaction; however, according to Johns (2012), human interaction does not disappear altogether as trust and commitment will continue to be shared between the bank and the clients.

Of note is that AI has many uses, which include providing recommendations for a career path that allows employees to be satisfied with their jobs, which leads to high performance. In addition, the use of AI algorithms had allowed for the review of employee morale (Schweyer, 2018). While AI has many advantages for the banking industry, research participants highlighted that retrenchments have been on the rise as machines and systems are taking over. The research also highlighted that maintenance expenses, customer safety and manipulation of data are some of the main themes which were deduced from research participants' responses to the ugly side of using AI in the banking industry. In the literature review, Businesstech (2019) states that even though unemployment is high in South Africa, most people do not understand what AI is. Consequently, most employees are replaced by AI, leading to job losses. Due to the increase of digitalisation, there is evidence of a decrease in the demand for routine and administrative jobs in the industry. The research findings also highlighted that maintenance expenses, customer safety and manipulation of data are some of the main themes which were deduced from research participants' responses to the ugly side of using artificial intelligence in the banking industry. Some clients who are older or who are not technology-friendly have been struggling to adapt to AI features, sometimes leading to these people being helped by strangers who sometimes steal from them.

4.1.7 Specific Objective 7: To Determine the Influence of Artificial Intelligence on Employees' Performance

AI has to a great extent helped employees to improve their overall performance. Using recommendation engines, according to Schweyer (2018), employee satisfaction and performance have increased. Broadly speaking, AI in performance helps management to know who top performers are and which employees are capable of being future leaders. From the findings identified, risk reduction, staying relevant, job satisfaction and connection were the themes that were reported mostly by the research participants. As with risk reduction, the use of AI in performance has led to fewer errors when employees are performing their duties, thus eliminating any bias and unwanted bias as banks will be making use of platforms such as

chatbots (Buck & Morrow, 2018). Employee performance is being improved using AI, as employees' data is used analyse employee work habits and their patterns, therefore allowing management to monitor and boost employee performance (Romeo, 2021).

This increases the productivity of the organisation in general. Additionally, employees tend to perform their very best to stay relevant as progress will be measured by AI-driven systems. Job satisfaction has been on the rise since the introduction of AI on performance as employees feel they are doing less but produce quality output.

4.1.8 Specific Objective 8: To make Recommendations for Future Research and Practice

The eighth objective regarding recommendations for future research for the banking industry will be discussed in Section 4.3. In Section 4.2, the limitations of this study will be elaborated on.

4.2 Limitations

This study has some limitations which will be discussed below. There is still a lack of researchers and studies on the South African banking industry with regard to AI, its impact on employees, on employee performance and AI and human skills interaction. Apart from the above statement, AI advancements and developments might affect banks and provinces differently. The researcher noticed that some of the limitations with regard to the study was that it was time-consuming. The sample size might have been too small to generalise for the South African banking industry. This study included only participants who had managerial positions in the North West Province, meaning that findings cannot be generalised to the banking industry across the whole of South Africa, since no other provinces were included. Participants who had managerial positions were interviewed which also narrows the responses on some of their judgement on how employees feel about AI in the banking industry.

The sample size of participants that were interviewed was 12. According to Myers and Newman (2007), some researchers, academic practitioners do not regard small sample research studies as serious. However, the sample size is determined by data saturation (Moloto, 2012). In this instance, data saturation was reached by 12 interviews. The researcher attempted to diversify the participants with age, gender and information variation. This

research made use of thematic analysis for data analysis. According to Braun and Clarke (2006), researchers differ in interpretations, which affect the analysis reliability levels. The researcher used their own beliefs and judgements which may be biased. Most studies did not have information on the South African banking industry on how AI has been used and how it has influenced employees' perception of technology.

4.3 Recommendations

Future researchers should embark on conducting this study on a larger sample, including participants from at least more provinces. A larger sample will allow the findings about the banking industry to be generalised across the whole of South Africa. Future researchers can use the etic perspective and compare this data with other banks across South Africa, to see what similarities or differences exist between different banks about AI's impact on the banking industry.

It is recommended that future researchers use different data collection methods, such as questionnaires and focus groups, to bring clarity and rich additional information on the research questions. Research participants must be allowed to complete small self-completion questionnaires before the actual interviews sessions are done, in order to keep the research participants anonymous; instead of participants writing their names, codes can be used.

A stratified sample can be used, basically interviewing as many bank employees from across South Africa from junior level to senior level. Using stratified sampling allows the researcher to get broad information from all different levels of employees. De Vos et al. (2011), state that a stratified sample is drawn from a population that has separate sub-groups or strata. Other researchers can also develop a questionnaire that will be able to measure the effectiveness of using AI simultaneously with humans to develop a more reliable performance assessment plan for employees in the banking industry. Managers may be biased since they may assess others concerning their convictions, hence widening the participants will make the information more valuable and richer.

The study recommends that banks should no longer restrict their services to the role of processing payments or providing funds for clients. Rather, banks should now provide convenience by interfacing and integrating with the retail internet world to support customer

lifestyles and remain competitive. Otherwise, they risk losing their market to neo-banks and fin-tech internet-based financial service providers.

The gradual introduction of AI in the banking industry was recommended by a participant. Since banks have been operating in the traditional style, the slow introduction of AI will allow employees to accept change because change is scary to some. According to a participant, some customers cry when they call, hence there is a need for machines to work simultaneously with employees. In addition, when AI is used to assist employees, good results are achieved. Some tasks need a superior human. Humans should advise in skills as systems/machines are advancing, for instance knowing any programming skills.

Banks sometimes experience network or systems challenges, and in such cases humans need to work manually. If the product is new, employees are needed to help clients. Errors also sometimes need human intervention to have reversals and corrections. Most importantly, employees need to be constantly training and discussing AI and not just top management.

From a human resources perspective, employees can be reskilled through training and development that will help the employees to match the skills that the AI requires. There is a need for diligent education and training programmes to be designed so that employees have the right skills to work with machines effectively and are able to boost digital skills (Petropoulos, 2018).

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Appendix 1: Ethical Clearance

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20 September 2019

Prof J Visagie
Per e-mail
Dear Prof Visagie,

EMS-REC FEEDBACK: 20092019
APPLICANT: Prof J Visagie – MCom in Human Resource Management
STUDENT: V P Darangwa – (26565153)(NWU-01370-19-S4)

Your ethics application on, *Exploring artificial intelligence in the South African banking industry*, that served on the EMS-REC meeting of 20 September 2019, refers.

Outcome:

Approved as a minimal risk study. A number NWU-01370-19-A4 is given for three years of ethics clearance.

Kind regards,

AL Bevan-Dye

Prof Ayesha Bevan-Dye
Deputy-Chairperson: Economic and Management Sciences Research Ethics Committee (EMS-REC)
Vanderbijlpark Campus

Appendix 2: Questionnaire

The purpose of the following questions is to gain insight on the influence of artificial intelligence in the banking industry. Participants are required to answer each question as elaborately as possible

1. What is your understanding of AI in banking system?
2. To what extent is AI being used in the banking industry (basic tasks or advanced services that would normally require human component)?
3. What have been employee's experiences in the banks when using artificial intelligence?
4. What do you think are the advantages and disadvantages that accompany artificial intelligence in the banks?
5. How do employee's skills influence the level of AI adoption in the banks?
6. How does AI influence on the change on job descriptions of employees?
7. How has employees' performance been since the implementation of AI in the banks?
8. Can you provide any recommendations on how artificial intelligence can work simultaneously with humans?