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The impact of digitalisation on the employment rate in the South African financial services industry

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0102826X

A research article submitted to the Faculty of Commerce, Law and Management, University of the Witwatersrand, in partial fulfilment of the requirements for the degree of Master of Business Administration.

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A. DECLARATION

I, Makoma Tiny Mokhabuki, declare that this research article is my own work, except as indicated in the references and acknowledgements. It is submitted in partial fulfilment of the requirements for the degree of Master of Business Administration in the Graduate School of Business Administration, University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination in this or any other university.

Signature: 

MAKOMA TINY MOKHABUKI

Signed at Durban

On the 21st day of June 2023

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D. ABSTRACT

This study aims to determine the impact of digitalisation on the employment rate in South Africa, with specific reference to the financial services industry. Many revolutions have been seen globally, from the Paleolithic and Neolithic eras to Agricultural Revolutions and the First, Second, Third, and Fourth Industrial Revolutions. Technological changes and a significant movement in employment and unemployment have occurred with these revolutions. The study seeks to determine how technological advancements through digitalisation have impacted the employment rate in the South African financial services industry.

A survey questionnaire was used to invite views from people employed in the financial services industry. The purpose of the survey was to determine perceptions regarding the introduction of technologies within the working environment and their impact on employee movements. The questionnaire also invited views on whether further introductions of technologies would create efficiencies and if this would impact their team sizes. An analysis was made using Qualtrics and SPSS on the data received.

The findings indicate that introductions to technology's impact on employment are complex as it depends on various variables such as the type of skills which the employees possess and those which are required by the employer. Firstly, introductions in technology can cause structural unemployment, which is, in essence, only temporary. The introduction of technology causes unemployment in those occupational levels whereby the work is repetitive and can therefore be automated. In contrast, introducing technology causes employment in jobs requiring cognitive and abstract thinking and, therefore, cannot be automated.

Within the financial services industry in South Africa, it was found that more employees in skilled positions were retrenched or transferred due to technology introductions. However, this was reduced by increased recruitment in professional positions requiring more technical skills and cognitive thinking. It was concluded that the advancement of technology should not be rolled out at a pace that would lead to a net unemployment rate; however, it should be rolled out efficiently, resulting in more employment in cognitive tasks.

Keywords: Fourth Industrial Revolution, digitalisation, employment, technology, unemployment, technology, financial services

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1. INTRODUCTION

1.1 Context

The President of South Africa, Mr Cyril Ramaphosa, aims to move the country's Fourth Industrial Revolution (4IR) forward while increasing the employment rate of the citizens of South Africa (Africa Growth Initiative, 2020; The Presidency, 2019; The Presidency, 2020). He has stated this in various public speeches and is also one of the authors of the Foresight Africa Report (Africa Growth Initiative, 2020). According to The Presidency (2019), he officially opened and addressed the first 4th Industrial Revolution SA – Digital Economy Summit, intending to address the 4IR initiatives.

OmniSA (2020) reported US-based futurist George Friedman as one of the critics who are cautious about the President's plans to expand 4IR in South Africa because he believes his plans are unrealistic. According to the report, George Friedman believes that advancing technology at the speed that President Ramaphosa refers to would indicate that the crucial steps needed before harnessing and reaping from 4IR benefits will inevitably be bypassed. These essential steps include infrastructure, a skills base, and the country's low literacy levels. Not having this could increase the inequality gap and lead to job losses while the elite prospers, thereby widening the inequality gap even further (OmniSA, 2020).

To indicate the significance of facilitating the 4IR and employment initiatives, South Africa's National Development Plan 2030 (NDP, 2030) also has, as one of its priorities, to reduce the unemployment rate of South Africa to six percent by the year 2030 (National Planning Commission, 2012). In this plan, Information and Communication Technologies (ICT) were identified as "a critical enabler" of economic activity, with communications networks as a generator of skilled and unskilled opportunities in the short, medium, and long term, respectively (National Planning Commission, 2012). From a broader perspective, technology should enable new industries where more workers would be employed, which is associated with economic growth and increased employment due to these new industries (National Planning Commission, 2012).

1.2 Problem Statement

Although fast-tracking of ICT in South Africa has been on the country's agenda to assist with the growth of economic activity, a decade has passed since the adoption of the NDP 2030, and only seven years remain to the targeted date of 2030. The unemployment rate in South Africa was at 35.3% in Q4 2021 as per Stats SA (2022), a fall of 10.4% from the unemployment rate of 24.9% reported by Trading Economics (2013) when the NDP was adopted.

Bessen (2019) has stressed that nations with greater income equality have more rapid employment growth during industrialisation due to their standardised preferences and hence narrower standard deviation, which implies that nations with greater income inequality will have a slower pace of economic development due to their varied differences. South Africa, one of the most unequal countries in the world, with a Gini coefficient of 0.63 as per Statistica (2022), would therefore benefit from an understanding of how the advancement of technology impacts its employment rate given Bessen (2019)'s research, the goals of NDP 2030, and the current unemployment rate.

Taking Bessen (2019) conclusions into account, digitalisation, instead of improving the economy as expected and reducing the Gini coefficient, may negatively impact employment in South Africa due to South Africa's high inequality rate. However, South Africa plans to advance in technology through its 4IR initiatives; its plans must be aligned with the current economic circumstances.

1.3 Research Questions

Main Question: Does the adoption of technology in the financial services industry impact the employment rate in South Africa?

- **Sub Question 1:** How has the adoption of technologies affected the employment rate in the South African financial services industry?
- **Sub Question 2:** What are the leading technologies which have impacted the employment rate in the South African financial services industry?
- **Sub Question 3:** Which occupational categories have mainly been impacted by technology adoption in the South African financial services industry?

1.4 Research Objectives

This study aims to investigate whether digitalisation, driven by the adoption of technology in South Africa, impacts the employment rate within the country, with a specific focus on the financial services industry.

1.5 Research Scope

The research will be limited to the financial services industry in South Africa.

1.6 Definition of Terms and Concepts

The following terms and concepts will be used throughout the text:

Table 1: Table of Definitions

Term	**Definition**
Agrarian	“of or relating to farms and farming.” (The Britannica Dictionary, n.d.).
Artificial Intelligence (AI)	“an area of computer science that gives machines the ability to seem like they have human intelligence.” (The Britannica Dictionary, n.d.).
Automation	“to run or operate (something, such as a factory or system) by using machines, computers, etc., instead of people to do the work.” (The Britannica Dictionary, n.d.).
Digitalisation	the use of digital technologies to change a business model and provide new revenue and value-producing opportunities; it is the process of moving to a digital business. (Gartner, n.d.)
Industrial Revolution	“the major social and economic changes that occurred in Britain, Europe, and the U.S. in the late 18th and 19th centuries when new

Term	Definition
	machinery, new sources of power, and new ways of manufacturing products were developed.” (The Britannica Dictionary, n.d.).
Labour Force	This indicates every individual who is employed and those who are unemployed. (Stats SA, 2022).
LinkedIn	A social website that brings together professionals through networking (LinkedIn, n.d.)
Neolithic	“of or relating to the time during the Stone Age when people used stone tools and began to grow crops, raise animals, and live together in large groups but did not read or write.” (The Britannica Dictionary, n.d.).
Paleolithic	“of or relating to the time during the early Stone Age when people made rough tools and weapons out of stone.” (The Britannica Dictionary, n.d.).
Structural unemployment	Unemployment resulting from industrialisation usually due to technological change than fluctuations in supply or demand (Oxford Reference, n.d.)
Technology	“the use of science in industry, engineering, etc., to invent useful things or to solve problems.” (The Britannica Dictionary, n.d.).
Unemployment rate	“the proportion of the labour force that is unemployed.” (Stats SA, 2022).

Term	Definition
Unemployed persons	“Unemployed persons, according to the Official definition, are those (aged 15–64 years) who: a) Were not employed in the reference week; and b) Actively looked for work or tried to start a business in the four weeks preceding the survey interview; and c) Were available for work, i.e., would have been able to start work or a business in the reference week; or d) Had not actively looked for work in the past four weeks but had a job or business to start at a definite date in the future and were available. “ (Stats SA, 2022).

1.7 Section Overview

This research report is divided into eight sections:

- Section 1 of the report introduced the study.
- Section 2 provides the theoretical background to the study.
- Section 3 presents a description of the research process and methodology.
- Section 4 presents the study's findings.
- Section 5 provides a conclusion of the study with a summary of the results and integration of theoretical framework and literature reviewed.
- Section 6 provides recommendations for practice.
- Section 7 provides recommendations for future research.
- Section 8 provides references to other authors’ writings in the report.

2. LITERATURE REVIEW

2.1 Introduction

The literature review in the subsections below describes what gave rise to technology and employment and how these developments have evolved. Previous studies by scholars have been included in the research regarding how technology has impacted the employment rate and, where necessary, the occupational level of workers affected by these technological changes.

2.2 History and Evolution

History demonstrates that as people gain knowledge of different facets of certain aspects of life, it becomes necessary and motivates them to improve those facets. The theory of Maslow's hierarchy of needs, depicting people's curiosity, outlines these numerous stages of human adaptation and evolution (McLeod, 2022). This starts with a person acquiring the most fundamental physiological needs. Once these are reached, the person's motives will drive them to advance to a higher hierarchy level (McLeod, 2022).

Similarly, Charles Darwin's theory of evolution, centered around species' innate need to endure and maintain themselves to avoid going extinct, suggests that for species to live and reproduce, it must adapt to its surroundings (National Geographic Society, 2022). This progression also applies to humans as it has been portrayed throughout history with people creating more advanced versions of their creations (Ruse, 2009). The Paleolithic, Neolithic, and Agricultural Revolutions are some of these eras that depict the human species' evolutions and adaptations (Britannica, n.d.).

The Agricultural Revolution is the most relevant to this study because, during this revolution, the human population increased and led to the division and specialization of labour and civilization (Chu et al., 2022). Chu et al. (2022) explain that during this time, communities moved from primarily using hand tools in the home to using machines to mechanise factory processes. These agrarian societies transitioned to industrial societies, hence, the industrial revolution. Therefore, the industrialisation of societies followed the same path (Chu et al., 2022).

2.2.1 The Industrial Revolutions

The first industrial revolution recorded was the First Industrial Revolution in Britain in the 1780s (Crafts, 2011). The Britannica (n.d.) explains this as being characterised by using metal instead of stone and wood. It continues by explaining that almost a century later, the Second Industrial Revolution followed. The use of steam and the transformation of mechanised processes to mass scale marked this (Britannica, n.d).

Another century passed, which observed the development of the Third Industrial Revolution, also called the Digital Revolution (Greenwood, 1997). This Revolution was characterised by computerization and automation in which technology and the internet were used to digitise services, production, and distribution (Greenwood, 1997).

Recently, there is a witnessing of the Fourth Industrial Revolution (4IR), characterised by cyber-physical systems, the merging of technologies, and blurring the boundaries between physical, digital, and biological systems (Schwab, 2017). This change involves utilising the power of artificial intelligence and robotics to assist in the growth of countries' economies (Schwab, 2017).

These Industrial Revolutions illustrate the evolution of technology represented by the technological shifts which have gone through various innovations starting from the Digital Revolution and the First Industrial Revolution up to and including the current Fourth Industrial Revolution (Britannica, n.d). The increased innovations led to several additional inventions and technological advancements, which led to an economy whereby products were no longer solely made by hand but by machines. Therefore, prices could be lowered due to the efficiencies obtained from the inventions. i.e., automation (Britannica, n.d).

2.2.2 Evolution of Employment

As much as technological evolution has been witnessed, an acknowledgement of the impact these technological advances have had should be done. Britannica (n.d.) describes one such consequence: those goods began to be demanded and produced in large quantities, leading to the development of factories. History.com Editors (2009) continue to describe that as factories increased, additional workers were required to operate them, further increasing the supply of jobs, in line with the Keynesian theory

of employment. People began working for factory companies in urban areas and got paid a better living than farming, thereby increasing employment opportunities and the attractiveness of employment (History.com Editors, 2009).

The Keynesian theory of employment suggests that increasing the demand for products would increase employment (Britannica, n.d). According to Britannica (n.d.), this theory was based on the short-run view and assumed that factors of production, such as technology, supply of labour, and efficiency of labour, would remain constant. The author continues by mentioning that Keynes further believed that government intervention could curb high unemployment in the long run. The government could reduce the unemployment rate and create jobs through spending. This would increase demand and supply and require more workers to produce the products. This theory would be stress tested in future times as technology advanced and rendered that these assumptions held a relatively narrow view of the world and would need to be expanded in a world where technological advancements are becoming the norm (Britannica, n.d.).

2.3 South Africa and Technology

In South Africa a memorable moment was created 2019 when the first 4IR Digital Economy Summit was held in South Africa. President Cyril Ramaphosa emphasises that Industry 4.0 is an opportunity for South Africa to utilise value to the extent of R5-trillion over a decade (The Presidency, 2019). This opportunity translated into approximately the size of South Africa's current September 2022 Gross Domestic Product of R4.6 billion (Trading Economic, 2023).

However, in a survey conducted by Deloitte (2018), 73% of South Africa's executives believed that 4IR technology would replace human workers rather than complement them. To make matters worse, 37% of executives thought their workforce was not ready and unprepared for Industry 4.0, as opposed to only 14% of executives globally (Deloitte, 2018). From their perspective in the Deloitte (2018) report, the South African workforce is more concerned about the lack of infrastructure, skills base, and low digital literacy, which would hamper the ambitious plans held by President Ramaphosa and his commission.

2.4 Employment and Technology

2.4.1 Technology and Structural Unemployment

Studies have shown that new technologies and inventions can also be a source of unemployment, causing structural unemployment due to inefficiencies in the labour market, including a misalignment between the supply and demand of labourers with the necessary skill set (Zemtsoy, 2020). The causes of these inefficiencies could be attributed to disruptive technologies and globalization. Bessen (2019) has also alluded to this notion of unemployment, though their study deems that the unemployment arising from these technological changes, thereby reducing labour, is temporary.

Bessen (2019) has continued to infer that technological development will increase employment in an industry with sufficient and elastic demand. He has alluded that the same technology giving rise to temporary unemployment will also reduce the product's price. This will inevitably increase demand and require more labour to cater to the increased demand. Their studies thereby see a netting off on the effect of technology changes on the labour force. The view assumes that the increase in demand, which triggers the requirement for more workers, would be higher than the efficiency that triggered layoffs due to the significant unmet needs in the market (Bessen, 2019).

Furthermore, international studies on developed countries such as Europe and the United States indicated that European economies must catch up in adopting new technologies (Duernecker, 2014). Duernecker (2014) study concludes that economies need to catch up in adopting and implementing new technologies experience a deterioration in their labour market. Therefore, the unemployment rate in Europe is worse than that of the United States because Europe needed to catch up with the United States in adopting new technology (Duernecker, 2014). In essence, the author implies that economies that take time to adopt new technologies will experience a higher unemployment rate than those that do.

In further studies, Harmed and Soleimani (2021) studied 163 countries which were structured in a cross-sectional form. The study showed that as digital technologies expand, unemployment will grow before beginning to decline as the growth of technology exceeds a value (Harmed & Soleimani, 2021). Also, alluding to Bessen

(2019); Duernecker (2014); and Zemtsoy (2020) studies that technology causes structural unemployment, which will improve with time.

2.4.2 Technology and Occupational Levels

Even then, the economies that adopt technology will experience job losses due to adopting the new technologies, such as that mentioned by Duernecker (2014). This is also reflected in studies by Frey and Osborne (2017) which concluded that 47% of jobs in the United States were at risk due to technology by automation. This implies that there will still be unemployment whether technology is adopted or not. However, the study by Frey and Osborne (2017) implies that the jobs at risk would mainly be for low-skilled workers. The study concludes by indicating that low-skilled workers needed to be upskilled in jobs that require creativity and socialisation to mitigate this risk of unemployment.

Peng et al. (2018) support the conclusion made by Frey and Osborne (2017) that workers who perform abstract and service tasks are less likely to be displaced. This is because the changes in technology will give rise to the creation of new jobs which have a high component of abstract tasks. Therefore, workers need to hold onto highly non-routine jobs, such as cognitive and manual jobs that cannot be automated.

Furthermore, Saka et al. (2021) study supports Frey and Osborne (2017) view that technology indeed increases unemployment at certain occupational levels. Saka et al. (2021) have, in addition, expanded the study by looking at the relationship between technology and unemployment for low and high-skilled workers. In their expanded research, they conclude that if total unemployment increases, this increase would be due to the high unemployment of low-skilled workers. Their study has shown that the employment of high-skilled workers increases in the face of automation. This is because there would have been a high concentration of low-skilled workers whose tasks would be replaced by machines through automation (Saka et al., 2021). The low-skilled workers perform routine tasks and are therefore more like to be displaced due to the automation of these routine tasks (Peng et al., 2018).

Similarly, Autor (2015) study on European countries showed that the unemployment rate for low-skilled workers, illustrated by middle-wage occupations such as sales office and administrative support, production, craft, and repair, has increased because they are susceptible to automation due to their repetitiveness. Furthermore, their study shows that the unemployment rate of high (managerial, professional, technical occupations) and low-wage (helping, caring, or assisting others) jobs has decreased as they require skills that are not easily automatable such as interpretation of data and applying the data in a specialist capacity; as well as that they need flexibility and judgement, which automated systems lack (Autor, 2015). In essence, Autor (2015) studies show that when referring to the impact of technology on the unemployment rate, a difference should be made between the tasks of the role and skills of the particular job rather than aggregate all jobs.

In addition, a study undertaken by Reljic et al. (2021) on European economies has concluded that when there is an increase in digital investments, labour gets replaced to reduce costs, and sometimes a restructuring of the organisation is required. Therefore, the demand for a manager will be more significant in industries with more digital input and greater technological innovation; however, this negatively impacts the occupations of middle workers, who are often skilled (Reljic, Evangelista & Pianta, 2021).

Studies by Otekhile and Zeleny (2016) on self-service technologies such as online banking, e-commerce, e-tickets, etc., and unemployment have concluded that low-skilled workers would have a reduction in employment due to that self-service technologies and their adoption is advancing at a rapid pace. The author has further stated that advanced economies can no longer increase employment opportunities because technological advancements have given rise to increased productivity (Otekhile & Zeleny, 2016). The author has concluded by saying that self-service technology has brought about a significant increase in productivity rate.

To conclude this, a study by Zemtsoy (2020) described the possible impact of new technologies on employment in Russia. In the study, it has been indicated that 44% of permanent employees (20.2 million) in the formal sector in Russia needed to adapt to technology because they were in positions that required routine tasks, thereby rendering them redundant (Zemtsoy, 2020). In the same token, a study by Cirillo

(2017) on technological changes and employment of professional groups has concluded that there is a destruction of jobs that affect the lowest skills in manufacturing industries. It has also been noted that introducing innovations most favours managerial skills, and process innovations most affect low-skill workers (Cirillo, 2017). This is probably because low-skill workers' jobs can easily be automated, while managerial positions require judgment.

2.4.3 Other Views

Even though there is a trend in most of the studies which show a negative relationship between technology and employment on low skills jobs, there are isolated studies, such as Postula et al. (2021) on European Union countries, which showed no impact that ICT had on unemployment and the labour market in those countries. Similarly, a study by Acemoglu and Restrepo (2019) in the United States showed no labour demand. It can only be deduced from this that there is, therefore, no increase in employment due to an acceleration of automation in the country, which has replaced manual tasks, as well as a reduction in the creation of new jobs. In addition, Acemoglu and Restrepo (2019) noted a slowdown in economic productivity, contributing to the sluggish labour demand. They continue to indicate that should the origin of productivity growth continue to be automation, without creating new tasks, labour is likely to decline (Acemoglu & Restrepo, 2019).

The results have further been corroborated in Europe through a study undertaken by Van Roy et al. (2018) on European patenting firms, which has indicated that innovation brought about by technology increases employment only in high and medium-tech manufacturing sectors and is irrelevant in low-tech manufacturing sectors as well as services sectors. The author has concluded that a positive employment impact exists in new and emerging sectors with higher technological opportunities. The author has cited high demand elasticity as the main reason for this (Van Roy et al., 2018). The reason for this could be the new tasks created by the sector. They also mention that demand for labour in these sectors may increase further as the quality of innovation increases.

2.5 Conclusion

The literature review sought to understand previous literature regarding technology and employment. Thus, Charles Darwin's theory of evolution is the starting point in pointing out that all species, including humans, have an inherent nature to want to adapt to self-preserve. The discussion showed this intrinsic nature, starting from the Paleolithic, Neolithic, and Agricultural Revolutions. The Agricultural Revolution transitioned agrarian societies to industrial societies, leading to mechanising processes and expanding factories.

This industrialisation of economies marked the beginning of technological evolutions, which were first recorded by the First Industrial Revolution, followed by the Second Industrial Revolution, and later the Third Industrial Revolution, also called the Digital Revolution. The Digital Revolution was when the leading technologies came with computerisation, digitisation, and automation, eventually leading to the Fourth Industrial Revolution, which has cyber-physical systems and artificial revolutions as its main positioning (Mhlanga, 2020).

As the revolutions advanced, the production of goods and employment increased as firms became more productive by mechanising processes. This was in line with the Keynesian theory that increasing demand for products would increase employment, requiring workers to work on the machines to meet the demand. This theory, however, had to be expanded in a world where technological advances are becoming the norm, as it would only be applicable in some cases.

All these revolutions have existed and advanced so that the countries can grow their economies. The increased innovation led to other inventions and technological advances expected to increase employment. Studies have shown that new technologies and inventions can lead to unemployment when there is a mismatch between the supply and demand for labour and the required skills. Therefore, the increase in employment can only occur in sectors with sufficient and elastic demand. Thus, technological changes will only increase employment where demand growth exceeds the efficiencies that triggered technology-related layoffs. The causes of these inefficiencies could be attributed to disruptive technologies and globalization.

Studies by Frey and Osborne (2017) and, Peng et al. (2018), and Saka et al. (2021) have shown that technology jobs can be threatened by automation. The studies also implied that the jobs at risk are mainly reserved for low-skilled workers, and workers must be engaged in activities that are highly non-routine and cannot be automated.

Autor (2015) has expanded on this by noting that the unemployment rate of high-paying (managerial, professional, technical jobs) and low-paying (helping, caring, or supportive) jobs have declined because they require skills that are not easily automated, such as interpreting data and applying the data in a technical function; they also need flexibility and judgment, which automated systems lack.

Similarly, the study by Reljic et al. (2021) on European economies concludes that the demand for a manager will be more significant in industries with more digital input and greater technological innovation. However, this has a negative effect on the jobs of the often-qualified middle workers. Furthermore, a study by Cirillo (2017) on technological change and occupations' employment has found that introducing innovation favours managerial skills, and process innovations most affect low-skilled workers. This is probably because low-skilled workers' jobs are easily automated, while managerial positions require judgement.

Many of the references reviewed conclude that technology adoption leads to unemployment. Because automation increases productivity; therefore, the demand for labour for these tasks falls, leading to layoffs and rising unemployment. In contrast, technology positively impacts tasks that require cognitive thinking and judgment, such as managerial jobs, and social ones, such as caregivers.

A trend has been seen from the literature review that the more that firms embrace digitization, the more likely it will lead to net job creation, in contrast to delays in adopting digital technologies, which would increase the likelihood of net job loss. In much of the literature surveyed, it is inferred that adopting technology does give rise to unemployment. It has been noted that the employment of workers in low-skilled jobs, which can be easily automatable, decreases with technology adoption. This is because automation increases productivity; therefore, the demand for labour in these tasks decreases, resulting in layoffs and rising unemployment. The issue of

technological unemployment should, however, be looked at with a more balanced approach rather than classified according to industries and occupational levels.

In contrast, technology has an immaterial impact on tasks that require cognitive reasoning and judgment, such as managerial jobs and those jobs of a social nature, such as caregivers. Firms should also note that there would be structural unemployment at first as it adopts new technologies. However, this will change in the longer term as the countries become more efficient in using technology and ensures that it upskills the nation in the non-routine skills that cannot be automated.

Section 3 below presents a description of the research process and methodology which has been undertaken to be able to achieve the purpose of the study.

3. METHODOLOGY

3.1 Research Approach

A quantitative analysis to obtain insight and understand the changes in the employment rate in relation to technological advances has been undertaken. The purpose of the study was to investigate the impact of digitalisation (technological advances) on the employment rate in South Africa. The focus of the study was on the quantitative aspects, which is where the research has placed reliance upon by manipulating the data into various analyses and studying the variables in the study against participants' responses.

The quantitative research method was chosen because it gathers various numerical data, allowing the research to perform statistical analysis showing relationships and comparisons amongst the data (Libarkin & Kurdziel, 2002). This was done through an online questionnaire methodological approach to South African financial services employees.

Instead of limiting the research to a small range of individuals and settings with no relationship causes, the methodology was chosen due to the variety of individuals and situations which could be used to analyse and come up with a single explanation even with a diverse range of individuals. The quantitative study approach assumed that the

respondents were aware of the changes occurring within their teams and were exposed to technology advancements as part of their jobs.

3.2 Research Design and Instrument

The research instrument used was a survey populated from the Qualtrics website, to which the researcher had free access. The result was a link that could be sent to any participant. The response from the participant was set to return as anonymous, with no contact details, IP addresses, or any options to add these.

The same standard questions were sent to participants with prepopulated options. Fourteen questions were sent to the participants in the flow indicated in Figure 1.

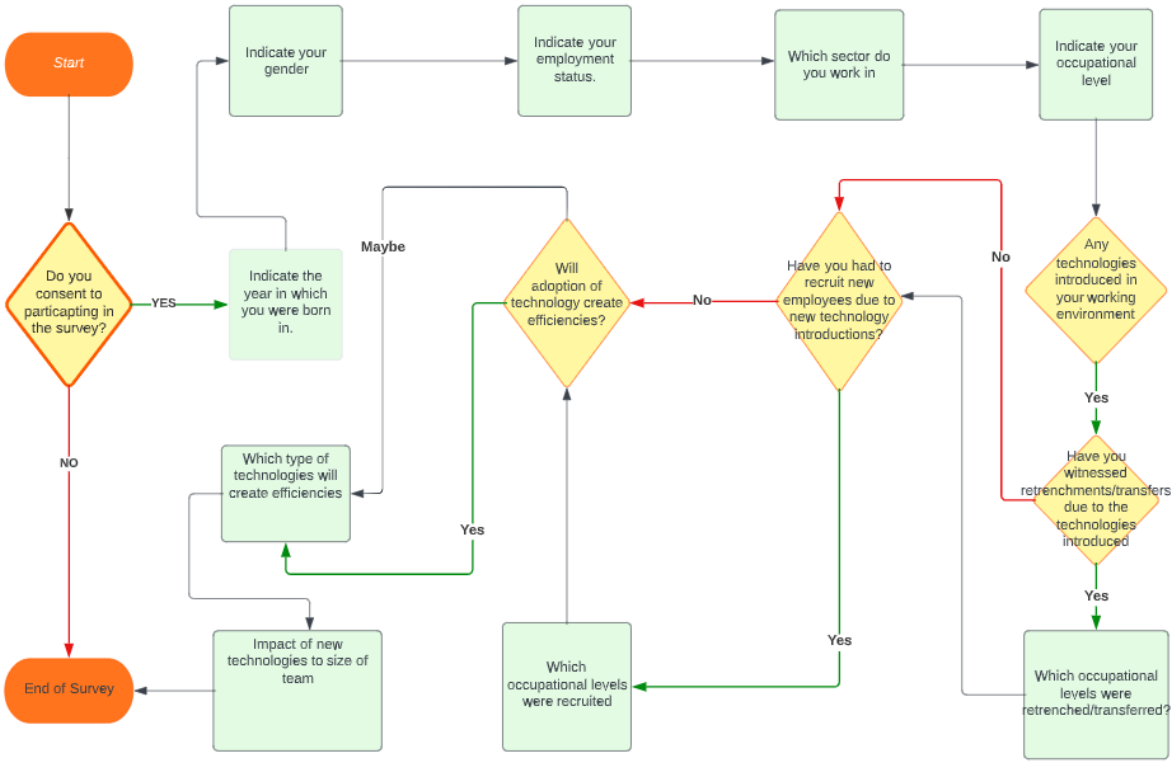


Figure 1: Research Questionnaire Flow Diagram

The first question in the questionnaire was a filter question whereby the participant was required to consent to participate in the survey. Where they do not indicate their

consent, the survey will automatically end, and the participant cannot access the remaining 13 questions.

The second and third questions were to determine the demographics of the respondents in terms of age and gender. The fourth question was to determine the respondent's employment status to ensure that the relevant individuals were selected to complete the questionnaire. The fifth and sixth questions were to determine the respondent's sector and the occupational level to be used to analyse the data, as these are the most critical variables for the study.

The seventh question was to determine whether technologies were introduced in the working environment and, if so, which technologies. A selection of the most common technologies in the sector was provided so that the information was standard and comparable across all participants. The eighth and ninth questions determined whether employee movement was due to technology changes and, if so, on which occupational levels. Respondents who responded negatively to question eight could not move to question nine but could answer question ten as question nine depended on question eight. Questions 10 and 11 were to determine whether they were any recruits due to technology changes and, if so, on which level the recruits were. Since question 11 depended on question 10, if a participant responded negatively to question 10, they could not respond to question 11.

Questions 12 to 14 were views sought from the respondents to determine whether the future adoption of new technologies could improve efficiencies in the working environment. The respondent could only move to question 13 if they answered positively on question 12 because question 13 depended on question 12. Question 13 gave options according to standard technologies generally adopted within the sector. Question 14 was to determine whether the participants viewed changes in the team sizes due to a positive response in question 12. The questions were expected to take a maximum of five minutes. The statistics recorded that the respondents responded within an average of 3 minutes and 25 seconds.

The questions used drop-down menus and a selection of prepopulated options where required, and participants were given options in which they were required to select the most relevant answer.

This approach was considered the most appropriate for this study due to its independence, providing objectivity when interpreting the data. The approach was structured in a way to be able to elicit information from the people who were presumed to have the essential information regarding their perspectives on technology and its impact on the expansion or contraction within the companies in which they are employed.

3.3 Population

The population of the participants is employees within the South African financial services industry. The financial services industry was identified according to the Standard Industrial Classification of all Economic Activities (SIC) published by Statistics South Africa.

According to Statistics South Africa (1993), the SIC assists in standardising industries according to their economic activities to promote uniformity and comparability of statistics compiled from different sources. The financial services industry forms part of a significant division of financial intermediation, insurance, real estate, and business services (Statistics South Africa, 1993). This industry has over a million employees, as displayed in Figure 2 below (Statistica, 2022).

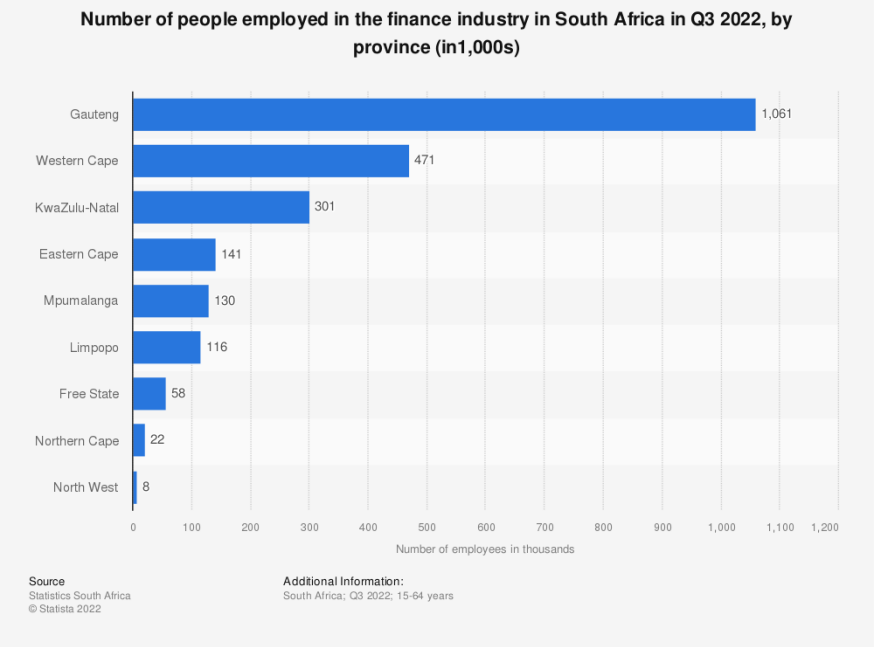


Figure 2: Number of people in the finance industry in South Africa in Q3 2022 by province (Statistica, 2022)

For this study, the analysis was limited to focus only on financial intermediation and insurance services as the component of the financial services industry studied. Any reference to the financial services industry in this study will consist only of these components.

3.4 Sample and Sampling Method

The sampling frame, defined by Welman and Kruger (2001) as a complete list on which each unit of analysis is mentioned only once, consisted of people registered on LinkedIn within the financial services industry with the assumption that most people within the industry are registered users on LinkedIn.

The sampling method was random sampling as it was the most convenient collection of population members and was readily available for research purposes (Welman & Kruger, 2001). A random sample of 250 employees registered on LinkedIn was selected, irrespective of gender, race, and age. The sample was limited to registered users listed as working in the financial services industry in South Africa and could receive a LinkedIn InMail message.

3.5 Data Collection

Data was collected through a link to a survey sent through LinkedIn InMail on the LinkedIn website. The data collection was based on the profiles of people working in the financial services industry and those registered to receive InMail messages on LinkedIn. A sample size of 30 was indicated as the target in the research proposal. However, 60 responses were received and considered a reasonable response rate utilised for further analysis.

The following search criteria were done on LinkedIn: search on banking and financial services and filtered for South Africa. More than thirty-eight thousand results were obtained and were sifted according to the individuals who had LinkedIn Premium and LinkedIn InMail and could therefore receive private messages. The Open Profile Premium feature allows anyone on LinkedIn to contact a Premium member for free,

even if they are not in the sender's network. All LinkedIn members can see the complete profiles of Premium members who have enabled Open Profile. To be an Open Profile member, you must have a Premium subscription, which the researcher had.

Only people with unlocked LinkedIn through InMail and those on premium were sent the survey through the LinkedIn messaging services. Each message was personalised to include the respondent's name as per their LinkedIn profile. The number of people sent the survey is 250, returning a response rate of 24% for completed questionnaires.

3.6 Reliability and Validity

The data was exported from the Qualtrics website and imported into SPSS software. The make of the survey is not directly testing reliability. However, the reliability of the data is deemed acceptable because the research method is consistent, the sample group is the same as it is employees directly selected from the same industry. The same questionnaire was sent to all the participants. The research results are valid because they correspond to existing literature and current theories.

3.7 Data Analysis and Interpretation

The data was analysed using ordinal measurement per the occupational levels defined by the Department of Labour, viz. top management, senior management, professionally qualified, skilled, semi-skilled, and unskilled. Furthermore, descriptive statistics were used to analyse the data, and the output was obtained from the Qualtrics website and SPSS software.

Views of the respondents based on industry and occupational level were the most critical because the financial services industry was the one that was studied, so any results which came through had to fall within this industry. Occupational levels were also critical because the decision makers and heads of divisions who usually have a purview of an organisation were typically individuals at these levels.

3.8 Limitations of the Study

There were a few limitations of the study observed:

- Reliance was made on a sample as an indicator of the entire population. The size of the population within the industry was indeterminable, as shown in the results that over 38 000 results were obtained, and this was only with people registered on the LinkedIn website. The population is significant because it is impractical and uneconomical to research the entire population. Consequently, data was obtained from only a sample population. This was done because of the limited time and financial resources; as well as that the results from the respondents can be comparable over a shorter length of period, as compared to a more extended period; in which the variables in the study may change over a more extended period.
- Only quantitative research with prepopulated options was studied, as opposed to qualitative or both. A qualitative approach would have allowed the researcher to probe further into the responses. The researcher could not explore the responses further due to their anonymity.
- The criteria to determine an appropriate sample size is usually based on three criteria: the level of precision, confidence or risk, and the degree of variability in the measured attributes, as indicated by (Israel, 1992). A confidence level between 90% and 99% is commonly used, with approximately 95% of the sample value studies in a normal distribution. A standard deviation (risk) of 0.5 is usually considered to be “good” (Israel, 1992). These elements could be amended depending on the required precision. The researcher needs to balance the confidence level with costs as larger sample sizes almost lead to the cost of time and resources. This was, however, not applied to this study. A sample size of between 100 and 500 would have been required, with a sample size of 324 considered a good sample size for an undeterminable population, as was the case of this study. Using the scientific method above, with a low confidence level of 90% and a high standard deviation of 10%, a sample size of 68 respondents would have been required. The sample size obtained of 60 is therefore considered reasonable and acceptable in accordance with the purpose of the survey. Although this sample is not desirable from a statistical point of view, it is acceptable for this research due to the similarity in the responses obtained.

3.9 Ethical Considerations

The level of risk considered in this research has been categorised as minimal due to the survey being sent to individuals in the field to gauge their opinions about the topic rather than sensitive questions. In addition, there were no potential risks to the participants, no unintended consequences of the research project, and no vulnerable categories of participants identified.

The survey questions requested information on the gender and age range of the participants. This was done to provide helpful information about whether this diversity criterion contributes to perceptions or exposure to technology and employment. The age range would provide beneficial information on the respondents as they can be categorised depending on when technological advances occurred. i.e., younger people are presumed to have more exposure to advanced technology than older respondents.

The participants were informed that the survey was anonymous before responding to any survey questions. The survey was anonymous because neither contact details nor computer IP addresses were collected. There was also a filter question as the first question in the survey, which required the participant's consent to conduct the survey, and where the filtered question was answered with a negative response, the survey would end. The survey continued only with positive responses to agree to participate in the survey.

3.10 Conclusion

To be able to achieve the purpose of the study, a quantitative research approach was undertaken because it gathers various numerical data, allowing statistical analysis of the data which shows relationships and comparisons amongst the data (Libarkin & Kurdziel, 2002). This was done through an online questionnaire to employees employed in the financial services industry in South Africa. A random sample of 250 employees registered on LinkedIn was selected, irrespective of gender, race, and age; with the sample size of 30 being the targeted response sample. There were limitations to the study which was observed namely reliance on a sample instead of the entire population due to limited time and resources. Another limitation which was observed was the undertaking of only a quantitative approached instead of both quantitative and

qualitative approaches. Given the considerations, the limitations to the study were acceptable due to the similarities of the responses received; and considerations that further research into this focus of study would be required for further research and add to the body of knowledge.

Section four and five below presents the findings, analysis, and conclusion of the study with a summary of the results and integration of theoretical framework and literature reviewed.

4. DISCUSSION AND ANALYSIS

The study initially targeted a minimum of 30 respondents and was to be sent out to 100 participants with an expected response rate of 30%. However, the survey was sent out to 250 people to facilitate the responses so that the 30 responses could be obtained in a much shorter period. Instead, 64 responses were received, indicating a response rate of 25.6%. Four participants only completed less than 30% of the survey questions. Due to this, their results were removed from the analysis to maintain the integrity of the results. The sections below describe the participants' responses and summarise the findings from the completed survey questions.

4.1 Study Representation

The survey included an indication of the gender, age, and current occupational levels of the respondents. The gender and age indication were so that the survey results could have diverse views on this topic. This can also provide helpful information on whether the perceptions differ in terms of gender and age and information on their exposure to technology and employment, which could later be categorised depending on the era in which technological advances came into effect.

4.2 Descriptive of the Data

A total of 64 responses were received, of which four respondents abandoned the survey before completing it. The participants took an average of 208.07 seconds (3 minutes and 46 seconds) to complete the survey, as depicted in Figure 3. The analysis in the section below is only for the 60 completed results.

Figure 4 and Figure 5 below shows that most respondents were, on average, 40 years of age, with the youngest respondent being 19 years old and the oldest respondent 63 years old.

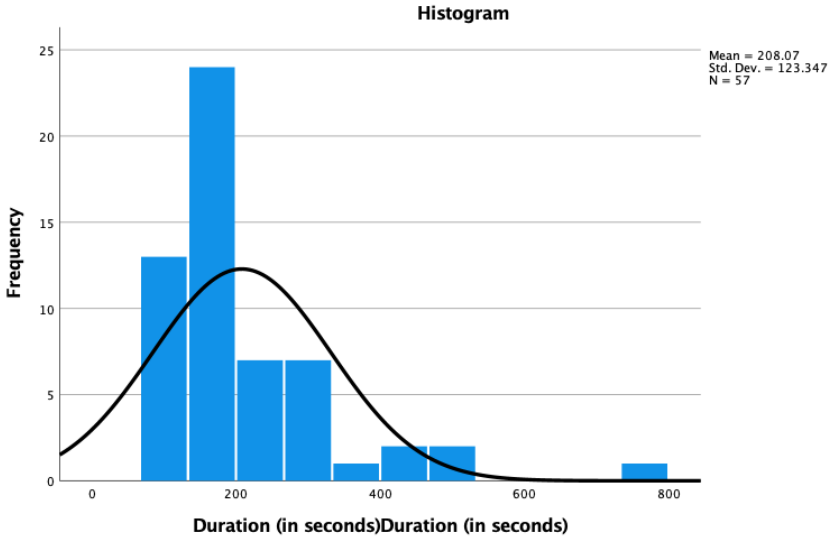


Figure 3: Duration of Survey (in seconds)

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Age	60	19	63	40.87	8.877
Valid N (listwise)	60				

Figure 4: Descriptive Statistics – Age

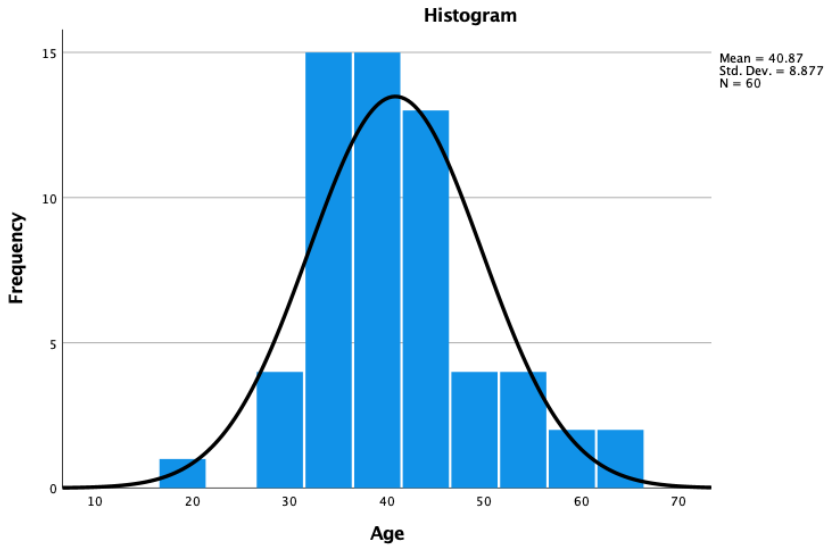


Figure 5: Respondents' Average Age

Figure 6 below shows that 93.3% of the responses were from respondents who were employed in full-time positions. 95.0% of the responses were received from employees within the financial services industry. Figure 7 shows that 43 respondents were in the banking sector, and 14 respondents were in the other financial services sector. This equates to 71.7% (Figure 8) of the respondents being in the banking sector, of which 41.9% were female and 55.8% were male (Figure 9). This was followed by 23.3% (Figure 8) of the respondents being in other financial services sector, with many being males at 57.1% and females at 42.9% (Figure 9).

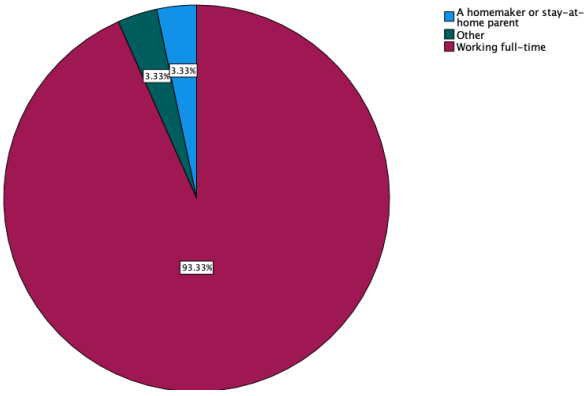


Figure 6: Respondents by Employment Status

		Gender							
		Female		Male		Prefer to self-describe		Total	
		N	%	N	%	N	%	N	%
Respondent Sector	Banking Sector	18	75.0%	24	68.6%	1	100.0%	43	71.7%
	Other Financial Services	6	25.0%	8	22.9%	0	0.0%	14	23.3%
	Other sector (specify)	0	0.0%	3	8.6%	0	0.0%	3	5.0%
Total		24	100.0%	35	100.0%	1	100.0%	60	100.0%

Figure 7: Respondents' Sector and Gender Statistics

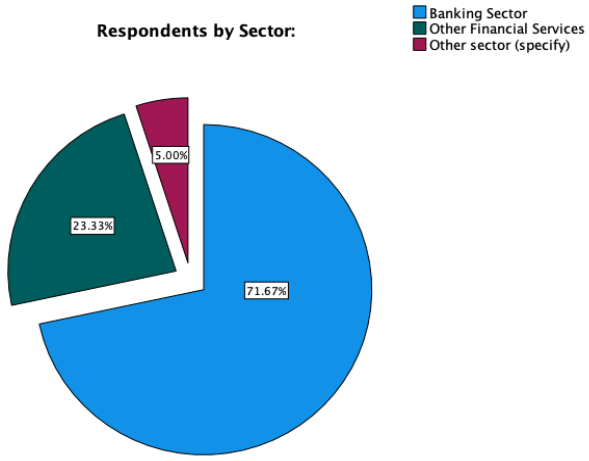


Figure 8: Respondents by Sector

		Respondents' Sector						Total	
		Banking Sector		Other Financial Services		Other sector (specify)			
		N	%	N	%	N	%	N	%
Gender	Female	18	41.9%	6	42.9%	0	0.0%	24	40.0%
	Male	24	55.8%	8	57.1%	3	100.0%	35	58.3%
	Prefer to self-describe	1	2.3%	0	0.0%	0	0.0%	1	1.7%
Total		43	100.0%	14	100.0%	3	100.0%	60	100.0%

Figure 9: Gender Statistics vs. Respondents' Sector

Figure 10 shows that most respondents were in general or middle management positions at 46.7%, followed by those in top management positions at 35.0%, with the remainder being professionals at 18.3%.

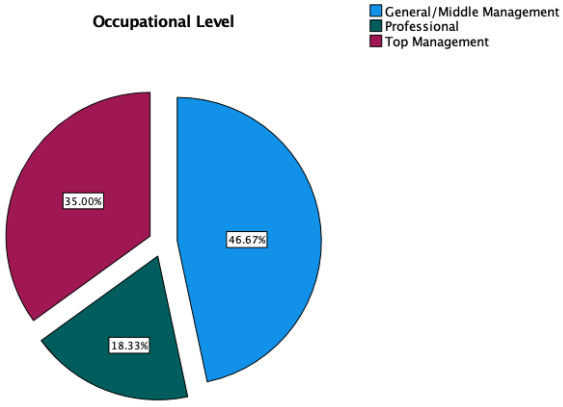


Figure 10: Respondents' Occupational Levels

4.3 Analysis of Findings

The main objective of the study was to determine whether digitalisation - the adoption of technology - in the financial services industry impacts the employment rate in South Africa. To answer this question, it should be determined whether the financial services industry has adopted new technology and, if so, which new technologies dominate the sector. The result of this determination is discussed in section 4.3.1. Secondly, a determination of whether new technologies have given rise to a change in employment status, as discussed in section 4.3.2. The study would not be complete without seeking the opinion of respondents on the future adoption of new technologies, which will be discussed in section 4.3.3. A summary of the findings will be discussed in section 4.3.4. Lastly, a conclusion will be determined in section 5 on whether digitalisation - the adoption of technology - in the financial services industry impacts the employment rate in South Africa.

4.3.1 Adoption of Technology in the Financial Services Industry

4.3.1.1 Introduction of Technology in the Working Environment: Perception by Sector

Figure 11 shows the introduction of new technologies in the financial services industry by sector. This figure shows that only five respondents have had no new technology introduction, resulting in 55 of the 60 respondents (91.7%) of respondents who have had new technologies introduced in the industry. The findings also show that of all the newly introduced technologies in the industry, the banking sector has introduced the most technological changes compared with other financial services sector, apart from chatbots.

The dominating technology change within the financial services industry is online and mobile banking, as 83.3% of respondents have illustrated. These technologies were introduced mainly in the banking sector, depicted by 93.0% of respondents in the banking industry, compared to 64.3% of respondents in the other financial services sector, indicating that in the other financial services sector, this is only the second dominant technology that was introduced. In addition, online and mobile banking has

been the most dominant technology introduced in the banking sector, in contrast to only being the second most dominant technology introduced in the other financial services sector. The other financial services have indicated that chatbots are the most dominant technology introduction.

Chatbots have been indicated as the second most dominant technology change within the financial services industry, as depicted by 66.7% of the respondents. This technology category has 67.4% of the respondents in the banking sector and 71.4% of respondents in the other financial services sectors, considering that the other financial services sector saw this category as their most dominant technology change.

Virtual assistants have been depicted as the third most technology introduced in the industry, as indicated by 51.7% of the participants. Both the banking and other financial services sector have listed this category as their third mainly introduced technology in their sectors at 55.8% and 42.9%, respectively.

Smart contracts are the fourth technology introduction within the financial services industry, as indicated by 46.7% of the participants. The banking and other financial services sectors have also seen this fourth most dominant technology change, with 51.2% of respondents in the banking sector and 35.7% of respondents in the other financial services sector.

The findings show that introductions in blockchain technology had minimal introductions within the industry as only 30% of the respondents in the industry have indicated, 32.6% in the banking and 28.6% in the other financial services sectors unanimously agree that they have seen this change in technology as last within their sectors.

		Employment Sector			
		Total	Banking Sector	Other Financial Services	Other sector (specify)
New Technology Introduction	Total Count (All)	60,0	43,0	14,0	3,0
	Chat Bots	40,0	29,0	10,0	1,0
		66,7%	67,4%	71,4%	33,3%
	Virtual Assistants	31,0	24,0	6,0	1,0
		51,7%	55,8%	42,9%	33,3%
	Online and Mobile Banking	50,0	40,0	9,0	1,0
		83,3%	93,0%	64,3%	33,3%
	Smart Contracts	28,0	22,0	5,0	1,0
		46,7%	51,2%	35,7%	33,3%
	Block Chain Technology	18,0	14,0	4,0	0,0
		30,0%	32,6%	28,6%	0,0%
	No Technology Changes	5,0	1,0	2,0	2,0
		8,3%	2,3%	14,3%	66,7%

Figure 11: Introduction of New Technology by Sector

4.3.1.2 Introduction of Technology in the Working Environment: Perception by Occupational Level

Figure 12 below illustrates new technology introductions in the financial services industry by occupational level. Twenty-eight (45.0%) of respondents in the general and middle management occupational level have responded as the most to have seen new technology changes in the financial services industry. This was followed by 21 respondents (30%) respondents being in top management positions and 11 respondents (16.7%) professionals in the financial services industry seeing the most technological changes. Skilled , semi-skilled, and unskilled employees have yet to respond to the survey; therefore, results for these two occupational levels are not available for analysis.

		Occupational Level					
		Total	Top Management	General/Middle Managem	Professional	Skilled/Semi-Skilled	Unskilled
New Technology introduction	Total Count (All)	60,0	21,0	28,0	11,0	0,0	0,0
	Chat Bots	40,0	13,0	22,0	5,0	0,0	0,0
		66,7%	61,9%	78,6%	45,5%	0,0%	0,0%
	Virtual Assistants	31,0	13,0	15,0	3,0	0,0	0,0
		51,7%	61,9%	53,6%	27,3%	0,0%	0,0%
	Online and Mobile Banking	50,0	16,0	24,0	10,0	0,0	0,0
		83,3%	76,2%	85,7%	90,9%	0,0%	0,0%
	Smart Contracts	28,0	11,0	13,0	4,0	0,0	0,0
		46,7%	52,4%	46,4%	36,4%	0,0%	0,0%
	Block Chain Technology	18,0	7,0	9,0	2,0	0,0	0,0
		30,0%	33,3%	32,1%	18,2%	0,0%	0,0%
	No Technology Changes	5,0	3,0	1,0	1,0	0,0	0,0
		8,3%	14,3%	3,6%	9,1%	0,0%	0,0%

Figure 12: Introduction of New Technology by Occupational Level

The main technology changes witnessed by 83.3% of respondents in top management positions are in the online and mobile banking technology categories in the banking sector. This was followed by new technology introduction in virtual assistants by 75% of the banking sector respondents. The respondents saw changes in chatbots and smart contracts equally, as 58.3% of top management responded. Finally, only 41,7% of the respondents saw new technology introduction in blockchain technology, with one respondent in the banking sector having yet to witness any technology changes in the sector.

For the top management in the other financial services sector, 71.4% of the respondents saw the most technology introductions for chatbots and online and mobile banking technology categories. This was followed by 42.9% of respondents for virtual assistants and smart contracts. Blockchain technology introductions remain as the minimally introduced technologies, as depicted by 28.6% of the respondents in this

sector. However, one participant in top management in the other financial services sector has yet to see any technology changes in the industry.

In the top management occupational levels, the banking sector top management has seen the most introductions to technology compared to other financial services, except for technologies in chatbots. It can be seen from Figure 13 above that when comparing the banking sector with other financial services, the only technology introductions which are highest in the other financial services are on chatbots. The remainder of the new technology introductions remains with the banking sector.

		Top Management			
		Total	Banking Sector	Other Financial Services	Other sector (specify)
New Technology Introduction	Total Count (All)	60,0	12,0	7,0	2,0
	Chat Bots	40,0	7,0	5,0	1,0
		66,7%	58,3%	71,4%	50,0%
	Virtual Assistants	31,0	9,0	3,0	1,0
		51,7%	75,0%	42,9%	50,0%
	Online and Mobile Banking	50,0	10,0	5,0	1,0
		83,3%	83,3%	71,4%	50,0%
	Smart Contracts	28,0	7,0	3,0	1,0
		46,7%	58,3%	42,9%	50,0%
	Block Chain Technology	18,0	5,0	2,0	0,0
		30,0%	41,7%	28,6%	0,0%
	No Technology Changes	5,0	1,0	1,0	1,0
		8,3%	8,3%	14,3%	50,0%

Figure 13: New Technology Introduction - Top Management Perception

The main technology changes which have been observed in the general or middle management level in the banking sector are on online and mobile banking technologies, followed by chatbots, virtual assistants, smart contracts, and lastly on blockchain technologies at a response rate of 95.7%, 82,6%, 60.9%, 56.5%, and 34.8%, respectively. There is no respondent in the banking sector's general or middle management occupational level that has yet to see any technology changes.

The main technology introductions in the general or middle management positions in the other financial services sector have been witnessed in chatbots as per 60.0% of the respondents. This was followed by 40% of the respondents seeing most technology changes in online and mobile banking, and lastly, 20% of the respondents' witnessed changes in blockchain technology. No general or middle management respondents witnessed changes in smart contracts. However, one respondent in the

other financial services general and middle management occupational levels has not seen any technological changes.

In the general and middle management occupational levels, the banking sector's general and middle management respondents have seen the most introductions to technology in all technology categories compared to other financial services. It can be seen from Figure 14 below that new technology introductions by general, and middle management occupational levels need to catch up in the financial services industry.

		General/Middle Management			
		Total	Banking Sector	Other Financial Services	Other sector (specify)
New Technology Introduction	Total Count (All)	60,0	23,0	5,0	0,0
	Chat Bots	40,0	19,0	3,0	0,0
		66,7%	82,6%	60,0%	0,0%
	Virtual Assistants	31,0	14,0	1,0	0,0
		51,7%	60,9%	20,0%	0,0%
	Online and Mobile Banking	50,0	22,0	2,0	0,0
		83,3%	95,7%	40,0%	0,0%
	Smart Contracts	28,0	13,0	0,0	0,0
		46,7%	56,5%	0,0%	0,0%
	Block Chain Technology	18,0	8,0	1,0	0,0
		30,0%	34,8%	20,0%	0,0%
	No Technology Changes	5,0	0,0	1,0	0,0
		8,3%	0,0%	20,0%	0,0%

Figure 14: New Technology Introduction - General/Middle Management Perception

The results have shown that for the professional occupational level, online and mobile banking has been the most highly introduced technology within the banking sector, with 100% of professionals having witnessed this technological introduction. The second dominant technology introduction was seen on chatbots by only 37.5% of professionals in the banking sector massive difference from 100% seen in online and mobile banking, the most dominant technology introduction. Smart contracts followed this at 25%, and lastly, virtual assistants and blockchain technology at 12.5% of each of the respondents. No professional in the banking sector has yet to witness technology change.

Other financial services sector professional levels have witnessed all the categories of technology introduction at 100%, apart from blockchain technology, in which only half of the respondents have seen this. Of the respondents, all other financial services sector professionals have witnessed technological change.

The respondents at the professional occupational level have more professionals in the other financial services sector witnessing new technology introductions in the industry than those in the banking sector.

			Professional		
		Total	Banking Sector	Other Financial Services	Other sector (specify)
New Technology Introduction	Total Count (All)	60,0	8,0	2,0	1,0
	Chat Bots	40,0	3,0	2,0	0,0
		66,7%	37,5%	100,0%	0,0%
	Virtual Assistants	31,0	1,0	2,0	0,0
		51,7%	12,5%	100,0%	0,0%
	Online and Mobile Banking	50,0	8,0	2,0	0,0
		83,3%	100,0%	100,0%	0,0%
	Smart Contracts	28,0	2,0	2,0	0,0
		46,7%	25,0%	100,0%	0,0%
	Block Chain Technology	18,0	1,0	1,0	0,0
		30,0%	12,5%	50,0%	0,0%
	No Technology Changes	5,0	0,0	0,0	1,0
		8,3%	0,0%	0,0%	100,0%

Figure 15: New Technology Introduction - Professional Perception

4.3.1.3 Conclusion on Adoption of Technology in the Working Environment

The discussions above have indicated that new technologies have been introduced within the financial services industry. The findings have suggested that more technology introductions have been witnessed in the banking sector than in the other financial services sector. Furthermore, the results have indicated that the dominant technology introduction within the industry has been in online and mobile banking, followed by chatbots, virtual assistants, and smart contracts. The exception listed is that within the financial services sector, chatbots have been the most dominant technology introduction in this sector. The findings have also indicated that there have been fewer technology introductions in the entire industry in the blockchain technology category.

Online and mobile banking technology introductions remain the most witnessed technology introduction by most occupational levels, regardless of the industry. In the top management occupational levels, the banking sector top management has seen the most introductions to technology compared to other financial services, except for technologies in chatbots, which was witnessed by top management in other financial services as the most dominant technology introduction. In the general and middle management occupational levels, the banking sector's general and middle management respondents have seen the most introductions to technology in all technology categories compared to other financial services. In contrast, the respondents at the professional occupational level have more professionals in the

other financial services sector witnessing new technology introductions than those in the banking sector. Generally, most new technology introductions are seen in the banking sector . The other financial services sector lags within the financial services industry, with blockchain technology remaining the minimally introduced technology regardless of sector or occupational level.

4.3.2 Movement of Employees due to New Technology

4.3.2.1 Retrenchments or Transfers of Employees

The financial services industry has witnessed retrenchments or transfers of employees due to the introduction of new technologies. Figure 16 shows that 41.7% of respondents in the financial services industry have witnessed either retrenchments or transfers of employees due to new technology introductions. The study further shows that most (57.1%) of the other financial services sector employees have witnessed retrenchments or employee transfers due to the introduction of new technologies.

In contrast, only 39.5% of employees in the banking sector have witnessed retrenchments or transfers due to new technology introduction. There have been more retrenchments in the other financial services sector from new technology introduction than in the banking sector. Introducing new technology has led to retrenchments or layoffs in the financial services industry, with the weighting being more on the other financial services sector than the banking industry.

		Respondents' Employment Sector							
		Banking Sector		Other Financial Services		Other sector (specify)		Total	
		N	%	N	%	N	%	N	%
Retrenchment and/or employee transfers due to the introduction of new technology	No	26	60.5%	6	42.9%	3	100.0%	35	58.3%
	Yes	17	39.5%	8	57.1%	0	0.0%	25	41.7%
Total		43	100.0%	14	100.0%	3	100.0%	60	100.0%

Figure 16: Retrenchments or transfers of employees due to technology introduction

The results of respondents who have witnessed retrenchments or employee transfers due to technology are further analysed in Figure 17 below. Figure 17 indicates that 60.0% of the respondents have witnessed that employees who were retrenched or

transferred due to new technological introductions were in skilled or semi-skilled positions, followed by general or middle management positions.

Within the banking sector, 76.5% of the respondents witnessed employees retrenched or transferred in skilled or semi-skilled positions, followed by general or middle management positions. The findings indicated that although the respondents have witnessed retrenchments or transfers in other occupational levels, such as top management and professional levels, these were far fewer than in skilled or semi-skilled positions.

In the other financial services sector, most (37.5%) of the respondents have witnessed employees who were retrenched or transferred in general or middle management positions. This was followed equally by employees in top management and skilled or semi-skilled positions on an equal basis, and the least employees retrenched in professional positions.

		Q2: What is the most recent sector in which you were employed? - Selected Choice			
		Total	Banking Sector	Other Financial Services	Other sector (specify)
Q9: Which occupational levels were retrenched and/or transferred?	Total Count (Answering)	25,0	17,0	8,0	0,0
	Top Management	2,0	0,0	2,0	0,0
		8,0%	0,0%	25,0%	0,0%
	General/Middle Management	6,0	3,0	3,0	0,0
		24,0%	17,6%	37,5%	0,0%
	Professional	1,0	0,0	1,0	0,0
		4,0%	0,0%	12,5%	0,0%
	Skilled/Semi-Skilled	15,0	13,0	2,0	0,0
		60,0%	76,5%	25,0%	0,0%
	Unskilled	1,0	1,0	0,0	0,0
		4,0%	5,9%	0,0%	0,0%

Figure 17: Retrenchment or transfers of employees by occupational level

The findings show that 44.4% of respondents in top management positions have witnessed retrenchments or transfers in skilled or semi-skilled positions. This was followed by general or middle management positions and top management positions, respectively. Respondents in top management positions have not witnessed any retrenchments or transfers in professional or unskilled positions.

70% of respondents in general or middle management positions have witnessed most retrenchments or transfers in skilled and semi-skilled positions. This was followed, on an equal level (10%), by general or middle management, skilled or semi-skilled, and

unskilled levels. The respondents on this level have not witnessed any retrenchments or transfers on top management positions.

Similarly, 66.7% of respondents in professional positions have also witnessed retrenchments or transfers, mainly in skilled or semi-skilled positions. This is followed by 33.3% of these respondents seeing the next level of reductions in general or middle management positions. Respondents on this professional level have not witnessed retrenchments or transfers in top management, professionals, or unskilled positions.

		Q5: What is your highest occupational level?			
		Total	Top Management	General/Middle Managem	Professional
Q9: Which occupational levels were retrenched and/or transferred?	Total Count (Answering)	25,0	9,0	10,0	6,0
	Top Management	2,0	2,0	0,0	0,0
		8,0%	22,2%	0,0%	0,0%
	General/Middle Management	6,0	3,0	1,0	2,0
		24,0%	33,3%	10,0%	33,3%
	Professional	1,0	0,0	1,0	0,0
		4,0%	0,0%	10,0%	0,0%
	Skilled/Semi-Skilled	15,0	4,0	7,0	4,0
		60,0%	44,4%	70,0%	66,7%
	Unskilled	1,0	0,0	1,0	0,0
		4,0%	0,0%	10,0%	0,0%

Figure 18: Retrenchment or transfers of employees by occupational level: perception by occupational level

4.3.2.2 Recruitment of Employees

The findings indicate that 63.3% of the respondents in the financial services industry have witnessed recruits arising from the introduction of new technologies. In the banking sector, 62.8% of the respondents have seen the recruitment of new employees arising from new technology introductions. Likewise, 71.4% of employees in other financial services have seen the same. Overall, a higher percentage of the respondents in the other financial services sector have witnessed recruits than those in the banking sector. Only 36.7% of respondents have indicated that they have not witnessed recruits in the industry arising from new technology introductions.

		Q2: What is the most recent sector in which you were employed? - Selected Choice			
		Total	Banking Sector	Other Financial Services	Other sector (specify)
Q: In your working environment, have you had to recruit new employees due to new technologies introduced?	Total Count (All)	60,0	43,0	14,0	3,0
	Yes	38,0	27,0	10,0	1,0
		63,3%	62,8%	71,4%	33,3%
	No	22,0	16,0	4,0	2,0
		36,7%	37,2%	28,6%	66,7%

Figure 19: Recruitment of new employees due to technology introduction

Observation of the findings in Figure 20 below is that 60.5% of recruitment of new employees in financial services due to technology changes have been for professional positions. Skilled and semi-skilled positions followed this at 23.7%, a significant variance from the recruitments in professional roles.

The banking and other financial services sectors have had their majority recruitments in professional positions at 55.6% and 70%, respectively. Recruitment of professionals in the other financial services sector far outweighs recruiting professionals in the banking sector. The findings show no recruitment of employees in unskilled positions for the entire financial services industry. The other financial services sector shows no recruitment of new employees in skilled or semi-skilled positions, in contrast to 33.3% of recruitments in the banking sector.

		Q2: What is the most recent sector in which you were employed? - Selected Choice			
		Total	Banking Sector	Other Financial Services	Other sector (specify)
Q11: Which occupational levels were recruited due to introductions of new technologies?	Total Count (Answering)	38,0	27,0	10,0	1,0
	Top Management	1,0	0,0	1,0	0,0
		2,6%	0,0%	10,0%	0,0%
	General/Middle Management	5,0	3,0	2,0	0,0
		13,2%	11,1%	20,0%	0,0%
	Professional	23,0	15,0	7,0	1,0
		60,5%	55,6%	70,0%	100,0%
	Skilled/Semi-Skilled	9,0	9,0	0,0	0,0
		23,7%	33,3%	0,0%	0,0%
	Unskilled	0,0	0,0	0,0	0,0
		0,0%	0,0%	0,0%	0,0%

Figure 20: Recruitment of new employees by occupational level

As much as 81% of top management employees have had to recruit new employees due to recent technological changes. Even though general and middle management and professional occupational levels also have had to recruit new employees due to new technologies introduced, the recruitment of the employees is far lower than that of top management, at 53.6% and 54.5%, respectively.

		Q5: What is your highest occupational level?			
		Total	Top Management	General/Middle Managem	Professional
Q: In your working environment, have you had to recruit new employees due to new technologies introduced?	Total Count (All)	60,0	21,0	28,0	11,0
	Yes	38,0	17,0	15,0	6,0
		63,3%	81,0%	53,6%	54,5%
	No	22,0	4,0	13,0	5,0
		36,7%	19,0%	46,4%	45,5%

Figure 21: Recruitment of new employees due to technology introduction: perception by occupational level

A high percentage of professional and top management respondents, at 83.3% and 70.6%, indicated that most of their recruits were for professional positions. Respondents in the general and middle management occupational levels witnessed recruits mainly in the professional sphere at 40.0% and skilled and semi-skilled at 46.7%. The study shows that recruitment in other occupational levels has been significantly low.

		Q5: What is your highest occupational level?			
		Total	Top Management	General/Middle Managem	Professional
Q11: Which occupational levels were recruited due to introductions of new technologies?	Total Count (Answering)	38,0	17,0	15,0	6,0
	Top Management	1,0	1,0	0,0	0,0
		2,6%	5,9%	0,0%	0,0%
	General/Middle Management	5,0	3,0	2,0	0,0
		13,2%	17,6%	13,3%	0,0%
	Professional	23,0	12,0	6,0	5,0
		60,5%	70,6%	40,0%	83,3%
	Skilled/Semi-Skilled	9,0	1,0	7,0	1,0
		23,7%	5,9%	46,7%	16,7%
	Unskilled	0,0	0,0	0,0	0,0
		0,0%	0,0%	0,0%	0,0%

Figure 22: Recruitment of new employees by occupational level

4.3.2.3 Conclusion on Movement of Employees

The study shows that the financial services industry has witnessed a movement of employees through retrenchments, transfers, or recruitments. Most of the retrenchments or transfers were witnessed in skilled or semi-skilled positions and mainly in the banking sector by general or middle management positions. The least retrenchments or transfers were witnessed in unskilled and professional occupational levels.

With recruitments, most recruitments were for professional occupational levels, which were high in both the banking and the other financial services sector. There were no recruitments in unskilled positions and fewer in other occupational categories.

In summary, there have been retrenchments or transfers in skilled or semi-skilled positions; however, there have also been recruitments but in professional positions. It can therefore be concluded that there is less demand for skilled or semi-skilled workers, which leads to unemployment in this employment category. However, at the same time, there is a demand for professionals, which leads to employment in professional positions.

4.3.3 Perception of Future Outlook on Technologies

4.3.3.1 Perception of Efficiencies from the Adoption of Technology

The findings have revealed that 81.7% of the respondents believe that the future adoption of technologies will provide more efficiencies in their working environments. The percentage of the respondents in the banking sector who say that future adoption of new technologies will offer more efficiencies slightly exceeds the rate of respondents in other financial services who say that at 81.4% and 78.6 %, respectively. While there are no respondents who say that future adoption of new technologies would not bring more efficiencies in the working environment, a percentage of 18.3% of the respondents are still determining whether there will be efficiencies that are perceived to arise from the future adoption of new technologies.

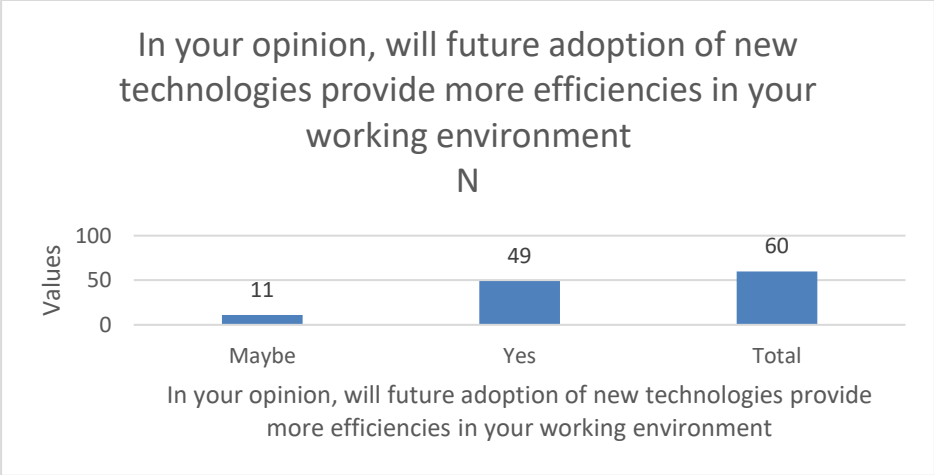


Figure 23: Opinion on future adoption of technology 1

In your opinion, will future adoption of new technologies provide more efficiencies in your working environment

	N	%
Maybe	11	18.3%
Yes	49	81.7%

Figure 24: Opinion on future adoption of technology 2

		Q2: What is the most recent sector in which you were employed? - Selected Choice			
		Total	Banking Sector	Other Financial Services	Other sector (specify)
Q13: In your opinion, will future adoption of new technologies provide more efficiencies in your working environment?	Total Count (All)	60,0	43,0	14,0	3,0
	Yes	49,0	35,0	11,0	3,0
		81,7%	81,4%	78,6%	100,0%
	Maybe	11,0	8,0	3,0	0,0
		18,3%	18,6%	21,4%	0,0%
	No	0,0	0,0	0,0	0,0
		0,0%	0,0%	0,0%	0,0%

Figure 25: Efficiencies arising from future adoption of new technology: perception by sector

The findings show that more top management (95.2%) strongly feel that adopting new technologies will provide more efficiencies in the working environment. General and middle management, as well as professional occupational level, think that new technologies will offer more efficiencies. Still, their perception is lower than top management as 78.6% of general and middle management feel so, and a low 63.6% of professional respondents think so. A large proportion of professional respondents, 36.4%, were still deciding whether adopting new technologies would improve their working environments.

		Q5: What is your highest occupational level?			
		Total	Top Management	General/Middle Management	Professional
Q13: In your opinion, will future adoption of new technologies provide more efficiencies in your working environment?	Total Count (All)	60,0	21,0	28,0	11,0
	Yes	49,0	20,0	22,0	7,0
		81,7%	95,2%	78,6%	63,6%
	Maybe	11,0	1,0	6,0	4,0
		18,3%	4,8%	21,4%	36,4%
	No	0,0	0,0	0,0	0,0
		0,0%	0,0%	0,0%	0,0%

Figure 26: Efficiencies arising from future adoption of new technology: perception by occupational level

4.3.3.2 Perception of the Type of Technologies for Efficiencies

The findings show that 58.3% of respondents believe virtual assistants will create more efficiencies in their working environment. This has been followed closely by 48.3% for smart contracts, 46.7% for chatbots, 41.7% for online and mobile banking, and 36.7% for blockchain technology.

The findings indicate that 53.5% of respondents from the banking sector view that new technologies should be adopted on virtual assistants and smart contracts. This will be followed by chatbots, blockchain technology, and online and mobile banking. Similarly, 71.4% of other financial services sector respondents believe that new technologies should be adopted on virtual assistants. However, this is to be followed by online and mobile banking, chatbots, smart contracts, and blockchain technology. The similarity between these two sectors is that most respondents feel that most technologies should be introduced in virtual assistants. The contrasts between the two sectors are that the banking sector thinks that the least technologies should be in online and mobile banking, and the other financial services think that the least which should be implemented is blockchain technology. Other financial services do feel that more technology should be implemented in online and mobile banking.

		Employment Sector			
		Total	Banking Sector	Other Financial Services	Other sector (specify)
Technologies for Efficiencies	Total Count (All)	60,0	43,0	14,0	3,0
	Chat Bots	28,0	21,0	6,0	1,0
		46,7%	48,8%	42,9%	33,3%
	Virtual Assistants	35,0	23,0	10,0	2,0
		58,3%	53,5%	71,4%	66,7%
	Online and Mobile Banking	25,0	18,0	7,0	0,0
		41,7%	41,9%	50,0%	0,0%
	Smart Contracts	29,0	23,0	5,0	1,0
		48,3%	53,5%	35,7%	33,3%
	Block Chain Technology	22,0	19,0	2,0	1,0
		36,7%	44,2%	14,3%	33,3%
	Other	12,0	8,0	4,0	0,0
		20,0%	18,6%	28,6%	0,0%

Figure 27: Technology Efficiency by Sector

		Occupational Level			
		Total	Top Management	General/Middle Management	Professional
Technologies for Efficiencies	Total Count (All)	60,0	21,0	28,0	11,0
	Chat Bots	28,0	11,0	13,0	4,0
		46,7%	52,4%	46,4%	36,4%
	Virtual Assistants	35,0	13,0	18,0	4,0
		58,3%	61,9%	64,3%	36,4%
	Online and Mobile Banking	25,0	10,0	11,0	4,0
		41,7%	47,6%	39,3%	36,4%
	Smart Contracts	29,0	12,0	12,0	5,0
		48,3%	57,1%	42,9%	45,5%
	Block Chain Technology	22,0	7,0	11,0	4,0
		36,7%	33,3%	39,3%	36,4%
	Other	12,0	5,0	7,0	0,0
		20,0%	23,8%	25,0%	0,0%

Figure 28: Technology Efficiency by Occupational Level

4.3.3.3 Perception of the Impact of new technology on team size

The findings indicate that 40% of the respondents perceive that there will be a decrease in their team sizes due to the impact of new technologies. The banking sector and the other financial services sector equally perceive that the introduction of technology will decrease team size.

		Q2: What is the most recent sector in which you were employed? - Selected Choice			
		Total	Banking Sector	Other Financial Services	Other sector (specify)
Q16: Which impact do you envisage that the new technologies will have on the size of your team?	Total Count (All)	60,0	43,0	14,0	3,0
	Increase team size	14,0	10,0	3,0	1,0
		23,3%	23,3%	21,4%	33,3%
	Decrease team size	24,0	18,0	6,0	0,0
		40,0%	41,9%	42,9%	0,0%
	No impact	16,0	12,0	2,0	2,0
		26,7%	27,9%	14,3%	66,7%

Figure 29: Impact of new technologies on team size: perception by sector

The findings show that most of the general and middle management occupational levels, 57.1%, perceive the introduction of new technologies to impact decreasing their team sizes. In contrast, most, 45.5%, professionals perceive that introducing new technology will not affect their team sizes, with the remainder being split on whether the team sizes will be affected. Similarly, most top management occupational levels perceive that introducing new technology will have little effect on their team sizes.

		Q5: What is your highest occupational level?			
		Total	Top Management	General/Middle Management	Professional
Q16: Which impact do you envisage that the new technologies will have on the size of your team?	Total Count (All)	60,0	21,0	28,0	11,0
	Increase team size	14,0	3,0	8,0	3,0
		23,3%	14,3%	28,6%	27,3%
	Decrease team size	24,0	5,0	16,0	3,0
		40,0%	23,8%	57,1%	27,3%
	No impact	16,0	8,0	3,0	5,0
		26,7%	38,1%	10,7%	45,5%

Figure 30: Impact of new technologies on team size: perception by occupational level

4.3.3.4 Conclusion on Efficiencies

The findings have indicated that the financial services industry is open to adopting new technologies to create efficiencies within their working environment, even though this will generally reduce their team sizes. Adopting virtual assistants as new technologies for efficiencies is highly supported by 61.9% of top management and 64.3% of general

or middle management positions. It remains the case that all occupational levels feel that blockchain technology is unnecessary for efficiencies within the sector.

4.3.4 Summary of Findings

Chatbots are indicated as the most dominant technology introduction in other financial services, in contrast with the most prevalent technology introduction in the banking sector being online and mobile banking.

The adoption of technology does impact the employment rate in the South African financial services industry, though the technologies being impacted are different per sector. The leading technologies that have impacted recruitments and retrenchments are online and mobile banking and chatbots. The occupational categories which have been retrenched due to technologies are the skilled and semi-skilled occupational categories. The occupational categories which been recruited are professional positions. The study is inconclusive on the net employment in each occupational category, though it has been observed that there is an impact.

The banking sector is ahead in implementing online and mobile banking, followed by chatbots. The latest technology to be realised is blockchain technology. It can therefore be concluded that for introductions to technologies, the three people who witnessed no technology changes are males and in top management, and the other two are split into a female and self-describing person in which one is in general or middle management, and the other one is a professional. The analysis is aligned with the literature review that sees skilled or semi-skilled employees being retrenched and more professionals recruited in their space due to the professionals' technical skills. Blockchain technology has been recognised as the minimally introduced technology in the financial services industry.

The implication of this is that the other financial services sector transfers and or layoff their employees when there is new technology introduction more than the banking sector.

Chatbots, having been the second most introduced new technology in the banking sector, were witnessed the most by general and middle management occupational

level by 78.6% of the respondents, followed by 61.9% of top management respondents, and lastly, 45.5% by professional level respondents. Lastly, 76.2% of respondents in top management occupational levels witnessed online and mobile banking as the most dominant technological change which has been introduced. It can be seen from Figure 14 above that in general or middle management positions within the other financial services sector, their technological introductions are less than those introduced in the banking sector, with a variance ranging between 14.8% to 55.7% fewer introductions, with 20% of the respondents in other financial services sector not having witnessed any new technology introductions. There is a significant gap in introducing new technologies between the banking sector and the other financial services sector within the financial services industry.

5. CONCLUSION

The study's objective was to determine whether digitalisation impacts the employment rate in the South African financial services industry. This was done by sending out questionnaires to participants in the financial services industry to determine whether they have had any new technology adoptions, the technologies adopted, and whether there have been any employee movements due to the adoption of technology.

The findings have indicated that the South African financial services industry has had introductions in technology. This is in line with the industrial revolutions as recognised by Greenwood (1997), Schwab (2017) and explanations by Britannica (n.d.). The introductions in the financial services sector were mainly in online and mobile banking. However, when analysing the industry further, it has been determined that the banking sector’s primary technology adoption is online and mobile banking, while the other financial services sector is chatbots. Therefore, both online and mobile banking, as well as chatbots, have dominated the financial services industry.

It has also been determined that the banking sector’s general introduction of new technologies, apart from chatbots, exceeds that of the other financial services sector within the financial services industry. Respondents in professional occupational levels mainly witnessed these introductions to technologies, followed by general and middle

management positions, and the least by top management positions. For the entire financial services industry, blockchain technology has minimal introductions.

The financial services industry has witnessed retrenchments within the sector emanating from the new technology introductions in line with Bessen (2019) and Duernecker (2014), and Frey and Osborne (2017) studies that technological adoption does give rise to a reduction of labour. Most of the reductions were seen in skilled and semi-skilled workers, and the least labour reductions were in unskilled occupational levels. Saka et al. (2021) study has also pointed out that technology only increases unemployment at certain occupational levels. The occupational levels of skilled and semi-skilled workers in the financial services industry which lost jobs due to technology adoption are in line with the study by Frey and Osborne (2017), which have concluded that jobs at risk are mainly for low-skilled workers and that these workers would need to be upskilled. In addition, Otekhile and Zeleny (2016) have also alluded that self-service technologies such as online banking will reduce the labour requirement for low-skilled workers.

Only 39.5% of the banking sector respondents have seen retrenchments, compared to 57.1% of respondents in the other financial services sectors, who saw more reductions than not. The banking sector respondents witnessed more decreases in skilled and semi-skilled workers and the least in top management. The other financial services sector witnessed more reductions in general and middle management positions and the least in unskilled workers. Respondents saw most retrenchments in general or middle management positions, followed by top management positions, and the least by professionals. Fewer reductions in the unemployment rate of professionals and unskilled positions have been witnessed because, as per Autor (2015), these jobs require skills that are not easily automated and require flexibility and judgment. The least retrenchments were witnessed in unskilled and professional occupational levels.

On recruitments, the majority (63.3%) of the respondents witnessed new recruitments. 62.8% and 71.4% of the respondents in the banking sector and the other financial services sector, respectively, witnessed the recruitments. The respondents saw more recruitment in the financial services sector than in the banking sector. Nevertheless, this means there is less unemployment in the financial services sector. Respondents

in top management positions witnessed the most recruitments, followed by professionals and the least by general or middle management positions.

The financial services sector witnessed more recruitment in professional positions and no recruitment in unskilled positions. 70% of the other financial services sector respondents noticed recruitments in professional roles, a significant difference from only 55.6% of the respondents in the banking sector, which saw the recruitments. Most recruitments into professional positions were witnessed by professional respondents, followed by top management. This view contrasts Saka et al. (2021), who have concluded that high-skilled workers increase in the face of automation. This view is, however, in line with the study by Autor (2015) that the unemployment rate of high (managerial, professional, technical occupations) and low-wage jobs decrease in the face of automation.

Similarly, in the financial services industry in South Africa, it has been shown that more professionals are recruited in the face of automation than skilled employees, no matter which skill level. It has been observed from the results that there have been fewer recruitments and fewer retrenchments for unskilled positions, resulting in no change in employment in the face of automation. Cirillo (2017) has also touched on this point that introducing technology will favour managerial skills because managerial positions require judgment.

In conclusion, the results show net positive employment, with the highest recruits for professional positions requiring technical expertise. It can therefore be concluded that the banking sector retrenched most skilled and semi-skilled workers in favour of more professionals. Similarly, the other financial services sector retrenched most general and middle management workers in favour of more professionals. Technology adoption, therefore, leads to unemployment, but only in certain positions, such as skilled positions; however, technology adoption favours the employment of professionals and managerial positions due to the cognitive thinking and judgment required in these jobs. Technology also has an immaterial impact on tasks of a social nature.

When the firms embrace digitalisation, there is more likely to be net job creation; however, in the positions which require cognitive thinking, such as the professional and technical positions, as seen by the results that there are more professionals recruited and no unskilled people recruited. Semi-skilled people are recruited, but not at a higher rate than professionals. This is in line with the trend from the literature study that as more people embrace digitisation, there will be more unemployment in skilled positions and more employment in technical positions.

Overall, the financial services sector is open to adopting new technologies to improve efficiencies, with the banking sector more open to adopting new technologies than the other financial services sector. Most respondents in top management positions see efficiencies from adopting new technologies, followed by general or middle management and the least by people in professional roles. Only the majority of respondents in general or middle management positions envision a decrease in team size due to adopting new technologies. The entire sector sees a potential reduction in team sizes to adopt new technologies.

In summary, there have been retrenchments or transfers in skilled or semi-skilled positions; however, there have also been recruitments but in professional positions. There is less demand for skilled or semi-skilled workers, which leads to unemployment in this employment category. However, at the same time, there is a demand for professionals, which leads to employment in professional positions.

Bessen (2019) has also alluded to this notion of unemployment, though their study deems that the unemployment arising from these technological changes, thereby reducing labour, is temporary.

Having taken the above results, analysis and conclusion into account, the study recommends certain areas which can be introduced into practice. These have been included in section six below, with section seven recommending areas which require further research to understand the field of research and further add to the body of knowledge.

6. RECOMMENDATION FOR PRACTICE

As noted in the study above, there are both retrenchments and recruits within the financial services industry; however, only in certain positions. There is a demand for employment in professional positions and less demand in skilled or semi-skilled positions. This is because skilled or semi-skilled positions can be easily automated. Therefore, as the world moves into 4IR, less demand in easily automatable positions will arise. An increase in professional skills should be invested in to obtain a net employment rate, with less investment in automatable skills.

This can be done by:

- Deep dive into each industry and the demand for labour on each occupational level. Each industry will have different priorities on which occupational levels to skill or upskill or whether they need to professionalise some occupations. A blanket approach cannot and should not be applied to all industries.
- Organisations should adopt digital strategies that seek to have a short-, medium- and long-term view on how the company will implement, monitor and evaluate digital and technological changes and their impact on their organisational structures.
- Skills audit must be conducted on the current organisational structure and measured against companies' strategic plans for realistic.
- Skills development should be geared towards professional development and technical development of staff with a long-term view.
- Basic and tertiary education to be geared towards professional occupational levels.

7. SUGGESTIONS FOR FURTHER RESEARCH

Suggestions for further research are for the study to be expanded into other industries to determine whether the movement in employees arising from technological changes is sector based or is standard across all industries. With this information, an appropriate recommendation can be given to companies and government on how to move forward with the Fourth Industrial Revolution so that the NDP 2030 plans become successful, despite the misgivings by executives and George Friedman.

Previous literature has not delved into the diversification categories to determine how each gender, age group, and occupational level perceives the impact of technology on employment. The gender and age indication were so that the survey results could have diverse views on this topic. This can also provide helpful information on whether the perceptions differ in terms of gender and age and information on their exposure to technology and employment, which could later be categorised depending on when technological advances came into effect. Further research can be done into this area to determine if there is a correlation between the diversification categories and the technology adoption and implementation type.

Additional management theories which relate to employment need to be explored and analysed with reference to the gaps which have been identified in the study. Further studies would assist to understand the identified gaps further in the financial services industry and determine whether there are industry specific impacts on employment or whether the impact on employment is standard across all industries. This will further add new knowledge into this research field.

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