

WORKING INSIDE BANK 4.0

ANALYSING THE IMPACT OF THE 4IR ON THE ORGANIZATION OF WORK IN THE BANKING SECTOR OF SOUTH AFRICA: THE CASE OF SIX BANKS IN THE CITY OF TSHWANE

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ABSTRACT

The main objective of the study is to analyse the impact of the 4IR on the organization of work processes in the banking sector of Pretoria, South Africa. The Fourth Industrial Revolution (4IR) is an extension of the digital revolution based on the interconnectedness of machinery and cyber-physical systems that intelligently produce and control production. The South African banking sector has not been immune to the changes brought on by the 4IR in other sectors, as many financial institutions in the country have digitized the bulk of their services, in order to make banking quicker and more efficient. Additionally, the latest COVID-19 pandemic has accelerated the emergence of digital solutions and e-commerce across different sectors worldwide, thus showing that 4IR is here to stay. On the surface, the adoption of various technological innovations within the banking sector seems like a logical step towards building a more efficient banking system, with minimal deficiencies and upskilling opportunities for banking employees, thus providing an improved and convenient banking experience for customers. On the other side, however, one can see general trends that may not be in the best interest for people employed within the banking sector. For example: the introduction of new technologies has reduced the number of employees in banks; the skills upgrade that some bankers have experienced as a result of new technologies, have come at the cost of the many job losses in the sector; also, the control methods in the banks have become more centralised, thus ensuring extreme monitoring of staff. Additionally, new technologies have eliminated the spaces for deficiencies, and have given consumers a greater role in their banking experiences, instead of being assisted from a-z in their local branches. In light of these changes, one has to question the real impact of these changes on the people that have chosen banking as a career, as ‘machines’ have taken over their banking institutions. Using the Labour Process Theory (LPT), this study examined the impact of the 4IR processes on the organization of work and the general employment experiences of employees in the banking sector of Tshwane, in the Gauteng province, of South Africa. This study found the following outcomes: technologies facilitate greater monitoring of the workplace, enable flexible specialisation for workers, reduces foot-flow in bank branches, and shifts the bankers’ work into the hands of the customers.

Keywords: 4IR, industrial revolutions, digital technologies, Labour Process Theory, banking, Control, organisation of work.

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ACRONYMS

4IR	Fourth Industrial Revolution
AI	Artificial Intelligence
API	Application Programming Interface
ATM	Automated Teller Machine
COSATU	The Congress of South African Trade Union
CPS	Cyber Physical Systems
CRM	Customer Relationship Management
FIAS	Financial Advisory and Intermediary Services Act
IBM	International Business Machines Corporation
ICT	Information and Communication Technologies
IoT	Internet of Things
IT	Information Technology
KPI's	Key Performance Indicators
LPT	Labour Process Theory
ML	Machine Learning
MOT	Management of Technology
NLP	Natural Language Processing
QMS	Queue Management Systems
QR	Quick Response
RDA	Robotic Desktop Automation
RE	Regulatory Examination
RMB	Rand Merchant Bank
RU-HEC	Rhodes University Human Ethics Committee

SARB

South African Reserve Bank

SASBO

South African Society of Bank Officials

UK

United Kingdom

USA

United States of America

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CHAPTER ONE

INTRODUCTION

1.1 CONTEXT OF THE RESEARCH

The Fourth Industrial Revolution (4IR) can be described as the introduction of disruptive technologies and trends such as the Internet of Things (IoT), robotics, virtual reality (VR) and artificial intelligence (AI), in the way that human beings live out their lives. The integration of these technologies into manufacturing practices is known as Industry 4.0. The First Industrial Revolution, in the 18th and 19th centuries, involved a change from mostly agrarian societies to greater industrialization as a consequence of the steam engine and other technological developments. The next technological age, the Second Industrial Revolution was driven by electricity and involved expansion of industries and mass production as well as technological advances. The Third Industrial Revolution, sometimes called the digital revolution, involved the development of computers and IT (information technology) since the middle of the 20th century (Schwab, 2017).

The Fourth Industrial Revolution is growing out of the third but is considered a new era rather than a continuation, because of the explosiveness of its development and the disruptiveness of its technologies. According to Schwab, (2017) the new age is differentiated by the speed of technological breakthroughs, the pervasiveness of scope and the tremendous impact of new systems. Specific technologies of the Fourth Industrial Revolution include but are not limited to: artificial intelligence; Internet of Things; robotics; virtual reality; mobile devices; 3D printing; smart sensors; big data/analytics; augmented reality (AR); data visualization; cognitive computing; location detection; customer profiling; block chain; quantum computing; and cloud computing. The Fourth Industrial Revolution (4IR) is a global phenomenon that is driven by complex technological developments, such as: the emergence of digital solutions with lower cost-models; financial-technologies; the move from traditional legacy banking systems; and the complete digitalization of office operations (PwC, 2018).

The financial services industry in South Africa, has been affected by different elements of the 4IR in some way or the other. Banking institutions in South Africa have moved away from the traditional models of banking and have embraced technologies and systems that have increased the efficiency of their banking systems. The objective of 4IR is to eliminate errors, and to increase efficiency across the board, whilst increasing the involvement of the consumer in their own banking experience, instead of them being assistance at the local branches. Many banking consumers have abandoned visiting local branches, and have resorted to banking using devices, such as laptops, computers, and cell phones. The adoption of the 4IR technologies in banking, has a class element to it, as many of the working and lower economic class segments of the South African population do not have access to the latest devices, and internet. Many people still visit their local branches for banking services.

However, the manner in which they are assisted at the branches, has changed, as many of the employees, now help clients on the internet banking and other apps using various devices such as iPads, computers, and touch screens provided by the bank. The introduction of the 4IR elements in banking sector in South Africa has a direct effect in the way in which banking services are offered to the public. The role of the bank employees has evolved in tandem with the technological changes that have taken place in the bank. On the one side, these developments show positive effects of the introduction of the 4IR processes in banking institutions, such as: efficiency; upskilling of bank employees; and better banking experience for the consumers.

On the other side, however, there are consequences such as: centralisation of control, increased employee surveillance; worker retrenchments; changes in the work functions of bank employees; salary concerns; increased roles for each bank employee; unequal access to technological devices and internet. In light of these two schools of thought, there is evidently, a middle road, which says that there are positive and negative outcomes with the introduction of new technologies and system in banking institutions. The objective of this thesis is not to choose either side, but to highlight the experiences of the employees in banks, as they are the first in line to experience the effects of changes in work processes, as a result of the introduction of 4IR in their sector. This study does not seek to lament the introduction of new technologies in the banking institutions, because as the COVID-19 pandemic has shown that, e-commerce is becoming a necessary aspect of everyday life.

This is most evident in the banking sector, where e-commerce has made banking more convenient for consumers. During the COVID-19 pandemic, a large number of clients, were able to do the bulk of their banking in the comfort of their homes, whilst others approached local branches and were helped quickly, because of the availability of banking computers and apps available on site in these branches. That said, however, the employees who chose banking as a profession also matter, as they are heavily affected by these rapid technological changes that are taking place in their banking institutions. This study contributes to the broader discourse on the impact of 4IR on the organization of work in the wider economic landscape of South Africa.

1.2 THEORETICAL FRAMEWORK

This study adopted the Labour Process Theory to analyse the impact of 4IR processes on the organization of work in the banking sector of South Africa. LPT scholarship is generally concerned with an array of workplace issues, such as: management control, labour agency; subjectivity, emotional and aesthetic elements of labour (Ellis, 2007). The significance of LPT as a research approach, is that it allows for an in-depth case analysis of various aspects of the workplace within a capitalist system. The LPT also prevents deterministic theses in workplace studies, by encompassing both optimistic and pessimistic perceptions of technological drive (Briken, 2020). LPT provides the necessary conceptual tools for understanding the drivers of technological revolution/s and their impact on the organization of work and the well-being of workers in general (Briken, 2020).

The organization of work under 4IR technologies is substantially restructured, therefore, the significance of LPT analysis is the focus on the ways in which machinery is controlled by the owners of capital and their impact on workers employment experiences in banks (Acemoglu and Restrepo, 2018). The South African banking sector is dominated by four major banks namely, Absa, FirstRand, Nedbank, and Standard Bank. Although reliant on physical branches, the banks envision radical digital transformations (PwC, 2018). Change is eminent across all functional elements of the modern bank, thus requiring lesser and smaller branches, and progressively turning to technological capabilities aimed at converting tedious tasks into seamless automations (COEFS, 2017). Banks such as Investec, Discovery, African Bank, and Bidvest Bank offer a completely digital system, with business models providing wider access to digital banking (PwC, 2018).

1.3 PROBLEM STATEMENT

The evolution of technology is an inevitable part of human life, as it provides many benefits and makes access to various services much easier for people. Technology also brings efficiency and lessens the burden of obtain quality products and services. In the banking sector the introduction of technology, and the 4IR processes in particular, is an attempt to increase efficiency, and to make banking quicker and easier for the clients. Studies have shown that 4IR process bring the following inputs in the banking institution: skills upgrade for staff; quicker and more convenient accessible banking for the public and the technology and 4IR system eliminate costly mistakes. On the other hand, however, the introduction of 4IR processes does not mean that everyone in South Africa can access banking services via gadgets, because many do not have access to these gadgets and the internet. The introduction of 4IR processes and systems also has an impact on the size of the labour force in banks and the nature of work in the modern banking institution.

1.4 RESEARCH OBJECTIVE

The main objective is to analyse the impact of 4IR on the organization of work processes in six banks of Pretoria, South Africa. The secondary objective of this study includes:

- Analysing the perspectives of branch managers on the impact of the 4IR systems in the way they manage their local branches and staff therein.

1.5 OUTLINE OF CHAPTERS IN STUDY

Chapter one provides a brief outline of the 4IR phenomenon in light of its impact on the organization of work. This chapter also provides a brief overview of the context of the research, the research methods, and the theoretical framework, problem statement and the objectives of the research. **Chapter two** integrates Labour Process Theory within the fourth industrial revolution framework. In other words, it is an attempt to merge the theoretical framework within the broader research context. The first part of the chapter kicks off with a comprehensive outline of the genealogy of the labour process theory (LPT). The second part of this chapter provides an overview of the lifespan of the 'Industrial Revolution' – from the 1st industrial revolution to the 4IR.

The **third** chapter of this study provides an outline of the: history of banking in South Africa; the current state of banking in South Africa; and the 4IR technologies being implemented in the banking sector. This chapter also highlights previous case studies that analysed the impact of advancing banking technologies, from a worker's perspective. **Chapter four** provides an overview of the research methodology that is utilised in this study to collect and analyse data. **The fifth chapter** consists of an analysis of the empirical findings based on the perspectives of branch managers and employees from six selected banks in Pretoria. This chapter is broken down into three sections: basic demographic information and historical backgrounds; the main themes discovered in the data; and the labour related impact of the rapid technological changes in the banking sector. The **sixth** and last chapter of this study, summarises the significant themes uncovered in the preceding chapters, and links them to the data analysed and make profound conclusions about the topic at hand.

CHAPTER TWO

LABOUR PROCESS AND THE FOURTH INDUSTRIAL REVOLUTION

2.1. INTRODUCTION

The Fourth Industrial Revolution (4IR or Industry 4.0) is a global phenomenon that is characterized by complex technological developments which include: advanced digitalization; robotics; Internet of Things (IoT); big-data, and artificial intelligence (AI) (Schwab, 2018). 4IR is an extension of the digital revolution based on the interconnectedness of machinery and cyber-physical systems that intelligently produce and control production (Gilchrist, 2016). Trends in banking institutions indicate the emergence of digital solutions. These changes have an effect on the way banking services are rolled out to the public (PwC, 2018). This study investigates four broad areas, namely: (1) the driving forces behind the 4IR in the banking sector of South Africa; (2) the changes that have taken place in this sector, as a result of external influences; (3) the impact of these changes on the way that the banking sector rolls out its services to the public and (4) how the employees/managers in this sector are adjusting to these technological innovations within their sector.

This study has adopted a Labour Process Theoretical (LPT) framework to examine the impact of the 4IR on the organization of work in the banking sector of South Africa. The Labour Process Theory examines the experience of production processes and helps to disclose how human labour, machinery, and raw materials are modified into the final product (McKinlay and Smith, 2009). The fundamentals of labour process are embedded with factors such as control, resistance, and consent in work. These are considered as the authoritative and disciplinary structures that ensure that workers are present at work, that workers maintain productivity, and that workers remain committed to reproducing their own work discipline (Burawoy, 1979). This form of theoretical analysis aims to understand capitalist production and its overall impact on the world of work. Earlier studies of the organization of work under capitalism (see Babbage, 1832: 196; Ure, 1835; Smith, 1986) sought to develop theoretical motivations for improving the effectiveness of capitalist production and for identifying ways to organize production.

Subsequent studies include those of Taylorist and Fordist ‘Scientific Management’ which sought to understand the complexities associated with the control of labor (McLoughlin, 1999; Smith, 2016). Studies focusing on the impact of technological change (under capitalist production) have often been framed under deterministic views (see Kerr, Dunlop, Harbison, and Myers 1973; McLoughlin 1999). These studies often associate technological inventions with causal powers – that technology has a determining effect on a society’s cultural values and social structures (McLoughlin, 1999: 17). An example of a technologically determinist approach in work organisation includes the Management of Technology (MOT) approach, which tends to concentrate on the processes of technology selection and implementation (Boreham, Parker, Thompson, and Hall 2008).

Technology selection is shaped by organisational strategy and is focused on identifying technologies that will produce the desired outcomes. In this context, the criterion for selection is determined by the features of the technology (Boreham *et al*, 2008). Thus, this study also seeks to capture the perspectives of employees in the banking sector, as their interests might not be in line with those of management. This study is different from most technology-centric research on the changing workplace (see Alge and Hansen, 2014; Coover and Thompson, 2014; Redden, Elliot, and Barnes, 2014) as it draws on the Labour Process Theory to understand the impact of the 4IR in the organization of work in the banking sector of South Africa. In the early days of LPT scholarship, the Marxist aligned scholars focused on the use of technologies (by capital) as a means of accumulating profits at the expense of labour (McLoughlin, 1999).

Over the years, the LPT scholarship has moved away from the more Marxist conceptualizations of the workplace, to exploring various other dimensions of the organization of work and labour. This study, essentially, attempts to situate the 4IR taking place in the banking sector of South Africa within the Marxist paradigm. The logic behind this endeavour is to revisit the Marxist foundations of LPT, as the technological revolutions are driven by capitalist drive for profit, efficiency and cost minimization. Inevitably, this type of technological evolution has an impact on the nature of work, and on the people, who perform that work. Marx is concerned with the relations between the property-owning class that buy labour power and the proletariat that sells their labour power (Watson, 2008).

Centralising this contentious relationship in the study of technological changes in the banking workplace is highly necessary and timely for the current climate. Therefore, applying the LPT in this study is ideal for understanding the impact of 4IR in the banking sector of South Africa.

This chapter is divided into three sections. The first section provides a comprehensive genealogy of the Labour Process Theoretical tradition, that is, from its Marxist foundation to its current state. The second section provides a historic overview of the different stages of the ‘Industrial Revolution’. The last section of this chapter provides an overview of the banking sector in South Africa and highlights the influence of 4IR technological innovations in this sector.

2.2 GENEALOGY OF THE LABOUR PROCESS THEORY

2.2.1 THE FIRST WAVE OF THE LABOUR PROCESS THEORY (LPT)

The LPT is founded on the Marxist tradition, which contended that “early nineteenth century capitalists deployed machinery and the technical division of labour to augment the productive potential of their enterprises. Consequently, machinery and the division of labour undermined the power of workers by throwing a portion out of work and deskilling the rest” (Elbaum, Lazonick, Wilkinson, and Zeitlin, 1979:227). According to Marx (1976), the labour process is an outcome of the antagonistic relationship between the owner of the means of production (owner of the business), and the owners of labour (the workers). Marx (1976: 20) argued that the ‘secret’ of capitalist profit, stems from capital’s ability to reap a greater portion of value from workers’ labour power (surplus value) than the cost of its initial purchase.

In layman’s terms, the capitalist’ main agenda is to make the employee to work as hard as possible in order to produce as much value or profit as possible, whilst paying an amount far less than the value or the surplus value profit he/she created (Knights and Willmott, 1990). From a Marxist perspective, the labour process facilitates systematic devaluation of the worker. Marx contends that profit is the appropriation of the extra value or surplus value that the worker produces in return for far less than the value he created. This means that the employee does not get his due in the capital labour relationship, which is what makes the interaction highly contentious (Strangleman and Warren, 2008). Marx centralised this contentious relationship, as it essentially is responsible for the manner in which the workplace is structured or organized.

The capitalist is more interested in extracting as much value as possible from the worker, whilst paying him as little as possible. This extra or surplus value is often referred to as ‘unpaid labour’ since it increases the capitalist’s profit rather than the worker who puts in the added effort (Knights and Willmott, 1990: 17). Basically, the capitalist will use any means at his/her disposal to make his/her quest for profit materialise (Ellis, 2007; Strangleman and Warren, 2008). Firms can increase the surplus-value appropriated from workers through a number of means, such as increasing relative surplus value extraction, increasing absolute surplus value, immiseration and super-exploitation (Selwyn, 2019). Increasing relative surplus value extraction can take place in two ways, that is, through the intensification of the working day through technological and managerial innovations and/or through reducing the costs of labour power (Marx, 1976).

This strategy may have limitations in terms of the worker’s physiological capabilities (e.g., fatigue or exhaustion), and it is mostly depended upon by capitalists who lack the means to increase their production capacity using labour-saving machinery/technology (Knights and Willmott, 1990; Ellis, 2007). Increasing absolute surplus value can take place through extending the workingday without increasing wages proportionately (Selwyn, 2019). The distinction between the relative surplus and absolute surplus is differentiated by the formal and real subordination of labour. Formal subordination commences when workers sell their labour power, and the real subordination involves the continuous use of organisational strategies to modify the balance of returns.

Marx argued that, in an advancing capitalist society, workers would get poorer as capitalists got richer. This notion leads to the last part of the Marxist assertion, which is ‘super-exploitation’, which basically means paying workers less than the costs of reproducing their labour power. For example, these can include the use of science and technology or the organisation of work based on a detailed division of labour (Knights and Willmott, 1990; Smith, 2016). The detailed division of labour was illustrated by the organisation of work in factories, wherein workers were divided according to detailed/specialised tasks. Furthermore, it enabled a hierarchy of labour power to develop which gave capitalist greater control/supervision of the production process because workers were thus placed to work on a segment of a subdivided production process (Ellis,2007). Additionally, as the hierarchy of labour power emerges, tasks that were relatively simple could then be given to the less skilled workers which also meant the cheapening of the workers labour power.

The formal and real subordination of labour is therefore a systematic process of production that is shaped to maximise the creation of surplus for the capitalist, and to limit the autonomy and discretion of the worker (Hyman, 2006). In essence, the implementation of science and technology in the production process became the principal method for controlling the labour power of workers on behalf of the factory owners (Thompson, 1999). Harry Braverman's *Labour and Monopoly Capital* built on Marx's Labour Process Theory by locating patterns of technological change within the dynamics of capitalist development. Braverman (1974) mainly focused on the degradation of work in the 21st century, which he associates with management's pursuit for control. According to Smith (2016: 207), control can be manipulated through "various means of management control or the historical evolution of employer's control strategies".

Consequently, management strives to establish effective techniques for ensuring control over the behaviour and productivity of employees. For Braverman (1974: 63), "the essential function of management in industrial capitalism was the control over the labour process". Braverman (1974) further insists that the pursuit for such control has been sought after in a more sophisticated manner through scientific management based on Taylorist and Fordist techniques. These techniques involve a separation of conception from execution, that is, the separation of the workers' mental planning and decision making from the exercise of manual labour (McLoughlin, 1999). Taylorism was an ideal mechanism for appropriating the scientific knowledge behind the creation of a product, thus stripping the worker their bargaining power.

Through monopolization of the knowledge of production and of the product, the worker becomes easily replaceable, because the knowledge that he once possessed, is now the property of the employer (manager) (Theobald, 1994; Marshall, 1998). Taylorism is concerned with finding the best way of performing work tasks through a systematic analysis of the work process.

Another major imperative of Taylorism was to identify the most efficient method to control and manage the labour force (Theobald, 1994). Taylorism is synonymous with giving management direct control of and over the entire production process and the worker. The separation of knowledge and execution was a key transformation in the capitalist organization of production, as it heightened the inequality between the employer and the worker. Prior to the Taylorist methods in the factory, the worker used their knowledge of the production process and their skills as a bargaining chip with the owner.

Taylorism removed this power, through appropriating the knowledge and further dividing the tasks into simple tasks, which do not require any skills or know (Warren, 2016). The tasks on the factory floor, were so simple, that even the most uneducated or unskilled worker could execute them. The worker thus became a disposable entity in the capitalist production process, as he/she was devoid of scientific knowledge of the product process, and of the skills set. This is what led Braverman to conclude that the capitalist labour process was designed in such a way that employees become deskilled, and their work degraded, all for the sake of efficiency and profit (Wilson, 1988). Braverman argued that the technological innovations and development that take place in a capitalist organization, are less about upgrading the workers' skill set, and more about achieving efficiency, with as little help from the workers as possible (1974).

He argued that the role of the worker was reduced to an unthinking cog in the organizational machine. The skills of the worker were not upgraded, but simplified through the implementation of new technologies to boost production efficiency. Braverman even shone a spotlight on the de-skilling and degrading effects of new technologies in 'white-collar' work, such as secretarial work and so on. He argued that the introduction of computers and other technologies in the capitalist organization simplify the work of the employee in such a way that even the most unskilled individual can be trained to execute tasks that previously required intense training and education. The introduction of technologies makes the education and skill of the employee almost redundant, as a result, the worker has little bargaining power, especially in a capitalist context where there is a large reserve army of unemployed people eager to work for even lower wages (Thompson, 1983).

Some scholars criticised Braverman's contribution to the LPT, arguing that deskilling was not the only concern for management. Other critics labelled Braverman's thesis as pessimistic towards the industrial revolution and technological innovations that were taking place (Strangleman, 2016). The point is that the new technology actually upskilled and developed the worker (Strangleman, 2016). Subsequently, Taylorist methods have advanced into new domains for the use of technologies to deskill jobs through automated technologies that require less manual labour. The key fact is that new technologies often simplify jobs into fragmented activities, thus requiring less or none of the workers conceptual ability or autonomous intervention (McLoughlin, 1999).

Building on the conceptual foundations of Taylorism, Fordism enhanced management control and introduced innovations for increasing productivity, lowering the costs of manufacturing, and pacing/controlling the worker's actions (Theobald, 1994). The key aspects of Fordism concerns (a) the application of the moving assembly line, (b) the specialisation/division of labour, (c) the control over the sequence of production, and (d) the increased introduction of technology in the factories (Theobald, 1994; Smith, 2006). The major differences between Taylorism and Fordism are associated with the sequential organisation of jobs and the amalgamation of new 'deskilled' tasks in the moving assembly line. In this sense, Fordism arranged production in a sequential manner in order to increase productivity in the production process (Ford and Crowther, 2005).

Braverman identified "the greater possibilities for widespread deskilling through the use of new forms of technology and science in the service of capital" (Thompson, 1989). Furthermore, the main interests for developing efficiency in the production process is one and the same with the drive to bring workers under the control of management (Thompson, 1989). For example, in the automobile factories, machines that were clustered together were placed into moving assembly lines, meaning that machines, parts, and workers were integrated into the new tasks. Put together, this system increased the speed of moving unfinished automobiles in the production process to greater heights (Ford and Crowther, 2005). The development of technologies (in this case 4IR technologies) can represent and stimulate greater centralisation of managerial activities as well as the realization of control in technological means, beyond the factory and into the office (McLoughlin, 1999).

The significance is that technological innovations in the workplace thereby repositions the worker to an instrument/device "which is controlled, again in so far as is possible, by management from outside the direct process" (Braverman, 1974: 212). Braverman (1974) asserts that capitalist interests for control and capital accumulation often lead toward deskilling, routinising jobs, and mechanising jobs in employment settings (manufacturing, retail clerical work etc.) (Watson, 2008). Combined, this condition of capitalist work is characterised as work degradation. This is because knowledge is systematically detached from the workers (direct producers) and concentrated into the possession of management (Smith, 2016). Furthermore, both manual and non-manual work are reduced to routine and deskilled tasks (Smith, 2016).

Braverman's views on management is that management desires to control all aspects of work, as it constrains the workers' skills and knowledge, and thereby reducing the worker's autonomy (Watson, 2008; Smith, 2016). Braverman's focus was not only primarily on the use of technology (by capitalist) to control workers. Rather, Braverman was interested in the driving force behind the changing workplace and organisation of work, as a result of technological changes. In essence, the LPT developed new concepts for analysing the employment relationship and effort bargain, through the use of what Ackroyd and Thompson (2016: 188) refer to as "Marxist ideas of work as a labour process whereby value is extracted from work".

2.2.2 THE SECOND WAVE OF THE LABOUR PROCESS THEORY (LPT)

The second wave of the LPT was initially born, in large part, as a response to Braverman's *Labour and Monopoly Capital*. After the publication of Braverman's seminal work, many labour-centric scholars contested the idea of de-skilling and work degradation in the era new technologies. These scholars argued that Braverman was wrong to assume that the introduction of new technologies led to the de-skilling and degradation of work, but rather, technological advancements in the workplace was necessary for the upskilling of workers. This contestation within the Labour Process circles, was labelled the 'de-skilling versus up-skilling' debate. What is evident from this debate was that those who critiqued Braverman were not adequately interrogating the Marxist underpinnings of his thesis.

Braverman was merely arguing that the introduction of technologies in the capitalist labour process has more to do with increasing production efficiency, profits, whilst decreasing the labour costs (Hyman, 2006). The aim for the introduction of a particular technology was about profit and productivity. The de-skilling argument was based on the separation of conceptualisation and execution of tasks. As such, this reduced the employee's value - through segmenting tasks into simple elements, which required no education or much skill (Wilson, 1983). Braverman saw the introduction of technology into the factories (at the time) as a way to remove the bargaining power from the worker, as he became a replaceable cog in the production machinery. Although, the critiques of Braverman were accurate in arguing that technologies do bring new skills sets within the workplace. However, these skill sets do not appreciate the value of the worker in the labour process, because workers do multiple jobs, whilst earning the same wage (Hyman, 2006; Watson, 2008). Hence multi-tasking instead of multi-skilling was taking place.

Additionally, the introduction of machinery and new technologies into the workplace, leads to the marginalization of low-skilled workers. Research shows a clear linkage between the introduction of technology into organizations and increased labour turnover across different sectors of the economy (Greenhalgh and Mavrotas, 1996; Grimshaw, Cooke, Grugulis, and Vincent, 2002). In this sense, those who are arguing for upskilling, overlook the capital labour tensions that define the technological trajectories of the capitalist organization. Braverman is also criticised for not providing an effective guide for measuring the ways in which skill levels change over time, and across certain jobs, sectors, and economies (McKinlay and Smith, 2009). In fact, according to the scholars, Braverman misjudged the scope of strategies used by employers in the quest for profit and control over the workforce.

For instance, as a strategy, managers could surrender control to skilled labour in the face of market/technical uncertainties, alternatively, managers could also choose not to implement Taylorist principles against a strong group of resistant workers (Smith, 2016). Braverman's position that (with all else unchanged) management will most certainly pursue a deskilling strategy is questionable. For example, research (Nelson, 1975; Edwards, 1979) has shown that only a few employers in the USA (1920s) used the Taylorist techniques to their fullest potential. From this debate, it is evident that a number of labour-centric scholars were deviating from the Marxist foundations of the Labour Process Theory. Post-Braverman LPT focused on the concepts that had been neglected by Braverman such as: control, consciousness, and agency (Burawoy, 1979), resistance (Edwards, 2010), subjectivity (Thompson and Smith, 2010), gender (Thomson, 1989), and managerial approaches (Salaman, 1982).

The notion of control in a capitalist organization also became highly contested, as some scholars believed that management utilised whatever mechanisms at their disposal (such as technology) as a means of controlling the worker. The second wave LPT scholars shone a spotlight on various aspects of the labour process, such as: management control of the production process and the workers. Second wave LPT scholars sought to expand on the various arrangements of control by considering the dynamics of control and consent at the point of production (Gatt, 2017). The reassessment of the LPT in the second wave was not aimed at diminishing the basic assumptions of labour process analysis. The result of this do-over is to suggest a contingency approach aimed towards a more open-ended understanding of the differences in the effects of technological changes within organisations (McLoughlin, 1999).

For instance, Freidman (1977) insists that under certain labour market conditions, management may introduce technology to acquire control by redesigning work and thereby granting workers greater discretion and autonomy. A range of control strategies can be implemented by management in the drive for securing and increasing profit margin (Edwards, 1979). The notion of control is interrogated in this study, as it seeks to understand the ways in which technologies and systems are used to control worker behaviour in banks. This study also examines the idea of de-skilling/up-skilling within the context of the technological and managerial systems that are used by banks. LPT theorists who advocated for technological advancements in the workplace, also highlighted the ways in which these strategies are practically contested and resisted by workers (Zimbalist, 1979).

Scholars who primarily focused on the application of technology as a means of controlling and subjugating workers, were criticised for neglecting factors such as the bargaining power and informal resistance of workers against technical and organisational change. An influential scholarly critique was that of Michael Burawoy's (1979), whose study on *Manufacturing Consent*, focused on the issue of agency and workers' consent. The author gives an account of the contradictions between coercion and consent concerning "the need for capital simultaneously to secure and to obscure the production of surplus" (Hyman, 2006: 42). Burawoy's (1985: 85) central point was that consent is not an 'externally-imposed ideology' on the worker, but rather an agreement produced by the worker's actions in the effort to bargain.

Burawoy (1985) gives an example of workers in manufacturing, who turned production targets into a game in which the rules of the game are negotiated, and the structures of the game are informal, can control earnings, and are aimed at making work more tolerable. This contribution to LPT studies, showed that, even in the most unfavourable working conditions, workers can essentially retain and exhibit agency (Burawoy, 1979; Ackroyd and Thompson, 2016). Within the context of the banking sector, this study also examines the ways in which workers respond to the new control measures used by their branches to increase productivity and efficiency. The analysis of worker control is important for this study because it can highlight some of the ways in which technologies have been introduced to further increase managerial control.

Research on managerial approaches highlight the contradiction between work intensification and new spheres of employee responsibility, such as Hochschild's (1979) analytical perspective on the issue of emotional labour. The study explores the way in which female nurses are expected to address customers in a polite manner, to maintain a friendly facial expression, and to maintain a positive body language to the customer (Hochschild, 1979). Hochschild (1979: 572) shows that such behavioural expectations of the worker can represent a worker's distinctive skill (to some extent), but the enforced production of these behavioural expectations can be viewed as a form of degradation. Braverman's shortcomings on gender were criticised by feminist writers (Pollert, 1981; Cavendish, 1982) for ignoring the issue of gender. Studies on gender used LPT to highlight the lived experiences of women across different organizational work contexts.

A study by Pollert (1981), focusing on tobacco workers for example, argued that Braverman failed to include the gendered identity of craft workers. Another study by Cavendish (1982) that focused on assembly workers, argued that Braverman failed to include the gendered identity of skilled workers. In both studies, the authors argue that Braverman overlooks the extent in which craft and skilled labour is gendered. These studies demonstrate how the nature of capitalism and patriarchy combine to cheapen women's labour. This occurs when profits (for owners) increased and men could assert dominance in the family due to their superior earnings (Bradley, 2016). These factors are considered to be some of the explanations for men's resistance to allow women to occupy jobs 'designed' for men.

For instance, Pollert's study on tobacco workers revealed how workers "seemed to accept that men 'deserved' to earn more" (Pollert, 1981: 184 cited in Bradley, 2016: 75). The significance of these particular labour process studies, amongst many others, is that they approached the labour process through the feminist lens (Ackroyd and Thompson, 2016). Feminist critique of Braverman's control perspective point out that work conflict extends beyond the labour and capital relationship in the sense that conflict can also be reflected in the antagonist and unequal sexual division of labour (McLoughlin, 1999). The argument is that technology needs to be seen not simply as the means in which control is sought by the management, but to also to view technology as a mechanism in which the subordinate position of women can be sustained by men (Cockburn, 1983). For example, Webster (1996) points out that historically, traditional work executed by women was often regarded as low-skilled and thus subjected women to lower pay rates.

Thus, since new technologies replaced traditional ‘male skills’, it allowed management to seek cheaper alternatives in the form of a female labour workforce (McLoughlin, 1999: 50). These studies also produced powerful illustrations of discrimination in the lived experiences of female workers and revealed further complexities of resistance and dissent which earlier labour process approaches neglected (Gottfried, 1994; Ackroyd and Thompson, 2016). Accordingly, this study also examines the different experiences of males and female employees in the banking sector by analyzing the gender differences and individual perceptions in the organization of work in the application of advanced technologies. For instance, although women’s participation rates have increased across professions, there is still a major pay gap between males and females in South Africa.

PwC (2018) study revealed that 61% of females earn below the median compared to 39% of males, contrarily, 63% of males earn above the median compared to 37% of females. Furthermore, studies (Thiessen and Nickerson, 1999; Smithson, Lewis, Cooper, and Dyer, 2004) examining the different experiences of male and female employees in employment indicated that women tend to be segregated into service, banking, and hospitality jobs; moreover, in computing and IT roles (digital revolution era). Females tend to dominate customer service work, whereas males occupy technical roles as programmers and system analysts (Baldry, 2007). Based on these critiques by second wave LPT theorists, the implementation and impact of technology itself is not viewed as process that upskills or deskills jobs.

Instead, the organisational effects of technological changes are a result of the capitalist’s desire to maintain control of the labour process to allow for greater profitability. Nonetheless, new technologies in the 4IR can reveal the various forms of job designs and work organisations that may be beneficial to the workforce. For instance, these benefits could consist of: (a) workgroups that have adequate engineering knowledge for operating the technology (e.g. AI engineer): and (b) the implementation of a system of task rotation that ensures that workers are given the opportunity to work on complex and routine jobs. Therefore, instead of worker-deskilling being a factor, these aforementioned benefits associated with new technologies could allow workers to retain their autonomy and control over the labour process, and to enable advanced technologies to complement the worker rather than to substitute the worker’s skills and abilities in favour of technology (McLoughlin, 1999).

Nonetheless, from the foregoing, Braverman's thesis insists that these forms of control and work organisation would not be beneficial to the management's interests under capitalism, and would thus require a major political, economic, and social transformation (McLoughlin, 1999).

2.2.3 THIRD WAVE OF THE LABOUR PROCESS THEORY (LPT)

Third wave LPT is referred to as new developments of 'alternative paradigms' to Taylorist and Fordist methods, of which were drawn from Japanisation. These paradigms include developments in lean production and flexible specialisation (Ellis, 2007). Lean production can be described as a completely new prototype for (a) organising production by cutting costs, (b) developing new products, (c) overseeing supply chains, and (d) managing sales and services (McLoughlin, 1999). Lean production sought to develop stimulating and fulfilling work for workers in order to improve on efficiency and to establish an appropriate response to market needs (McLoughlin, 1999). Flexible specialisation presented a strategy that emphasizes permanent innovation. This strategy attempts to develop a system capable of accommodating unabated and ceaseless change, rather than attempting to control change (Piore and Sabel, 1984).

Flexible specialisation looks to employ and develop employees with multiple skills and is focused on the implementation of multi-use-equipment and machinery capable of performing multiple functions (McLoughlin, 1999). By means of politics, flexible specialisation looks to create "an industrial community that restricts the forms of competition to those favouring innovation" (Piore and Sabel, 1984: 17). The significance of Japanisation is that it offers new ways to organise work. As Japanese firms expanded their products and production processes internationally, the techniques associated with Japanisation appeared to be superior compared to Western products and production processes.

Thompson (1990: 218) refers to these developments as 'paradigm wars'. The dimensions of Japanisation include mediated and direct Japanisation. The former refers to the attempt at combining and integrating the most efficient Japanese practices, and to legitimize changes in indigenous practices under the guise of 'Japanese efficiency' in order to make the changes seem necessary/desirable (Watson, 2008: 161). Whereas direct Japanisation refers to a situation wherein Japanese firms integrate into the economy of another society (Beynon, 2016). The characteristics of Japanisation include firstly lifelong employment. Japanese corporations recruit new talent directly from schooling institutions regardless of the availability or need for the job.

These recruits remain with the organisation for their entire working life and are promised promotions and job security (Theobald, 1994). Secondly, lack of specialised career path. Workers are trained across all dimensions of work and are expected to perform duties at various points in the organisation, however, the lack of specialised career path enables a flexible organisational structure (Theobald, 1994). Lastly, collectivism. Japanisation values collective success over individual success. The needs and ambitions of the organisation are based on a collective consensus (Theobald, 1994).

2.2.4 NEED FOR A RETURN TO LPT STUDIES

Ellis (2007: 64) stresses the need for labour process approaches to consider the links between workplace dynamics and the broader political economy. To provide detailed descriptions of the essential elements of contemporary work would require a) an understanding of modern capitalism and b) to restore political economy within LPT studies (Ellis, 2007). An analysis located within the broader analytical perspectives of both Braverman and Marx is essential. The significance of the need to return to LPT studies for this particular study is aimed at a return to the traditional elements of LPT as conceptualised by Thompson (1990: 213) through a ‘core’ theory of LPT comprising of four elements. These elements pay close attention to subjectivity and the human conditions. The first element concerns the indeterminacy of labour – as labour process creates surplus of which is key to reproducing the economy, thus, “the role of labour and the capital-labour relation is privileged as a force for analysis” (Thompson, 1989: 242).

The second element concerns the concept of accumulation, which refers to the logic of accumulation, in this sense, management attempts to reduce the gap between the worker’s capability and the actual effort in their productivity. Essentially, the logic of accumulation refers to the imperatives for capital accumulation that instructs capital to constantly transform the production process (Thompson, 1989). The third element refers to the control imperative, which follows from the logic of accumulation, since “market mechanisms alone cannot regulate the labour process” (Thompson, 1989: 243). The control imperative illustrates the capitalist’s constant need to acquire control in the context of changes in the labour process. The fourth element is based on structured antagonism – as employees react to control measures, there is an element of structured antagonism between the capital and labour (Thompson, 1989).

The relevance of the above is to allow a more in-depth analysis of labour-centric issues by detailing the ways in which labour has been organized and controlled in industrial revolutions.

2.3 THE FOUR PHASES OF THE INDUSTRIAL REVOLUTION

The fourth Industrial Revolution (4IR) is a term coined by Klaus Schwab, founder, and executive chairman of the World Economic Forum, describes a world where individuals move between digital domains and offline reality with the use of connected technology to enable and manage their lives (Xu, David, and Kim, 2018). Advances in technological development in the 4IR precedes the recent eras of technological development that transformed political and social beliefs, and the broadening of political power and material wealth (Skilton and Hovsepian, 2017). Technology is defined as the evolution of scientific knowledge in terms of achieving outcomes or producing goods and services. Historically, technological advancement improved human skill sets by creating various methods and processes to manipulate natural resources through the creation of tools that assisted or replaced human effort in production (Skilton and Hovsepian, 2017). The development of technology is an essential component for the rise of industrialisation.

For instance, this can be reflected in the way societies transitioned from the agrarian methods focusing on agriculture towards methods focusing on industry. Industry is defined as a process concerning the production of goods and services using technological and organisational improvements, and industrialisation refers to the advancement of industries on a far-reaching scale (Skilton and Hovsepian, 2017). For this study, industrial revolution refers to technological advancements that aided the use of mechanical technologies, electrical technologies, digital technologies, and now 4IR-related technologies. The changes brought by technologies vary from changes in manufacturing, production methods, work practices, infrastructure, and transportation (Skilton and Hovsepian, 2017).

2.3.1 THE FIRST INDUSTRIAL REVOLUTION (1760 – 1880)

Before the first industrial revolution took place in Europe the patterns of work were seasonal, religious, and based on a particular task. For example, farmers would harvest crops according to the appropriate season, fishermen relied on the state of the tides, and handicrafts were made by individuals that had their own tools (Bittman, 2016). This situation significantly changed during 1605-1904 due to the enclosures of the common lands.

This meant that people had to find other means of livelihood by selling their labour. The most significant change in labour associated with the first industrial revolution is the putting-out system of cottage industry. In this system, workers resided in cottages and were similar to the handicraft workers in the sense that they maintained ownership of their own tools of trade (Bittman, 2016). Workers in the textile industry in England had control of how they wove their own cloth, however, securing cooperation from the workers was a major issue for the merchants who employed them. For example, when workers received a great price for their work for their work, it was common that they would work only on Mondays and Tuesdays while spending the rest of their time in alehouses or playing ninepins (Thompson, 1967).

Prior to the introduction of mechanisation, production activities required the use of humans or draft/domesticated animals, for instance, planting and harvesting activities were performed by humans using simple agricultural (e.g., sickles), whereas animals were used in farming as pullers for plowing (Stearns, 2013). The first industrial revolution involved a shift from rural-agrarian production to more urbanized mechanical production, with the invention of core infrastructure such as vapour and steam-powered machinery, and fuel that required less human guidance and effort (Stearns, 2013). The steam engine, considered the most important technology of this revolution, was crucial in transforming production. For instance, James Watt's "ten-horsepower engine enabled a wide range of manufacturing to production and agricultural machinery to be powered" (Skilton and Hovsepian, 2017: 15).

By 1886, steam engines produced enough horsepower to be used in large-scale ocean steam ships. The impact of this revolution was its ability to utilize mechanical energy without requiring human intervention. Production-efficiency was significantly improved through the use of mechanical energies such as crane lifts, fixed stationery pumps, and locomotion via horseless carriages (Blackburn, Coombs, and Green, 1985). The transformation of this revolution was first completed in England. It involved key changes such as the establishment of a national market, an increase in the size of the working class, and improved manufactured exports and output (Olson and Kenny, 2014). The principal changes in production during this era are based on a sequence of configurations outlined by Marx, the first change was the transition from individual craft work to simple co-operation involving a production process formed on the basis of collective work thereby accelerating the division of labor.

This intensification of the division of labor resulted in operational changes in craft operations for many firms and eventually provided the foundations for detailed tasks and deskilled laborers (Smith, 2016). Consequently, these changes resulted in individual labor processes making use of simple tools and mechanical devices that were more consistent with repetitive work compared to individual craft work (Olson and Kenny, 2014). Marx (1976) refers to this system as a ‘manufacture’, wherein products are made by hand by a collective group of workers working alongside each other. However, the labor process of both the individual worker and the group was constrained by the physical strength of human labor (Blackburn, *et al*, 1985). This paved the way for the systematic use of steam powered machinery (e.g., steam train) which Marx (1976) refers to as ‘machinofacture’.

This will be further elaborated in the proceeding discussion outlining the second industrial revolution. The significant difference between the phases of manufacture and machinofacture is that the latter reflected the start of the transition of the capitalist mode of production from a “purely extensive expansion to a mature process which focused on intensive growth” (Blackburn *et al*, 1985: 35). Nonetheless, this era resulted in significant changes in the labour process across industries, for instance in agriculture. For example, in Europe, wealthy farm owners sought to develop their lands through the application of new methods for maintaining soil and for breeding productive crops. As a result, tenant farmers and landless farm laborers had to search for work in the factories located in the cities, which led to the availability of low-cost labour for factory owners (Headrick, 2009).

The cotton manufacturing industry saw major inventions in cotton machinery such as the Spinning Jenny (invented in 1764) and the mule (invented in 1769). These machines resulted in cheap but rough yarn (e.g., making threads for sewing) with great productive capacity that could produce 100 times as much yarn as a human labourer working by hand (Headrick, 2009). In England, unskilled workers working in the textile industry worked side-by-side with the relatively few skilled mechanics under the supervision of foremen. Women and children were employed in the factories, were underpaid, and were required to work under strict discipline in a 12-16-hour workday (Headrick, 2009). Although operating at a rudimentary level, the application of technical control in the form of continuous-flow production provided European manufacturers with an opportunity to establish the pace of work (Olson and Kenny, 2014).

The efforts to control the labour process went beyond the change of speed in which work was performed, since machines operated at a uniform rate, workers were no longer able to establish their own work pace or to impose their own rhythm. For example, before the widespread use of machinery in production, workers could still create their own work pace by ‘doubling up’ whereby one worker performs the work of their own and of their colleague, and the latter would then have a chance to relax until it was their turn (Edwards, 1979: 114). Worker mobility was another factor that influenced the work experience of the worker. Before the use of machinery, workers were in contact with one another (e.g., moving materials or disposing finished goods) and could engage in conversation in the shops. In the power-driven factories and mills all machines worked together “and the operative had neither any cause nor any right to move about the mill”, resultantly, workers became rigidly fixed to a physical location as the machinery (Edwards, 1979: 114). These factors significantly reduced contact among workers since each worker had to look after their machine. This allowed further control and coercion by management to occur, because workers had fewer opportunities to discuss grievances or to compare wages (Donkin, 2001).

2.3.2 THE SECOND INDUSTRIAL REVOLUTION (1870-1970)

The transition into the second industrial revolution was established through the implementation of electrical machinery, referred to as machino-facture. Machinofacture is not only a quantifiable improvement in production for the capitalist. Rather, machinofacture was a particular labour process that resulted in the transition from the formal subordination of labour towards the real subordination of labour by the capitalist (Brighton Labour Process Group, 1977 cited in Blackburn *et al.*, 1985: 35). The second industrial revolution was led by the United States of America (USA) and was characterized by mass production, developments in distribution and communication, and the creation of electricity supply (Schwab, 2016). The key features of industrialization in the USA included, firstly, the application of electrical machinery to production. Secondly, the need for a focus on transportation. Because the size of the country was large, manufacturing companies sought to establish a large system of railroads that would assist in the transportation of manufactured goods (Olson and Kenny, 2014). Thirdly, the USA focused on improving communication. Communication was assisted by the creation of the telegraph which enabled long distance communication “by using a code of electronic pulses passing over a wire” (Singh, 2012: 64).

Ultimately, the developments in railroads and telegraphs enabled the USA to establish a national market, which then fostered the continuous development of transport and communication mechanisms. The spread of US manufactured technology established new production processes which rapidly transformed the iron and steel manufacturing industry. For example, the Bessemer process and the open-hearth furnace enabled mass and inexpensive manufacturing of steel (Singh, 2012). Furthermore, the First Industrial Revolution would be overshadowed by the Second Industrial Revolution (e.g., electric turbines) which generated energy using coal, petroleum, and hydroelectric power (converts mechanical energy into electricity) (Stearns, 2013). These new machines enabled the use of powered equipment to spread across a variety of production sectors. For example, bakeries started using steam or electrically driven kneading machines, construction companies started using mechanical saws, whilst the food processing industry started using refrigerators and canning machines (Singh, 2012).

These technological developments were not only making changes in manufacturing, for instance, farmers started using gasoline-powered tractors/harvesters, and households started using technologies such as washing machines and vacuum cleaners in completing housework duties (Olson and Kenny, 2014). Essentially, these changes in technology reflect the ways in which industrial revolutions eradicate and replace prior developments since “almost every type of work could now, in a technological sense, be mechanized” (Stearns, 2013: 161). The second industrial revolution also changed the pace and specialization of crucial sectors of production.

For example, the introduction of the sewing machine in shoe manufacturing, resulted in the move from craft production to factory production (Olson and Kenny, 2014). These changes homogenized the experience of work as work moved into factories. The importance of skill was still intact, but since a lot of operations became mechanized, skills changed from being purely traditional/natural to being learnt (Stearns, 2013). The result was a decrease in unskilled jobs since physical strength was no longer as important as before – machines could now perform lifting and hauling duties (Stearns, 2013: 162). Technological developments in this era impacted on the size and structure of an organization. Big industrial companies sought to develop ways to improve gains in mechanization, worker productivity, and in product diversification (Singh, 2012). This systematic organization of the workplace is a defining feature of the impact of this revolution on work processes.

This is highlighted by the influence of large-scale mechanized mass production in the assembly line (Stearns, 2013). Significant contributions to the changes in the work processes in this era include Taylorism and Fordism. Henry Ford's automobile manufacturing which transformed workers to operating like machines - by making work more routine so there is less need for human thought or reflection (Stearns, 2013: 163). Part of Ford's innovation is the moving assembly line which subdivided assembly operations in automobile manufacturing – this significantly changed (a) ways in which products were produced (e.g., mass production), (b) how workers were trained (e.g., assembly lines and routine) and (c) the way management functioned (division of labor or specialization) (Singh, 2012). Fordism created new methods for increasing worker productivity and lowering costs of manufacturing by: (a) dividing complex work into simpler tasks; (b) increasing productivity via the assembly line; (c) sequentially organising workers (and machines and parts) in the production process; and (d) implementing a linear production line (Ford and Crowther, 2005).

The application of these changes in the work process created repetitive jobs and put high pressures on workers since workers could not advance to the next production task prior to completing the previous task (Donkin, 2001). Furthermore, the sequential organisation of production increased the speed of delivery for semi-finished product to the next production process since workers, machines, parts were placed into long assembly lines. This was further enhanced by the application of the moving assembly line, which involved a process where workers and machines adjoin parts of the automobiles at various stations. These parts are transferred to each station with workers adding each part to the process (Casteel, 2011).

Part of Ford's idea was that through improved technology work would not only be an obligation for sustenance, but that technology could improve work in a way that enables manufacturing companies to pay workers sufficiently for them to be able to purchase the products they produce (Donkin, 2001). Taylorism and Fordism dominated the directives of production and manufacturing employment in the second industrial revolution. In fact, "large companies used well paid employees performing repetitive fairly simple tasks on assembly lines to produce complex though largely standard products" (Casteel, 2011: 5). This formula was not without shortcomings, as the 1930s Great Depression hit in America and in most parts of the world.

Big manufacturers backpedaled on Ford's suggestion for paying workers well and proceeded to cut back on worker's wages (Donkin, 2001). In response, worker's unions in America sought to challenge manufacturers by advocating that workers be afforded a living wage and job stability. The result of the lowered wages meant that less goods were purchased. To mitigate this issue, manufacturers engaged in the process of globalising production because "in this way lower wages are moved to another consumer market in which the wages are relatively high" (Casteel, 2011: 9). Lastly, in the workplace, workers were mostly rooted in one spot or section, while outside of work, they could drive out of town with family and were free to explore beyond the rows of worker housing near the factory. Yet, this freedom was specious considering the fact that workers were expected to report to work at a set time, their thoughts and ideas had to remain outside the workplace and had to work according to a set pace which was controlled by the employer (Donkin, 2001).

2.3.3. THIRD INDUSTRIAL REVOLUTION (1970s ONWARDS)

The third industrial revolution is characterized as a digital revolution and will be referred to as such in the proceeding discussions. The roots of this revolution stem from the introduction of micro-electronics and semi-conductors, which refers to the transition from mechanical/analogue technologies (e.g., washing machines) to digital electronics (e.g., computers) (Skilton and Hovsepian, 2017). This transition was led by computerization and increased capabilities in networking thereby resulting in changes in the digitalization of information (converting information into a digital format). This revolution also introduced information technology (IT) at an industrial level, for example, IT and business-orientated computing from companies such as Microsoft and Hewlett Packard led to the rapid expansion of digital information in automated services (e.g., online help center or web-based services) (Skilton and Hovsepian, 2017:). Another significant feature of this revolution concerns the developments in telecommunications, since the introduction of the internet in the 1990s, and the rise of Information and Communication Technologies (ICTs) (e.g., eBooks or email) (Stearns, 2013). The most significant impact of the digital revolution is that it spread globally and enabled connectivity between people and industries at a much bigger scale, compared to the previous industrial revolution. The digital revolution not only improved on productive capabilities faster than the previous industrial revolutions.

Instead, it empowered newer ways of control and coordination of activities at reduced costs (Cascio and Montealegre, 2016). This revolution introduced an entirely new and invisible electronic space that enabled digital resources to become easily accessible, processed, and transferred regardless of factors such as location or distance (Cascio and Montealegre, 2016). This revolution paved the way for the emergence of search engines (e.g., Archie and Google), mobile devices (e.g., Nokia), and social networks (e.g. Facebook) (Skilton and Hovsepian, 2017). The digital revolution advanced industrial processes using digital manufacturing (computerization, telecommunications, and the internet), and signified the codification of knowledge: where machines compliment human labour in production, to work together to achieve a shared goal (Schwab, 2018).

These advances led to the foundations of new digital technologies that enabled machines to communicate with each other and with humans, and also established digital workforces - which enabled businesses and individuals to connect and to exchange products and services by means of ICTs and web-based operations (Skilton and Hovsepian, 2017). The changes above significantly altered the organization of work, for example, higher levels of automation using robots reduced the need for manufacturing labour. Additionally, industrial sectors such as coal mines and textiles gradually faded. Although robots have been part of the factory operation for decades, they however, only performed simple tasks (e.g. spot welding) and repetitive tasks (e.g., handing over objects/products to employees), and were highly expensive (Stearns, 2013; Cascio and Montealegre, 2016). The increased capabilities to connect with societies/businesses from across the globe is an essential component of this revolution.

One particular reason is that it led to the process of globalisation which plays a huge role in the 4IR (Gandini, 2019). The nature of the working environment in the digital revolution did not merge the physical world and the electronic space, the 4IR therefore pivots the physical world with the electronic space and also aims to overcome the previous constraints in both of these elements. It does so by “creating a ubiquitous space that allows a level of complexity, speed, and quality not possible before” (Cascio and Montealegre, 2016: 353). Changes in work in the digital revolution can be characterised by a scientific management principle of post-Fordism, these include the detailed division of labour, supervised work, and management work-planning.

Fordism recognised the benefits of fostering social consumption norms in order to create a mass consumption market suitable for the mass production industries (Aglietta, 1979). However, developments in the digital revolution have transitioned to post-Fordist regimes, these changes have been brought about by ICTs which enable “the mechanisation, at high levels of productivity, of more flexible production of a higher level of variety of products” (Watson, 2008: 93). The digital revolution allowed the integration of work units to be applied electronically which meant that workers were no longer physically concentrated in large units in order to facilitate cost-effective production (Casteel, 2011). The impact of this global connectivity enabled workers and companies to collaborate beyond the national borders and allowed for smaller companies to compete with larger companies.

Post-Fordism also includes the feminization of the workplace, this relates to the masculine ideals of Taylorism and Fordism where the skills and needs of women workers were perceived to be different to those of men. Post-Fordism has also shifted the focus on consumer types beyond that of class (affordability) whereby companies market their products based on age, gender, interests, and purchase trends (Casteel, 2011). Another key element of post-Fordism concerns flexible specialisation, a concept that encourages flexible manufacturing and a flexible workforce. These concepts facilitate changing consumer needs by allowing companies to develop complex manufacturing processes that provide consumers with an array of products (Johannessen, 2018). Computer systems in the digital era have significant consequences for supervision and managerial control of the labour process.

These computer systems are able to process and transfer masses of operating information across geographical areas and have therefore given management an opportunity to integrate elements of control into the machines (Dawson, 1998). For instance, computer systems can be tasked with directing work processes, monitoring employee performance, and evaluating production operations. The utilization of digital technologies in this regard can also reduce managements’ dependency on hierarchical structures of control and therefore replaces the traditional duties of the supervisor through the use of a computerised structure of control (Dawson, 1998; Thompson, 1983). Research (see Smithson *et al*, 2004; Jonker, 2019) suggests that the application of digital technologies such as ICT’s has led to significant changes in the forms of employment and work organization.

For instance, boundary less organisations have resulted in a fragmented employment relationship as organisations make use of outsourced consultants and independent contractors (gig workers). The effect is that many of these workers are not protected by traditional labour legislation and are thereby placed in a vulnerable situation (Campbell and Price, 2016). Digitalization also provides an opportunity for workers to get a job by virtue of having access to a computer, internet, and workspace. In the South African context, high levels of unemployment constrain individuals from finding permanent employment, resultantly, gig work provides an alternative for a form of income (Bernstein, 2019). Yet, as studies on self-employment (such as Wall, 2015; Bernstein, 2019) indicate that gig work is the most perilous form of work, as it is associated with “possible irregular income, no benefits and lack of group representation” (Bernstein, 2019: 299). An example of this, is in the form of unions or bargaining councils (Bernstein, 2019). The digital revolution saw changes in the types of jobs with most of the workforce transitioning from industrial production jobs (e.g., warehouse workers) towards service and knowledge jobs (e.g., bank teller). One of the side-effects of technological advancements in the workplace, is the reduction in the number of jobs in the former, and an increase of jobs in the latter (Thurow, 1999; Johannessen, 2014).

2.3.4 THE FOURTH INDUSTRIAL REVOLUTION

The Fourth Industrial Revolution (4IR, or Industry 4.0) builds on the digital revolution by introducing concepts beyond the mobile internet and digital technologies. Simply, 4IR is characterized by powerful technological developments. The emergence of 4IR propels the diffusion of technology and innovation faster than previous industrialization periods. 4IR is embedded in aligning societies with new technologies that connect societies through the use of advanced digitalization, as well as technologies such as Cyber-Physical Systems (CPS), Internet of Things (IoT), and artificial intelligence (AI) (Boobier, 2020). It is this sophistication of digital technologies and the integration thereof that results in the transformation of society and of the global economy. 4IR is seen as a new phenomenon posing challenges and changes to the human future, the scope of this phenomenon is much wider than machine and digital systems of previous industrial revolutions; instead “it is the fusion of these technologies and their interaction across the physical, digital and biological domains that make the fourth industrial revolution fundamentally different from previous revolutions” (Schwab, 2018: 12).

Coined in 2011, 4IR became a proxy for all types of technological change, the term was initially perceived as a concept based on Cyber Physical Systems (CPS). CPS refers to machine-to-machine automation resulting in the creation of smart factory systems in the production process (Gilchrist, 2016; Briken, 2020). The CPS is considered a crucial defining difference between the digital revolution and the 4IR, CPS is a computer system that controls machines using computer-based algorithms and it is referred to as a “system that integrate cyber components (namely, sensing, computation, and human users), connecting them to the Internet and to each other” (Skilton and Hovsepian, 2017: 12; Briken, 2020). These developments in CPS are mostly reflected in intelligent smart machinery and smart products. The former refers to the automation of the entire factory through automation that is capable of self-managing subsystems, and the latter refers to products with embedded intelligence in the production process (e.g., locating/tracking a product in the manufacturing stages) (Gilchrist, 2016).

In practice, these smart products can control the production process to a greater extent compared to the digital revolution; for instance, smart products can instruct automation on which production line to follow, and it can assess the condition of the product and the required steps needed to complete the production process - all without requiring human involvement (Gilchrist, 2016). Unlike the limited ICT system of the digital revolution, CPS enables greater networking capabilities for industrial businesses. For example, business can build global connectivity and information exchange by linking production machinery and factories to cyber-physical systems (e.g., smart storage facilities or smart supply chains) (Gilchrist, 2016).

The significance of the 4IR is that changes in production have already begun interweaving both human intelligence and machine intelligence to a greater extent compared to the previous revolutions (Schwab, 2018). The IoT for example, consists of technologies using voice control services, driverless transport, connectivity/automation using sensors and smart products (Gilchrist, 2016). The IoT basically combines sensors and actuators and connects them to the internet. To elaborate, sensors are devices that measure physical inputs from the environment (e.g., heat) and converts into data or a binary code that can be processed and interpreted by a computer or a human (e.g., thermostat). Actuators refer to a part of the machine/device that assists in performing physical movement by converting energy (e.g., electricity) in order to enable movement (Gilchrist, 2016).

Simply, IoT can be defined as “the automation and communications network of smart embedded and external sensors and machines representing an intelligent industrial factory and supply chain lifecycle” (Skilton and Hovsepian, 2017: 11). AI is characterised by the increase and improvement in the quality and efficiency of systems and operations, by allowing computer systems to extract, analyse, and predict mass data across a variety of industries or work functions (Boobier, 2020). AI can use surveillance technologies to analyse employee movements or to better understand how employees and departments function through robotics and machine learning (ML) analysis that track behavioural patterns (Teahan, 2010). Advancements in AI and the combination of advanced sensors enable robots to perform tasks requiring complex judgements and to function in uncertain and fluid situations at work (Cascio and Montealegre, 2016).

Robots are not only submerged in the organisational social system but have instead begun developing into social actors in the organisation system as they increasingly become adaptable to the work environment (Cascio and Montealegre, 2016). Machine learning (ML), a key component of AI, refers to a computerised learning capability that does not require explicit programming. An example of ML includes image processing or online customer support software. Another key component in AI is the Natural Language Processing (NLP) system, wherein machines are developed to better understand human interactions (verbal or written) (Boobier, 2020). The NLP system uses computers to understand language and speech derived from large data input, that train and teach the NLP system in analysing human interaction; a practical example of NLP includes predictive text, smart assistants, and speech recognition software.

Ultimately, AI systems are not based on simply analysing activities and predicting after-effects, instead, AI systems are built on learning from those analyses and predictions in the long run (Boobier, 2020). Effective AI systems that predict and learn from data over time can be applied in multiple contexts in society, but this requires computers to gather enormous amounts of data to train an algorithm (Teahan, 2010). AI has also been implemented in talent management especially for conducting tasks tedious and prone to error tasks such as payroll and recruitment. A key focus concerning labour centric discussion on the impact of these aforementioned 4IR innovations surrounds the issue of techno-unemployment and deskilling. Research (Arntz, Gregory, and Zierahn, 2016; Piasna and Drahoukoupil, 2017) indicates that routinized jobs are being automated at a rapid rate compared to non-routinized work which requires a greater level of skill and often consisting of interpersonal contact, critical thinking, and creativity.

A recent study (Bernstein, 2019: 298) analysing the impact of 4IR on human thriving in the South African context, referred to these changes as a 'skills-bias hypothesis'. The study found that top and senior managers (majority white males) are unlikely to be affected by automation since these occupations entail critical thinking skills. The study also found that routinized work which requires lower level of skills (mainly black workers), is more vulnerable to automation. In essence, manual jobs and routinized jobs are far more susceptible to automation and digitalization as opposed to non-manual or less routinized jobs (Bernstein, 2019). 4IR technologies generate changes in employment structures as work transforms thereby destroying old jobs and creating new ones. Jobs in this era consist of completely new content predominantly in information-related and service orientated jobs due to the "informatization" of automation of work (Johannessen, 2018: 41).

Recent studies have indicated that the organization of work is advancing beyond flexible specialisation and Japanisation towards a new organizational logic based on lego flexibility and experience design (Meister and Mulcahy, 2017; Johannessen, 2018). Lego flexibility refers to a new method of work distribution and specialisation in a global and professional setting. This production process breaks products down into small components pieces where they will then be produced at a low-cost and with high quality (Meister and Mulcahy, 2017). The components parts/pieces are collected from different geographical locations and are assembled together to make up the product. This process is augmented by technologies such as AI and robotics which enable new forms of co-operation in the workplace (Johannessen, 2018).

Experience design is an organisational design characterised by non-bureaucratic and non-hierarchical organisation; the main focus is on "experience at the frontline and exists between customers and people on the frontline" (Johannessen, 2018: 46). Simply, this organizational structuring represents a move toward process organisation, wherein the consumers are positioned at the centre of the frontline. Customers' experiences are tailored using big-data and AI which allows organisations to customize and update customer profiles. Through NLPs, customers can receive real-time solutions by interacting with robots (Johannessen, 2018). Essentially, experience design signifies a systematic link between frontline employees and technology and are interwoven in a strong well-co-ordinated linked system.

Studies concerning labour centric issues in the era of 4IR technologies tend to emphasize on the stress of agile adaptation to the implementation of new and advanced technologies in the workplace (Kohl and Swartz, 2019; Ludike 2019). The main focus in these studies is concerned with the art of adapting to change and innovation and the challenges presented in the era of advanced technologies. Other studies take a more optimistic view by insisting that 4IR offers fresh opportunities for human thriving in the form of exponential learning and employee development (Coetzee, 2018; Jee, 2019). These studies seek to highlight the skills gained by workers as they complement new technologies at work. Recent research has shown that workers in the 4IR are seeking work arrangements that are flexible, meaningful, and collaborative, including a greater sense of increased autonomy and work that provides opportunities for constant learning (Kohl and Swartz, 2019).

The 4IR introduces new forms of social networking in the workplace far greater than the innovations of the digital revolution. In the 4IR, workers are benefitting from range of communication technologies (e.g., virtual workspaces) that have strengthened remote and flexible interactions (Kohl and Swartz, 2019). 4IR has major implication not only for the working environment but for the workers, for instance, 4IR technologies such as smart manufacturing effectively alters processes in purchase and production through the application of advanced automation and the integration of businesses processes. These factors trickle down to the workers since they will be confronted with these changes “due to the disruptive nature of emerging technologies and modified structures for communication and collaboration” (Kohl and Swartz, 2019).

Yet, the Global Employment Institute (Wisskirchen, Biacabe, and Bormann; 2017) published a study focusing on the AI/robotics’ impact on the workforce. The study, based in London, found that mobility work as a result of increased digitalisation “encourages the weakening of employee representative bodies and will further reduce the number of members of unions” (Wisskirchen, Biacabe, and Bormann; 2017: 41). Organisations have begun implementing social technologies in the workplace, for example, networks such as Yammer and SAP Jam allow employees and stakeholders to connect with each other in real-time by sharing work schedules, virtual workspaces, and globalised collaboration in a boundary-less manner. Compared to innovations of the digital revolution, these social technologies aim to enable a richer “exchange of information, data as currency and creative collaboration” (Ludike, 2019: 389).

Rather than focusing on the positives/negative impact of 4IR, recent Marxist related studies on the 4IR seek to analyse how 4IR affects the balance between capital and labour. For instance, Hughes and Southern (2019) suggest that the 4IR results in increased production with very little human labour while at the same time reducing the opportunity for individual consumption as human labour is displaced by automation. The increase in production and the reduction in consumption is essentially contradictory and thus contests whether capitalism is able to create new jobs quicker than the old ones it dismantled. If this is the case, then Marx's (1973: 704) conjecture on objectified labour becomes important - that machinery appropriates 'living labour' (the workers). The point emphasized by Hughes and Southern (2019) is that every phase of industrial revolution under capitalism resulted in machines replacing human labour power. Yet, the 4IR is significantly different because machines are also replacing some human reasoning and mental capacities. This revolution has not resulted in the end of labour or caused a substantial cutback of the labour forces. But research on the banking industry (see, Mohlala, Goldman, and Goosen, 2012) reveals that the worker is increasingly having to "step to the side of the production process instead of being its chief actor" just as Marx (1973:705) predicted.

2.3.5 CONCLUSION

The above chapter gave an account of the phases of industrial revolutions. The first industrial was crucial in shaping the landscape and organization of work; this is evidenced by the exacerbation of the division of labour and the subsequent detailed division of labour. The second industrial revolution is distinct from the first in the sense that production processes moved from mechanical production to electrical production. The era of the second industrial revolution was significant in technological development by mechanising almost every type of work. This largely increased the pace that work was done and therefore created specialised production by moving craft production into factories (Olson and Kenny, 2014). Furthermore, the impact of machine-facture characterises the second industrial revolution; this stemmed the foundations towards the real subordination of labour. The digital revolution saw a major change in the organisation of work, through post-Fordist aspects such as supervised work and management work-planning. The introduction of ICT's and web-based operations allowed greater connectivity between businesses and individuals, but most importantly it enabled machine-to-human interaction. The impact of the 4IR cannot be understated. The rapid advancements in technologies' capabilities have significantly exceeded the technologies of the previous industrial revolutions. The organisation of work is already under construction, this is highlighted by the desire to augment technological capabilities with human capabilities to a much higher extent than before.

CHAPTER THREE

BANKING IN THE AGE OF 4IR

3.1 INTRODUCTION

The South African financial sector plays a key role in the development of the economy. Since the 1960s the technological developments in banking have strengthened the impact of the financial sector in developing the economy (Castells, 2000). The process of globalisation, the deregulation of the financial markets, the internationalisation of the financial sector, and the increased competition in the banking industry were significant factors in the implementation of digital technologies in banking processes during the digital revolution (Roberts and Mukonoweshuro, 2015). The first section of this chapter provides an international account of the evolution of banking, from bank 1.0 through to bank 4.0. The second section of this chapter provides international accounts of banking in the era of 4IR, this includes case studies from Zambia and Finland which analysed banking technologies from a worker's perspective. The third section of this chapter will give a general outline of the South African banking sector and the technologies impacting the organisation of work. This chapter provides an outline of the (a) history of banking in South Africa, (b) the current state of banking in South Africa, and (c) the 4IR technologies being implemented in the banking sector. The final section of this chapter consists of South African case studies relating to the impact of technologies from an employee and management perspective.

3.2 BANKING 1.0 TO 4.0: THE GLOBAL EVOLUTION OF TECHNOLOGICAL AND SYSTEMS INTERVENTIONS IN THE FINANCIAL SECTOR

3.2.1 Bank 1.0

The origins of banking dates back from several millennia. Evidence from 2000 BCE finds that Babylonian temples provided banking services by safeguarding deposits of grain and other agricultural produce (Walker and Morris, 2021). Temples could also issue out loans of seed grain and eventually offered money loans.

Banking became such a crucial part of mankind's development that banking practices became codified into laws which established practices such as the rate of interest on loans (Walker and Morris, 2021). Over time, banking continued to develop into a crucial element of commerce, in fact, under the Romans, banking "became regularised and various banking roles were recognised (and at times even appointed) by the state" (Walker and Morris, 2021: 9). Christianity also played a role in the evolution of banking through usury interest laws and lending practices. In Lombardy (Italy), the use of double-entry bookkeeping (debit and credit) made a substantial change in the organisation of work in banking (Goddard and Wilson, 2016: 28). This practice is considered the foundation and growth of traditional banking. Historically, traditional banking centred around the branch as the primary access point. This was established by the Medici family (Italian) in the fifteenth century, and by the sixteenth century the first modern state-owned bank called the 'Banco della Piazza di Rialto' was established in Italy (Walker and Morris, 2021: 10).

The state bank was primarily established to safe keep merchants' funds and it enabled merchants to make transactions without the physical exchange of coins. Following the establishment of state-owned banks, European countries such as Sweden (1668), England (1694), and Scotland (1695) created national banks (Walker and Morris, 2021). National banks, by controlling the issuing of banknotes, facilitated payment schemes and sought to regulate the banking industry. Before the application of technology in banking, services and products were provided by means of physical interactions. Bankers were thus required to be physically present in the market in order to facilitate the provision of funds. Over time, bankers established a separate presence from within the marketplace. This resulted in the forming of branch networks to provide an alternative channel for engaging with clients and acquiring clientele (Goddard and Wilson, 2016).

Branch networks were mainly at a local level, for example in the nineteenth century, countries such as Germany and Spain had formed regional banks which provided services for the local communities (Walker and Morris, 2021). Many of these banks expanded and diversified beyond their geographical restrictions, and by the 1970s and 1980s the local and regional banks went through a period of consolidation thus resulting in fewer banks with extensive branch networks (Goddard and Wilson, 2016). Many of the traditional banking products and services (e.g. merchant lending facilities) have been in existence for thousands of years. Some of the most notable developments include, namely: banknotes, cheques, traveller's cheques, and wire transfers.

Banknotes were established in China and were widely used from the ninth century to the thirteenth century. A trader would bank their goods at a banking representative in exchange for a receipt commonly referred to as 'flying money' (Walker and Morris, 2021: 24). At a later stage, the trader could then exchange the flying money for cash. The use of banknotes became widespread in the seventeenth century. The modern cheques (handwritten) were established in England in the sixteenth and seventeenth century. By the 1960s, cheques required technological transformation (e.g. magnetic ink) in order to make the cheques readable to machines. Traveller's cheques were established in England in the eighteenth century. The purpose of the traveller's cheques was to allow noteholder to withdraw cash from corresponding branches in the network of branches. Wire transfers and electronic payments were first introduced in the USA (1871), which enabled people to send each other money from various locations (Goddard and Wilson, 2016).

3.2.2 Bank 2.0

The first ATM was launched in 1967. The customer obtained a paper voucher from the bank and a six-digit security code (Walker and Morris, 2021). The voucher was retained by the bank, and, the banking staff retrieved the vouchers from the machines which then allowed the customer's account to be debited. The first modern ATM was installed in 1972, this allowed customers to decide on the amount of cash to withdraw. Yet, many customers were reluctant to put money in an envelope, place it into a machine, and wait for verification which often took hours to process (King, 2010). The level of sophistication of the ATM's was rudimentary and consisted of illuminated text. In the 1990s, the speed, interface, and efficiency of ATMs evolved. Whilst the function of the ATM stayed the same (i.e. cash delivery), other self-service devices such as cash deposit machines and cheque deposit machines became widely available to customers (King, 2010).

The invention of the ATM significantly reduced the fixed costs of retail banking operations, this was caused by branch rationalisation (closures) and a reduction in staff numbers. In addition to the reduction in costs, banking automation significantly increased customer convenience by providing customers with access to cash at any given time (King, 2010). Self-service banking was accelerated by telephone banking and the commercial internet. Telephone banking was established in 1965 and it allowed customers to obtain their account balances and transaction information through the telephone. By the 1980s, telephone banking was widely available at many banks in Europe and America (Walker and Morris, 2021).

The functions of telephone banking involved a staffed call centre where the customer could speak to a call centre agent, and through an automated pre-recorded voice response unit (Goddard and Wilson, 2016). Online banking was first launched in the USA (1980), in which customers paid a fee in order to access their account information on their home computer (Walker and Morris, 2021). Online banking was also text based, and it used telnet (remote server) to access credit unions through the internet.

3.2.3 Bank 3.0

In bank 1.0 and bank 2.0 the major channels that banks could engage with customers was face to face interaction (at the markets, temples, or branches). For the customers, the local bank manager or banker was the only way to engage with the banks. Bank 3.0 encompasses a banking service when and where you need it. Bank 3.0 was enhanced by mobile banking and later by the emergence of the smartphone in 2007 (Walker and Morris, 2021). Mobile banking was enabled by the advent of web browsers on mobile phones in the late 1990s, mobile banking consisted of text-based user interfaces. By 2007, the widespread use of mobile banking was fostered by a mobile money-transfer system called M-Pesa which allowed people to send and receive money (King, 2012). From a customers' perspective, mobile banking provides a seamless way of managing finances at any given time. From the banks' perspective, mobile banking enables higher levels of security (e.g. biometric authentication) compared to internet banking in bank 2.0. Through mobile banking applications, banks are able to deploy large volumes of customers via application stores and are thus able to reduce the usage of the branches and contact centres (Walker and Morris, 2021).

3.2.4 Bank 4.0

Bank 4.0 is a transformation of the banking industry, it encompasses voice-based smart assistants that assist customers with their payments, bookkeeping, investments, and queries. Bank 4.0 consist of sophisticated AI technologies that assess a customer's affordability, it also offers access to real time assistance tailored to the customer's needs (King, 2018). For instance, bank 4.0 technologies can be embedded in vehicles, smart-glasses, and other devices that can pay bills or evaluate affordability. In essence, bank 4.0 "is about new capabilities, new jobs and skills that underwrite competencies banks have never needed until now" (King, 2018: 32).

3.3.1 INTERNATIONAL ACCOUNTS OF THE IMPACT OF 4IR IN BANKING: FROM A WORKER'S PERSPECTIVE

A quantitative study focusing on the major banks of Zambia, concerning the impact of 4IR from a worker's perspective analysed the factors contributing to the readiness of banking industry employees in adapting to AI, a key 4IR concept (Mutumba, 2019). Based on the findings, the application of AI in the workplace revealed three main driving factors impacting on the labour force, namely: leadership clarity, employee skill level, and employee attitude to change (Mutumba, 2019: 76). Banking employees criticised senior management for a lack of ownership/leadership of the digital strategy which can "lead to a lack of focus regarding the implementation of these strategies" (Mutumba, 2019: 77). At the employee skill level, the findings suggest that employees regarded qualifications and skill level as an insignificant factor concerning the impact of the use of advanced digitalisation such as AI.

The sample in question consisted of a highly skilled workforce represented by 81% of graduates (Mutumba, 2019). Lastly, the data reported a positive correlation between employee attitude to change and the adoption of AI. Findings revealed that employees were susceptible of the disruptions brought about by technological change (Mutumba, 2019: 78). A 2017 case study in Finland analysed banking employee perspectives on digitalisation and change management (Pirainen, 2017). The study indicates that a strong majority of respondents were unaffected by digital changes in workplace operations, with 92% of the respondents agreeing that digitalisation was part of the modern business operation. Furthermore, "none of the respondents have felt that digitalisation has not affected their job descriptions" (Pirainen, 2017: 33). What this means is that while technology is considered a part and parcel of business transformation, it also has the capacity to influence the content in the job descriptions of the workers.

In contrast with the *Zambian study*, employees in the *Finland case study* insisted that education and skills was not prioritized due to the lack of training and education (Pirainen, 2017). Research by Accenture (2018) investigated the impact of intelligent technologies in the global banking sector, across 11 countries, surveying more than 14,000 workers from across all skill levels. The findings reveal that managers reported that only 26% of the workforce is ready to work with intelligent technologies such as RPA's and AI systems, contrarily, 88% of the workers are confident of their ability to work with AI's (Accenture, 2018). Furthermore, 75% of the workers found it imperative that their skills are developed to adjust to the advanced technologies, and 61% of the workers insist that

technologies improve their jobs (Accenture: 2018).

Another study (Agarwal, Arora, Dua, and Cherian: 2017) on the banking sector of Mumbai, sought to highlight the effects of computer automation on the work environment of human workers. The study finds that 26% of bank workers felt that front-office and customer-interacting technologies (e.g. interactive robots) resulted in 15% cost savings annually. Additionally, the advanced technologies implemented in the banking sector contributed to a more standardised process flow (e.g. communication lines or workflows), a reduction in errors, and a reduced dependency on multiple processes for task execution (Agarwal *et al*, 2017). Finally, a 2019 study on banking employees across various Nationalized Banks reported that 4IR digital technologies such as block chain, AI, and cloud computing software contributed to an improvement in skills, a reduction of workloads, and an increase in employee productivity levels (Jeyalakshmi, 2019).

Evidently, based on the various accounts surrounding the impact of 4IR technologies, the general consensus is that technological innovations have been largely welcomed by banking employees (Piiirainen, 2017; Jeyalakshmi, 2019; Mutumba, 2019). Nonetheless, there are varying accounts concerning skills readiness and upskilling, as well as technological implementation strategies. From a workers' perspective, these findings imply an optimistic account of the impact of 4IR technologies on the way that tasks are executed. From a managers' perspective, the automation of banking processes is mostly an effort to reduce costs, increase efficiency, and assuring safety and security against cyber-attacks.

3.4.1 A TECHNOLOGICAL HISTORY OF THE SOUTH AFRICAN BANKING SYSTEM

The South African banking sector is highly dominant in the domestic arena, partly because foreign banks disinvested from the South African economy in protest against the apartheid regime (John, 2000). Nonetheless, the South African banking sector has a highly sophisticated system characterised by an outstanding legal infrastructure that recognises contractual and creditor rights. In fact, the impact of colonialism had created prudent and sophisticated banking structures which were uncommon in comparison to those in developing African markets. Compared to the rest of Africa, the banking structure described above positioned the South African banking industry in a more advanced position in terms of the financial and structural capacity for implementing banking technologies (Roberts and Mukonoweshuro, 2015).

Although South African banks were restricted from expanding into neighbouring countries during apartheid, the end of apartheid enabled the internationalisation of South African banks. By the 2000s South African financial institutions had become big investors in Sub-Saharan Africa's financial sector (Odenthal, 2001). The application of ICTs and the rise of the internet in the digital revolution fostered the growth and expansion of South African banking organisations into neighbouring countries. This was further motivated by intense domestic competition which stimulated banks to look for opportunities abroad, for example, by 1998, Standard Bank had established branches in Swaziland, Botswana, Kenya, Uganda, and Zambia (Roberts & Mukonoweshuro, 2015). The capabilities for these expansions during the digital revolution was enabled by a well-developed and competitive ICT infrastructure.

For instance, Telkom's monopoly-hold of the telecommunications sector meant it could determine the costs for internet, however, the liberalisation and privatisation of the sector allowed for competition in network providing (Roberts and Mukonoweshuro, 2015). Effective competition can foster development of internet-based activity, and more importantly, can lower prices since access to internet is gained through fixed telecommunication lines. This is because Telkom's monopolisation in the sector retained and consisted of a fixed telephony system (Roberts and Mukonoweshuro, 2015). The integration of technology in the banking industry has been in existence in the bank's product and services offerings for decades now (Eubanks, 2018). Automation was initially confined to the automation of back-office operations, which refer to the administrative and support staff who are not client-facing (e.g., compliance or IT services) (Coetzee, 2019). The major technological changes in banking are underpinned by technological innovations during the digital revolution, these include: Automated Teller Machines (ATMs) electronic banking, internet banking, and e-commerce (Roberts and Mukonoweshuro, 2015).

3.4.2 THE STATE OF SOUTH AFRICAN BANKS IN THE MIDST OF TECHNOLOGICAL CHANGE

The major retail banks in South Africa include namely FNB, Standard Bank, Capitec, ABSA, and Nedbank (Coetzee, 2018). Commercial banks are aimed at providing service for business customers and companies, and, are involved in more complex services such as managing cash flows and providing credit lines (Boobier, 2020). The top four commercial banks in South Africa include namely, ABSA, Nedbank, FNB, and Standard Bank (Relbanks, 2018).

Investment banks provide services for financial companies and assists in financial strategies for individuals and businesses functioning in financial markets (Boobier, 2020). The main investment banks in South Africa include namely Barclays Africa Group, FirstRand Group, and Grindrod Bank (Relbanks, 2018). Merchant banks focus on investment holding and commercial loan provisions, merchant banks offer corporate advice and provide firms with capital via shared ownership rather than loans (Boobier, 2020). The main merchant banks in South Africa include namely, Mercantile Bank Holdings, MMI Holdings, and Rand Merchant Bank (RMB) (Relbanks, 2018). Central banks – this type of bank provide banking services and manage monetary systems for a government and for the commercial banking system (e.g., regulating fair practices in the market system and ensuring fair competition) (Boobier, 2020).

The South African Reserve Bank (SARB) is recognised as the central bank in South Africa (Relbanks, 2018: 1). Although reliant on physical branches, the four main big banks envision radical digital transformations (PwC, 2020). For instance, in 2019, the big-four retrenched a combined total of 3960 staff, with 695 branches shut down this decade (SASBO, 2019: 2). These developments led to planned protest action against the job losses in the banking industry. The protest was ruled out by the Johannesburg-based Labour Court. The Finance Union (formerly known as the South African Society of Bank Officials – SASBO), and The Congress of South African Trade Union (COSATU) vowed to appeal and to continue with demonstrations against job losses (Bianchi, Wessels, and Richardson, 2019).

The planned protest would have been the biggest strike in the banking industry in almost a century, with over 50 000 workers expected to join the protests (Bianchi, *et al*, 2019: 1). Digitalisation is increasingly becoming a key driver of growth for South African banks, for example, in 2017, FirstRand Group reported digital sales (purchasing goods) amounting to 8% of total sales (FirstRand Group Ltd, 2017: 23). At the minute, banks such as Investec, Discovery, African Bank, and Bidvest Bank offer a completely digital system, with business models providing wider access to digital banking far beyond the technologies of the digital revolution (PwC, 2019). In 2017, Nedbank made major strides in developing a completely digitalised branch named the “NZone” which provides customers with an interactive video kiosk, free Wi-Fi, and virtual reality space (Khumalo, 2017: 1).

Furthermore, ABSA Life's medical underwriting technology pioneered the use of big-data technology and data-analytics in insurance claims. Other banks (Standard Bank, FNB etc.) have committed major plans and investment to implement AI and robotics in their banking systems (PwC, 2019: 3). Generally, the function of a bank is to borrow and lend money, and to administer cash withdrawals/deposits, but the idea of a cashless society is increasingly becoming a reality. For example, in 2015, over 50% of transactions in the UK were cashless (e.g., mobile payments, mobile wallets, debit/credit cards, and e-commerce) (Sheffield, 2015: 1). Locally, Nedbank has sought to reinforce social distancing concerns related to the standard card and pin payment by encouraging the use of Quick Response (QR) code payments for their customers (Thomas, 2020). The transformations in banking solutions do not only expose customers to emerging technologies, instead, they help inform and prepare customers for the future of banking (Khumalo,2017).

Ultimately, the lack of personal interaction in banking remains a challenge, the latest COVID-19 pandemic already accelerates automation due to the reliance on digital banking and the turn to cashless transactions in combatting the spread of the virus (Deloitte, 2020; WEF, 2020). The banking sector, in general, is increasingly aiming towards the implementation of analytical approaches in banking operations. These consist of 4IR technologies (AI, IoT, CPS, and Robotics) referred to as intelligent self-learning systems (Eubanks, 2018; Boobier, 2020). In the financial services industry, the banking sector is leading the use of advanced analytics and cognitive analytics. The former refers to a systematic computer-based analysis of data which can be used to discover, explain, and address important patterns in data (e.g., fraud detection software).

The latter refers to the application of human intelligence to certain activities such as deciphering words in a text (e.g., Siri or Alexa) (Eubanks, 2018; Ohene-Afoakwa and Nyanhongo, 2018). These intelligent, self-learning systems are applied across various functions of the bank including a) customer analytics and operational efficiency – obtaining and using data from customer behaviour to assist in decision making and predictive analytics; and b) risk management – to protect against potential risk and to predict outcomes (e.g., mitigating repetitive losses) (Boobier, 2020). The rapid advancement of 4IR technologies has consequences for professionals (especially senior professionals) in terms of adapting to technological changes, some banks have approached this issue by providing training or continuous development.

For example, Nedbank and Standard bank committed to providing adequate training for back and front-office staff and to assist in the redeployment of employees impacted by 4IR technologies (Moyo, 2019).

3.4.3 4IR TECHNOLOGIES IN SOUTH AFRICAN BANKS

The application of advanced analytics and AI impact on key operational functions of major South African banks. The section below will highlight the key functions of modern banks and will provide examples of the application of advanced analytics and AI and other 4IR related technologies in operational functions such as: a) finance and administration, b) risk and compliance, c) acquisition management, d) human resources, and e) customer support and service. Finance and administration are concerned with money management, and overseeing financial aspects of the organisation (Boobier, 2020). 4IR technologies can be applied using AI and robots which can perform tasks such as claims processing, recording journal entries, and inventory processing (Ohene-Afoakwa and Nyanhongo, 2018). The benefits of implementing robotic and AI driven systems in finance and administration is based on the fact that these technologies “exists as software and are designed to automate a wide range of processes that tend to be repetitive, labour-intensive, and rule-based” (Ohene-Afoakwa and Nyanhongo, 2018: 4).

For example, in 2019, ABSA launched a fully automated and AI driven system that allows customers to automatically switch from their current bank to ABSA in under seven minutes (Villar, 2019). The risk and compliance division deals with conducting risk assessments, ensuring compliance of global and national financial regulations, investigating security and financial vulnerabilities, and maintaining compliance for anti-money laundering risks (Boobier, 2020). A study by Coetzee (2018) found that the South African banking sectors is relatively lagging when it comes to implementing the use of AI and robotics in dealing with risk and compliance. This is caused by a variety of reasons, with the major reason being that – increased digitalisation creates lots of avenues for cyber-attacks (COEFS, 2017; Coetzee, 2018). For example, in 2016, Standard Bank was prey to a prudent and co-ordinated cyber-attack (computer-orientated crime) which targeted credit card details of 1600 customers (COEFS, 2017). The pursuit for 4IR driven technologies in facilitating risk and compliance is highlighted by the constant threat posed by such cyberattacks.

Banks such as FNB and RMB aim to mitigate security risks by focusing on data driven, and AI orientated solutions (Coetzee, 2018; Ohene-Afoakwa & Nyanhongo, 2018). For example, in May 2020, FNB launched “Manila” an AI based software that monitors financial risks such as insider trading, money laundering, and tax evasion (Lourie, 2020). RMB on the other hand introduced a data processing/capturing robot called “Mr Rob” which handles tasks such as financial data consolidation, and ongoing maintenance of customer’s information (Naidoo, 2018: 1). The Acquisition management division often interrelates with customer acquisition (growing a customer base) and involves activities such as managing contract agreements, sales and marketing functions, and business acquisition (Coetzee, 2018).

Acquisition and management functions are becoming more digitalised due to developments in customer-relationship-management (CRM) software and Robo-advisors (Dorfleitner, Hornuf, Schmitt, and Weber, 2017; Boobier, 2020). CRM technologies consist of data-driven marketing tools that track information and obtain insight on customers, whereas Robo-advisors are robots that can interact with customers by giving financial/investment advice (Dorfleitner *et al*, 2017; Boobier, 2020). For example, in 2018, Nedbank famously introduced “Pepper” – an NLP and AI interactive robot capable of communicating with customers, placing orders for inventory stock, and recording delivery details (Alfreds, 2018: 1).

The human resources (HR) division deals with business functions such as recruitment, screening, job training, staff retention, staff development, and conducting employee-benefit programs (Boobier, 2020). Technological change has impacted on the HR and corporate services function as technology is infused into work operations. The 4IR related technologies in this division are designed to automate HR functions such as recruitment and employee assessment. This has led to a reimagining of HR functions which have generally been focused on soft skills (e.g., communication and emotional intelligence). Yet the changing complexity of work requires the HR division to be equipped with technical and analytical skills (Eubanks, 2018). Research by Eubanks (2018) in the USA reported that “nearly half of the investments in HR technology went to firms touting bots, machine learning and other AI features and components”. Major AI technology investments include for example, chatbots, voice-based assistants, and reading comprehension system (e.g., Alibaba – reads questions and predicts answers) (Eubanks, 2018; King, 2018).

Locally, in 2016, Standard Bank launched a Robotic Desktop Automation (RDA) software that gathers and screens applicants, run application forms, perform extensive background checks, and facilitate workplace retraining (Everest, 2020). Recruitment and selection process have been online since the digital revolution; however, the technological changes have been much more advanced in areas such as psychometric test kits, and applicant screening software, and job simulation using virtual reality (Boobier, 2020). Finally, the customer support and service division largely relate to customer retention and communicating solutions for customer's queries. Banks have turned to self-service mechanisms through automated machines and self-service in the branches as well (e.g. Nedbank's Pepper). Although the use of mobile applications has been around since the digital revolution, this area is integrating AI and robotics at a much faster rate (Eubanks, 2018).

The major customer support and service systems based on 4IR technologies includes a CRM tool such as 'customer 360-degree' which has transformed customer support since the 1990s. Customer 360-degree engages in creating customer profiles from data collected and to use that data to find solutions for customer preferences and concerns (Eubanks, 2018). Every big bank in South Africa has a well refined mobile app device which can essentially be regarded as part of development in the digital revolution, however, recent trends in CRM include advanced technologies such as biometrics, finger scanning, voice/face recognition (Boobier, 2020). These customer orientated technologies for example AI, "relies heavily on biometric technologies to identify clients and offer tailor-made advice through the use of big data and self-learning" (Coetzee, 2018: 5).

In terms of digital use, Capitec is one of the largest digital banks in South Africa with just under seven million users conducting transactions and payments, and internet banking through the app (Laurie, 2020). Lastly, in 2019, Capitec also launched a contactless-enabled card - which is contactless technology that lets the customer tap their bank on any contactless card machine ('tap and go') (Lourie, 2020: 1). Ultimately, the South African banking is rapidly transforming from ATM's and mobile apps towards augmented. AI systems which apply analytically infused technologies such as: ABSA's automated bank switching; FNB's risk compliance 'Manila' software; Nedbank's interactive robot 'Pepper'; Standard Bank's RDA office software; and Capitec's contactless-enabled card.

Furthermore, the pervasive implementation of 4IR technologies in banking strategies may be more extensive, for example, Nedbank alone has invested in video banking software, quick-chatbanking, virtual reality, and facial recognition amongst others (Khumalo, 2017). The use and reliance of the ATM implies that cash will still be important in the current society, but the move towards a completely digitalised banking system and smart machine system in work organisation is rapidly gaining traction as banks continue to search for effective banking solutions using technologies such as cloud computing, block chain, and quantum computing. Ultimately, the scale and scope of these innovations is unprecedented.

3.5.1 SOUTH AFRICAN EMPLOYEES AND MANAGERS IN BANKING

The pressure for banks to innovate the banking system is also placing pressure on bank employees and the need for skilled staff. The skill set of banking employees requires fundamental shifts to cope with technological developments by being able to analyse data which is “expected to become a ‘mandatory core competency’ of professionals across the board” (Tableau, 2017: 12). A study conducted in the South African retail banking industry revealed for example, that, Nedbank, Standard Bank, and FirstRand Group emphasised the need for developing employee skills (Coetzee, 2018). Nedbank focuses on training and recruiting staff who can grapple with 4IR-related technologies such as RPAs, predictive risk analytics, and digital innovation. Standard Bank is proactive in developing employee skills through skills development programmes, upskilling, and collaboration with higher education in developing Information Technology curricula (Coetzee, 2018).

FirstRand Group made a considerable investment on skills training which saw expenditure on skills development increase by 240% from 2015-2017 (Coetzee, 2018: 7). A study (Mohlala, Goldman, and Goosen, 2012) focused on employee retention in an IT division of a South African bank. The report from the study was based on the perspectives of senior managers and directors in the bank. The study found that employee retention amidst technological changes in the bank’s IT department related to a set of factors such as the lack of a retention strategy, the inability to retain technical skills, constant restructuring, loss of interest, and the use of old technology. (Mohlala *et al.*, 2012). In sum, the study reported that the bank managers felt that a) the IT division was not recruiting people with competent skills, b) the bank made an excessive effort to acquire technically skilled graduates but failed to develop them, c) that the constant restructuring (e.g. retrenchments)

in favour of technologies does not give employees sufficient time to settle into work, d) that on average young graduates stay in the organisation for two years, thus, managers are predicting an influx of aging employees in the workforce, and e) that younger graduates prefer newer technologies since technology is rapidly increasing, thus, the younger generation are “reluctant to work with old technology that is used by the legacy systems” (Mohlala *et al.*, 2012: 8). A 2018 study investigating the influence of e-banking and its effect on employees from various banks in Mahikeng (South Africa), found that employees largely embraced the implementation of banking technologies (Poeng, Agu, and Chukwuere 2018). The study focused on employees who were tasked with monitoring client’s use of online banking and found that the employees had a positive perception towards the implementation of online banking solutions.

The major concerns were in relation to the issue of security and privacy as employees perceived their privacy and security to be vulnerable. Furthermore, employees felt that the adaptation of digital banking solutions “is not frustrating, but the usage requires consultation, and individual sound mental effort to use” (Poeng *et al.*, 2018: 73). Ultimately, these case studies are not specifically linked to the use of 4IR technologies since most of the digitalisation refers to advances from the digital revolution. However, the significance of pointing out the studies is that they provide a starting point for understanding the perceptions of employees and senior managers in implementing modern solutions for technological change.

For example, Nedbank, introduced conversational banking which allows customers to interact and address concerns with Nedbank employees in real-time. This application was handy considering the challenges of work-from-home protocol during the COVID-19 pandemic (Thomas, 2020). In the 4IR spectrum, remote-working requires remote-working tools, thus, banks such as Standard Bank and Nedbank have implemented cloud-based productivity tools, and online training for staff development (e.g., Microsoft teams) and health and wellbeing (e.g., counselling services) (Thomas, 2020: 1). This timely study hopes to contribute to the field of work organisation through fresh lenses of 4IR technologies in the South African workplace, and in particular, in the banking sector - as most of 4IR-related changes are already being implemented in the sector.

CHAPTER FOUR

RESEARCH METHODOLOGY

4.1 INTRODUCTION

Research design is understood as the ways in which a research objective is developed into a research project that can be practically implemented by a researcher (Given, 2008). Research design is not confined to the selection of methods/techniques for data collection for a research project; instead, it also includes an outline of the decisions made in (a) conceptualizing the research, (b) the conduct of the research project, and (c) the ways in which the research contributes to the development of knowledge in a certain field (Given, 2008). The main objective of the study is to analyse the impact of 4IR on the organisation of work processes in the banking sector of Pretoria, South Africa. This study is important because many organisations are undergoing rapid transformation as a result of the 4IR, a key part of which is changing work processes. These changes have a direct impact on the manner in which employees approach their work. This research sought to analyse the experience of change. Therefore, qualitative techniques were better suited than quantitative ones (Ellis, 2007).

Qualitative research is significantly better at explaining organisational processes and uncovering individual and group experiences of work (Cassell and Symon, 2004). It explores phenomena by using multiple sources of data and organising data into abstract units of information (Creswell, 2009). Qualitative research is useful for explanatory research due to its ability to discover phenomena that are under-researched, and to recognise the subjectivity of experience (Ellis, 2007). Qualitative research is characterised by three unifying principles. First, qualitative research rests on interpretivist assumptions; that is, the way in which society is interpreted, experienced, and constituted (Mason, 2002: 56). Secondly, data collection methods are based on context specific and flexibility in order to adapt to developing understandings and needs (Mason, 2002).

Lastly, qualitative research seeks to generate findings that are suitably contextualised by using methods of analysis that enhance insight on complex situations, detail, and context (Mason, 2002). Qualitative research seeks to engage and observe experiences and behaviours by means of naturalistic engagement with the people, a community, or an institution (Creswell and Poth, 2018). These experiences and behaviours are then recorded by the researcher who is physically present within the groups in question (Braun *et al.*, 2020). Qualitative research uses both descriptive and analytic methods for understanding and ultimately analysing the complexities and meanings of people's experiences and understands that these experiences exist in the context of the people being studied (Ravitch and Carl, 2019).

4.2 DATA COLLECTION METHODS

The use of multiple data collection methods (e.g. secondary data, focus groups, observations, interviews) represent a significant aspect of qualitative research (Kumar, 2011). This study used two qualitative methods, namely: in-depth interviews and focus groups. Semi-structured interviews are beneficial to this study because they “provide deep, rich, individualized, and contextualized data that are centrally important to qualitative research” (Ravitch and Carl, 2019: 152). The main aims of semi-structured and in-depth interviews are to: (1) gain an in-depth understanding of the participant's lived experiences, (2) gain insight into how the participants make sense of reality in relation to the focus of the study, and (3) explore how individual experiences and perspectives correlate with other study participants or other studies centred on similar research topics (Kumar, 2011).

Focus groups allow the researcher to observe and facilitate interactions in the group and how the group and individuals describe their experiences and opinions. The data generated from focus groups can be based on content (topic) or process (group dynamics) (Millward, 2012). Focus groups (or group interviews) provide a platform for an in-depth discussion and group interaction on the research questions (Millward, 2012). The focus group format deals with respondents who have knowledge of the topic, and it allows individuals in the group to understand the perspectives of others and to add comments beyond their own original responses. In this format, respondents are not required to have mutual agreement on a topic or to disagree on a topic. Rather, the aim is to gain “high-quality data in a social context where people can consider their own views in the context of the views of others” (Patton, 2002: 386).

A drawback for using focus groups is that topics that are sensitive, extremely personal, and culturally inappropriate are difficult to discuss in the presence of strangers or colleagues. This study is not concerned with any of these topics and will therefore focus on the topics addressing the research question. A researcher can focus on both content and process depending on the goals and questions of the research. Since this research is focused on the views and experiences of employees/managers of a bank, the primary focus will be based on content. When conducting the focus groups, the researcher gave each of the participants an opportunity to answer the questions as this will make the data richer. Disadvantages of interviews is that they can be time consuming and expensive as the researcher will have to travel across different locations, or in the context of online interviews the researcher would need data or Wi-Fi connection. Furthermore, the quality of data is often dependent on the quality of interaction.

Moreover, since all interviews are unique, the quality of responses obtained from each interview will vary (Merriam, 2009). The skills, experience, and commitment of the interviewer plays a role in quality of data gained. The advantages of the interview relate to the fact that the interviewer can collect in-depth information by probing and asking follow-up questions to gain a clear idea of the responses. Furthermore, complex questions can also be explained by the interviewer to avoid any misunderstanding considering that the research topic of 4IR is an emerging concept and could possibly be confused with concepts of the digital revolution. The interview and focus group format followed a semi-structured approach, which provided the researcher with a research instrument that organises and guides the discussion, as well as providing an option of follow-up questions (Ravitch and Carl, 2019).

Semi-structured interviews consist of an interview guide with a mixture of roughly structured interview questions, the questions are used flexibly, and the researcher is concerned acquiring specific data from all respondents (Merriam, 2009). The semi-structured interview included a set of specific questions for all participants, but the order of questions and sub-questions was based on a conversational exploration. This interview format has no predetermined wording or order of questions, but the main section of the interview is guided by a list of questions that will be explored. The reason for applying this format is that it enables the researcher to analyse and respond to a particular situation according to the respondent's views and fresh ideas on the topic.

Each interview session was recorded using a recording device. The recordings are saved on the device as well as on a cloud service as a back-up in order to prevent the loss of data.

4.3 SAMPLING

Sampling procedures in qualitative research are not so rigidly prescribed as in quantitative studies. Even if it were possible, it is not necessary to collect data from everyone in a community in order to get valid findings. In qualitative research, only a sample (that is, a subset) of a population is selected for any given study (Kumar, 2011). The study's research objectives and the characteristics of the study population (such as size and diversity) determine which and how many people to select (Ravitch and Carl, 2019). The significance of sampling is to obtain in-depth knowledge about a phenomenon and to gain insight about different aspects of the participant, in the hopes that the participant can provide insight into the group that they represent (Kumar, 2011). The sample size for this study included 15 participants (managers; portfolio managers; and employees). The reason is that a sample size of 15 participants is big enough to uncover a range of opinions and was adequate to limit the sample size at the point of saturation. Sampling included two non-probability sampling techniques: purposive and snowball sampling. Purposive sampling is one of the most common sampling strategies.

Group participants are approached according to pre-selected criteria relevant to a particular research question (for example, managers and employees working in banks in Pretoria). This approach is highly beneficial for studies that seek to gain insight into something that is relatively unknown or under-researched (Kumar, 2011). Purposive sampling allows the researcher to use their judgement to select participants that can provide the best information based on the goals and objectives of the study, individuals are approached based on the researcher's judgement and opinion on who will most likely be willing to share and provide them with the right information (Creswell, 2009). The primary downside to purposive sampling is that it is prone to researcher bias due to the fact that researchers are making subjective or generalised assumptions when choosing participants. However, researcher bias is only a real threat to a study's credibility when the researcher's judgements are poorly considered or when they have not been based on clear criteria (Kumar, 2011). The selection criteria in this proposed study were straightforward. The researcher was guided by the research question, which examines the impact of 4IR on the organisation of work in the banking sector.

To evaluate this “impact” - the study focused on people in managerial positions in banks, especially involved in managing the implementation of the new technological programmes and systems. As well as the workers who implement the programmes when dealing with clients. The analysis focused on key aspects such as employee training, employee control and monitoring, skills usage, and client experience from the workers perspectives. Purposive sampling is a popular method used by researchers due to the fact that it is extremely time and cost effective when compared to other sampling methods. Snowball sampling refers to a process wherein a sample of participants are selected using networks. This sampling technique is useful for the researcher who is external to the group or organisation being studied or for a group or organisation that the researchers know little about (Merriam, 2009).

The reason is for this is that the researcher will only interact with a single (or few individuals), who will then direct the researcher to the appropriate people in the organisation being studied (Kumar, 2011). These included workers with a minimum of 3 years of experience in the banking sector, because these individuals would have experienced the impact of 4IR changes on their daily work functions. In this process, the researcher selects an individual or group and collects the necessary information from them. The researcher then asks the individual/group to identify or connect them with other members in the organisation. The researcher then collects the required information from the identified members, who now become the database for further data collection (Merriam, 2009).

This process goes on until it reaches a point of saturation or until enough information has been obtained; when the same responses appear again and again then the point of saturation has been reached. The problems associated with this sampling technique is that “the choice of the entire sample rests upon the choice of individuals at the first stage” (Kumar, 2011: 208). This raises issues of bias because the members being asked to identify other members can have strong biases in their choice of referrals. To reduce bias, the researcher requested a list of 3 referrals/participants who were then selected randomly. Furthermore, this technique is also difficult to manage when the size of the sample becomes extensive. Nonetheless, sample sizes, which may or may not be fixed prior to data collection, depend on the resources and time available as well as the study’s objectives (Merriam, 2009).

4.4 FOCUS GROUP INTERVIEW

There was a single focus group interview consisting of the 3 employees from one particular bank. The job positions of the participants included the branch manager, one personal loans consultant, and one sales consultant. The length of the interview was 1 hour 15 minutes, and the interview was conducted in the boardroom of the bank's premises (socially distanced and adhering to COVID-19 protocols). The majority of the interview was conducted in English, but the occasional use of Setswana was accepted because Setswana is the dominant language in Pretoria. The participants in the focus-group interview were proficient in both languages.

4.5 IN-DEPTH INTERVIEWS

The in-depth interviews consisted of 12 individuals from 5 different bank branches. The job positions of the participants included five branch managers, two integration architects, two personal loans consultants, and three sales consultants. The length of the interviews was between 30-45 minutes depending on the responses of the participants. The interviews were conducted face-to-face (at the bank's premises) and through online platforms - nine interviews were conducted in-person, and three interviews were conducted using online platforms (one on Skype and two on Microsoft teams). Skype and Microsoft Teams were the most suitable platforms because they are free to use, and both platforms were deemed appropriate to use on the participant's work devices. The individual interviews were conducted in English and Setswana (the languages that the individuals were most comfortable in speaking).

Table 1: List of participants

Job Title	Age	Race	Gender	Years in job
Branch manager	34	Black	Male	3
Branch manager	35	Black	Male	4
Branch manager	58	Black	Male	10
Branch manager	42	Black	Male	6
Branch manager	39	Black	Male	3
Branch manager (stand in)	34	Black	Male	1

Personal loans consultant	25	Indian	Male	5
Personal loans consultant	29	Black	Male	3
Personal loans consultant	36	Black	Male	8
Sales consultant	34	Black	Male	5
Sales consultant	34	Black	Female	6
Sales consultant	44	Black	Male	7
Sales consultant	26	Black	Male	3
Integration architect	39	Black	Female	3
Integration architect	47	Black	Male	5

4.6 RELIABILITY, VALIDITY, AND ETHICS

In qualitative research, the focus on reliability and validity are concerned with the study's conceptualisation and the collection of data, the interpretation of data and presentation of findings (Kumar, 2011). A qualitative study should therefore provide enough information to indicate that the researcher's conclusion makes sense. In qualitative research, methods of data collection are structured using measures which are flexible and evolving and are thus not as standardised as in quantitative research (Kumar, 2011). The criteria for reliability and validity in qualitative research is framed in the context of trustworthiness and authenticity. In this sense, the criteria for determining trustworthiness and authenticity are based on four elements: (1) credibility (extent of believability), (2) transferability (whether the study can be generalised to other contexts), (3) dependability (whether the study can produce the same results), and (4) confirmability (whether the results can be corroborated by others) (Trochim and Donnelly, 2007).

4.7 CHALLENGES OF THE RESEARCH

The challenges encountered by the researcher was mainly in the quest for participants due to the current measures of social distancing associated with the covid-19 pandemic. Consequently, companies had a reluctance for walk-ins or face-to-face interviews. Approaching participants via emails or telephone is a strategy that is widely used by researchers. However, the problems associated with this strategy is that individuals often do not respond to unsolicited emails(Seidman, 2006). Communicating via telephone also proved to be difficult for the researcher as most potential participants are working from home due to the structural operational changes in organisations. To overcome these problems, the researcher contacted branch managers (gatekeepers) telephonically (since most branch managers are based in the office) and explained the nature of the research, established a time for a face-to-face interview, and sent documents viaemail that included the study aims and the participant consent forms.

4.8 ETHICS

An application for ethical clearance was submitted to Rhodes University's Ethical Review Application System (ERAS). As per the ERAS process, the participants involved in the study were fully informed on the purpose of the research prior to obtaining their consent. The participants were provided with consent declaration forms which explicitly outlined the objectives of the research; participants were further informed that their participation in the study would serve to gather and analyse their perceptions/experiences of the research objectives. The ethical protocols in line with social research have been acknowledged and approved by the Rhodes University Human Ethics Committee (RU-HEC). As such, privacy, confidentiality, and anonymity of data was prioritised.

CHAPTER FIVE

REALIZING 4IR: A CASE FOR PRETORIA BANKERS

5.1 INTRODUCTION

This chapter discusses the findings that were obtained during the data collection phase of this research. The findings were gathered over a period of four months. The qualitative data collection methods included interviews and focus groups with bank managers and employees working in roles such as management, consultancy, and IT. This chapter addresses the main research objective, which is to highlight the impact of technological change in the banking industry within six of the largest banks branches in Pretoria. More specifically, this chapter discusses the experience of bank employees amidst an increasingly digitized financial sector. This chapter is divided into three sections. The first section consists of an outline of the basic demographic information and historical backgrounds of the participants involved in the study. This section contextualizes the sample population involved in the study. The second section covers key themes that were discovered in the data, such as: the respondent's perspective of 4IR; what 4IR means in terms of employment (e.g., work organization, worker control, and skills); and the actual technological changes that have taken place in the bank. The third section discusses the labour related impact of the rapid technological (and digital) changes in the banking sector. The analysis in this section provides an overview of the worker's perspectives regarding technological influence on elements such as work responsibilities, efficiency, skills, and the job challenges associated with the 4IR.

5.2 BASIC DEMOGRAPHIC INFORMATION AND HISTORICAL BACKGROUNDS

This section describes the demographic landscape and historical backgrounds of the respondents involved in the study and covers the following areas: the respondents' median age; nationality; minimum work experience; gender; educational history, and job position. This chapter is designed to make a connection on the main reason the purposive sampling technique was applied.

The significance of including biographical information is that it provides sufficient basis for justifying the sample population involved in the study. This information also highlights some of the factors that could be influencing workers' attitudes, productivity, and commitment in response to technological changes in the workplace. For example, biographical information could raise questions on the likelihood that managers and employees will have the same experiences and views of the objectives of this study. The demographic information presented below is outlined in a descriptive format. This is useful, because qualitative research methods generally strive at attaining differing perspectives, therefore, the descriptive analysis seeks to give more meaning and interpretation to the data.

5.2.1 BASIC DEMOGRAPHIC INFORMATION OF THE RESPONDENTS

The sample consisted of 15 South African participants between the ages of 29-58 years, in terms of the racial demographics, the sample consisted of 14 black South Africans, and 1 Indian South African. The participants involved consisted of a minimum of three years of work-experience in the banking industry. The analysis at the level of age and work experience is important, because it means the sample of respondents have acquired sufficient professional experience that can provide a richer and valid account of their perceptions concerning the research questions. The gender make-up of the respondents consisted of 13 males and 2 females. Out of the 15 participants, the sample population consisted of 6 branch managers (all male) and 9 employees (2 females and 7 males). The lack of women (especially in managerial positions) is in contrast to the studies examined in the literature review (Thiessen and Nickerson, 1999; Smithson *et al.*, 2004) which reported that women tend to be segregated into hospitality, banking, and customer services jobs. Furthermore, such an analysis could raise the argument made by LPT theorists - that technology should be viewed as a mechanism in which the subordinate position of women can be sustained by men (Cockburn, 1983; Webster, 1996). The lack of female branch managers indicates an unequal sexual division of labour within the banking sector of South Africa. It shows an obvious glass ceiling exists, within this sector, as female employees are employed at lower levels within the sector.

5.2.2 HISTORICAL BACKGROUNDS OF THE RESPONDENTS

The historical backgrounds of the participants were very similar. For instance, all the participants matriculated through the public schooling system of South Africa, and all but one participant had obtained a post-school qualification. In terms of the secondary schooling experience, a majority of the respondents revealed that their public schooling experience prepared them for higher education and the labour market. However, the respondents also pointed out that there were significant disparities between the level of education offered in the public and private schooling system, which made it difficult to enter the labour market. The respondents argued that it is mainly due to the differences in the subjects offered at private and public school.

“The education system for public school is not the same as private school. The subjects offered at the school did not equip or prepare us for anything, because what happened was that in school, I did mathematics, science, and geography, then I went to do IT in university. And when I did IT, it was a totally different world because none of the things that I studied in high school actually helped me. In private school, grade 11 and grade 12 they’ve got information systems where they’re teaching them the basics of IT; so it has given them that basic start when they got to first year of IT. But for us in the township we do not have such, everything is new. It is something that is not offered as part of the syllabus.”

These differences in schooling, university, and labour market outcomes can be linked to the fact that schooling choice is often a direct route to low-skill employment in the banking sector. Therefore, the efficiency of the higher education system in South Africa requires strategies that “can potential human resources into the types of high level and scarce skills which are in demand by the economy” (Rogan and Reynolds, 2016: 15). With regards to qualification levels, 14 out of the 15 respondents had obtained at least one post-school qualification (degree/diploma) in areas such as: internal auditing, information technology, BSC mathematics, business education, secretarial certificate, national diploma in finance and accounting, technology, finance and, and management. The participant (sales consultant) that had not obtained a post-school qualification, mentions that they enrolled towards a degree in Mathematics but could not complete their final year of studies due to a lack of funding. According to the consultant, banking was a means to employment because a sales position only required a matric certificate.

When asked whether their qualification(s) prepared them for a career in banking, the respondents questioned the relevance of their qualification (s) in relation to their work duties. They argued that post-school qualifications did not adequately prepare one for a career in banking, because the qualifications in question were irrelevant from banking. One of the respondents working as a sales consultant claims that even though there are auditors in banking, his internal auditing degree is “irrelevant” and “not related” to the current job specification and responsibilities as a sales consultant. Most of the qualifications obtained by the participants are arguably in line with banking (e.g., internal auditing, administration, business education etc.). The important factor to consider regarding the connection between qualifications and job positions pertains to the era in which these qualifications were obtained. At the time, these qualifications were applicable and relevant to the job, but as technological and structural changes took place the qualifications became irrelevant. In terms of career choice, the entire sample population reported that banking was not their dream career and that their decision to join the bank was mainly due to a lack of job opportunities. A sales consultant stated that “*banking was my next best option*”. The table below outlines the job titles, job specification, employment status, and working schedules of the sample population group. The data entered in the table is extracted according to the narrative description of their general tasks and job specifications. Thus, job duties listed in the table may differ from a strict definition of the duties in a particular job – that is, the duties described in the table are taken directly from the participants’ perspective.

Table 2 - Job Description		
Job Title	Duties	Employment Status
Branch managers (6)	Resolving queries Enforcing compliance and processes Managing staff and authorizing work for staff	Permanent
Personal loans Consultants (3)	Selling personal loans Promoting personal loans Marketing personal loans Acquiring clientele	Permanent
Sales consultant (4)	Risk assessment (client profiling) Matching client needs Generating sales Offering financial advice to clients	Permanent
Integration architect (2)	Supervise all activities related to the integration of software	Permanent

	Provide service to various application software (e.g., ATM) Bridges the connection between the front-end and back-end of ATM's Draw up the design for the software developer	
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5.3 EMPLOYMENT AND TECHNOLOGICAL REVOLUTION

This section focuses on employment and the actual technological changes that have taken place in the 6 different banks covered in this study. The significance behind this endeavor is to gain an understanding of the worker's experiences in the current technological revolution. The data described in this section illustrates a link with the Marxist foundations of LPT, that is, the technological revolutions are driven by capitalist drive for profit, efficiency, and minimization of costs.

5.3.1 CONNECTING 4IR TECHNOLOGIES AT WORK

This section sets the scene, in the sense that, it provides an account of the respondent's understanding of what 4IR actually means. Based on the data, the respondents are adequately informed on the phenomenon that is 4IR. For example, respondents raised the point that with the advent of 4IR, the use of jargon such as "digital migration" and "digital first" is considered as the language of today in the financial sector. Furthermore, 4IR is perceived to be making a major impact in the financial sector as opposed to other sectors (e.g., agriculture). The respondents justify this claim by making note of the downsizing and the closure of many branches across the country. Banks are reducing the number of branches, not because the bank is making losses, but rather, it is because of the significant reduction in transactions performed inside the bank, which means there is less foot-flow in the bank and thereby less staff required. Consequently, mobility work is seen as a major shift taking place at the bank, the capabilities of a mobile working structure is enabled by the fact that most of the work can already be performed at home, rather than having to work in the office. Even though the digital revolution made it possible for businesses and workers to function (especially in finance) regardless of the location or distance. The revelation from the data suggests that mobility work in the 4IR has created "a ubiquitous space that allows a level of complexity, speed, and quality not possible before" (Cascio and Montealegre, 2016: 353). In fact, managers felt that mobility work makes it easier to manage employees. This sentiment was expressed by one bank manager, who indicated that:

“You can manage people from home without seeing them, because you can see whatever data they have on their laptops, the analytics are very powerful”.

The concept of 4IR was described by the respondents as something that is fast becoming evident in the bank. Yet, the respondents were considerably apprehensive about the skills and education required to adapt to the 4IR. The main concern raised is that the younger “Black generation” is still enrolling in courses that are not suited to 4IR, especially at the banks. For example, bookkeeping and financial management courses/qualifications are no longer sought after in the bank. This is because, banks have AI assisted systems that uses client-data and chat-bots to assist with bookkeeping, as well as organizing and monitoring a customer’s finances. There is a great level of emphasis on the societal impact of 4IR which has caused anxiety and fear in the respondent’s communities and personal lives. There is also a sense of realization that society and corporate has no choice but to keep up with the times considering that 4IR is a global phenomenon. An Integration Architect claims:

“In our banking environment, last year the CIO employed a team of I think 10 interns, and they had a robotics project that they ran. They are trying to introduce robotics to ensure that other type of work that does not require human intervention or doesn’t need anyone to work. But the problem we have is that we are changing our payment systems as [X bank], the system was very old so now we are upgrading to a new one. The whole world is using technology, South Africans must just accept that we are there now.”

5.3.1.1 DRIVERS OF CHANGE

According to the data, an overwhelming majority of respondents referred to competition as being the major driver of technological change in the banking industry. Like most industries, competition amongst businesses is based on finding new solutions that enable greater productivity and efficiency. Based on the data obtained, bankers were quick to mention that the key source for maintaining a competitive edge in the financial sector lies with technology. For instance, research (King, 2018) exploring the interconnectivity between global banks insists that the pressure to “keep up with the changes” is a major imperative for technological change for the banks to be on par with the global markets. Contrarily, the data also highlights that not every bank is in competition.

For example, according to the respondent data, because central banks oversee the commercial banking system of a particular country, they are thus not in competition with the retail and commercial banks. The simple reason is because Central Banks are the regulators of the entire banking system. Besides maintaining a competitive edge, the respondent data suggests that the banking industry is focused on establishing a high level of convenience for clients. In fact, the primary focus on cliental is to reduce the amount of foot-flow within the bank by creating mechanisms (e.g., interactive video application) that allow clients to conduct banking activities in the comfort of their own home.

5.3.1.2 TOWARDS BANK 4.0

Bank 4.0 is a widely used concept developed by Brett King (2018), a global influencer in financial services. Bank 4.0 represents the dynamic shift in the way in which people gain access to basic banking services through their mobile devices as opposed to the bank branch. The significance of Bank 4.0 is that it has a direct influence on labour centric issues within the banking industry, for example, the principal elements of traditional banking is the move towards service offering wherein clients view banking as a device-based value service instead of viewing the bank as a physical artifact (e.g. debit cards and cheque books). King (2018) finds that at the core of Bank 4.0, the bank branch, the managers, and the consultants based on information asymmetry (that sellers may possess more information than buyers) will “give way to contextual, behavioural offerings tailored to your personal world in a way that the traditional financial institution could never deliver via a face-to-face experience” (King, 2018: 333).

The respondents in this study echoed King’s (2018) claim that the warm welcoming of technology in the banking sector reflects a desire to move away from the outdated legacy systems and computing software that are reliant on human intervention. The major technologies requiring little to no human intervention included: new AI administered ATM’s called “Intelligent ATM’s”; video booths, and mobile banking applications. The intelligent ATM is an extension of the traditional ATM, with the major difference being that these new ATM’s are AI administered via interactive speech software that assists clients when depositing money, changing passwords, and retrieving statements. An experienced bank manager insists:

“If you want to deposit money, back then you used to come straight to the tellers and then you come with your hard cash and you deposit. Nowadays you can just go to the intelligent ATM and you can deposit money just like that because even if you get stuck there are chatbots that can assist easily. The video recording is used when you don’t want to talk to one of the staff, you can just go there and call the call centre and somebody will assist you.”

At the time of the data collection phase, the video booths were not in operation due to COVID-19 health protocols, however, the respondents revealed that video banking was fast becoming an alternative to banking assistance for the clients. These findings are consistent with the 4IR technologies highlighted in the context chapter (Coetzee, 2018; Khumalo, 2018), the data findings confirm that video booths are located at multiple major branches and their function is to provide live assistance to clients without the need to wait in line for a consultant/teller in the bank. Additionally, robots have already been introduced and streamlined in the bank, their presence in the bank is to roam around and offer clients assistance. What has been noted is that these robots are fast becoming submerged in the organizational system and are increasingly becoming adaptable to the work environment. Notably, the workers attitude towards these robots consisted of both pessimistic and optimistic account. In the former, workers shared an opinion that soon the bank will replace them with robots. The optimistic view, on the other side, indicated that robots are able to assist clients, process financial data, and handle administrative tasks.

Although mobile banking applications have been around since the digital revolution, there is a strong assertion that mobile banking applications have made major strides in the era of 4IR. Based on the data, the emphasis and stress on banking applications or electronic banking suggests that mobile banking is one of the most powerful innovations in the banking industry. Mobile banking allows clients to bank anywhere and anytime, the respondents refer to it as the safest mechanism for banking in the 4IR sphere, due to its modern safety features such as facial recognition and biometric authentication, all of which exist in South African bank offerings. In sum, Bank 4.0 is thus about redefining the way in which financial services fit into the consumer experience and business operations. Technology is not only finding ways to make delivery more seamless, but it is also finding ways to transform financial services and to transform the work organization of employees in the bank. A branch manager stated:

“Banking can be done completely electronically. The most powerful tool is that you can manage everything on your mobile, laptops will even be outdated because people can carry their phones everywhere. For example, someone asked me to authorize something on a Saturday when I was off, she called and asked me what to do and I instructed her to do it on her phone. When I was at “Bank X”, we learnt about a bank from some other country which had about 10 people in the bank, but now 10 people in at the bank seems very normal.”

5.3.1.4 CLIENTS’ EXPERIENCES

This section discusses the experience of clients from the worker’s perspectives since a lot of the bankers’ job tasks are based on providing some form of service to clients. Respondents highlighted that the new banking technologies offered many benefits to clients in the sense that almost every banking service can be performed via apps without the need for help at the bank. Nevertheless, the respondents also indicated that there is a considerably large client base that still requires the need for face-to-face assistance. The findings suggest there is a considerable concern for the way in which clients are responding to the technological changes in the bank’s service offering. The main concerns are in relation to factors such as education, age, geographical location, and resistance to change. Workers feel that a majority of the clients are struggling to cope with the rapid technological changes. The most vulnerable to these changes include older clients (that is, the senior citizens), the uneducated or illiterate folk, and those residing in the rural areas and townships. The ageing group of clients face immense struggle with using services such as video booths, interactive robots, and smart ATM’s. There is a consistent claim that a majority of the senior citizens prefer traditional methods in the form of face-to-face contact. The illiterate or uneducated customers mostly struggle with interpreting and contextualizing information on the mobile banking system or video booths. Even though these technologies have visual imageries and language translation processes that explain information to clients, there is still a significant need to seek the help of human bankers in identifying problems/solutions that could otherwise be handled by an interactive robot or AI chatbot. In terms of geographical location, the workers insisted that customers residing in the unindustrialized areas struggle with the technological solutions offered by the bank due to the lack of exposure to these advanced technologies. A branch manager with 32 years in the banking industry remarks:

“There are people that will tell you “no I don’t want to use the ATM because it will eat my money, or I don’t want to use the app, I want the banker to open that investment for me”. I don’t think it’s about distrust, I think it’s about belief. Some people are not technologically inclined to understand what we are putting out to them. Our robots and apps are user-friendly, but it’s just a lot of things that you need to do. For example, when you launch the app on your phone you have to create a profile and password, then you put your ATM pin, then create another username and a password, and at the end of everything use a 5 digit pin to login to the app. It’s just the steps that you have to follow that clients may not understand, which means they have to come inside the bank to get help.”

5.3.2 WORK ORGANIZATION

5.3.2.1 ISSUING OF WORK TASKS

The focus concerning the issuing of work tasks is divided into two contrasting perspectives between the branch managers and the bank employees. Even though each bank has different work organization structures, the data found that the issuing of work tasks was similar across the various banks. Data from the branch managers revealed that work tasks are mainly issued from the main office, these tasks are systemically generated on a monthly basis through key performance indicators (KPI’s). These tasks are part of the job description (see table 1) and include tasks such as checking employee reports and reaching monthly targets. Bankers in various functions (e.g., sales and loans consultants, and internal auditors) have their own reporting lines in the form of teams or departments. The findings reveal that there is a basic hierarchical structure and layering in terms of how work tasks are issued, but for most of the employees a lot of their work tasks are self-issued and based on meeting monthly targets for their specialized individual tasks. Such organization of work into detailed and specialized tasks highlights the way in which the hierarchy of labour power gives the capitalist (in this case the bank) greater control of the production process. An integration architect declares:

“In the integration team we have our own report lines, so my boss might be reporting to someone else, but I report to the integration manager who then reports to the demand manager. Our bank has many teams, for example, there’s a team that reports to finance, or HR, or forex, exchange rate, etc. What a demand manager does is that she receives work from all other teams, she prioritizes and then assigns them to us and then I do my timeline for the month.”

5.3.2.2 EMPLOYEE MONITORING

Employee monitoring is facilitated through the use of surveying systems and employee monitoring techniques that can track employee performance. The respondents described various methods used in their respective banks concerning the ways in which employees are monitored in the workplace. Based on the responses from the respondents, it seems as though, the main systems in place for monitoring employees are in the form of digital systems such as Power BI, Queue Management Systems (Qmatic), and Computerized Information Systems (CIS). Power BI is a business analytics service that is used to gather information about a company's data by connecting different data sets to visualize the data. For instance, a branch manager monitored via Power BI is appraised based on their individual KPI's which are a result of the performance of the team being managed. The manager explains:

“My KPI's are a collection of everyone's KPI's, for example if an employee gets an 8/10 or the other 6/10, overall their KPI's filter into mine. So that is how I measure them (employees), so I see that we are battling here then I have to engage with the individuals.”

The Qmatic system is highly similar with the CIS, that is, both are aimed at tracking and monitoring the day-to-day activities of employees. The Qmatic system is widely used by major banks in South Africa and its primary focus is to monitor and direct employees by generating statistical metrics about things like transaction times, traffic patterns in the bank, client and staffing needs, and identifying strengths and weaknesses. A branch manager describes the Qmatic system as:

“A Qmatic system is where the staff has to log-in. For example, if a staff member is idling you can see that they are not working, that is how I monitor staff that are not working. There is a verbal or skype communication that happens in real time, then from my device I can skype and say “I see that there is a client walking, why are you not working?”

A personal sales consultant gives a similar explanation of employee monitoring based on their job role and daily experience:

“We have to report daily, we have to give daily feedback especially since most of the workers are working from home. Our system can monitor you; it can tell you what you did yesterday and what you didn't do or what opportunities you missed. It is a computerized system, everything that you

touch on the computer is recorded. We call it CIS, they will tell you that yesterday you touched the profile of Kabelo for example, it will tell what you did on the profile of Kabelo. There is no way you can lie, the stats are there on the system, it will recognize everything that you touch. Even if you just went to another system and you thought no one is looking at me, they will know what you did yesterday.”

Ultimately, the data suggests that there is a high level of employee monitoring taking place. Some of these computer systems (e.g., Qmatic system) have been around since the digital revolution, in fact the use of these computer systems is not a new concept. However, respondent data indicates that there is significant emphasis on the use of big data analytics and AI software. Workers suggest that these computer systems using big data and AI are being used to further increase employee monitoring beyond the workplace but into mobility work as well. In essence, traditional measures used by supervisors and managers (e.g., shop floor monitoring) to control the labour force has been replaced by computerized structures of control. Of value is that these forms of control are consistent with LPT studies (see Thompson, 1983; Dawson, 1998) that view the use of digital technologies as a factor contributing to the reduction of managerial dependency on hierarchical structures of control. In hindsight, it becomes clear that technology in the production continues to serve as a method for controlling the labour power of workers on behalf of the bank.

5.3.2.3 EMPLOYEE TRAINING

Most of the respondents, particularly branch managers, felt strongly about the importance of employee training as a significant criterion for adjusting to technological changes. The group of respondents had received formal training via the Regulatory Examination (RE) process. Furthermore, the majority of the respondents were obligated to undergo formal training accredited by the Financial Advisory and Intermediary Services Act (FIAS). One of the respondents, a sales consultant, insisted that *“you cannot sell without RE accredited by FIAS, without it you’re not allowed to sell”*. For a majority of the bank managers, training methods such as in-house-training were used for enforcing compliance and authorization. In terms of training methods in line with technological adaptation, workers undergo multiple training courses to adapt to the introduction of new computer software systems such as API’s (Application Programming Interface). Other than formal training there is also a great deal of “learning on the job” or self-scheduled training due to the fast-paced environment. An integration architect explains:

“Our team, our team is very fast paced so I had to learn stuff on the job, but our training is like formal training where they introduce these API’s technologies, then you sit in a classroom and the IBM president will take you through the training as to how you create an API, and how you publish it. There is also default training that you schedule for yourself when you join the bank.”

(IBM stands for International Business Machines Corporation, and it is the provider for IT services, AI, and enterprise systems and software).

5.4 LABOUR RELATED IMPACT OF TECHNOLOGICAL CHANGES IN THE BANK

This section seeks to highlight the workers perspective concerning technologies’ influence on: (1) duties and responsibilities; (2) worker efficiency; (3) skills and qualifications; and (4) job challenges.

5.4.1 DUTIES AND RESPONSIBILITIES

In the most general term, duties and responsibilities is exactly what the worker’s job entails. Duties and responsibilities are part and parcel of job analysis, which refers to a systematic analysis of tasks, and responsibilities of a job, and the qualities needed to perform it. (Riggio, 2015). The perspectives of the workers give a positive account of the ways in which technological changes have influenced their work duties and responsibilities. The availability of alternative banking services such as mobile banking and smart ATM’s have significantly reduced the foot-flow in the bank branches. As a result, bank consultants particularly working in the sales environment (home loans, personal loans etc.) are required to alter their approach in terms of acquiring cliental.

For instance, banks are now offering clients the ability to make personal loan applications online which can then be pre-approved or approved using big-data technology and data-analytics. The impact of the COVID-19 pandemic has also made it increasingly difficult for bankers in the sales environment because they are unable to visit clients, and also because clients can now be offered services completely online. Furthermore, respondent data revealed that workers actually acknowledge the significance of face-to-face interaction at work, and for their clients. Several respondents (mainly branch managers and sales consultants) point out that as much as technology is heavily applied at the work level, there is still an encouraging atmosphere that reminds them that they are not replaced by technology.

This point highlights the point made by LPT scholars (Burawoy, 1979; Ackroyd and Thompson, 2016) that even in the most unfavourable working conditions, workers can source a bit of agency by recognizing a sense of self-assurance and self-worth. A personal loans consultant describes the current situation:

“As of this year [2020] clients could start doing personal loans online, so I lost a lot of business in sales. Clients can just go on the app and a loan could be done in 5 minutes. I deal with the challenge by just calling the regular clients to get some new business. Obviously now because of COVID we can’t visit clients, but that’s what we used to do before. We used to go to companies and visit clients just to give them that feel that we are still here as people, and to say to them “don’t worry robots and machines and phones haven’t taken over our space you know”.”

There is a significant reduction in admin (e.g., filing) and manual (e.g., printing) work, in fact respondents from several banks noted the implementation of a “clean desk policy” which is used to discourage paperwork on desks and working areas. When asked about these measures a branch manager insists “it has influenced us actually for the better in the sense that there is very little paper-work. The manual work that we are used to doing and the manual capturing has changed”.

5.4.2 WORKER EFFICIENCY

Worker efficiency is a key element in the LPT analysis, it relates to the factors involved in the accomplishment of a task, these include factors such as speed and accuracy. The analysis of worker efficiency in this paper is crucial because it speaks directly to the capitalist’s desire for productivity. As mentioned in the literature review (Braverman, 1971) technological revolutions are driven by capitalist drive for profit, efficiency, and minimization of costs. The perspectives of the workers give a positive account of the ways in which technological changes have influenced their efficiency. The implementation of technologies (e.g., biometric scanners) have resulted in quicker ways of conducting work. This is because bankers are no longer filling in manual forms or conducting extensive credit checks that took long amount of hours to complete. Workers also report that these innovations that have been implemented by the bank have resulted in less foot traffic in the branches. Thereby, allowing workers to invest their time in other areas that can further increase their output.

For example, a respondent describes how much their efficiency increased as a result of biometric scanners and AI data analytics that can process a client's information at a much faster rate compared to the era of the digital revolution and the era of traditional legacy systems. The analysis of the above relates to the concept of accumulation as described in the core theory of the LPT, this is caused by the gap between the workers capability and the actual effort in their productivity (Thompson, 1989). What this means is that the logic of accumulation directs the banks to constantly transform the production process. A sales consultant insists:

“These days things that took me 2 hours to complete can be done in just 30min. With our latest technology I can now I can open an account in less than 30min. Back then when we still had legacy systems you would open 2 accounts in one day and you would feel like you’ve worked really hard. But today you can even open 6 accounts before 3oclock and you still feel like you haven’t done anything.”

5.4.3 SKILLS AND QUALIFICATIONS

The data findings in this section are contrary to Braverman's writing on deskilling, which argued that workers become a disposable entity in the capitalist labour process. This is because the respondent data is consistent with the claims that banks are continuously upskilling their employee. But most importantly, the respondent data is also consistent in finding that employees are not actually retrenched when banks opt for technologies, instead, employees are trained to perform other functions at the bank. For example, an admin manager (a position that no longer exists in all of the banks studied) is not disposed of in favour of robots, rather, their skills and experience are deployed elsewhere thereby resulting in flexible specialization (McLoughlin, 1999). These factors characterize several elements of Japanisation that emerged in the third wave of LPT (i.e., lifelong employment and a lack of specialized career path) (Theobald, 1994). Braverman argues that employees become deskilled due to the capitalist's desire for profit accumulation, yet the research data is actually in support of Braverman's critics who insist that technological innovations bring about the advancement of worker skill sets. On the other hand, the data can also suggest that the age of 4IR also brings to light management's desire to control all aspect of work, including the worker's skills. Management achieves this form of control through employee training programs and work restructuring (flexible specialization) methods to enable efficiency and profitability.

This links to a common theme in the literature that, the technologies at work reposition the worker to an instrument controlled by management from outside the direct process (Braverman, 1974). The data findings varied on the question of educational qualification and skill utilization. The respondents felt that their skills and qualifications were not utilized, because they are either doing work that is irrelevant from their qualification or work that only uses the bare minimum skills. In terms of skills capacity at their respective jobs, the data was consistent in finding that the technological changes at work have led to an increase in skills capacity, because workers are regularly trained on new aspects of the job. Scholars such as Hyman (2006) and Watson (2008) sought to question whether the increase in skills was appreciative of the value of the worker in the labour process since workers do multiple jobs while earning the same wage. However, the fundamental issue on the ‘de-skilling versus up-skilling’ debate is not clear in the data. Similarly, Braverman was unable to provide a guide for measuring how skill levels change over time. But what is clear from the respondent data, is that technology does indeed introduce new or different skill sets to the workers. As explained in the context chapter (Theobald, 1994; Marshall, 1998), the introduction of technologies gives very little bargaining power to the worker due to the fact that to some extent the worker’s skills and qualifications are made redundant in favour of technology. The data does not give sufficient evidence regarding the level of bargaining power that bank employees have over their employers. Nonetheless, in terms of bargaining power, the entire sample population are members of trade union SASBO. Furthermore, workers feel that their rights are further protected by industrial relations officers and employment equity forums.

Basically, employee rights are protected at work and there is consensus that the banks are focused on the protection of staff, for example, the respondents argue that the case of this being true could be marked by the fact that there have not been any worker’s strikes/protests. Contrarily, the interview data recorded pessimistic accounts regarding the bargaining power of employees. Some of the respondents argued that employees do not partake in protests, because of a lack of confidence in the union, they feel that the union is controlled by the banks. The common assertion evident in the respondent data was that the bank’s influence over the economy overpowers any entity that seeks to go against it. In fact, 5 respondents referred to the “failed” SASBO protests in 2019 as an accurate example of the bank’s power over trade unions. The planned strike would have been the biggest protest in the banking industry in almost a century (Bianchi, *et al.*, 2019).

Fear of a loss of income due to the no-work-no-pay rule was also a factor that discouraged workers from engaging in forms of protests. Despite the gloomy account described above, workers feel that the banking industry has very good opportunities for growth and development. The data finds that factors such as on-going training and scholarships/bursaries paid for by the bank offers employees many opportunities for promotion. Respondents across the various banks also gave mention to the fact that the recruitment strategy of the banks are aimed at developing employees who are already part of the bank.

5.4.4 JOB CHALLENGES

The data findings revealed various accounts of challenges experienced by bank employees in the context of 4IR based technologies; the main issues noted are in relation to difficulties in managing staff, acquiring cliental, and dealing with system failures. The issue of managing staff was mostly a concern for branch managers because a large part of their job specification is based on controlling and effectively managing the labour force. Establishing effective techniques of ensuring control over the behavior and productivity of employees is crucial. The views from managers finds that there is a great deal of difficulty in controlling the staff at the bank. One branch manager stated:

“We provide our staff with regular trainings on new technologies like API’s, but to control human beings is very difficult, I don’t know how many times we have to hammer the same thing again and again”.

Acquiring clientele was presented as another challenging aspect of work at the bank. For example, meeting KPI targets through sales (e.g., home loans, vehicle finance, and accounts) was challenging because of the reduced foot-flow in the branch. To provide context, a regular day at work for a sales consultant would consist of sitting behind a desk and capturing a client’s pay slip information, but the main issue is getting that particular client inside the bank. Although technologies introduced by the banks have given clients several avenues for acquiring the bank’s services. There is nothing from the data that places the impact of technologies to result in a loss in cliental. Instead, bankers are more focused on finding different ways of attracting cliental. A sales consultant shares the following:

“I wouldn’t say the apps and the technologies have made a difference in terms of working harder and trying to get in more people. I think the technology was a wake up for me to say “people have other ways of being here [inside the bank] so I better do something about it”

The significance of highlighting the challenges described by the respondents is to perhaps show that different environments encounter different challenges, in this context system failures were found to be a major hindrance for workers, especially for front-office staff that have to deal with demanding customers. The respondent data was highly similar in their utterances on the challenge of system failures experienced at work. One integration architect expresses their frustration stating:

“When the system is not working or offline or if it’s crashing, that is the most challenging thing because there is nothing you can do about it. System failures is about having to deal with these new technologies and getting issues where no one has an answer to, now you have to try calling a friend or searching on google. If the system is off then it means we – the workers are off. Meaning we can’t assist our clients; and the clients won’t understand that. I honestly don’t think there’s other challenges except for system failures.”

The above reflect feelings of frustration, exasperation, and resentment in terms of the frequency in which system failures occur in the bank. The data does not allude to any of the system failures as an issue of security risk as previously highlighted in the context chapter. Rather, the issue of system failures is one that constraints workers daily activities and performance targets. Alternatively, the studies highlighted in the literature review section described challenging factors such as a lack of leadership clarity (e.g., Zambian study), or lack of prioritization of skills and education (e.g., Finish study). Even on the local front the issue of system failures was not reported as a major challenge for employees, for example Coetzee’s (2018) study on the South African retail banking showed that various banks emphasized the need for developing employee skills; Poeng’s (2018) study on the other hand found that banking employees in Mahikeng embraced technology and were only concerned with personal security and privacy issues associated with technologies in the workplace.

5.5 CONCLUSION

The data analysis chapter gave an overview of the findings that were obtained during the data collection phase of this research. The first section in this chapter outlined the basic demographic information and historical backgrounds of the 15 participants involved in the study. This section finds that the sample population was highly similar in terms of their historical background. All participants in the study attended public schooling and had pursued a post-school qualification. The public education system may have prepared the participants for higher education and the labour market, however, concerns were raised over the differences in the subjects offered at private and public schools. The post-school qualifications failed to prepare the participants for a career in banking, this is because the qualifications were irrelevant and unrelated to the participants' current jobs. Venturing into a career in banking was thus a means to employment due to the lack of employment opportunities. The job description (table 1) highlighted the employment status, job titles and job duties of the participants in the study. This information is significant for this qualitative study, this is because an outline of the worker's job duties and positions presents varied and richer perspectives in line with the research objectives. It further shows that the impact of 4IR on the organization of work is not only influencing front-office staff (e.g., sales consultants); instead, it impacts on the back-office staff such as integration architects.

The second section in this chapter focused on employment and actual changes that have taken place and are currently taking place in the six different banks covered in this study. The findings presented in this section are synonymous with the imperative for capitalists to engage in technological revolutions for the sake of profit, efficiency, and cost minimization. The respondent data have a solid understanding of the phenomenon that is 4IR - the fact that workers engage in 4IR jargon and acknowledge the societal impact of the 4IR is a reasonable justification to this point. Banks have no choice but to keep up with the times, but there is also an effort required by the broader society and the "black generation" that is enrolling in courses (e.g., bookkeeping) that have become inapt in the current banking system. Therefore, the impact of 4IR is not only making changes in work organization (e.g., mobility work or reduced foot-flow), instead, its impact goes beyond the workplace and into the broader society. The drivers of change in 4IR work processes are mainly a desire to maintain a competitive edge (this excludes Central Banks), and to establish a high level of convenience for clients to enable banking anywhere and anytime.

The presented findings suggest that the major banks in South Africa are heading towards a concept of Bank 4.0. Technologies impacting on work organization represents the banking industries' desire to move past the outdated legacy systems through the introduction of smart ATM's, video-booths, mobile banking applications and so on. These technologies require little to no human intervention, consequently, the bank becomes a digital artifact where services are offered from the comfort of the client's home. The respondents gave pessimistic and optimistic account of banking technologies such as robots; in the former there is a concern that workers will be replaced, in the latter there is an appreciation for technologies. The issuing of work tasks was similar across the various banks, this highlighted the nature of the hierarchical structures in the banks. The significance is that work tasks are systematically generated via digital means. Furthermore, there is a connection between the issuing of work tasks and employee monitoring. Simply, the issuing of work tasks correlate with the daily monitoring of employees, for example, an employee that has not met their KPI targets can be evaluated based on the Qmatic or CIS systems that monitor the daily activities of the worker.

The analysis on employee training is important because it relates to Braverman's deskilling debate that is largely critical of the capitalist labour process. The data obtained in this study does not allude to a "deskilled" and "degraded" workforce, instead, the data shows that banks are constantly upskilling employees by funding in-house training or formal training programs. Yet, a question remains on the extent of bargaining power that workers have due to the way in which technology makes skills and qualifications almost redundant. The fact is that as a new technology system/application is introduced, workers are then required to jump to the tune of the bank. Furthermore, banks that are constantly altering a worker's duties (in the name of flexible specialization) that are now being taken over by technology (e.g., admin work), suggests that workers only have two options: to accept being placed in another role or to end up jobless. This compels an argument that to some degree, the workers have no say in the capitalist labour process. The worker is therefore reduced to an unthinking cog in the organizational machine. The lack of confidence in trade unions and the systematic limitations in the bargaining efforts (e.g., no work no pay) is exemplary of the capitalist's control over the worker. Taking the aforementioned points into consideration, the 4IR is already making major changes in the organisation of work.

But that is not without any challenges, workers are not only required to deal with the system changes and the impact of those changes on their work activities. Instead, there are fundamental challenges with the systems and technologies which place a great deal of burden on the worker.

CHAPTER SIX

CONCLUSION

6.1 INTRODUCTION

This research paper has tried to contextualize some of the significant issues plaguing the organization of work in the banking industry particularly in the age of 4IR. These include the challenges in relation to the fundamentals of the LPT which allows for a better understanding of the drivers of a technological revolution and its impact on the organization of work and the well-being of workers. Earlier studies of work focused on the theoretical motivations for improving and organizing production; this study thus falls as part of the proceeding studies that are aimed at understanding the complexities associated with the control of labour. The core focus of this paper sought to analyze the authoritative and disciplinary structures that are maintained by technologies in the drive for profit and efficiency. These structures are guided by LPT elements focusing on factors of control, consent, resistance, and skills erosion through the application of 4IR technologies such as AI, robotics, and CPS systems. Ultimately, these developments can be linked to labour process analysis because the outcome is that machines reduce the human labour required to produce a unit of output.

6.2 EMPRICIAL FINDINGS AND CONCLUSIONS

This study sought to examine the banking industry as an example of an industry that is currently undergoing major technological changes in their service offerings and how work is organized at the banks. There is certain level of sophistication desired by the banks in terms of their production processes, one major ‘disruption’ concerns the way in which bankers’ work is transformed due to the digital migration in the bank’s service offerings. In the case of the bank: bankers have to deal with constant trainings, major modifications in work systems, and more intensified methods that ensure employee monitoring.

Essentially, management makes use of advanced technologies to control the way work is organized, the speed and efficiency of work, and the duration of work beyond the workplace. From a LPT point of view, these factors are crucial to ensuring profitability. The focal point of chapter four was to analyze the impact of technological change in the banking industry. The significance of illustrating and exploring the role technology in this sector is due to the role that technology plays in the financial sector as a whole. Consequently, it was considered pertinent to explore how technology is used in the banking sector and how it impacts on the workers' skill, autonomy, and value. The reliability between the data findings and the theoretical framework enabled a greater understanding of the drivers of technological revolutions. This further showed how technological revolutions impact on the organization of work and on the workers' wellbeing.

In the sphere of 4IR, the workers planning, and decision-making capabilities are highly concentrated at the level of the AI systems, robots and other 4IR technologies that integrate machinery and cyber-physical systems in their production processes. This research paper is not focused on the processes of the reasons for selecting a particular technology, or on the features of that technology. Rather, this study revealed the social relationships behind technological change. The realization of mobility work has become highly relevant in the 4IR as workers can carry out work tasks at home while under the control and supervision of management. The perspectives of workers and managers are considered to be crucial because they uncover both optimistic and pessimistic perceptions and experiences of technological drive.

The 4IR allows for a much greater level of control in the workplace compared to era of scientific management/Taylorism. This type of work organization is highly reliant on technologies in order to monitor workers (e.g., Qmatic system), issue out work tasks (e.g., KPI's), and to increase the overall efficiency of the production process (e.g., robots). The core of 4IR technologies is seemingly applied at a rudimentary level, this is because 4IR envisions (a) a bank that is completely intangible, (b) a high level of mobility work, (c) an increased sophistication of control measures, and (d) the transformation of worker skills. In terms of the skills debate, the strategy of the banking sector is to actually upskill workers which in turn results in flexible specialization and exhibits bits of Japanisation. However, this research found traces of the 'logic of accumulation', the simplification of tasks by means of advanced technologies is strategically used to transform the

production process on a constant basis. The gap between the worker's capability and actual effort in their productivity is significantly reduced.

6.3 CONCLUSION

The main conclusion is that 4IR technologies are effectively used by banks and corporations to not only increase profit and efficiency, but to also facilitate control over the entire production process with little help from the workers as much as possible. This includes the workers' mental planning and decision making, their skills, and their knowledge of the production process. As tellers, administrators, and financial advisory jobs become automated by RPA's, AI's, and robotics, where will entry-level jobs exist in the banking industry? Already, the self-service technologies (e.g. the 'N-Zone' interactive kiosk) have shifted the banker's work into the hands of the consumers. Whilst the worker gains from skills trainings and flexible work arrangements, the worker can also become a disposable entity in the capitalist production process. This is because knowledge is systematically detached from the workers (direct producers) and concentrated into the possession of management by means of advanced 4IR technologies.

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APPENDIX A

INTERVIEW SCHEDULE

Section A: Introduction

Respondent Details

First name	
Surname	
Position / Job title	

Contact details.

Home address	
Contact number	

Interview Details

Place of Interview	
Date of interview	/ /2020
Interview start time	:
Interview finish time	

Section B: Basic Demographic Information

1. What is your age?
2. What is your gender? (Male or female)
3. What population group do you belong to? (Black, White, Coloured, Indian)
4. What is your nationality? (South African or other)

Section C: Historical Background

5. What type of school did you mostly attend?
6. Do you feel that this school prepared you for higher education and the labour market?
7. Was banking your dream career?
8. Do you have a post-school qualification? (describe the school, and the type of qualification)
9. Do feel that this qualification prepared you for a career in banking?

Section D: Employment

10. Describe your employment history before your current job in the bank?
11. How did you secure your current job?
12. What is your job position?
13. Did you receive training for your current job? (explain)
14. How long have you been working at your current job?
15. What is your employment status? (casual; permanent; contract)
16. How many days do you work per week?
17. How many hours do you work per day? (Do you have breaks?)
18. Do you work on weekends or public holidays?
19. What does your job entail? (describe)
20. How is your work issued on a daily basis? (Who issues your work tasks?)
21. How are employees monitored at your workplace?

Section E: 4IR at work

22. What do you know about the 'Fourth Industrial Revolution', especially in the banking sector?

23. List and describe the technological changes that have taken place since you started working at the bank?
24. What do you think is driving the technological changes in your bank?
25. How have these technological changes changed the way work is organized at the bank?
26. How have technological changes influenced the banking experience of clients?
27. How has technological changes influenced your work duties and responsibilities?
28. Do you think the introduction of these technological changes increases worker efficiency? (explain)
29. Do the technological changes make work in banking easier? (explain)
30. Do you feel that your qualification and skills are being utilized in the bank?
31. Do you think the technological changes in your job have increased or reduced your skills capacity?
32. Do workers at the bank have the same qualifications and skill set? (explain)
33. Have technological changes increased or decreased the workload for employees?
34. Do you think that digitization in banking will lead to the replacement employees in the bank?
35. Has the changes in technology caused a reduction of employee numbers at your bank?
36. What are most challenging aspects of your job?
37. Is there room for growth and development (promotions) in your place of work? (explain)
38. Do you feel that your salary is enough, considering the work that you do?
39. Is there a trade union or a representative body (for employees) at your bank?
40. Has there been a strike since you started working at your bank?
41. Do you think that employee rights are protected at your workplace? (explain)

42. How do you see the future of banking work in the next ten years?