Adopting technology in favour of human labour: a managerial perspective on the impact of Fourth Industrial Revolution technologies in South Africa

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ABSTRACT

The unemployment rate in South Africa has reached unsustainable levels and the advancements in the capabilities of technologies associated with the fourth industrial revolution are such that what was once considered science fiction is now becoming a reality.

Making use of an exploratory qualitative research design, this study sets out to explore what would be the driving forces behind business leaders wanting to adopt fourth industrial technologies in South Africa and where does the responsibility for a solution reside to the unemployment challenges which South Africa faces. A total of fourteen semi-structured, in-depth interviews with senior business leaders across ten different industries took place to gather the required data.

The findings of this study showed that there is an awareness amongst business leaders when it comes to the technologies of the fourth industrial revolution, their capabilities, as well as the impact these technologies can potentially have in exacerbating levels of unemployment. The findings show however that business leaders do not believe that South Africa's current unemployment challenge has been caused by the adoption of technologies of the fourth industrial revolution primarily due to limited adoption rates.

Business leaders see competitive advantage as a strong enough driver to adopt technologies even at the expense of human labour, and concerningly they see South Africa's education system as inadequate when it comes to arming humans with the skills required to succeed in a world which is continuing to integrate with technologies of the fourth industrial revolution.

This research and its findings contribute to the extant literature on Technological Unemployment.

DECLARATION

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

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1. INTRODUCTION TO THE RESEARCH PROBLEM

1.1 Background

Since the dawn of the first industrial revolution in the mid-18th century, humans and machines have proven that it is possible to co-exist. In fact, research has shown that machines have made it possible for humans to thrive through the benefits of increased productivity which they (machines) provide (Autor, 2015).

However, that was then and this is now. Where technological advances since the first industrial revolution have mostly driven complementarity between humans and machines, the more recent advances of the fourth industrial revolution have seen the substitution of human cognitive ability by machines. Brynjolfsson and McAfee (2014) refer to what we are seeing as the 'The Second Machine Age' and somewhat poignantly they question the benefit for society in all of these technological advances.

The fourth industrial revolution with its array of ground-breaking technologies not only makes it possible to combine physical, digital, and biological worlds (Schwab, 2017), but at an unprecedented speed, undoubtedly a hallmark of the fourth industrial revolution, the continued co-existence between humans and machines is being challenged. The ability for humans to not only adopt and adapt to these technological advancements, but to do so timeously has renewed an age-old academic debate of whether machine capability, this time round, will succeed in replacing humans in the workplace (Acemoglu & Restrepo, 2020).

This study sets out to explore how business in South Africa, through those in leadership positions is considering its responsibility towards the country's unemployment crisis in the face of fourth industrial revolution technologies.

Since the term was first coined, 'Technological Unemployment' has proven an emotive topic amongst the academic community. Keynes (2010) explains technological unemployment to mean "unemployment due to our discovery of means of economising the use of labour outrunning the pace at which we can find new uses for labour" (para. 16). Those proposing that technological advancements be seen as the enemy are subject to being ridiculed as modern-day luddites with an unsubstantiated cause for scepticism and thus themselves becoming the enemy of progress. There is a call to approach the topic of technological unemployment in a refreshed manner and rather than

tackle the merits of the technological applications themselves it is being asked to seek to understand the role of business as a mediator between humans and machines (Fleming, 2019; Kim & Scheller-Wolf, 2019).

An exploratory study was conducted to understand how business leaders view the fourth industrial revolution, the use of its technologies and whether South Africa's unemployment levels indeed have a link to technology adoption rates within the workplace. The study further set out to understand if the pressure on business leaders to maintain competitive advantage is in fact a consideration in the adoption of fourth industrial revolution technologies, and as a result is there a sense of responsibility amongst business leaders to ensure their workforce is adequately skilled to maintain their employability and mitigate the risk of a further rise in South Africa's unemployment levels.

The role of business in society, business ethics and stakeholder theory must be relooked in the context of the fourth industrial revolution lest we forget whom it is that organisations are meant to serve (Strudler, 2017).

1.2 Research Problem

Frey and Osborne (2017)'s widely cited work estimates that on the current technology innovation trajectory, close to half of all jobs in the United States are at risk of automation.

The fear of technological unemployment has existed through the ages from as far back as the 1930's with John Maynard Keynes' already mentioned call for caution towards the machines, then again it resurfaced through the 50's, 80's and 90's (Fleming, 2019). However, a review of the labour market over the past two centuries, in the US at least, counter-intuitively shows an improvement in the employment-to-population ratio rather than the much-feared move towards mass unemployment (Autor, 2015). But here are the first of a few criticisms with the literature as it currently stands, firstly there is an extreme bias in favour of developed economies and secondly past performance should not be a proxy indicator for future outcomes.

By expanding on these two criticisms the research problem of this study is revealed. Firstly, developing economies and in particular South Africa have a unique set of socio-economic challenges (unemployment levels for one) that render the implications of technological unemployment far more dire when compared to developed economies

(Statistics South Africa, 2023). Secondly, the pace of change in the fourth industrial revolution and its associated technologies makes Autor (2015)'s point of an overlooked reality being those tasks unable to be automated by technology have typically been complemented by it almost redundant, as the pool of jobs/tasks once considered immune to automation is rapidly shrinking.

It is contested that in the case of the previous industrial revolutions the pace of change, although significant, was not fast enough to outpace the rate at which new jobs were created to replace the old jobs that technology displaced (Acemoglu & Restrepo, 2019). It therefore appears that there was no obvious mediator in the feared stand-off between humans and machines and co-existence proved to be possible.

But that was then, and this is now. Kim and Scheller-Wolf (2019) pose the question of meaning in a world without work opportunities and as a result they call for considered thought into what kinds of automation organisations should implement. Essentially, due to the challenges brought on by the fourth industrial revolution and the pace at which the technology environment is evolving, for humans and machines to continue co-existing in the workplace a mediation is required. This study seeks to contribute to the understanding of what form this mediation could take by relooking the construct of stakeholder theory in the fourth industrial revolution, positing that responsible leadership can play a leading role in the process.

Fleming (2019) calls for public organisational studies in this regard to address the need "not simply to speak out … but to speak out about the right things" (p. 33).

1.3   Research Aims

This research study does not set out to debate the merits of the fourth industrial revolution. It is conceded, for better or worse, that the advancement in the various technologies of the fourth industrial revolution will continue somewhat unabated, infiltrating almost every conceivable facet of human lives.

This study will look to explore the responsibilities of business leaders in mediating the relationship between humans and machines in the workplace given the high levels of unemployment in South Africa. The study seeks to better understand, under the concept of stakeholder theory if business leaders see a risk in the unique challenges posed to

humans by machines of the fourth industrial revolution, and whether or not this contributes to South Africa's unemployment levels.

1.4 Research Questions

This research study sets out to understand the role of Responsible Leadership in mediating the relationship between humans and machines where technologies of the Fourth Industrial Revolution are concerned.

With this objective in mind and based on the reviewed literature the researcher developed three hypotheses. The three research questions that follow were then formulated to evaluate these hypotheses.

1.4.1 Research question one

How will the adoption of Fourth Industrial Revolution technologies in the workplace improve or accelerate the rate of unemployment in South Africa?

1.4.2 Research question two

What factors drive the adoption rates of Fourth Industrial Revolution technologies?

1.4.3 Research question three

How relevant is the education system in supporting the development of the requisite skills needed for the future of work?

1.5 Significance

1.5.1 Business relevance

The threat to human labour in the workplace posed by machines and the technologies of the fourth industrial revolution should be of concern to business. While technological innovation to date has gone a long way in improving the efficiency of routine tasks, a projection of technological progress means that it is no longer an absurd thought that machine capability could take on tasks once believed to be reserved solely for human capability.

The topic should hold the attention of business as technological advances do not only have to be seen in a negative and fearful light, in fact Foster (2017) points out that it is

within the bounds of possibility for business to use the advances in technology for emancipatory ends. What may be comforting is that the advancements in the capabilities of technology, in particular artificial intelligence, are progressing in a predictable order (Huang & Rust, 2018), business leaders should therefore commit to themselves to get ahead of this disruption for the benefit of their stakeholders.

The challenge for business in South Africa is that the country's readiness to make use of the technologies of the fourth industrial revolution is worryingly inadequate (Levin, 2018). This lack of readiness should be of concern to business leaders as it is potentially leading to what Fleming (2019) has termed 'bounded automation', a concept that supports the theory of job polarisation as explained by Goos et al. (2014). Job polarisation accentuates the pay of highly skilled professionals, proliferates low-skilled jobs but at considerably poorer pay and displaces the 'middle' consisting of manufacturing and routine office workers.

Simply put, job polarisation increases inequality and with South Africa sitting as the fourth most unequal country in the world (Seery et al., 2019), business leaders should be concerning themselves with anything they could aggregate this situation.

1.5.2 Academic relevance

This study is seen to have relevance to academic debate as to date the focus of the fourth industrial revolution and its impact on human labour in the workplace has been biased towards the technology itself opposed to the impact of the technology on society (Xu et al., 2018). There is also a noticeable bias in the geographical focus towards developed economies (Acemoglu & Restrepo, 2020; Autor, 2015; Fleming, 2019; Huang & Rust, 2018; Mokyr et al., 2015).

This study is relevant to the academic debate of the fourth industrial revolution and its associated technologies due to its focus on the impact automation is having on the relationship between humans and machines in the workplace and how business leaders can take on the new role of mediators between the two. The study is further seen as relevant as it will potentially add to the conversation of business leaders' ethics in the face of automation technologies and how business leaders can positively contribute to a growing societal challenge (Fleming, 2019).

The above is captured in the work of Hollensbe et al. (2014) who point out that the role of business in society is in no way predetermined but that it will evolve based on moral and social choice.

2   LITERATURE REVIEW

2.1 Introduction

The fourth industrial revolution is another sign of mankind's innovative prowess when it comes to technology. The capabilities which technologies now possess or at the very least show potential of possessing in the near future are beyond the comprehension of even the most forward thinkers of the first three industrial revolutions, and it is because of this that the anxieties around technological unemployment have been renewed.

The literature review will work through what characterises the fourth industrial revolution and what differentiates it from the three which preceded it. Following this, the academic debate concerning technological unemployment will be unpacked and why, even if history has proven technological unemployment to have caused unwarranted anxiety when it comes to job losses, there is a renewed and growing concern that technology and human labour may this time round be on potentially catastrophic collision cause.

The literature will cover somewhat newer theories such as bounded automation and job polarisation and assess the grounds on which these have been based and where there may be growing tension on their efficacy due to the capabilities of fourth industrial revolution technologies. Following this assessment the literature will explore what is described as the axiological and teleological challenges presented by technology adoption at the expense of human labour. It is these thoughts which form the core objective of this research study, which is to simply understand what could happen if technology adoption renders the demand for human level irrelevant. Building on this a little further is what the impact of human redundancy will be when there are pervasively high levels of unemployment that exist.

Organisational ambidexterity, education in the fourth industrial revolution and automation versus augmentation are then explored as consideration sets facing business leaders as they wrestle with balancing the opportunities provided and the challenges caused by fourth industrial revolution technologies. What then follows is a look into artificial intelligence and its role, as one of the newer and more advanced technologies of the fourth industrial revolution, in the debate between machine and human labour.

The more recent academic literature looking into the broad topic of technological unemployment is beginning to test business model theories and because of this this literature review looks into stakeholder theory and how this alternative to shareholder

theory could be explored in the face of potential disruption to human labour caused by technologies of the fourth industrial revolution.

Finally, the literature review draws on research pertaining to responsible leadership and how the thinking contained in this body of research may be used as a variable to mediate the relationship between machine and human labour.

The literature review made use of, amongst others mostly three- and four-star journals to ensure a quality review could be achieved on the subject of technological unemployment and the associated topics with the fourth industrial revolution.

2.2 The fourth industrial revolution and the second machine age

Our current reality, having begun at the turn of the 21st century is that of the fourth industrial revolution which brings with it technologies that are proving to fundamentally change the way we live, work, and interact not only with each other but also with the very same technology driving this change (Schwab, 2017).

While progress has seen humanity move through three previous industrial revolutions, Brynjolfsson and McAfee (2014) point out that we are now in what they call 'the second machine age' where unlike the first machine age which saw production advancements that complimented human labour, technological advancements are capable of substituting human labour raising concerns once again that we may be entering a time in history where the fear of technological unemployment may finally materialise.

To appreciate just how powerful the fourth industrial revolution and its associated technologies is and why this revolution brings with it a new set of challenges compared to the first three industrial revolutions, a brief walk through each of the first three revolutions is what follows.

The first industrial revolution was broadly characterised by the introduction of steam power (Schwab, 2018). As far as the impact on human labour was concerned, the need for new skills that supported these technological advancements rendered the impact on the number of total jobs inconsequential.

The second industrial revolution saw the advent of mass production (Schwab, 2018). The technology through this era favoured both high and low-skilled workers where workers with mid-level skills (neither high-skilled nor low-skilled) were impacted the most

as they were replaced by those with low-skills and supervised by high-skilled workers (Chin, et al., 2006).

The third industrial revolution had as its hallmark the microchip which made automation possible (Schwab, 2018). Highly skilled works with the ability to understand and make use of technologies powered by microchips were seen to enjoy a level of job security as their skillset, their cognitive ability was out of the reach of technologies which existed at the time. Technology capabilities of the time complimented skilled human labour, and at the same time created enough productivity which in turn ensured new jobs were created faster than the rate at which substituted jobs were destroyed.

The first three industrial revolutions had their fair share of labour disruption, all of which has mostly been proven to be temporary in nature. The concern with the second machine age is the speed at which the change in technology capability is occurring and because of this rate of change it is hypothesised that studies fail to comprehend how big the challenge between humans and machines in the workplace could get, if left unchecked. Brynjolfsson and McAfee (2014) point out that the exponentiality of growth being experienced is in a way unable to be comprehended by human understanding.

This implies that the scope of the challenge unfolding, specifically the relationship between human labour and machines in the workplace is underestimated and that a form of mediation is required before the impact on human labour caused by the fourth industrial revolution is permanent.

What this mediation may look like is the contestation of this study.

2.3 The Fourth Industrial Revolution

The term 'Fourth Industrial Revolution' is synonymous with Klaus Schwab, the founder and executive chairman of the World Economic Forum (WEF). Schwab describes the fourth industrial revolution as a world where humans move between virtual and offline reality with the use of connected technology to enable and manage their lives (Xu et al., 2018).

The Fourth Industrial Revolution, why is it different?

From the turn of the millennium, we have seen the beginning of what we now know to be the fourth industrial revolution. Loosely characterised by the internet and artificial intelligence (Schwab, 2018) the fourth industrial revolution is a period in time where we are experiencing exponential change in what technology is capable of, and while change, even exponential change, is synonymous with a revolution, what makes the fourth industrial revolution different to the three which preceded it is the speed at which this change is occurring.

It is this rate of change which, as already mentioned, has once again put human labour and technology on a collision course as the speed at which the machines are "learning" is far greater than the speed at which humans can acquire new skills required to survive. Due to the redundancy of human labour, technological unemployment, is once again a much-debated topic in academic circles.

History has proven Keyne's terminology as it is defined to be somewhat of a red hearing and as Autor (2015) points out that this is in most part because while technology advances which created automation opportunities were designed to substitute human abilities (musculature, handiwork and "wetware") for machine capabilities (mechanical power, consistency and digital calculation), there are tasks which have not been substitutable by automation, but encouragingly have been complemented.

Worryingly for humans, that is now beginning to change as the tasks being complemented by technology have been those that require the cognitive skills which humans possess which under the first three industrial revolutions were beyond the capability of the technologies of the time (Susskind & Susskind, 2016) but as Huang and Rust (2018) point out that may no longer be the case.

However, while this may all be true it is important to point out that the spirit of Keynes' assertion is arguably more precise than he himself would have liked as we have been at odds with technology, and possibly more now than ever before. What we are seeing though is that the debate around the impact of technology on human labour is starting to shift away from whether there is an impact and what the extent of that impact is or will be (broad acceptance of truth here), and turning towards the normative questions inherent in the world of artificial intelligence (Kim & Scheller-Wolf, 2019) and calls for "Public Organisation Studies" to address pressing public concerns (Fleming, 2019).

Schwab (2017) argues that the job market in the fourth industrial revolution may become increasingly segregated into low-skill low-pay and high-skill high-pay roles, which could escalate social tension. Without proper mechanisms of the stakeholder capitalism in place in the fourth industrial revolution, workers will lose their jobs, and there is going to be serious problems of poverty and food insecurity. In addition, the fourth industrial revolution will exacerbate inequality. The challenges posed by rising inequality in the fourth industrial revolution are hard to quantify, as a great majority of people are consumers and producers, making innovation and disruption to affect the living standards and welfare of people both positively and negatively. Schwab (2017) suggests that the fourth industrial revolution could lead to greater inequality, particularly in its potential to disrupt labour markets. These problems are critical, and the effects of some of these challenges are currently being experienced by humanity. However, the doctrine of the Stakeholder Theory or stakeholder capitalism argues that the purpose of the company in the fourth industrial revolution is to ensure that people are treated with dignity and respect (Schwab, 2019a). Companies should honour diversity and strive for continuous improvements in working conditions and employee well-being. In a world of rapid change, companies should foster continued employability of its employees through ongoing upskilling and reskilling (Schwab, 2019a). This clearly explains that if the stakeholder theory is properly incorporated in organisations, the problems associated with rapid technological changes such as job losses will be addressed with minimal effort because companies will strive to ensure that their employees remain in an employability state. Not only the issue of job losses will be addressed once stakeholder capitalism is adopted, but inequality can also be contained in some way. Schwab (2019a) argues that when companies embrace stakeholder capitalism, they will serve society at large through their various activities, supporting the communities they operate from and paying a fair share of taxes. When companies do this, inequality will be greatly reduced, which is unlike traditional capitalism where the winner takes it all mentality rules.

The stakeholder theory has defined a view of capitalism that stresses the interconnected relationships between a business and its customers, suppliers, employees, investors, communities, and others who have a stake in the organisation. Furthermore, the fourth industrial revolution was defined as a way of describing the blurring of boundaries between the physical, digital, and biological worlds. It is a fusion of advances in artificial intelligence (AI), robotics, the Internet of Things (IoT), 3D printing, genetic engineering, quantum computing, and other technologies. In this study, it was discovered that the doctrine of the stakeholder theory could allow the companies in the fourth industrial revolution to have good capitalism, known as stakeholder capitalism. With this

stakeholder capitalism, the study discovered that some of the problems directly and indirectly associated with the fourth industrial revolution, such as inequality, loss of jobs, climate change and cyberwars and technological exclusion/digital exclusion, could be solved if companies embrace the principles of the stakeholder theory. The study also found that when companies embrace stakeholder capitalism, they would serve society at large through their various activities, support communities they operate from and pay a fair share of taxes. This can help to address inequality. Taxes will be used by governments to fund various social welfare projects that will help to reduce the gap between the rich and the poor. Based on the findings of the study recommends that organisations embrace the doctrine and principles of the stakeholder theory for the world to have good capitalism, which can help to solve challenges affecting the world today. (Mhlanga & Moloi, 2020)

This study does not attempt to determine if the current wave of technological advancements will have an impact, temporary or lasting, on human labour. These are taken as a given insofar as having an impact is concerned. This study has its focus more on the view that business leaders appear to hold a key (possibly 'THE' key) to unlocking the challenge posed to human labour by technological advances and that business leaders have an increasing role to play in mediating this impact, and no more so than those business leaders who find themselves operating within South Africa where the context of significant unemployment levels (Statistics South Africa, 2023) and social inequality (International Monetary Fund, 2020) provide added complexity to the possibility of machines replacing human labour on a mass scale.

Causes, Consequences and Solutions

The debate surrounding technological unemployment can be simplified on one side of the proverbial equation to causes (where attempts are made to understand the drivers behind technological unemployment) and with that the potential raft of consequences (both favourable and unfavourable) and then on the other side of the equation the possible solutions to these consequences.

Lima et al. (2021) lean into the understanding of the consequences of automation and the potential social impact these advances have, they also put forward possible actions to be taken. It's important to note here that Lima et al. (2021) highlight indirectly the bias in modern literature towards developed nations and that a research gap exists on this

topic when it comes to developing nations. This point is also highlighted, again indirectly, by the widely cited studies of Frey and Osborne (2017).

Lima et al. (2021) calls out as a consequence the increase in inequality that technology advances may perpetuate. It is in fact this risk, one of capital distribution, that Kim and Scheller-Wolf (2019) note as being more significant than current literature is giving due credit.

2.4 Technological Unemployment

What is technological unemployment?

John Maynard Keynes, in 1930, somewhat prophetically put forward that in the coming century society would be at odds with technology. It was from this assertion by Keynes that the term "technological unemployment' was born and a term over which academic literature has been divided since its creation.

Technological unemployment simply put is the loss of employment due to technology. However, technology and unemployment are both a lot more complex and to view technological unemployment with such simplicity would be to misunderstand how these two variables, being technology and unemployment, have interacted with each other since Keynes' assertion over a century ago.

Technological unemployment was defined by Keynes when he coined the term as "unemployment due to our discovery of means of economizing the use of labour outrunning the pace at which we can find new uses of labour" (Keynes, 1963/1930, p. 364).

Akst, (2013) introduces automation anxiety, what will the future hold if there is greatly improved computing power, artificial intelligence and robotics raises the possibility of replacing labour on a scale not previously observed. There is no guarantee every person will earn a minimum wage. The catalyst of the anxiety which exists due to automation (Akst, 2013; Autor, 2015) has arguably been the industrial revolutions which have seen society witness the creation of steam powered machinery through the mid-18th century (the first industrial revolution), the introduction of mass production in the late 19th century (the second industrial revolution) and the invention of computing technology at the turn of the millennium (the third industrial revolution) (Schwab, 2018). All three of these

revolutions made it possible for automation to exist, such that machines were able to replace, at least in these instances, the jobs of unskilled or semiskilled workers.

Academic debate on the merits of the anxiety levels created by the possibility of technological unemployment has been as constant as the term itself. Notwithstanding this anxiety, the stubbornly held view of labour economists is that in the long run technological innovation does in fact create more jobs for humans than it destroys (Autor, 2015).

What is different now in the fourth industrial revolution when compared to the three that preceded it is the speed at which technology capabilities are advancing, such that the hallowed arena of human emotion and higher-level cognitive thinking, once inaccessible to the machines, is being threatened. It is this change in landscape which resulted in Brynjolfsson and McAfee (2014) reigniting the conversation around technological unemployment, and in particular countering critics of the past. They have injected into the critics of technological unemployment the variable of exponential change. This rate of change, they argue, makes it plausible that a critical mass of human workers displaced by machines will be unable to acquire the required skills fast enough to avoid the displacement becoming permanent.

Frey and Osborne (2017) predicted that the current workforce of the United States is highly susceptible to job automation, with up to 47 percent of jobs at risk of being automated within the next 20 years. These concerns are further compounded by the ability of artificial intelligence, machine learning and robotics to perform tasks that prove a challenge to humans. These tend to be less expensive to maintain, can learn faster and are less likely to lose interest in tasks that are repetitive when compared to human labour. Essentially, these traits represent significant cost and efficiency benefits to organisations that adopt automation, as the technologies can carry out some tasks more accurately and at a lower cost than humans (Qureshi & Syed, 2014).

2.5 Automation and new jobs - Why do the critics exist?

To believe that technology, but more specifically automation, destroys more jobs than it creates and thereby to not embrace the benefits of technology is to be a Luddite. Over two centuries ago the Luddite uprising caused by the fear of significant job losses in the British textile industry led to property destruction in the hope of preventing the progress of what they believed were job destroying technologies.

In the mid-twentieth century the concerns around job losses due to automation had returned and were enough for a commission of enquiry in the United States of America into the impact of technology and automation on unemployment. The enquiry was to investigate concerns, not with the technologies themselves, but rather into the growing concerns that productivity improvements created by the use of such technology and automation were rising so fast that there was a risk that these improvements would outstrip the demand for labour (Autor, 2015). The commission found the concerns to be invalid insofar as they related to unemployment and that "the basic fact is that technology eliminates jobs, not work" (Bowen, 1966, p.9).

The critics of technological unemployment lean on history which shows that workers being displaced from employment due to technology is a temporary phenomenon and that in the long-run, technology has created more employment opportunities than it destroys. This is evidenced by the fact that the employment to population ratio rose during the 20th century (Autor, 2015).

Acemoglu and Restrepo (2017) and Chiacchio et al. (2018) underline the fact that automation affect wages and employment in two ways: The direct displacement of workers from the tasks they previously performed creates displacement effect which negatively affects employment and the increase in demand for labour by industries which creates productivity effect which positively affects wages and employment.

Badet (2021)'s research introduces the importance of education into the technological unemployment equation by concluding that automation will inevitably displace many of the jobs currently performed by human labour, but especially those jobs which require either a low level of education or skill or both. The growing importance of education is highlighted by Badet (2021)'s findings that new jobs (smart jobs) will be created through this displacement period and that these new jobs will require a higher level of skills.

Fleming (2017)'s research supports the view that machines are not likely to replace all jobs, however due to socioeconomic and organisational forces the process of digitisation and adoption of artificial intelligence is constrained when human labour is the casualty. Bounded automation is what Fleming (2017) uses to explain why low-skilled jobs are likely to flourish not perish and why semi-skilled jobs will be more difficult to come about.

2.6 Bounded Automation

The impact of socioeconomic factors is a variable in the technological unemployment debate that are more prevalent in developing countries. The widely cited literature of Frey and Osborne (2017) has its origins in the United States which somewhat dilutes its applicability to developing economies like South Africa.

'Bounded automation' is Fleming (2017)'s attempt to explain how socioeconomic factors affect the use of technologies in organisation. Fleming (2017) puts forward that the adoption of fourth industrial revolution technologies such as artificial intelligence is hindered by the cost of labour, labour unions and the type of task. Bounded automation is one way to explain why it was possible to put a man on the moon over fifty years ago, yet today there are still work processes carried out in a very manual fashion.

Developing economies are characterised by a large percentage of their population living below the poverty line and as a result human labour is oversupplied and the cost supressed. It is this factor that has for many years been a competitive advantage for organisations residing in developing countries as human labour costs undercut the required investment in technology. Fleming (2017)'s assertions around cost of labour are a case in point of this research study as the speed at which fourth industrial revolution technologies are advancing will cause downward pressure on their investment requirements and as such narrow the gap to, and therefore the benefits of, manual labour provided by developing countries.

Labour unions are a key component to technology adoption and they (labour unions) play a key role in adoption of technologies due to the power they hold over organisations. Employers it is expected would prefer to utilise technology where this would result in a redistribution of the balance of power between themselves and the labour unions as this would potentially eliminate workforces emboldened by strike activity used to submit employers to their requests (Silver, 2003).

The third factor in Fleming (2017)'s bounded automation theory is to consider the nature of the task which human labour performs. The industrial revolutions that preceded the fourth iteration were limited in the scope of technology capability and as a result, where part of the task contained a human component which proved indispensable, only part of the task was then able to be automated. This fragmented capability of technology protected human labour in the types of tasks which required human cognition. Customer demands also play into this area where even if the technology exists to substitute human

labour, customers may be demanding of human interaction with certain services deemed as sensitive, an example provided by Biggs (2015) is in the activities surrounding banking services, where customers it shows prefer and require human interaction when verifying whether or not their bank account has been compromised. Challenging this assertion almost ten years later is the fact that fourth industrial revolution technologies have not only advanced far enough to now challenge human labour's cognitive abilities but also enjoy far more ubiquity in modern society and with it also challenge the merits of at least one factor supporting Fleming (2017)'s bounded automation theory.

2.7 Job Polarisation

What the critics to technological unemployment ignore, or conveniently gloss over, is the shift in the types of jobs that technology has both destroyed and created. Goos and Manning (2007) called the outcome of technology replacing routine tasks "job polarisation", which resulted in a disproportionate distribution of wages across the occupational skill spectrum leaving the 'middle-class' exposed and in somewhat of a 'no-(wo)mans' land. While wage and capital distribution are not focal points of this study, their impact as witnessed by income inequality is of particular relevance to the context of the South African employment market, a context that would serve future literature studies well.

Acemoglu (1999), Autor et al. (2006), Goos and Manning (2007), and Goos et al. (2009) (among others) document that employment is becoming concentrated at the tails of the occupational skill distribution. This process has accelerated since the 1980s, as per capita employment in middle-skill jobs disappears. This hollowing out of the middle is linked to the disappearance of occupations focused on "routine" tasks which are those activities that can be performed by following a well-defined set of procedures.

2.8 Axiological vs Teleological challenge

Kim and Scheller-Wolf (2019) define two challenges which business managers will need to lean into when embarking on the journey of not only automation but the wide-spread adoption of fourth industrial technologies which as shown are now able to 'play' within the arena once reserved for human cognition. The first challenge, defined as axiological, considers that if an unwanted but inevitable outcome to the machine age is technological

unemployment what is the unintended consequence of limiting working opportunities and with it that very act which provides meaning to those who provide their organisations with human labour. Kim and Scheller-Wolf (2019) label this unintended consequence a 'meaning crisis'. The second challenge, only in sequence but not in importance, which business leaders must face is that of the role of business ethics in the coming machine age, defined as the teleological challenge which places a burden on business leaders to be mindful that there is not only the capitalist responsibility of shareholder theory to maximise profit for the providers of their capital but that a responsibility to their employees exists to understand what is the purpose of business in future society.

2.9 Organisational Ambidexterity

Organisational ambidexterity is understood as the achievement of balance between the exploitation of what is known and what need to be known (Andriopoulos & Lewis, 2009; March, 1991; O'Reilly & Tushman, 2013; Rojas-Cordova et al., 2022; Rothaermel & Alexandre, 2009; Tushman and O'Reilly, 1996). As business leaders utilise current capabilities within their organisation with consistency and execute with routine discipline, they can maintain a competitive advantage and with it achieve acceptable earnings. Exploration or innovation is the acquisition or creation of new capabilities which hold the power to safeguard earnings and improve competitive advantage thereby securing the organisation's continued existence (O'Reilly et al., 2009). Highly ambidextrous firms manage to not only efficiently create products or services, but at the same time are also able to constantly work on innovating or creating new products or services (Heavey et al., 2015; O'Reilly & Tushman, 2013; Raisch & Birkinshaw, 2008).

Automation, a technology established through the earlier industrial revolutions with the advent of steam power but which has been enhanced through the third industrial revolution on the back of the microchip and computing, is now seen in the fourth industrial revolution as the transfer of operational processes from humans to artificial systems. The fourth industrial revolution's addition to the automation process shifts automation technology from providing complimentary capabilities to human labour and thereby increasing productivity, to being a substitutive technology which will gradually replace human labour in its entirety with machines (Arntz et al., 2017; Autor, 2015). In an increasing global market as organisations worldwide continue to work to maintain or increase their competitive advantage, they increasingly rely on automation technologies to improve efficiency (Jungmittag, 2021; Vanacker et al., 2021; Wright & Schultz, 2018).

Competitive advantage can be maintained or improved by achieving a balance between exploration and exploitation, by being ambidextrous. The literature on organisational ambidexterity stresses both the benefits and importance of a achieving a balance between exploration and exploitation (e.g., Raisch & Birkinshaw, 2008; Raisch et al., 2009). However, an increasing level of investment in automation led by a focus on the capitalist benefits which automation provide may lead to tensions with innovation management as exploitation is favoured making it more challenging for organisations to secure sufficient time and resources for exploration.

An imbalance towards automation runs the risk of upsetting the balance between exploration and exploitation, which in turn could lead to increased tensions for individuals and organisations aiming for high levels of ambidexterity as a means to superior competitive advantage. In such a scenario, the axiological challenge put forward by Kim and Scheller-Wolf (2019) would not garner the required attention.

The increase in the automation of business processes in conjunction with fourth industrial revolution technologies is predicted to have a far-reaching impact for employees in developing countries dependent on historical advantages through cheap labour (Autor, 2015; Morrar & Arman, 2017; Vanacker et al., 2021; Wong & Ngin, 1997). The evidence available suggests that the benefits associated with automation technologies, such as reducing costs, production efficiencies, and reliable production (e.g., Åström et al., 2022; Parthasarthy & Sethi, 1992), hold far greater weight than the detrimental effects of automation on employees such as redundancies (Gasteiger & Prettner, 2017). As a consequence, when pursuing avenues of competitive advantage via automation, organisations may face renewed tensions between efficiency gains and retaining employees. If these tensions are not resolved, employers' risk unstable and disengaged labour which carries with it organisation costs capable of outweighing the benefits of automation.

2.10   Education in the fourth industrial revolution

Brynjolfsson and McAfee (2014) have gained prominence in the conversation of mass unemployment due to technology through their writings in their book, The Second Machine Age. They argue that as a result of the pace at which technology is advancing, a hallmark of the fourth industrial revolution, the view that technology in the long run

creates more jobs than it destroys has possibly lost its relevance due to the fact that technology, the machines, are themselves acquiring the new skills required to take advantage of these advances at a rate faster than which humans can learn them. Those skilled workers with "special skills or the right education", are well placed to benefit from these advances, however those semi-skilled or unskilled workers face a far more uncertain and undoubtedly scarier future.

Fleming (2017) discusses three categories of workers; the highly skilled, the semi-automated occupations and those in roles unworthy of automation. The first category possesses technological expertise at a managerial level which makes automation computerise. Semi-automation of jobs relates to jobs which can be digitized but require an element of human involvement. Skills scarcity and demand remain a decisive factor when determining where a job falls. Lastly there are jobs which are not worthy of automation because the costs of labour are so low it does not warrant the investment into machinery.

It has been pointed out already that Badet (2021) predicted an impact on jobs which require a low level of education and/or skill. On the other end of the spectrum organisations will need highly qualified professionals whose talents will be in great demand and will be able to train other workers to better master and better adapt to the new tasks that automation will generate.

Badet (2021) call out that 54% of employees will need to learn new skills to meet the expectations of the new tasks created by automation and 35% of these workers will need training for at least six months, training for more than 6 years will be necessary for 9% of workers and 10% will need training for more than one year (World Economic Forum, 2018). But we often see a mismatch between skills and technologies because workers need to master the use of new technologies in industries but they often do not possess those skills to do those tasks. These new skills often require a high educational or experimental capacity, which workers in most situations do not have. Most of the time it is also difficult for employers to find workers that can master the new jobs and tasks induce by the intensive automation (Deloitte & the Manufacturing Institute, 2011).

If low-skilled jobs are impacted by technology adoption and productivity gains do create new jobs, the employment in the future which is created by this adoption will require high levels of education. In this context, jobs requiring less educational requirements are in danger and at the same time, the demand for jobs requiring educational capacities or higher skills increases. The education system plays a decisive role in the new jobs that

will lead to automation. The quality of skill depends on the quality of the educational system. If the educational system is not up to the skill requirements that new jobs require, the outcome is a mismatch between skills and technologies. Education systems, formal or informal which are capable of providing sufficient knowledge to an organisations human labour can be seen as a tenant of competitive advantage.

Badet (2021) shows that both macro and socioeconomic factors of a country such as the economic structure, the investment policy into new technology, and also the quality of education, will impact the effect of automation on employment. The rate at which countries adopt technologies such as automation therefore varies as a result of the prevailing macro and socioeconomic conditions. The influence of automation on the job in technologically advanced countries will be different from that in technologically stagnant countries.

Education for the future should turn its focus more towards knowledge and understanding of new technologies. Automation and by extension the more advanced technologies of the fourth industrial revolution such as artificial intelligence does not need to be seen as a threat to human labour, but to be able to benefit from these technologies, human labour must be equipped by focusing training and skills development more towards the skills that these new technologies will require.

2.11   Automation vs. Augmentation

"A simple idea to fine-tune the purpose of future business" (what is the purpose of future business?)

Douglas C. Engelbart proposed it in 1962 as an alternative mindset to automation. He wrote: By "augmenting human intellect" we mean increasing the capability of a man to approach a complex problem situation, to gain comprehension to suit his particular needs, and to derive solutions to problems. [….] We do not speak of isolated clever tricks that help in particular situations. We refer to a way of life […].

To embrace the latter, business leaders should take steps toward augmentation sooner than later, study the future of business, and think about the axiological loss that they would likely incur with respect to meaning in life if they did nothing but recklessly and naively automate in the coming decades

Fast becoming an ethical challenge for business leaders rather than an economic challenge. Centred around the question of, "what is the role of business in society". Is it to create wealth for capital owners, is it to provide meaning through employment or is it to continuously innovate as a means to maximise productivity. But to what end?

The variables to this equation are automation and unemployment, the mediator (or antagonist) this study puts forward is for business leaders to act with care and through and hold a mindset broader than just a capitalist endeavour. What this research study is calling for is for business leaders to apply responsible leadership alongside technology adoption and human labour.

Unemployment as a consequence of automation (or technological advances) has garnered a fair amount of academic attention over the years with both critics and supporters to the theory of Technological Unemployment. Critics will show the facts that technological advances have in fact created more jobs than they have erased. However, one could argue that in the age of the fourth industrial revolution and with the coming of the second machine age, the speed at which technological advances are progressing have reignited the fears of those who support the merits of technological unemployment.

There is a gap in the research available on this topic when it comes to developing economies, which highlights the inherent risk in viewing the technological unemployment theory only from a developed nations standpoint, as developing economies bring with them far more complex societal challenges, often supported by high levels of inequality and unemployment.

Responsible leadership, like the research on technological unemployment is subject to a gap when it comes to developing economies, but not only this, responsible leadership is now being needed to be thought about from an ethical viewpoint and not only a strategic angle, such that leaders look to not only maximise shareholder wealth under capitalist regimes but also do good in society. Profit versus purpose is a commonly used phrase, but in the age of machines the purpose side of this equation is growing in complexity and diminishing in clarity.

Disruption associated with automation has the potential to influence business processes and transform industries. This view was supported by Gans (2016), who suggested that disruption brings opportunity for organisations to gain competitive advantage by implementing innovative ways of addressing the disruption.

Over the years there have been potential solutions proposed to mass unemployment ranging from guaranteed minimum income schemes provided by the government (funded by the taxpayer), to free education (The Hearld Post, 1966).

Autor (2015) posits that we have not experienced mass unemployment due to technological advances as a result of the economic reality that where automation cannot substitute a task, it will generally complement the task and through that add economic value to the process. The challenge to this viewpoint is that it was made in a time where technology's ability to substitute more than just human muscularity was seen as fanciful dreaming, suited to the world of science fiction. Today's advances have turned this viewpoint on its head by virtue of the increasing realisation that through artificial intelligence, machines are far more capable of replacing human tasks that involve higher level of cognitive thinking.

The purpose of this study is then not to argue the impact or relevance of technological advances on human workers, nor is it set out to debate technological unemployment and whether, like during the first three industrial revolutions it is likely to be only temporary in the current and fourth iteration.

This study acknowledges both these variables, being technology and unemployment, and looks to add to the equation of technological unemployment the role of leaders in business and looks to test what role business leaders play in the equation and to what extent, if at all, they can be viewed as mediators.

Brynjolfsson and McAfee (2014) highlight that having the right set of skills or level of education to cope with technological advances positions workers in an enviable position as we stare into the second machine age. And while an older article, the Time magazine story of February 24,1961 pointed out that, in reference to that time, "Today's new industries have comparatively few jobs for the unskilled or semi-skilled…". This statement still holds true in today's fourth industrial revolution.

Virgillito (2017) points out that developing countries will feel the impacts of automation and artificial intelligence far more than developed countries with their workforces comprising an overwhelming weight towards semi-skilled and unskilled labour. It is argued that due to the speed of these technological changes, workers are unable to acquire new skills at a pace faster than which they are being displaced and therefore these workers are powerless to protect themselves against the wave of technology and the potential havoc it can create. Business leaders have never held more responsibility

through an industrial revolution as custodians of the working class, even more so in a country like South Africa where economic factors over and above technological advances are placing even more pressure on the ability to find work, as evidenced by the rising unemployment statistics (Statistics South Africa, 2023).

World Economic Forum (2018) identified preferred skills in the age of automation which if acquired would protect against redundancy; which included complex problem solving, critical thinking, creativity, management of people and collaboration. Responsible leadership, if applied by business leaders in the face of rapid technology advance, it is put forward is a catalyst to creating these skillsets.

Reskilling is seen as a necessity for business leaders to address the potential for displacement of the workforce. Reskilling in the areas of 'the future of work' will enhance the possibility that workers can avoid substitution of their work and rather work alongside technology as a complimentary agent, improving their own productivity, or even better their quality of life. Responsible leadership as a principle would do well to be developed in this area, possibly ahead of any other (purpose over profit).

2.12   Artificial Intelligence

Hao (2018) explains that artificial intelligence induces machines to learn, ration, and act independently taking on cognitive level thinking once the ground reserved only for humans. Artificial intelligence is a generic term for various methodologies designed to provide computers with human-like abilities to see, hear, reason, and learn (Güngör, 2020).

In the fourth industrial revolution, where information is created and transmitted at a rate faster than ever before, Miller (2018) defended that human labour and machines working together is fundamental to a superior level of individual capacity.

In its infancy, artificial intelligence was primarily used to replace mechanical, routine, and analytical tasks. The impact of artificial intelligence on human labour can vary from replacing only a small task to the extreme case of a total replacement of human labour. The point is, the capability exists and as a result artificial intelligence is expected to be introduced gradually across employment sectors, but first where adoption benefits are strongest (Stone et al., 2016).

Distrust in Artificial Intelligence

The adoption of artificial intelligence does not necessarily provide the benefits promised or expected as adoption does not always mean an efficient interaction between human labour and machines due to the presence of fear of redundancy.

Siau and Wang (2018) report that trust in artificial intelligence can be achieved through transparency around implementation and the achievement of superior performance. Business leaders would do well to manage the perceptions around adoption of artificial intelligence to alleviate the fears of job loss and a view that through mass unabated adoption there would be the eventual sidelining of human intelligence and the consequent destruction of society (Stone et al., 2016).

Stone et al. (2016)'s findings call out to business leaders that as a society we are now at a tipping point when it comes to determining how to adopt technological solutions in ways that would promote just how human labour could thrive alongside the technologies of the fourth industrial revolution. Competitive market forces will continue to support further technological advances and Atkinson (2019) argues that such advances should not be slowed down on the account of anxiety over job losses, but rather strategies be created and deployed which have at their core a solution for human labour to adapt to technically advanced jobs, the so-called future of work.

Artificial intelligence and machine learning have gained traction in recent years and business leaders are comprehending that even with the potential for job losses that these technologies are still worth adopting. The benefits attributable to improved productivity and efficiency of human labour because of these technologies are being seen as essential to a superior competitive advantage (Ramachandran et al., 2022).

2.13   Stakeholder Theory

Stakeholder theory is seen as a credible alternate view of capitalism to the more popular shareholder theory and places a high level of importance on the interconnected relationships between a business and its customers, suppliers, employees, investors, communities, and others who have a stake in the organisation (Wagner et al., 2012; Fontaine et al., 2006). The theory is built on the foundation of creating value for all stakeholders, not just shareholders (Fontaine et al., 2006).

Clarkson (1995) describes stakeholder theory through three factors, namely the organisation or the company, other stakeholders, and finally the nature of the company relationships.. Clarkson (1995) goes further and describes stakeholders as being divided into two groups; primary and secondary stakeholders. Primary stakeholders as expected are those stakeholders formally tied to the company, often through contractual relationships such as customers, suppliers, employees, and shareholders. Secondary stakeholders it follows are those stakeholder tied to the company on a more informal basis, typically without contracts such as government authorities or the local community (Wagner et al., 2011). Stakeholder management is thought to be fulfilled by the managers of an organisation. Managers should not only manage an organisation for the benefit of its stakeholders, ensuring their rights and participation in decision-making, but they should also act as the stakeholder's agent to ensure the survival of the organisation and in doing so safeguard the long-term interests of each group (Fontaine et al., 2006). All stakeholders, to varying degrees will influence the business environment, avail resources as required, exert influence on the company, and benefit from its growth, efficiency, and reach, whether positive or negative (Donaldson & Preston, 1995). Because of this interconnectedness with stakeholders, it is critical to maintain sound and stable relationships with both internal and external stakeholders (Freudenreich et al., 2019). The long-term sustainability of an organisation is achieved by the quality of its relationships with defined stakeholders (Freeman, 1984).

Approaches to Stakeholder Theory

Donaldson and Preston (1995) share that stakeholder theory should be regarded as a combination of theories for the effective management of its stakeholders. As a result of this view, stakeholder theory is divided into three distinct approaches: the normative, instrumental, and descriptive approaches (Donaldson & Preston, 1995, Friedman & Miles, 2006). The normative approach is guided by the view that the purpose of an organisation should be based on ethical principles (Friedman & Miles, 2006). This approach assumes that stakeholders' interests should be given priority by business managers regardless of the impact on the organisation because doing so is the ethical responsibility of managers in being responsive to the legitimate claims of stakeholders (De Colle, 2005). The descriptive approach explains the interaction between managers, organisations, and stakeholders (De Colle, 2005). The descriptive approach serves to improve the understanding of the complex relationships that exist between the different stakeholder groups (De Colle, 2005). Lastly, the instrumental approach assumes that in

order for managers to maximise the objective function of an organisation, they must consider the interests of the stakeholders and that ignoring stakeholder interests can be a significant risk to the organisation (De Colle, 2005)

Changing Stakeholder management

Friedman (2010) holds the view that the objective of an organisation is not about social responsibility, it is about capitalism: "use its resources and engage in activities designed to increase its profits so long as it stays within the rules of the game, which is to say, engages in open and free competition, without deception or fraud" (Friedman, 1962, p. 133). Freeman (2010) sees things in a different light and that the objective of an organisation is more about how profits are obtained through (1) the building of meaningful relationships with its customers, (2) through providing great products and services, (3) by building solid relationships with suppliers who keep operations up to date, (4) with employees and a commitment to improve the company's processes and (5) with communities that allow for the company's sustainable growth.

Stakeholder theory in the fourth industrial revolution

As already stated, an organisation's stakeholders are interested parties that, directly or indirectly contribute to its wealth creation and activities and are therefore potential beneficiaries as well as conduits of risk (Post et al., 2002).

Broadly speaking there are three business models that companies can choose from, being shareholder capitalism, state capitalism and finally the stakeholder capitalism (Schwab, 2019b). Shareholder capitalism is widely embraced by most western organisations, where it supports the notion that the primary goal of a company is to maximise profits in favour of shareholders (Schwab, 2017; Schwab, 2019a). State capitalism entrusts governments to come up with the direction in which the economy should move and this has been embraced mostly by organisations in emerging countries, mostly notably in Asia (Schwab, 2019b).

One of the reasons given by the World Economic Forum for embracing stakeholder capitalism in this age is the "Greta Thunberg" effect; "The young Swedish climate activist who argued that adherence to the current economic system represents a betrayal of future generations, owing to its environmental unsustainability" (Schwab, 2019b).

Another reason in support of stakeholder capitalism was that executives and investors have begun to appreciate that their long-term success is closely linked to that of their customers, employees, and suppliers (Schwab, 2019b). As a result, stakeholder capitalism is gaining in popularity.

Whittaker (2019) states that governments and philanthropists cannot fix the evident ills of capitalism on their own. Government and philanthropic actors alone cannot solve deep, systemic problems like inequality, the future of work, and climate change on their own. Competitive marketplaces need to be part of the solution. This is one of the central motivating forces behind the stakeholder model, which is the recognition that the much-vaunted shareholder primacy pathway is showing sign of being inadequate in modern society when it comes to an inclusive solution, and that private enterprise has a growing role to play in improving people's lives (Whittaker, 2019).

2.14   Responsible Leadership

Responsible leadership can be understood as "a relational [and purpose-driven] influence process between leaders and stakeholders geared towards the establishment of accountability in matters pertaining to organisational value creation" (Maak et al., 2016, p. 464).

While there is growing consensus amongst business leaders that responsibility at the individual and organisational level is important, there is still a general knowing-doing gap in regard to responsible leadership and only limited 'orienting knowledge' for executives to lead responsibly in emerging countries, let alone navigating complex situations.

Literature on responsible leadership in emerging markets is rare and has mainly focused on leaders of western multi-national organisations conducting business in emerging economies (Moody-Stuart, 2014; Stahl et al., 2016).

Roles of a responsible leader

Responsible leadership roles that are particularly relevant to the leadership challenges of the fourth industrial revolution are the normative roles of the leader as steward, citizen, and visionary. The leader as steward is a custodian of values and resources with a strong ethical decision-making compass (Paine, 2006). Acting out this role is to protect what

one is entrusted with (this can range from organisational values and heritage to environmental protection) and to ensure that there is consistency between the philosophy of the organisation and the actions and deeds of organisational members as they interact with stakeholders (Maak & Pless, 2006).

The leader as visionary is equipped with foresight and a long-term perspective. Role behaviour plays out in the motivation and inspiration of followers through a clear sense of purpose which is directed towards all legitimate stakeholders of the organisation.

Lastly, the leader as citizen recognizes that business and society are inextricably intertwined and as a result has a responsibility to not only address but also resolve societal problems. This role behaviour shows up in the demonstration of caring behaviour aimed at the wellbeing of all communities that are impacted by the operations of the business (Pless, 2007).

Characteristics of a responsible leader

Muff et al. (2020) shows how five competency dimensions of responsible leadership have emerged: (1) creating, managing, and securing good relations with multiple stakeholders, (2) ethically correct and values-based behaviour, (3) a continuously developed self-awareness, (4) good understanding of the interdependencies of a larger system, and (5) the ability to lead change and innovation towards sustainable development.

Schraa-Liu and Trompenaars (2006) continued the above train of thought by combining the understanding of system interdependencies with the need for respecting multiple stakeholder relations. These types of leaders are characterised by being able to recognize and respect their diverse responsibilities and act on them by successfully engaging the organisation and its varying stakeholders.

Responsible leadership and stakeholder theory

Maak et al. (2016) have identified two normative responsible leadership approaches, an "instrumental" one and an "integrative" one. Leaders with an instrumental responsible leadership approach are described as being focused on the organisational objectives of maximizing profits and realizing growth, as well as being able to prioritise business

performance above all else, paying little or no attention to noncore business issues. These types of business leaders feel that they are only accountable to shareholders of the organisation through their fiduciary duties and have a limited range of stakeholder interactions, focusing mainly on shareholders/owners/founders of the organisation and a selective group of core business constituents, such as employees, suppliers, and governments. Instrumental leaders understand these constituents as a means to an end to achieve business objectives and interact in an instrumental, transactional and/or rule-based manner (Pless et al., 2012). In stark contrast, leaders with an integrative responsible leadership approach are described as leading with a broader focus on value creation and integrating business and societal objectives. These types of leaders feel accountable to all legitimate stakeholders and as a result will engage with a broad range of constituencies, including fringe stakeholders. They understand these stakeholders as ends in themselves, engage in active communication and collaboration with stakeholders, and pursue a collaborative and inclusive approach.

Leaders who follow an integrative logic are not only guided by a moral rule of law, "but also [by] what the mature person with a 'good' moral character would deem appropriate" (Ferrell et al., 2000, p. 54). Maak et al. (2016) argue that leaders following an integrative logic are guided by more than just profit maximisation and are driven by a social welfare orientation. Integrative leaders consider needs of all legitimate stakeholders, including those termed as discretionary and who can neither create urgency nor have power (Mitchell et al., 1997).

Responsible leadership and the responsibility to an employee as a stakeholder

Responsible leadership which follows an integrative approach has an ethical imperative for organisations to create the conditions for meaningful work because meaningful work is seen as a fundamental human need (Yeoman, 2014). Building on this, a second perspective of such leadership style is the concern with moral requirements internal to the organisation such as structural conditions for employees to experience themselves as autonomous and responsible agents (Ciulla, 2012) or the responsibility for creating an ethical climate where employees experience alignment between personal and organisational values (Kahn & Fellows, 2013).

Leadership as mediator

Since the term was first coined, 'Technological Unemployment' has proven an emotive topic amongst the academic community. Keynes (2010) explains technological unemployment to mean "unemployment due to our discovery of means of economising the use of labour outrunning the pace at which we can find new uses for labour" (para. 16). Those proposing that technological advancements be seen as the enemy are subject to being ridiculed as modern-day luddites with an unsubstantiated cause for scepticism and thus themselves becoming the enemy of progress. There is a call to approach the topic of technological unemployment in a refreshed manner and rather than tackle the merits of the technological applications themselves it is being asked to seek to understand the role of responsible leadership as a mediator between humans and machines (Fleming, 2019; Kim & Scheller-Wolf, 2019).

The roles and characteristics of responsible leaders along with stakeholder theory create a melting pot of thoughts to consider in how business leaders can approach the technologies of the fourth industrial revolution and the impact these have on human labour such that competitive advantage of organisations can be maintained or even enhanced while not contributing to growing unemployment, especially in developing economies.

2.15   Conclusion

Technological unemployment and the anxiety that surrounds it has been shown to be a constant theme throughout the industrial revolutions. Despite compelling arguments that aim to disprove the fear of mass unemployment due to advances in technology and the consequential automation of jobs, the topic of technological unemployment and the impact on society is heating up again.

Such is the speed of progress in this area, the foundations of the counterviews to mass unemployment are being tested not too long after they were proposed. Existing literature focuses more so on the technology; this study attempts to advance the conversation by bringing the role of business leaders as mediators to this technology into the equation and using the principles of responsible leadership to do so.

Accepting that the fourth industrial revolution and its associated technologies are unavoidably pervasive, it is the view of this study that the role of business leaders as lead actors in society needs to be promoted.

The literature review set out to understand why the fourth industrial revolution is different to the three that preceded when it comes to the anxiety it creates around unemployment and by extension if the concept of technological unemployment is now in the fourth industrial revolution cause for concern

From this **Research Question 1** arose:

How will the adoption of Fourth Industrial Revolution technologies in the workplace improve or accelerate the rate of unemployment in South Africa?

The literature review then illuminated the constructs of responsible leadership and stakeholder theory in the context of the fourth industrial revolution and sought to understand their relevance in the contest between humans and machines in the workplace, from this **Research Question 2** arose:

What factors drive the adoption rates of fourth Industrial Revolution technologies?

To conclude and tie the literature review together the role of business leaders as mediators in the relationship between humans and machines was explored and an attempt was made to understand the broader responsibilities of business leaders in the push for automation, from this **Research Question 3** arose:

How relevant is the education system in supporting the development of the requisite skills needed for the future of work?

3   RESEARCH QUESTIONS

As presented in chapter one, the research aims of this study set out to understand the role of business leaders in an increasingly ubiquitous digital world, where not only because of the advances in automation, artificial intelligence, and other technologies of the fourth industrial revolution, but also because of the speed at which we are seeing these advances occur, the capability of machines and/or technology threatens to supplant humans in the workplace. Chapter three, considering the research problem put forward in chapter one, sets out three research questions based on the existing literature presented in chapter two.

Research Question 1: How will the adoption of Fourth Industrial Revolution technologies in the workplace improve or accelerate the rate of unemployment in South Africa??

Research question one sets out to evaluate how business leaders, in the face of worsening levels of unemployment in South Africa view the impact that adopting fourth industrial revolution technologies has on the levels of unemployment in South Africa.

This research question aims firstly to understand South African business leaders' levels of awareness around the technologies of the fourth industrial revolution, how pervasive they believe these technologies have become in the workplace and the impact these technologies have had on the unemployment levels in South Africa.

Research question one also aims to gain insights into the thoughts of South African business leaders around whether government should be intervening through legislation or perhaps by any other levels of involvement to govern the adoption of fourth industrial revolution technologies in the South African workplace.

Research Question 2: What factors drive the adoption rates of fourth Industrial Revolution technologies?

Research question two sets out to evaluate what factors drive South African business leaders, when it's potentially at the expense of human labour, to adopt fourth industrial revolution technologies.

This research question aims to understand the views of South African business leaders when it comes to what their corporate purpose is, how their corporate purpose is defined and in a broader sense who it is that corporates should exist for.

Research question two is also expected to highlight how South African business leaders have handled employees affected by the adoption of Fourth Industrial Revolution technologies.

Research Question 3: How relevant is the education system in supporting the development of the requisite skills needed for the future of work?

Research question three sets out to evaluate if South African business leaders are directly or perhaps indirectly contributing to the unemployment levels in South Africa by not helping employees within their organisations to develop the skills necessary for the future of work.

This research question aims to understand how South African business leaders view their own roles in dealing with unemployment in South Africa, what role education plays or should play in developing skills for the future of work and whether they believe the South African education system can meet this need.

4 RESEARCH METHODOLOGY

4.1 Introduction

This section provides a discussion into the research methodology that was used to achieve the stated research aims introduced in chapter one and answer the research questions as laid out in chapter three. Chapter two established that while there is extensive literature on the topic of technological unemployment, there is relatively little insofar as technological unemployment relates to developing countries and seemingly even less so when it comes to the more normative questions which technological unemployment is now posing in developing countries. With this understanding, the research adopted a qualitative approach, following an exploratory methodology to research design, data sampling, gathering and analysis.

To set the context, the fourth industrial revolution along with its related technologies is a dominant topic in both academic and business circles when it comes to the impact that it is having on the workforce, but in particular on the (future) need for human labour.

Given how much of modern society is being shaped by technologies of the fourth industrial revolution and with the global pandemic forcing a gear change in the speed at which the rate of these technologies is developing as well as the ease at which they are being adopted, the anxiety around technological unemployment has returned.

It is expected that in the face of rising unemployment in South Africa along with the pressures to maintain any form of competitive advantage, business leaders may not appreciate the responsibility they hold when it comes to the role they play in maintaining harmony between humans and machines in the workplace. With human labour and technology as the variables in this unemployment equation, this study agitates towards the principles of Responsible Leadership as a mediator. It is with all this in mind that the main purpose of this study, to understand the managerial perspective on the impact of fourth industrial revolution technologies on human employment, was created.

The ATLAS.ti software was used to analyse and categorise the data collected via one-on-one semi-structured interviews with a sample of business leaders into individual codes, code groups and research themes. This chapter is concluded by discussing ethical considerations, quality controls and limitations inherent to the research design.

4.2 Research Methodology and Design

What follows in this section will set out how the research study was designed when it comes to the research methodology, sampling, data gathering and analysis. As the research questions pose more of a socio-economic challenge, there is a need to understand the subjective meaning of social action (Bell et al., 2019). An interpretivist paradigm was therefore selected with an inductive approach as it was believed that themes would become clear, and new insights would emerge from the data collected (Saunders & Lewis, 2018).

It is acknowledged that there is a knowledge gap in understanding how responsible leadership applies in developing countries, especially in the face of societal problems such as social inequality. Furthermore, responsible leadership insofar as it relates to the pervasiveness of technology in the workplace and therefore the impact it has or could have on human employment levels is also relatively new in the academic field as is evidenced by the limit in available research on the topic. It is these limitations which led the researcher to follow a qualitative research methodology and an exploratory approach being selected.

Pragmatically, given the time constraints to gather and analyse primary data through interviews, a cross-sectional study was deemed to be a suitable fit-for-purpose approach (Saunders & Lewis, 2012; Zikmund, Babin, Carr & Griffin, 2013). A mono-method was used in the data collection which is conducted solely through a qualitative process of semi-structured participant interviews and purposive sampling.

Data collation for this study was achieved through face-to-face semi-structured interviews with senior business leaders across a variety of industries as it was felt that the purpose of this study lent itself to more of a societal nature and is therefore agnostic to industry choice. All the interviews were conducted online via Microsoft Teams due to time constraints of both the researcher and the interviewees as well as the practical challenges with proximity to the subjects at the time when the interviews were scheduled.

Although the interviews followed a semi-structured approach which allowed, by design and if required, adjustments to be made as insights became apparent (Saunders & Lewis, 2018), the same interview questions were asked of all the interviewees.

4.3 Population

Saunders and Lewis (2012) define a population for purposes of a research study as all members of a group.

Due to the level of unemployment in South Africa reaching record highs (Statistics South Africa) and its pervasiveness across all levels of society, it is deemed reasonable to consider unemployment as a national crisis which requires a concerted effort from not only the ruling government party to solve, but also from the top echelons of all South African businesses. The relevant population for the purposes of this research study was therefore identified to be senior business leaders from both public and private sector businesses in South Africa.

The researchers professional network allowed for access into the senior levels of public and private entities across varying industries and who were expected to hold positions of influence in their respective organisations when it came to employment strategies and who could therefore provide relevant data in the attempt to understand a manager's perspective on the impact of Fourth Industrial Revolution technologies on human employment.

Candidates' suitability to sample criteria was established during the interviews through interview questions 1c, 2a, 2b, 5b & 10.

4.4 Unit of Analysis

The unit of analysis was seen as the perspectives to be offered by the senior business leaders not only in how they may personally perceive the topic of technological unemployment in the context of South Africa's own societal challenges but also, given their positions within their organisations and influence into their corporate strategies how they see the principle of responsible leadership in the face of technological unemployment influencing their organisation's purpose, if at all.

4.5 Sampling Method and Size

Relevance played a key role in selecting the sample for this study. Senior business leaders who are influential in their respective corporate strategy design, who are responsible for either the championing of or execution against their organisational

purpose and whose organisations have already implemented or are seriously considering the application of technology to automate jobs, tasks and/or processes.

The sampling method deemed appropriate for use in this study was purposive and non-probability in design, a sampling technique often associated with qualitative research (Taherdoost, 2016). The goal of this chosen technique was to ensure that through the process of selecting the participants there was relevance between the chosen sample and the research questions being posed (Bell et al., 2019).

Further support for the choice of the purposive sampling method being suitable for this study was that a listed strength of this method, amongst others, is that it is ideal for exploratory research (Malhotra & Birks, 2007).

To begin with, the sample was sourced from the researcher's professional network which is believed sufficient to gain access to senior business leaders that meet the specified criteria for this study. Furthermore, the researcher's colleagues have long-standing relationships with many senior business leaders and these networks were leveraged to gain further interviewees. Lastly, to be able to round the sample off, snowball sampling also proved useful where referrals to senior business leaders who met the specified criteria were obtained from initial interviewees (Bell et al., 2019).

The suitability of the size of a sample relies on the need to reach saturation. As to what the ideal sample size should be, this point in qualitative research is keenly debated (Gerson & Horowitz, 2002; Guest et al. 2006; Mason, 2010; Warren, 2002). With it being particularly challenging at the outset of a research study to know what the ideal sample size would be to reach saturation but knowing that saturation is the criterion for sample size, specifying the exact sample size was deemed pointless (Bell et al., 2019). As an indication though, Mason (2010) found that the sample size across interview-based qualitative research tends to have a median of 28. Warren (2002) points out that a sample size of between 20 and 30 appears to be acceptable in academic circles.

The researcher holds a particular interest in the outcome of this study and as a result did not hold a fear of conducting a high number of interviews. However, the concept of technical and data saturation was well noted at the onset of selecting the sample as well as the time burden that conducting and coding interviews would (an did) present. With this thinking, the researcher set out to conduct between ten and fifteen interviews, appreciating that because of saturation this number would likely vary on either the low or the high side. The researcher ended up concluding a total of fourteen interviews.

4.6 Research Instrument

With the constraints of work commitment, time availability and cost imposed on the researcher the interview method was deemed to be the most attractive as a data collection method.

As expected, the literature review provided a cacophony of voices around the fourth industrial revolution and the observed impact of its associated technologies and the uses thereof. However as already stated there is a noticeable gap in the conversation when it comes to (1) the practical implications of these technologies on human labour within South Africa which is grappling with systemic socio-economic challenges and crippling unemployment levels and (2) considering the first point, the effect that the fourth industrial revolution technologies have on South African business leaders dealing with the pressure of maintaining a competitive advantage.

The research questions were derived from the literature and provide a specific set of topics that need to be covered through the interview process, however given the researcher's perception that senior business leaders, and by extension their organisations, are not giving sufficient thought to the implications of unrestricted adoption of fourth industrial revolution technologies on South African society, there does need to be sufficient leeway provided to the participants to gain insights into their thoughts on the topic as the interviews unfold. Following Bell et al. (2019)'s advice, a semi-structured interview is seen as most appropriate to achieve the objectives of this study.

A draft interview guide (Appendix 3) was created based on the views already detailed and because the robustness of an exploratory study is improved through additional insights gathered in the process, the interview approach was designed to start off broad to build context and understanding to the research problem with the participants, following which the focus was narrowed to gain more focused insights and thoughts of the interviewees. The Interview questions were also mapped against the research questions.

Lastly, as the fourth industrial revolution and its associated technologies do have many points of interest there is a need to keep a specific focus on the objective of the study. As noted by Bell et al. (2019) and as further support of the qualitative interview protocol in this study, they highlight that an advantage of qualitative interviews is that they are well suited to keep the researcher focused in addressing specific research questions.

4.7 Data Gathering Process

As part of the university's required protocol to conducting research, ethical clearance was obtained (Appendix 1) prior to any engagement with the intended participants. It was not seen as a necessary requirement to gain any authorisation from the organisations for which the interviewees worked as the unit of analysis was the perspectives offered by each of the senior business leaders.

Data gathering was conducted using the semi-structured interview approach as literature aligned to the objective of the study was found to be limited. The researcher held a view that face-to-face interviews would yield rich insights as the semi-structured nature of the interview, facilitated by an interview guide, would allow flexibility for the researcher to probe for new information and for an exploration beyond the specific questions asked of all the interviewees (Saunders & Lewis, 2018).

The researcher initially conducted pilot interviews to improve clarity in the process as well as to eliminate possible ambiguity. The pilot interviews were carried out with a fellow student as well as a work colleague. A further objective of doing this was to gain comfort in the academic lens being applied through the research questions (student pilot) and then to test the interview guide in the context of an organisation when interviewing senior business leaders (colleague pilot).

The researcher was cautious that given the topic of the study and its polarising nature the risk of the conversation diverting away from the focus of the research questions did exist. This would place pressure on the expected time constraints of the interviewees and therefore care was taken to guide the interviewees to, at a minimum, answer the interview questions.

Fourteen online interviews were conducted with senior business leaders over a time period of just under four weeks. Microsoft Teams was used for all of the interviews, and upon acceptance from each of the interviewees the proceedings were recorded. Three of the interviews were conducted from an international office while the researcher was on an international business trip, three were conducted from the researchers home and the remaining eight interviews were conducted from the researchers place of work. A copy of the interview guide (Appendix 3) was emailed to each participant ahead of the interview along with a consent form which was signed and returned to the researcher prior to the interview taking place. Each of the interviewees had the purpose of the research study explained to them, ensuring that the purpose of the study and their

participation was understood and again, in addition to the signed consent form, agreed upon.

4.8 Data Analysis Process

The process of analysing the qualitative data through the research is cause for angst felt by the researcher and the description of 'attractive nuisance' by Miles (1979) did resonate well even before the data gathering process had begun.

The approach towards the qualitative data analysis in this study is in line with the most common method of thematic analysis (Bell et al., 2019). The researcher looked to identify themes that emerged through the data gathering process that provided insights at worst and answers at best to the research questions.

It was anticipated that interviews would be recorded by use of electronic devices, after written consent to this approach was received from each interviewee. For purposes of efficiency, the use of a transcriber was considered beneficial to assist in transcribing each of the interview recordings, and the output thereof was then analysed. The ATLAS.ti software package was also used to help code, categorise and sort through the data, as well as search for common themes that emerged from the interview process.

An interpretivism, qualitative approach to research requires meaning to be extracted from the collected data. It was anticipated that Saldaña (2013)'s research model would prove to be useful in the coding of the data and the emergence of thematic groupings, as expected, did occur from the data from which analysis was drawn.

The interview process resulted in audio recordings, field notes and transcriptions from audio into text. All these outputs from the interview process were stored electronically in duplication across more than one system platform to ensure that the data was kept secure and allowed for an easy retrieval process if required. All electronic files were kept within password protected locations to ensure the confidentiality of the contents contained therein. The use of the transcriber was supported by a signed non-disclosure agreement before access to the audio files was provided.

4.9 Research Quality and Rigour

To ensure that the quality of this study is sufficient the three prominent criteria in business research of reliability, replicability and validity need to be demonstrated (Bell et al., 2019).

The researcher views the end-to-end interview process to be an iterative one and as such pilot tested the interview questions and interview guide before proceeding with the interviewees. Although the candidates helping to test the interview guide satisfied the criteria to form part of the study, they were excluded from the sample to avoid any researcher bias given the nature of the researchers work and proximity to these individuals. Their input however assisted greatly in improving the quality and rigour of the research instrument and by association the objective of the research focus.

The research questions were explained in detail with each participant to the study as the focus holds an ethical focus on the implementation of job automation technologies and the researcher felt that there was a need to avoid the potential for 'virtue signalling' when it came to discussions around corporate purpose and therefore possible participant bias.

4.10   Limitations

As pointed out there were pilot interviews conducted to enhance the quality of the interview process. This process is also conducted to address the potential limitation that existed due to the inexperience of the researcher in conducting interviews (Roulston, 2010).

Researcher bias was noted as a potential limitation to the study given the researchers keen interest into the subject of responsible leadership and technology adoption considering South Africa's crippling unemployment levels. Maintaining a robust following of the interview guide, recording the interviews, and making use of professional transcribing services were seen as suitable counter controls.

Finally, due to the nature of the study and the negative impact job automation can be perceived as having on unemployment, it is noted that a limit to the study exists in participants potentially not being forthright about the motivations for automation technologies being applied or considered in their businesses. The researcher needed to build trust in the research process and its ethical guidelines with participants as quickly as possible to mitigate this limitation.

5   RESULTS

5.1 Introduction

Chapter five is set out to present the results of the analysis which was conducted on the data collected through the fourteen semi-structured interviews. The layout of this chapter follows the logic of describing the sample selection, affirming sample suitability, and proving data saturation.

An outcome of the qualitative analysis was a set of code groups which were formed by the categorisation of individual codes. The key themes of the research emerged from these code groups and it is against these themes which the research questions as set out in chapter three are discussed in chapter six.

5.2 Sample Description

Table 1 lists the relevant details of the participants to the interview process. The names of the participants as well as their respective organisations have not been disclosed to preserve anonymity of responses. To ensure such anonymity each participant has been allocated a unique interview participant code.

It was seen as important to the efficacy of the research that the interviewees to the research study held a degree of seniority and leadership responsibility within their organisation, this contributed to increasing the probability of rich data being extracted from each interview. Secondary to this requirement, but still seen as important was the diversity of industry from which the interviewees emanated, such that a heterogenous view was achievable.

All fourteen of the interviews were conducted using the Microsoft Teams platform to account for the availability of not only each participant but also the interviewer. The ability to interview participants who held the level of seniority described was made possible by both the direct and indirect professional network of the researcher. Each interview participant was provided with the research topic, research questions and a brief overview of the purpose of the study prior to sitting for the interviews.

Without exception, the researcher provided confirmation to each participant that their anonymity would be assured throughout the research process.

Table 1: Research participants ordered in the sequence of each interview held

Participant	Industry	Role	Gender	Interview Length
IP #1	Agriculture	Executive	Male	01:00:19
IP #2	Telecommunications	CFO	Male	01:00:31
IP #3	FMCG	CFO	Female	00:37:53
IP #4	FMCG	CFO	Male	00:49:00
IP #5	Manufacturing & Retail	CEO	Male	01:22:07
IP #6	Legal	Partner	Male	01:19:47
IP #7	Banking	Senior Manager	Female	01:01:34
IP #8	FMCG	CFO	Male	00:39:20
IP #9	Technology start-up	Founder	Male	00:54:08
IP #10	Banking	Director	Male	01:12:52
IP #11	Telecommunications	Director	Female	00:42:06
IP #12	Mining	Senior Manager	Male	00:41:24
IP #13	Logistics	CCO	Male	00:58:48
IP #14	Insurance	Senior Manager	Female	00:39:09

5.3 Data Saturation

The first seven interviews took on average one hour and thirty minutes with the second seven interviews only taking an average of fifty-five minutes. This is indicative of the fact that it proved less time intensive to move through the second half of interviews as fewer unique codes and therefore new insights were generated.

Data saturation is determined as being reached at the point where no new insights to the research study are achieved during the coding process (Strauss & Corbin, 1998). At this point it is determined that further data collection will be of little value to the research study (Saunders et al., 2016, Fusch & Ness, 2015) and accordingly further interviews are deemed unnecessary.

Taking the above into account, collection of data was showing signs of completion due to saturation after the ninth interview. Interview ten provided a growth in new codes which supported continuing with the scheduled interviews. Interview participant #10 worked within the financial service industry and the growth in new codes corroborated the finding that the impact of automation on human labour is affected by the industry as well as the growth stage of an organisation. Interviews eleven – fourteen were conducted to ensure saturation but also because they had been arranged prior to knowing when data saturation would be achieved. Their conclusion further supported the assertion that data saturation had been achieved after interview eleven.

Figure 1 below is a graphical representation of data saturation

Figure 1: Data saturation

Research Codes
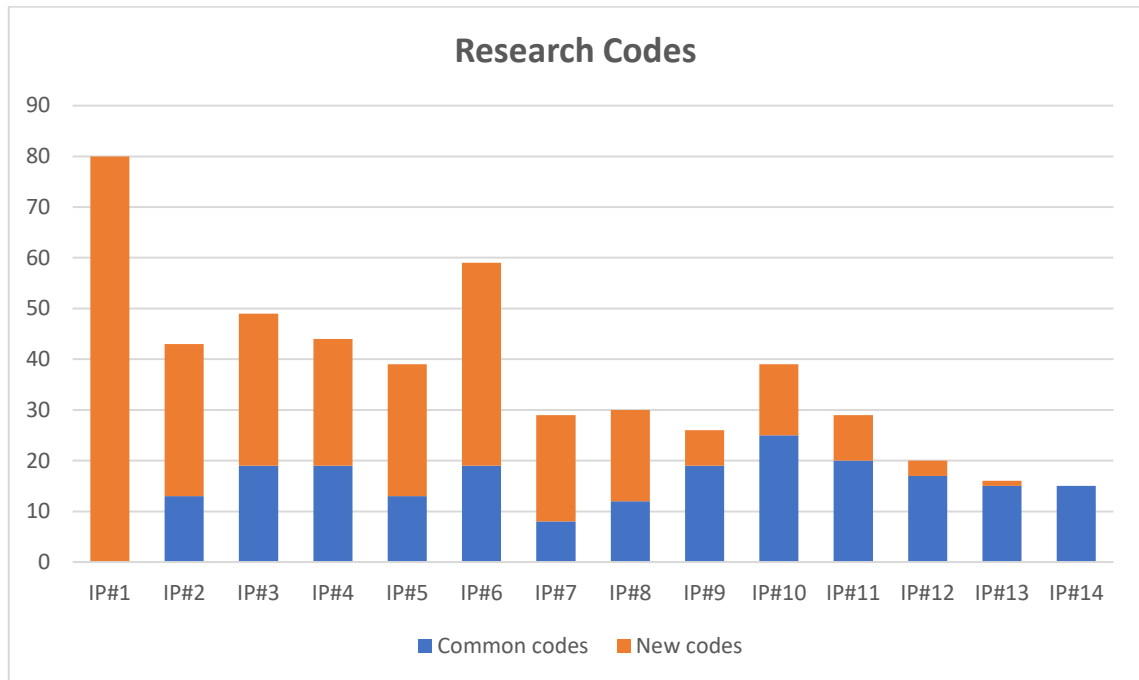
5.4 Suitability of Sample

The sample for this research project was chosen based on the purpose of the study which is to gain insights into how business leaders in South Africa are approaching the adoption of fourth industrial technologies, and what drives this adoption where such adoption has the potential to substitute human labour and thereby potentially compound unemployment levels.

As each of the interview participants meets the sample criteria of being a business leader in South Africa by virtue of the organisations they work in and the roles they hold, each interview participant proved to be suitable for purposes of the study.

5.5 Results: Research Question 1

Research Question 1: How will the adoption of Fourth Industrial Revolution technologies in the workplace improve or accelerate the rate of unemployment in South Africa?

The literature in chapter two points out that history has arguably shown the term 'technological unemployment' to be more temporary in nature as technology, in the long run, eliminating jobs but not work (Autor, 2015). Chapter two also points to the impact being felt by the rapid changes in the capabilities of technology under the fourth industrial revolution and why 'technological unemployment' may now, through the fourth industrial revolution, be of more concern to human labour than in the three previous industrial revolutions.

With one of the highest unemployment levels in the world (Statistics South Africa, 2023) as well as the highest level of inequality, as measured by the Gini-coefficient (International Monetary Fund, 2020). South Africa already face a major threat to its economic stability. It is therefore put forward in this study that the renewed threat to unemployment levels, caused by the adoption of technology in the workplace at the expense of human labour should be treated with extreme caution by both the public and private sectors.

Chapter two highlights the impact of technology on human labour and the speed at which technology is advancing. Based on the assertions of the literature, the aim of this study is to gain an understanding into how business leaders in South Africa are viewing their role in the renewed debate of (wo)man versus machine and the possible existential threat that machines pose to human labour.

Research question one aims to build an understanding of the interview participants' level of knowledge and understanding amongst South African business leaders when it comes to the fourth industrial revolution and its associated technologies. Research question one seeks to understand the interview participants' views on how pervasive these technologies may have become in the workplace and if they view these technologies to have played a role in the unemployment levels that are seen in South Africa.

Research question one also aims to gain insights into the thoughts of South African business leaders when it comes to government involvement and whether government has a role to play in technology adoption that impacts the level of human labour in the workplace.

Summarised, South African unemployment levels are unsustainably high. Will an unabated adoption of technology by business leaders at the expense of human labour further exacerbate the situation?

Interview question 1a sought to test each of the participants knowledge and understanding of four key terminologies to the study, these being - the Fourth Industrial Revolution, Automation Technologies, Technological Unemployment, and Responsible Leadership.

Interview questions 1b & 1c provided an insight into the interview participants' views around the level of adoption of these technologies by South African businesses as well as how they, as business leaders, view the impact of technology adoption on the levels of unemployment in South Africa.

Interview questions 2a & 2b turned the focus onto the organisations where each of the interview participants work and to gain their insights into what impact the adoption of technologies has had on their employees.

Finally, interview question 3 sought to gain insight into the interview participants' views on government intervention when it comes to fourth industrial revolution technologies and unemployment.

The literature review in chapter two called out that if technological unemployment is now a more credible threat to human labour than it has proven to be in the past, there is then a pressing requirement to look at the challenge of technological unemployment from a different viewpoint where business leaders will need to consider their responsibility to a broader set of stakeholders than may have traditionally been the case.

It is this train of thought and debate which sets the foundation for research question two and the questioning of business leaders around organisational purpose and not only being able to define stakeholder groups, but to also understand what responsibility towards these groups may look like through the fourth industrial revolution.

Business leaders, the literature calls out in chapter two, have a growing dilemma which is imploring them to consider their impact on society and the role they play should they proceed unabated with technology adoption at the expense of human labour.

It is from this thinking that this research study raises the construct of responsible leadership and what this may mean to business leaders in the context of a renewed anxiety around technological unemployment.

5.5.1 Knowledge and Understanding

Literature on the subject of technological unemployment has been shown to have a bias towards developed countries. It was therefore seen as a requirement for this research study to test South African business leaders' levels of understanding on the subject matter. Through the introductory stage of each interview the interview participants' understanding of the fourth industrial revolution, automation technologies, technological unemployment, and responsible leadership were tested and discussed to create a foundation on which to build research questions two and three.

The responses from each of the interview participants were grouped into code groups and from these code groups consistent themes could be seen to emerge. With each interview it became evident that the frequency with which unique code groups emerged did reduce. In addition to this progressive reduction in code groups the average time taken to conclude the second half of interviews also reduced, and in doing so supported the assertion made in section 5.3 that data saturation had in fact been achieved.

5.5.1.1 Knowledge and understanding of the fourth industrial revolution

THEME	CODE GROUP
Broad Interpretation	Jargon
	Sentiment
	Industry dependent
Business Models	Competitive advantage
	Speed of change
Digitisation	Data economy
	Digital transformation

	Robotics

Technology has unquestionably advanced over the years and while it may be seen to be ubiquitous in modern society, the technologies of the fourth industrial revolution when it comes to substituting human labour are quite specific (i.e. machine automation, robotics, and artificial intelligence). It stands to reason that if business leaders are able to fully appreciate the impact that these technologies can have on human labour they are expected to have a level of knowledge not only on what the fourth industrial revolution is but also the capabilities that technologies of this revolution possess. It's further expected that if business leaders do not understand or haven't heard of the term, 'technological unemployment', they would at the very least appreciate the ability of fourth industrial technologies to supplant human labour rather than compliment it, as was the case through the first three industrial revolutions.

If the interview participants proved to be ignorant of the fourth industrial revolution and its associated technologies, it would then be argued that they would not be aware of the possible impact on human labour in the workplace and their responsibility as leaders towards technological unemployment, and therefore the question this research study poses in terms of correlation to unemployment levels would be redundant. Building on these assertions, the initial line of questioning serves not only the purpose of building a foundation from which to build the research study on, but it also provides corroboration to the assertion of sample suitability.

It was clear that each of the interview participants had a fair understanding of what the fourth industrial revolution was, what it referred to and its importance within business. The latter point here was explained through the impact on human employment levels when technology is adopted but also against the idea of competitive advantage. Interestingly the importance of technology adoption within business was also measured by the impact on employee wellness and work/life balance.

Evident by its occurrence throughout the interviews was the view that commonplace to the topic of the fourth industrial revolution was a myriad of jargon. It became evident that given the widespread application of technology in modern society, the interview participants felt that the fourth industrial revolution was not a reference to only one technology type per se but that it was made up of multiple technologies and that it was also not a 'one size fits all' term. The perceived impact of technology adoption on

employment levels in South Africa was also not universal nor was it only seen in a negative light, and finally what also came through was that the impact of technology on human labour is currently industry dependent in South Africa.

5.5.1.1.1 Broad interpretation

> IP#1: "if we work through all the buzz words and the jargon it probably comes down to a data driven economy"

> IP#3: "So ja, look I think it is if you ask me, a terminology that has been bantered around too loosely in SA – and I think actually globally as well – you know I think it is a buzz word and actually very few people understand the true context."

> IP#3: "rather than just implementation of automation and digitisation strategies for the sake of it and for being a buzz word and being able to tick a box as part of an organisation"

> IP#5: "So this is just another phase, but to be quite honest, for me I don't think much is really changing, to be quite honest. You know you can give it another name, and I think this is just the funny side of people over-complicating it."

> IP#6: "and in a place like South Africa, I do think that 4 IR has been thrown around as a catch phrase without context or proper appreciation of what it actually means"

> IP#6: "Well, I think it means very different things compared who you chat to, particularly around the world"

> IP#10: "So it is kind of like, 4th IR is quite broad stroke, I always say, let's play this game, 'let's play buzzword Bingo!'"

As a result of this broad interpretation across the population as to what the fourth industrial revolution is, its impact on business was seen to also be easily misunderstood which would create a misunderstanding of the potential dangers to human labour of widespread adoption:

IP#1: "Because I believe if you have got a similar definition then at least you can get people to think in parallel, otherwise they all have their own perceptions"

In an encouraging way there was also a view that adopting technology in the workplace would actually result in increased employment as competitive advantage improved, and so the sentiment around technology and employment was positive in some of the interview participants' responses:

IP#1: "So what the effect has been on the rest of the economy if I think about things like Checkers 60/60, all of a sudden you need more drivers, you need more pickers, that is not necessarily tech savvy people, but it has created job"

IP#6: "So in our technology space we're hiring more people as developers"

IP#11: "And we start off with what you see in the market as a big hype around 5g, but behind the scenes there is so much around how do we actually now start with bringing this into the e-commerce marketplaces and actually creating work – jobs around it/employment around it."

It's one thing to understand the fourth industrial revolution from a theoretical point of view, and it is argued that this can be instinctively correct given the ubiquitous nature of technology in modern society. The fact that business leaders have the perception that this field of interest is characterised by jargon and can be misunderstood, leads to a view that appreciating the consequence of technology adoption on unemployment levels in South Africa may be underdeveloped.

5.5.1.1.2   Business models

As the interviews progressed this initial question on what the fourth industrial revolution is led to a commonality in talk around organisational business models and not only how these have had to adapt to maintain competitive advantage, but the speed of change required to these business models as a result of technological advances.

The fourth industrial revolution, due to the speed at which technology is advancing and the speed at which the technology is able to learn relative to human labour is seen as a source of competitive advantage for business leaders and their organisations.

> IP#5: "I think we're just living in a world where, due to technology, the pace that we do things is just so much quicker"

> IP#1: "So those are typical things that is really positive. What we have seen that is really due to technology and due to the economy that is under pressure, of course there is a big focus on cost, and technology has got the capability to really reduce cost"

> IP#3: "And if you don't automate, if you don't eliminate that cost of labour unrest etc, what is going to happen is you become so overall uncompetitive, that you actually tomorrow may not even have a business to protect"

With the speed of innovation there was a view that competitive advantage gained through technology would be short lived due to competitors being able to copy technology:

> IP#9: "The one literally copied our UI."

One of the interview participants took this thought, extended it further and offered an interesting view on human employment and posited that humans, unlike technology, cannot be copied and so human relevance in the workforce is still a critical factor in business regardless of the capability of technology.

> IP#5: "The only way to execute a strategy is to have a pool of people that is so much better than your competitor's; because we can all have exactly the same plan, but the success rate's going to depend on the execution side of it. And the execution, you only get results through people. So for me, your competitive advantage has to in the people, because whatever you do from a systems point of view or a technology point of view one day they're going to copy. But you cannot copy the DNA of the people. You can't. You can say, ah, I'm going to try – that is the glue that keeps everything together."

Competitive advantage most certainly weaved its way throughout the interview process from both the interviewer as well as the interviewees. It became evident that the impact which the fourth industrial revolution technologies had on employment levels was seen in the idea that competitive advantage has, does or would drive the adoption of these advanced technologies where adoption would translate into either productivity of workforce, efficiency of output, or reduced cost to the business. Interestingly though is that competitive advantage through technology adoption did not always present itself in increased unemployment. It was acknowledged however that there was an increased risk to employment levels when technology was adopted.

> IP#5: "might be at risk because we're not going to be competitive"

> IP#8: "Just because something exists doesn't mean it needs to be adopted, right? So there are a number of angles: one is the size of the benefit I want to get out of this thing vs the cost I am going to get out of it, and how does that rank against other opportunities. So you know, and again this is where I sit on the risk spectrum I supposed"

Interestingly, the ability to use fourth industrial revolution technologies to create more opportunities for a healthier and more balanced workforce came through as another positive in the debate on technology adoption.

> IP#6: "So it's freeing up time for those people to do things that's actually worth more of their time. So we're also finding the level of job satisfaction appears to be increasing, at least in my area of influence"

> IP#7: "They're very intelligent people, they've studied for a long time, and they're doing very manual work. So on the one end of the responsible side is, giving them some relief, some work-life balance, all of those things, by saying how do we automate?"

5.5.1.1.3   Digitisation

A theme of digitisation came through from the questioning around knowledge and understanding of fourth industrial technologies. More specifically the view that the fourth industrial revolution is the creation of a data economy; the advent of digital transformation

where manual effort is transformed into digital process flows. Digital transformation was most commonly characterised by robotics:

> IP#1: "The revolution is that nowadays everything is connected and everything is generating data, and the more data being generated, the more we can see how things fit together, what are the correlations that exist"

> IP#2: "Because what's been happening is, you've got a lot of data and each data task has to have more and more data. So it's, what do you do with that? How do you now analyse that data so that you can make money out of it"

> IP#1: "in taking something from physical to data, that is a conversion, that is digitization, and the next step is automation"

> IP#2: "Also, we did a lot of robotic process automation, particularly as we developed the digital app. That didn't result in unemployment directly. What it did do is that it gave us extra value-add, because then we started to understand customer behaviour."

> IP#6: "So it's probably the last 5 to 10'ish year that there's been quite a… robotics have come in quite strongly"

Monetisation of the process of extracting data can be seen as a crucial element to the fourth industrial revolution and arguably key to maintaining or improving competitive advantage. The interview participants showed that the use of automation technologies was key to this, however what came through is that in this process these technologies were complementary to human labour and not necessarily a threat.

As the interview participants were putting across their understanding of the fourth industrial revolution and its technologies, there was a common frequency with which they were alluding to automation technologies in particular, this being a second theme pursuant to the research topic that found its way into the conversation. Calling out automation served as a segway into testing the understanding of the concept of automation technologies.

5.5.1.2 Knowledge and understanding of automation technologies

THEME	CODE GROUP
Redundancy	Routine tasks
	Efficiencies
Digitisation	Competitive advantage
	Speed of change
Wellness	Employee wellbeing
	Work/Life balance

The interview participants were very familiar with automation technologies and felt most comfortable in the understanding of when these types of technologies would be adopted, why they would be adopted and the benefits that these technologies could provide.

Redundancy was a theme that emerged as automation technologies would be implemented to eliminate routine tasks and create efficiencies within the process flows of the organisation. Digitisation was pulled through from the discussion on the fourth industrial revolution and built upon further as competitive advantage and speed of change were key 'why's' to the adoption of automation technologies in particular.

Lastly, and in an interesting build on redundancy was a theme of wellness where the interview participants highlighted that while the use case for automation technologies was predominantly one of eliminating routine tasks and creating efficiencies which could provide superior competitive advantage in a world of significant change the outcome did not necessarily have to be job loss. The ability to create improved levels of employee wellbeing and a work/life balance was a clear opportunity of automation technologies.

5.5.1.2.1   Redundancy

Automation technologies was used interchangeably with the concept of the fourth industrial revolution and it was clear that interview participants saw these types of technologies as commonplace to removing routine tasks of humans in favour of machine

automation, with predominantly administrative tasks being more at risk and as a result a potential lead cause of redundancies.

> IP#4: "4 IR in my mind is the automation of mundane processes, or repetitive processes – it may be a better way of putting it."

> IP#4: "And then also at an operational level there is a finance arm and kind of some of the guys where they capture money coming in and things like that. We've just taken some of those points out and try to automate those where it either comes straight from a bank or some form of electronic source which is then captured into the system itself, by an automatic RPA versus a manual entry."

> IP#6: "because we're getting automation on certain of the more mundane tasks."

5.5.1.2.2 Digitisation

Automation technologies were also seen to be the 'tool' through which digitisation was occurring within business and providing the ability to improve or create competitive advantage. Interview participants drew a clear link between automation and the creation of a 'data economy'

> IP#1: "if we work through all the buzz words and the jargon it probably comes down to a data driven economy"

> IP#1: "The revolution is that nowadays everything is connected and everything is generating data, and the more data being generated, the more we can see how things fit together, what are the correlations that exist"

> IP#9: "digital age, digital transformation"

5.5.1.2.3 Wellness

In the interview participants understand of automation technologies there was a refreshing theme of care towards employee wellness and that automation, while capable of replacing human labour in its entirety could be used as a force for good to create enhanced employee wellbeing.

Balancing the objectives of an automation journey between commercial gain or competitive advantage and employee wellness was seen as crucial to understanding automation:

> IP#3; "I guess it is about getting the balance right between automation, perfecting your bottom line vs employee wellbeing, community wellbeing and stakeholder wellbeing. So it is about getting that balance right between both sides of the coin."

> IP#7: "They're very intelligent people, they've studied for a long time, and they're doing very manual work. So on the one end of the responsible side is, giving them some relief, some work-life balance, all of those things, by saying how do we automate?"

The answers provided by the interview participants to this particular question demonstrated that even if it's not explicit, business leaders do have on their leadership radar the notion that they do hold a responsibility towards their employees where the fourth industrial revolution and its potential impact on unemployment is concerned.

5.5.1.3 Knowledge and understanding of technological unemployment

THEME	CODE GROUP
Leaders' considerations	Positive
	Negative
Education	Standards
	Relevance
	Access

While technological unemployment is specific in its definition not all the interview participants were familiar with the term and therefore its relevance in academic circles, but they were able to logically piece together what it could mean.

> IP#13: "technological unemployment is a bit of a grey area for me from my understanding"

> IP#14: "Hm. I have no clue what it is"

> IP#1: "Tech unemployment, I have never really thought about it but just from the words itself I would say that if there is tech unemployment it doesn't mean that if he has got technology skills that you are unemployed, it is where you become unemployed due to being replaced by technology."

> IP8: "I guess it would be basically humans being made redundant because technology can do jobs better, faster, over time basically"

What was evident from how the interview progressed, when it came to technological unemployment, was that there were both positive and negative views on the thought that technology could cause unemployment and the overall efficacy of the term as it pertains to South Africa's unemployment challenges. The interview participants then created a theme in their responses around education and the level of standards, the relevance and skills required as technology advances continued to grow.

It was noted that even if business leaders were naïve to the academic relevance of technological unemployment, they were acutely aware of the impact technologies of the fourth industrial revolution could have on human labour, the disruption they could cause and the theoretical link to South Africa's unemployment challenges.

5.5.1.3.1 Leader's considerations

The responses to technological unemployment did elicit some negative sentiment which confirmed that technology adoption was viewed as a potential accelerator to unemployment where technology adoption held the capability of substituting human labour rather than complimenting it.

> IP#8: "this adoption will have a negative impact in that it will cause greater unemployment"

> IP#8: "We have reduced heads."

Encouragingly though there was more positive sentiment towards technology adoption where technology not only provided an opportunity to save or even create more jobs through increased productivity, but also its ability to improve employee wellbeing.

> IP#1: "So what the effect has been on the rest of the economy if I think about things like Checkers 60/60, all of a sudden you need more drivers, you need more pickers, that is not necessarily tech savvy people, but it has created job"

> IP#6: "So in our technology space we're hiring more people as developers"

> IP#7: "They're very intelligent people, they've studied for a long time, and they're doing very manual work. So on the one end of the responsible side is, giving them some relief, some work-life balance, all of those things, by saying how do we automate?"

> IP#10: "Ja, so where we have implemented automation and we can see first-hand, we have just increased risk coverage, so we are able to use the excess productivity to better serve our clients, better fraud detection, review more alerts – so now there are three times as many more alerts for example, which means we are detecting fraud better, we are getting better products and services out there, clients are getting a better experience, call waiting time is reduced from 15 minutes to 5 minutes"

5.5.1.3.2 Education

South Africa's education system and the functionality it provides was shown to be sub-standard in the eyes of the interview participants:

> IP#4: "If you want to fix the country, you've got to fix the education, which is really, really important"

> IP#5: "No, I think it's fundamentally flawed. And that is the much longer-term problem with regards to unemployment"

> IP#7: "the curriculum definitely, I don't think it's adequate now"

The relevance of the curriculum as it relates to the fourth industrial revolution and its associated technologies was questioned and the ability to access quality education was seen as a hindrance to being able to adequately skill the population to cope with the pressure of technology being favoured over human labour.

> IP#4: "but the government or the public education system just isn't up to scratch to be able to get them to the right level to even operate in 15 years ago, let alone in today's app worlds and bitcoin or whatever"

> IP#6: "Private schools are only really catering for an elite few people. It's improving the government schools and assisting government where they are failing"

5.5.1.4 Knowledge and understanding of responsible leadership

THEME	CATEGORY
Enterprise Leadership	Fiduciary responsibilities
	Employee responsibilities
Ethical Leadership	Values
Stakeholder Management	Inclusivity
Wellness	Employee wellbeing

The interview participants saw responsible leadership in line with their responsibilities as business leaders more than as a concept in itself, grouped into the themes of Enterprise Leadership, Ethical Leadership and Stakeholder Management.

A common trend through the interviews was for the participants to call out 'Wellbeing' as a responsibility of theirs as business leaders. The idea that as business leaders they had a responsibility to their employees to help with work/life balance came through in the responses.

> IP#3: "I guess it is about getting the balance right between automation, perfecting your bottom line vs employee wellbeing, community wellbeing and stakeholder wellbeing. So it is about getting that balance right between both sides of the coin."

IP#7: "They're very intelligent people, they've studied for a long time, and they're doing very manual work. So on the one end of the responsible side is, giving them some relief, some work-life balance, all of those things, by saying how do we automate?"

IP#11: "So as much as we have a responsibility to our organisations, we have a responsibility to the people that is actually building that organisation. So it is how do we balance what is our output required from the organisation vs the humans actually doing the work behind it."

It was seen through these responses that the assertion within the Responsible Leadership literature review that the term is underdeveloped was in fact true and why it, Responsible Leadership, is pointed out later in this study as an area of future studies. Even more so when it comes to the impact of the fourth industrial revolution.

IP#10: "So I suppose responsible leadership is around how do you apply the science, how do you apply that, realising the benefits in trade-off between costs and optimisation vs coverage"

IP#13: "Responsibility of leadership, whether it be at various levels to ensure ethics driven within an organisation, or responsibility, not only to the organisation but to its employees in terms of the greater good."

5.5.2 Adoption and Unemployment

THEME	CATEGORY
Adoption rate	High levels
	Low levels

If the fourth industrial revolution technologies are proving to be a driver of the unemployment levels in South Africa, it would be reasonable to assume that business leaders would hold the view that adoption rates are strong.

Through the interview process the theme of adoption rate was tested with a popular view that there were low levels of fourth industrial revolution technology adoption rates in South Africa, with an exception from IP#10 who works in the financial services sector and who felt that adoption in the industry was very high:

IP#10: "Ja, I mean I think what is amazing, what is available has definitely permeated in our space and I have seen probably in the last three years very visible changes, whereas before we didn't speak about robotic process automation and it has become standard, right"

This view that adoption could vary by industry was shared by the views of one of the interview participants:

IP#8: "I think there are some businesses and some industries that lend themselves to automation and there you have probably seen a little bit more and those are probably those that are focused on telecommunications to some extent and maybe already technology focused, where I think adoption comes a little bit easier"

The overwhelmingly clear view that South Africa's adoption of fourth industrial revolution technologies is low came through in the following comments:

IP#4: "As a percentage wise? Eish! Probably less than 25%"

IP#6: "I certainly do believe that we haven't taken, we've not nearly taken advantage of what's available to us and what's appropriate to us as a country"

IP#8: "And that is what will happen here. So, in SA I think we are pretty nowhere"

IP#12: "It's to a much lesser extent."

IP#13: "Not a lot."

IP#14: "To be quite honest I believe we are still rather lacking in terms of technology usage."

In testing the views of adoption rates in South Africa it can be inferred from the responses of the interview participants that the South African unemployment levels cannot be solely driven by the fourth industrial revolution and its associated technologies, and confirmed a viewpoint in chapter two's literature review that unemployment is far more nuanced in modern society, especially developing economies.

> IP#1: "if there is tech unemployment it doesn't mean that if he has got technology skills that you are unemployed"

> IP#5: "Yoh! Look, I think unemployment, we should not blame technology for the fact that we've got unemployment"

Interview question 1c called this out as follows:

THEME	CODE GROUP
Technology has impacted employment levels	Positive impact
	Negative impact
Technology has not impacted employment levels	Macro factors
	Generational impact
	Adoption lag
	Unemployment vs unemployability

5.5.2.1 Technology has impacted employment levels

5.5.2.1.1   Positive impact

> IP#6: "So in our technology space we're hiring more people as developers"

> IP#11: "I think my view is positive, because I think quite honestly there is – and again referencing Africa and South Africa - the population is so big and the population growth is faster than what our economy growth is."

> IP#14: "I think it has reduced the unemployment rate"

5.5.2.1.2   Negative impact

There were however cases where it was clear to the interview participants that because of technology headcount within their organisation had been reduced:

> IP#8: "We have reduced heads."

5.5.2.2 Technology has not impacted employment levels

In the case of one interview participant whose organisation is defined as high growth there has been an increase in heads despite technology advances, however it was viewed that the growth of the organisation was driving this growth but on a constant base measurement the number of employees was in decline:

> IP#10: "So I suppose the challenge with us is we are growing so we haven't seen that 1 for 1 okay our employee base is shrinking; in retrospect we are probably actually growing so it is a little bit unfair, particularly when you are in a growth phase, I mean we are growing since inception between 10 and 20% per year"

> IP#10: "if you go into a branch today there is four or five people and that is max, because we have also automated the queues, the calling process, the electronic signatures and so forth."

5.5.3   Levels of Implementation and Employee Impact

THEME	CODE GROUP
High	Administrative tasks
	Competitive advantage
	Efficiencies
Low	Education system
	Unions

When looking into the levels of adoption and the impact on levels of employment it was seen that a high prevalence rate was in the field of administrative tasks where routine tasks were common and where automation was already well positioned to take on these types of roles.

5.5.3.1 High

5.5.3.1.1 Administrative tasks

> IP#1: "So robotic process automation is a good example of that because it takes repetitive logic and it just explains it in terms of data"

> IP#4: "The only 4 IR things that we bring in are system-based stuff around our ERP, and then in terms of some, and I say basic integration between some of our software platforms, and we just kind of linked all those through, because we're a bit of a quilt of old and new systems that all sit on top of each other. So basically through RPA, you know, Brian is always trying to sell me some kind of RPA stuff, but I've done limited work in that just to try and take some of the pain points out of the finances - where there's a bit of manual capturing, to just take some of the human element out, finger error element out"

5.5.3.1.2 Competitive advantage

Competitive advantage as pointed out was a key consideration to adoption rates being high. A particular example in maintaining competitive advantage through technology adoption was made possible in the pivot of business model. Embracing technology made this possible:

> IP#11: "So I think you know I am not sharing something confidential, you know that our company is moving from a pure telco play into a techco play, with that again you know referencing again digital transformation vs digital products, if we look at the digital transformation part I think we have really embraced the technologies that are available."

5.5.3.1.3 Efficiencies

Efficiencies were the final category of high adoption prevalence, where business leaders shared that as a result of either technology creating more efficiencies either directly through their own capabilities or through helping employees redirect their efforts to more beneficial tasks, but again not necessarily impacting employment levels:

> IP#6: "That's one of the reasons why I wouldn't have a problem with technology taking over the commoditised people work, because if my competitor's doing it, and I can do it with a machine cheaper, then I'll rather take the machine because it's cheaper, and get my clever people doing other things."

> IP#13: "So that definitely enhanced the individual's effectiveness and efficiency and didn't eradicate the role."

5.5.3.2 Low

5.5.3.2.1 Education system

The education system elicited numerous responses:

> IP#5: "I think it's because humans have not responded to the new world that we live in, acquired a new skill that differentiates you."

> IP#6: "But that then opens up another Pandora's box relating to education and access to education."

> IP#4: "we have a challenge around the education system where people are not educated enough to be able to use those kind of technologies."

> IP#8: "and that is just a function of the skills available, the skill levels of the workforce, and I think there are massive structural challenges that unless they are addressed, will lead to higher unemployment, either directly through replacement technology, or through companies becoming uncompetitive and actually closing down in the long term."

> IP#2: "And this is my pet hate – our education system is pathetic! And I'm not just talking about schools, I'm talking about universities. They don't teach what you and I know."

IP#5: "it's more the education system that's flawed than really saying computers are replacing humans."

5.5.3.2.2 Unions

IP#2: "The second part of it is that we have cheap labour. So, our issue is not so much unemployment and cheap labour and lots of people, it's productivity."

IP#3: "historically it wasn't really a big factor of consideration because employment costs were low or affordable within SA compared to global markets."

IP#3: "labour unrest is significantly lower than ours, and also in the bigger scheme of things, just in terms of affordability and scale with global market it is possible for vendors over there to produce products cheaper."

IP#6: "And it's often where you have, what we could call unskilled labour or semi-skilled labour where machines can take over those jobs. You know, if you're dealing with highly skilled labour, generally you try and push people out of their comfort zones to think out of the box to generate a more productive business.

IP#13: "So that definitely enhanced the individual's effectiveness and efficiency and didn't eradicate the role."

IP#6: "but I think that it's a little bit less about because technology has been deployed in certain sectors, people have lost jobs, and more about because certain sectors are not productive and are not generating enough revenue."

IP#1: "So those are typical things that is really positive. What we have seen that is really due to technology and due to the economy that is under pressure, of course there is a big focus on cost, and technology has got the capability to really reduce cost."

Unionisation and resultant labour unrest which were seen as prominent South African challenges came across as barriers to adoption and causes for either low adoption or slow rate of adoption:

IP#2: "The second part of it is unionisation is a real problem. We set out to break the union at Cell C, because they had such a hold on the company, because of the previous manager that just allowed them to flourish. And I don't want to under-estimate the impact of unionisation in terms of this technological advancement and how companies are stymied from doing that, because you're forced to deal with unions."

IP#3: "cost of labour unrest is significant."

5.5.4 Government Involvement

THEME	CODE GROUP
Negative sentiment	Incompetence
	Overregulation
Positive sentiment	Incentivisation

It was difficult to garner a positive response when talking about Government and Technology when it came to their (the government) involvement in the process and how they (government) should be approaching the challenge;

5.5.4.1 Negative sentiment

5.5.4.1.1 Incompetence

Incompetence came through as the most predominant category under the theme of negative sentiment, with an undertone of cynicism linking in corruption as an inevitable outcome were they to involve themselves more through regulation:

IP#1: "Ag, no. Please."

IP#9: "They are useless"

IP#4: "And the challenge that we have in our government, I think there's a lot of… (sighs) pocket-lining and…"

IP#6: "And there is so little trust in the government's ability to deliver"

IP#10: "It's a firm no. That is just scary you know, like government really just wants to over-regulate everything."

IP#9: " they are not contributing, they have way too many rules and regulations in SA that don't make any sense, that are stifling our economy, that is not contributing to the SME world in SA, there is absolutely no support for small businesses and or entrepreneurship as a whole"

5.5.4.1.2 Overregulation

Regulation was seen as a killer of entrepreneurship and allowing free capital markets to solve the issue at hand:

IP#6: "That is a tricky one. It depends if you're talking to a socialist or a capitalist."

IP#5: "I don't think so. You know, I don't like regulation. The moment you start regulating stuff, threaten with penalties and fines and whatever, it kills entrepreneurship"

IP#8: "I don't know what your philosophy on this is, so I don't have a very protectionist philosophy, I really believe you have got to make yourself competitive. And I would be less inclined to try to regulate"

5.5.4.2 Positive sentiment

5.5.4.2.1 Incentivisation

Positive sentiment when it came to government involvement came through in the form of incentivisation versus regulation. If organisations were incentivised to protect and/or create jobs the feeling is that there would be more progress versus being regulated:

IP#12: " I think so hey, I think so, because in terms of incentivising the adoption I think it goes more with the kind of technology being introduced and the way it is powered."

IP#6: "I would prefer to look at government intervention more of an incentivisation, as opposed to regulation"

Again, through the interview participants responses, a theme of competitive advantage came through when looking to put across a view on government involvement in technology adoption and potential for aggravating unemployment levels:

> IP#8: "For a good example here would be duties. So as a principle I don't think duties are a good measure, neither are subsidies. So I think what you have got to do is find a way to make yourselves competitive"

> IP#6: "We just seem to be putting up skittles, and that the guys are trying to protect employees the entire time. And all that does is, it forces people to look at other jurisdictions."

> IP#10: "I think that is the wrong approach. It is like legislating against the petrol car because you were worried about the impact on the horse business. You will very quickly become isolated in a world where nobody has got that"

> IP#8: "The same thing here, you are under threat so you try to regulate, but the world is going to carry on, so you are going to regulate and try and preserve jobs, become uncompetitive"

5.5.5   Summary Overview to Findings in Research Question 1

It was the intention of this research question to understand, "How will the adoption of Fourth Industrial Revolution technologies in the workplace improve or accelerate the rate of unemployment in South Africa?".

Through testing of the interview participants knowledge around the topic it was clear that there is a broad interpretation of the subject but that the impact on unemployment is not necessarily a factor driving current levels in South Africa, and that there is a more structural issue driving this.

Interview participants felt that there is an opportunity to utilise fourth industrial revolution technologies to improve employee wellness and that if managed correctly there are productivity and efficiency opportunities available.

Government was not seen as well positioned to contribute positively to the challenge of unemployment, and that regulation, incompetence and corruption drive this perception.

Thinking emerged around incentivisation as an area in which government could contribute positively to the challenge.

5.6   Results: Research Question 2

Research Question 2: What factors drive the adoption rates of Fourth Industrial Revolution technologies?

Though the scale and long-term impact of technological unemployment has been heavily debated in academic circles for quite some time, it is not a primary contestation of this study as to whether or not technology has the ability to eliminate jobs. What this research study aims to achieve is an understanding of how business leaders in South Africa are approaching technology adoption in the face of significant levels of unemployment.

Despite the understanding of technological unemployment as explained through the research, this research remains biased towards developed economies and an understanding of the relevance of technological unemployment within developing economies is considered to be underdeveloped. What is missing from the research is a deeper look into what impact socio-economic challenges, which are more common and more systemic to developing economies, have on how business leaders approach the adoption of fourth industrial revolution technologies and the apparent benefits they could provide.

Research question two therefore aims to understand what factors are considered in the process of adopting fourth industrial technologies by South African business leaders. The interview questions aim to understand how, if the impact of technological unemployment is arguably more severe to developing economies, how South African business leaders then view the purpose of the organisations they work for. Competitive advantage came through strongly as a theme from research question one, and so it begs the question on whether the benefits of competitive advantage are enough of a factor for business leaders to advance with adopting fourth industrial revolution technologies, when this is at the expense of human labour.

Drawing a link from the research (Kim & Scheller-Wolf, 2019) findings, where there is a growing need to understand the challenge of technological unemployment from a viewpoint other than that of capitalist theory, research question two looks to understand

whether or not the alternate principles of stakeholder theory would be a consideration in eclipsing the more traditional capitalist views of shareholder theory.

Interview question 4 leans into organisational purpose and how this is defined by business leaders. It attempts, without prompting, to understand if organisations have a purpose beyond that of financial returns.

Interview questions 5a & 5b focuses in on competitive advantage and the potential for collateral damage in the form of human labour as business leaders are possibly pressured to maintain, but at the very least not lose, their competitive advantage in the marketplace.

Interview questions 6, 7a & 7b lean into how business leaders are viewing their role when it comes to the unemployment levels in South Africa, specifically as it relates to fourth industrial revolution technologies and if there is a correlation between technology and unemployment in South Africa.

These interview questions were guided by the findings of the literature review of chapter two and were created with the objective in mind to gain insights into who business leaders believe their organisations exist to serve.

5.6.1 Organisational Purpose

THEME	CODE GROUP
Customer centricity	Data economy
	Value for money
Innovation	Digital connection
	Market leaders
Relevance	Corporate survival
	Sustainability

5.6.1.1 Customer centricity

The customer came through as a common answer in the responses as to whom the interview participants felt their organisations existed to serve. Through the adoption of fourth industrial technologies data could be utilised to enhance the product or improve the service which could be provided to the customer, ultimately providing value for money to customers:

> IP#1: "We defined the purpose statement a while back now, and our purpose is to provide innovative and sustainable solutions that enable our customers' business."

> IP#13: "the purpose of our organisation is to ensure that we provide a value for money service to our customers and ensure the safe movement of their products from A to B in the most effective and efficient way possible. Again, just to add some context, we understand that costs are rising, we understand that we may not be the cheapest within the industry, but again it is based on value for money."

> IP#10: "The purpose. I mean you know when we look at it I think it is you know offering a fantastic financial product with the client in mind"

> IP#5: "I always try and, through the eyes of the customer, evaluate what we're doing, and then how do we then reward our people, and that's why profit-share is such an important aspect for me, because the more your staff feel part of the business, and the more they understand, there's a pool that's for the store whatever – you guys decide. If you want to run it with less people, you run it with less people, but don't come and talk to me about overtime or this or that. You govern it yourself. It's your profit share. And if you can add an extra salary every month through profit share, I'm very happy, because we make the profit. Obviously, the customers are voting with their wallet, they're happy. You're happy and I know my shareholders will ultimately get their dividends and they'll be happy. So for me that's a philosophy. I think too many businesses focus too much on the shareholder and the external stakeholders and all of those kind of things; they forget the essence why you're in business."

The interview participants spoke passionately about purpose and it was clear that this centred around the product or service their organisation provided. It became clear that

as far as organisational purpose was concerned, employees were not necessarily a priority and one could therefore deduce that as far as the adoption of technology was concerned, if it served the organisation's objectives in terms of bettering the product or improving the service which their organisation provided to their customers then the adoption rate would increase, even if at the expense of human labour.

One interview participant even held a strong view that the fiduciary duty of business leaders to the organisations they serve was an absolute priority:

> IP#2: "So this is a tough one, because you've got various fiduciary responsibilities, and firstly, it's to the company – not to individuals, not to boards, not to investors, banks, it's to the company. And particularly as a CFO, I don't have to tell you this, but you put the company first.'

5.6.1.2 Innovation

Innovation came through in a way that business leaders felt that it was incumbent on them to ensure their organisation was innovating to be able to provide value to (once again) their customers.

> IP#5: "So you know, if people are purpose-led and they can hang their hat onto something that they feel so strongly about, that they're passionate about, it will automatically drive innovation, creativity, productivity, all of those good things that we talk about."

> IP#14: "And I cannot remember it off the top of my head. We are unstoppable, we want to be the market leaders"

5.6.1.3 Relevance

Organisational purpose was also explained in the context of maintaining relevance.

> IP#6: "So we've recently relaunched, they call it Ambition 2025. And our firm normally proceeds, if I'm not mistaken, on sort of a 5-year strategy with constant revision as to whether we are relevant"

IP#9: "And so for us, a challenge/threat/risk is to continue to remain relevant from a product perspective but then also the type, the architecture in which we are building our company"

The stage of where a company is in its lifecycle also has an impact on organisational purpose and how business leaders think about technology adoption. If adoption met the need of survival, even if at the expense of human labour, then business leaders showed a line of thinking that supported survival over further employment in order to be sustainable, maintain relevance and be able to provide more employment:

IP#2: "That's a good one. Purpose for survival. One word. We have to survive because it was just… I don't think we were in any position to have any kind of purpose"

IP#3: "But also, the other part of responsible leadership has also been looking at vacancies within the organisation and seeing whether or not we are able to shift people around, to still protect as many of the jobs as possible."

5.6.2 Competitive Advantage & Technology

THEME	CODE GROUP
Competitive advantage	Skills
	Cost management
	Shareholder returns

5.6.2.1 Skills

Competitive advantage was a key driver for business leaders and in order to maintain their organisations relevance in the market they felt that technology was important. A challenge to this was the availability of skills able to utilise the technologies available:

IP#10: "Ja, and so it comes down to that is that they grow in cost base because it becomes more expensive to drive data driven insights and all the solutions around that, the models and all those kinds of things there is definitely some cost at the top, because you need to get higher skilled individuals to run those right?"

IP#5: "I think globally everybody's fighting for survival, but for me, I think the biggest challenge is the war for talent, worldwide."

IP#5: "I think that's our biggest challenge is, how do we keep that uniqueness through our people in this massive demand out there on people? And the one thing that technology did, unfortunately, there's no pause time, shutdown time for people because they're 24/7, they're in touch with some sort of a technology and whatever, which in the old days there were periods like open, people cannot… What we'll deal with tomorrow, we'll deal with tomorrow. But now, globally, because we're dealing with global supply-chains etc. etc. you're 24/7. You have businesses that are running in different countries, which means you never stop, because maybe it's night-time for you, but it's daytime for them – operations carry on. So the fact that operations now is a 24/7, that in itself is a massive, massive challenge for companies; and how do you keep this uniqueness of your people that will stand out and differentiate you in the long run?"

5.6.2.2 Cost management

Competitive advantage was also closely linked to cost management and in order to maintain an advantage business leaders were constantly finding their cost base a challenge where technology was able to provide a solution.

IP#10: "Ja, and I think driving our costs is definitely where we need to leverage off future technologies to help us scale that. I think the second one is really making that transition to being a fully digital bank right? Because you know we have still got an issue around our client base is people still want cash; you still see the banking lines are infamous on pay day, right?"

5.6.2.3 Shareholder returns

International competition is challenging in that competitive advantage is not only of importance versus local organisations who it is argued are facing the same challenges, but now thanks to technology advances the competition is also from foreign territories. These foreign organisations are able to implement technologies without the same hindrances faced by South African organisations.:

> IP#8: "Then we have others where we are seeing competition from overseas, so where our ability to manufacture cost effectively is being eroded, and as soon as you start losing a bit of volume then that erosion accelerates, right? So there is a challenge around business model and what you actually need to be to service your customer base. You know I guess there are environmental factors, there is a shrinking sort of middle class in SA now, where before it was growing quite rapidly, that is reversing."

> IP#3: "And if I can just give a bit more clarity, we are no longer competing in the South African market only; we are competing with global markets"

> IP#8: "Because they just will not be able to compete with global businesses where automation has been adopted and they have been able to do that without punishing their populus."

And then there is the pressing requirement to manage commercial returns. Capital investment requires a payback.

> IP#14: "To be quite honest I don't think stakeholder theory will ever be a fully adopted solution. We are in a capitalist world, we are in a capitalist country and it is all about profit"

> IP#1: "Yes, shareholders are important, shareholders' returns are important, it is part of our KPIs and management goals and measurements goals and structures – it is something that we are looking at full time."

> IP#2: "I think in the first instance it would have to depend on the actual issue at hand. So, right off the bat, shareholders get the biggest say because they're the ones providing the funding that allows all of the stakeholder group to benefit from"

5.6.3 Summary Overview to Findings in Research Question 2

Research question two set out to understand that even with the socio-economic challenges in South Africa such as significantly high levels of unemployment, what factors would still hold enough weight to drive business leaders to adopt fourth industrial revolution technologies at the expense of human labour.

Organisational purpose was defined to be most closely aligned to the products and services that organisations provide and the impact these have on their customers. While philanthropy and doing the right thing featured in the interview participant's responses, it did not come across that employment was a consideration.

Business leaders were not completely ignorant to the plight of employees in terms of employment, however there was more of a leaning to the view that the responsibility of business leaders was to ensure relevance in the market in order to be sustainable and thereby provide opportunity to employ.

Ensuring employees were capable of meeting the needs demanded of the fourth industrial revolution through training and skills development was the conclusion reached through research question two.

In summary, superior competitive advantage through customer centricity, innovation and relevance were strong enough factors to drive the adoption of fourth industrial revolution technologies, even if at the expense of human labour.

5.7 Results: Research Question 3

Research Question 3: How relevant is the education system in supporting the development of the requisite skills needed for the future of work?

Through the process of research question one and two it was clear that business leaders were not convinced that the fourth industrial revolution can be to blame for South Africa's unemployment levels and added to that they, business leaders, view competitive advantage a strong enough driver to support technology adoption, even if at the expense of human labour.

Research question there drew a line from these two outcomes to understand the importance of education and skills development in the research study's objective of

machine versus human labour. In addition to this, there is also a view to understand whose responsibility it may be to provide the requisite skills for employees in order to survive this fourth and most disruptive industrial revolution.

Interview question 8 is an exploratory question designed to determine validity of the South African education system from business leaders' viewpoint.

Interview questions 9a and 9b probe into the roles of business and government in tackling the unemployment that South Africa faces.

Interview questions 10 and 11 then look to understand from business leaders where they have proceeded with technology adoption that has impacted employee's ability to hold down employment, what do they consider in the process. Understanding how businesses are going about providing an opportunity to reskill employees, impacted or not by technology adoption for the future of work.

5.7.1   Education System

THEME	CODE GROUP
Relevance	Speed
	Outdated
Business Responsibility	Government failures
	Future protection

5.7.1.1 Relevance

5.7.1.1.1   Speed

With education coming through quite clearly as a factor in the whole debate of human versus machine, it became clear that the interview participants had a view that the education system in South Africa was not positioned well enough to support human labour to compete against machines.

Relevance as a theme emanated from the responses, with speed and being outdated clearly coming through:

IP#1: "Not fast enough"

IP#2: "It's an absolutely crap system"

IP#2: "The time taken to teach the SA education curriculum is too slow"

IP#5: "it's more the education system that's flawed than really saying computers are replacing humans"

5.7.1.1.2 Outdated

It in fact came through that unemployment levels in South Africa were linked to education levels and skills gaps which are driven by an outdated education system.

IP#3: "skill shortage is what creates unemployment"

IP#5: "No, I think it's fundamentally flawed. And that is the much longer-term problem with regards to unemployment"

IP#5: "a lack of skills drives unemployment"

Access to the right level of education was also picked up as an issue and that with the high levels of social inequality the government funded education system was not capable of providing a relevant education able to compete with international standards.

IP#2: " educational institutions and structures are not up to standard to address the fourth industrial revolution"

IP#3: "I think that is the different. I think families that are able to afford private school education, I think those students are getting the advantage, I think they are keeping up with global trends etc, I think if you are in the masses of government school education, I think it is lacking in that particular space"

5.7.2   Solutions Mindset

THEME	CODE GROUP
Business solution	Organisational culture
	Learning
	Reskilling
Government solution	Jobs
	Grants
	Sustainability

It then follows that if the education system is not sufficient enough to address the change caused by fourth industrial technologies then something needs to be done about it. A solution is needed. The interview participants came through strongly with the view that due to government failures the responsibility of creating these solutions now rests with business leaders.

> IP#2: "leaders need to be part of the solution to the education lag when it comes to the fourth industrial revolution and its technologies"

> IP#3: "leaders are responsible to upskill employees"

If it is then held true that solutions are required to fix the education system and thereby fix unemployment, it is important to understand what role business and government plays in this process.

The interview participants categorised their views into business being responsible for creating a culture within their organisations around the importance of skills relevance, providing access to learning and ultimately helping human labour to reskill themselves to take advantage of the fourth industrial revolution technologies.

Government responsibility it was seen was to create a macro environment conducive to job creation, providing support to those that needed it and ultimately ensuring an element of sustainability.

5.7.3   Consideration towards Employees

THEME	CODE GROUP
Present need	Efficiency
	Learning
	Access to resources
Future need	Reskilling
	Balance

If education was seen as a major issue to employment levels and that business leaders through their organisations held a responsibility towards human labour in term of a solution it was important to understand what considerations were taken into account in this process.

5.8   Conclusion

Chapter five concludes with the findings of research which are based on the research questions outlined in chapter three. The findings show that business leaders are pressured by and therefore thinking of competitive advantage when it comes to the decision on technology adoption, even if at the expense of human labour.

The research did highlight further that business leaders were not naive nor ignorant to the challenges faced in South Africa by significant high levels of unemployment, however it was common in the responses that education will play a key role in not only preparing human labour for the future of work but that it will also act as a more effective solution to unemployment compared to blocking or delaying technological adoption.

There was a positive sentiment towards technology adoption and its impact on human labour and employment levels with a commonality in the view that there is a need to adopt technology in order to maintain competitive advantage

What could be considered as responsible leadership principles came through in business leaders wanting to 'do the right thing' when it comes to technology adoption and human labour, although it was not expressly called that nor is it believed that there was a

knowing link from the interview participants as to what responsible leadership in academic circles expressly is. The interview participants felt it important to secure jobs by reskilling employees to become relevant in the fourth industrial revolution.

Repetitive tasks were acknowledged as facing the highest risk of automation. However when it came to job security and the implications of technology adoption, the interview participants felt there was an opportunity for improved employee wellness and overall balance if technology was used to provide increased productivity and remove mundane tasks from employees, thus complimenting human labour rather than substituting it.

Although there was a negative attitude towards government involvement and capability to support business leaders in the area of technology adoption and human labour, the interview participants did suggest that government should look into incentive programs for organisations rather than regulation and legislation when it comes to technology adoption.

6 DISCUSSION OF RESULTS

6.1 Introduction

Chapter six sets out a detailed discussion of the results from chapter five that emerged from the semi-structured interview process as defined through chapter four. Chapter five's findings are compared to the literature of chapter two.

Chapter six is laid out in the same structure to that presented in chapter five. Where it makes sense to do so, the discussion confirms the consistency between the findings of chapter five and the literature review of chapter two.

6.2 Discussion of research question one

How will the adoption of fourth industrial revolution technologies in the workplace improve or accelerate the rate of unemployment in South Africa?

6.2.1 Objective

Research question one set out to understand if there is in fact a link between technology adoption and unemployment in the fourth industrial revolution. The literature review in chapter two shows that in the previous three industrial revolutions, if there was a link it was only temporary as new jobs were created at a faster rate than which technology displaced old jobs. This research study recognises that with the advancement of the capabilities of technology into the areas of machine learning, artificial intelligence, and cognitive abilities, the fourth industrial revolution may prove to be more of a threat to human labour than the three that preceded it.

The interview participants identified that the adoption levels of fourth industrial revolution technologies is in its infancy in South Africa and that despite the potential existing for these technologies to cause job losses, South Africa's unemployment is likely to have other route causes more closely linked to macro and socio-economic factors. The interview participants identified that adoption levels do vary by industry and where adoption was more advanced, such as in the case with the financial services industry, unemployment was improved and not exacerbated.

The overriding theme which came through in the answers to research question one was that through adopting fourth industrial revolution technologies in South Africa the benefits to improved competitive advantage would likely provide more of an opportunity for South African businesses to employ more human labour than they replace.

6.2.2 Competitive advantage and technological unemployment

As South African organisations compete more and more with global organisations, a lack of competitive advantage was highlighted as more of a detriment to unemployment than technology adoption. Adopting fourth industrial revolution technologies was seen as complementary to competitive advantage.

The interview participants commonly referred to relevance of their organisation being vital to survival and technology was seen as a positive contributor to this ability to survive. It follows from this line of thinking that competitive advantage, technology and improving levels of employment could be closely linked and would serve as a topic for future research on how a virtuous circle could be created to drive a far broader impact for not only organisations but society as well.

It was acknowledged that although competitive advantage was a key driver in technology adoption and that unemployment levels in South Africa were not necessarily caused by this adoption, a risk to human labour did exist where technologies are advancing into the once hallowed grounds of human cognition. What did however transpire from the interview participants is that an opportunity does exist, through technology adoption, to provide more meaningful balance and that improved employee wellness should be seen as a positive outcome when implementing technology.

6.2.3 Conclusion on the findings for research question one

Unemployment is undoubtedly a major challenge to South Africa's economic stability and while technology adoption has the potential to exacerbate unemployment levels it is not seen as a major driver of the situation. The adoption of technologies from the fourth industrial revolution it is concluded is more useful to organisations in improving competitive advantage and in turn being able to create, not destroy jobs.

The adoption of fourth industrial revolution technologies holds the potential to prove the merits of technological unemployment more than the first three revolutions. It is concluded from research question one that business leaders are well placed to ensure that this is not the case.

Future studies would do well to look into how superior competitive advantage would drive an improved level of employment and in particular how the adoption of fourth industrial revolution technologies could be used to improve competitive advantage for South African organisations.

6.3 Discussion of research question two

What factors drive the adoption rates of fourth industrial revolution technologies?

6.3.1 Objective

Research question two had as its objective, against the backdrop of significantly high levels of unemployment in South Africa, a want to understand what factors would still drive the adoption of technology.

The interview participants built on their response to research question one when it came to competitive advantage and that this is a key factor that has, is or will drive high levels of adoption of fourth industrial revolution technologies, even at the expense of human labour. A secondary theme that came through in higher levels of adoption was the industry, with financial services appearing to be one such industry which has lent itself to technology adoption.

On the opposing side of high adoption and factors that inhibit or delay adoption are South Africa's active labour unions and the power they wield. Labour cost versus the cost of technology adoption currently appears to favour human labour over technology. There is a link here between stage of adoption which was acknowledged by the interview participants as being underdeveloped and the cost of adoption, for this reason this factor is considered to be temporary, while labour union more permanent.

6.3.2 Competitive advantage and Industry sector

The interview participants came through consistently with a view that maintaining competitive advantage was a key factor in adopting technology, even if this adoption resulted in reduced levels of unemployment.

Interview participants held a view that the level of adoption and therefore the permeation of technology into organisations was not advanced at all in South Africa and that, with perhaps an exception in the financial services sector, South Africa was well behind other countries in terms of its adoptions. The interview participants also shared a view that in terms of technology and unemployment, while there is a plausible link between adoption and loss of jobs, that South Africa's challenges with unemployment are not because of technology. Structural socio-economic challenges as well as education levels play more of a factor in their minds to this challenge.

6.3.3   Labour unions and technology costs

Labour unions being so active in South Africa came through in the interviews with confirmation that the power which unions wield does on the one hand inhibit technological adoption should it remotely threaten employment of low to semi-skilled workers, then on the other hand the union does provide incentive for business leaders to lean into the fourth industrial technologies as the opportunity to loosen the grip of unions on organisations is an exciting prospect. Fleming (2019)'s theory on bounded automation was confirmed through this section of interview questions.

6.3.4   Conclusion on the findings of research question two

Interview participants were not aware of the detailed academic debate around technological unemployment and while there is merit in the view that unemployment is not caused by technology in South Africa, the concluding view is that business leaders remain unaware as to the real challenges that lie ahead with significantly high levels of technology adoption.

The findings recorded in chapter five for research question two revealed that competitive advantage outweighs the ideology of organisations playing to the greater good of society, if this would mean a reduced level of competitive advantage.

In fact, it can be concluded from the research findings of research question two that shareholder theory, a view where capitalist principles reign supreme, is still a firm driver of business leaders thoughts and that it, along with any supporting business principles (like competitive advantage) will be a key factor in adopting technologies of the fourth industrial revolution, even if this comes at the expense of human labour.

Unless business leaders reframe their own role in society when it comes to technology adoption, the pressure on unemployment and potential for technological unemployment will continue to rise.

6.4 Discussion of research question three

How relevant is the education system in supporting the development of the requisite skills needed for the future of work?

6.4.1. Objective

Research question three sought to understand business leaders are thinking about the education system in preparation for fourth industrial revolution technologies and whether the skills exist to keep employees relevant for the impending future of work.

6.4.2. Skills gap

Education and skills were highlighted repeatedly by the interview participants as more of a factor in the unemployment challenge versus technologies which could be adopted at the expense of human labour. Technological advancements history shows had an extensive impact on skills throughout all the industrial revolutions and debated at length in academic circles, with the skills and abilities required in the fourth industrial revolution continuing to be explored by academics (Frey & Osborne, 2017; Virgillito, 2017). The existing literature supports the findings of this study as it pertains to education and skills and the concerns around what the future of work looks like for those who do not reskill accordingly. With the interview participants highlighting an understanding about the role they must play in protecting or at least supporting their workforces future job security, the responsible leadership principles can be seen to compliment the findings of this research question.

6.4.3. Conclusion on the findings of research question three

Education systems play a crucial role in human labours relevance, not only in today's society but well into the future. The role of employees within the business model of organisations if appropriately skilled will likely be a source of competitive advantage greater than that which the technology trying to replace human labour can be.

With a view that technology adoption within the South African context is at its infancy and therefore not as much of a factor in unemployment levels as may instinctively be thought, business leaders would do well to align the journey of technology adoption and employee education or skills development alongside each other and in an approach which shares in the thinking of integrative stakeholder management create a sustainable competitive advantage which would not only see human labour shielded from the potentially negative impacts of fourth industrial revolution technologies but could see human labour play a catalytic role to the power which these technologies bring to business leaders and their organisations.

7 CONCLUSION AND RECOMMENDATIONS

7.1 Introduction

This research study set out to determine how business leaders in South Africa are approaching the fourth industrial revolution in terms of the technologies it provides and what factors drive these technologies to be adopted within their organisations, particularly when adoption of these technologies could have an impact on employment of human labour. It follows on from this interest as to what responsibility business leaders hold towards not only their employees but towards society when it comes to adopting fourth industrial revolution technologies that substitute rather than compliment human labour.

The literature highlighted that there has been an unfounded anxiety in the past to technological unemployment as there has always been an ability to create more jobs for human labour at a rate faster than which the technology is replacing jobs. The fourth industrial revolution however has seen advances in recent technologies which now poses the ability to substitute human labour rather than just compliment it and with that poses a renewed threat to human labour and a return of anxiety towards technological unemployment.

A summary of the research findings is pulled together in this chapter and then linked to the consequences for academic and business interest which is an answer to the academic and business relevance of the study stipulated in chapter one. To close, the limitations of the study are documented and possible lines of interest for future research are pointed out.

7.2 Consolidation of Research Findings

As the processes of the research methodology defined in chapter four unfolded, the three research questions set out in chapter three were provided with answers. The interview participants shared a common view that technologies from the fourth industrial revolution do have in them the capability to replace human labour beyond just routine and repetitive tasks which was the primary use case for technology adoption during the three previous industrial revolutions. Despite this acknowledgment, there was a consistent view that South Africa's unemployment challenges are not solely attributable to the adoption of technology at the expense of human labour. The interview participants shared that the adoption of fourth industrial technologies was mostly in its infancy in South Africa, with the exception to this being the financial services industry and for this reason could not be held responsible for the reduction in human labour and the resultant increase in unemployment levels. South Africa's unemployment challenges were felt by the interview participants to be a result of much more complex socioeconomic challenges.

The findings from research question one support the existing literature which holds a view that adopting technology may in fact reduce jobs but it does not replace work (Autor, 2015).

The interview participants did acknowledge that there is a growing requirement on business leaders to adopt fourth industrial technology with caution and that they do hold a responsibility towards their employees and not only shareholders. This insight supports the literature of Kim & Scheller-Wolf (2019) who call for business leaders to think differently about how they may go about adopting technology as well as the pace at which they choose to do so.

Although there was an overwhelmingly negative response towards government and their ability to play a constructive role in technology adoption, it was conceded that the governments could support incentivisation towards reskilling human labour to be able to thrive in the future of work.

Research question two concluded that competitive advantage is a key driver for business leaders when considering the adoption of fourth industrial technologies, even if this resulted in loss of jobs for human labour. What became a key insight to research question two was the consistent view from interview participants that technologies that were now capable of cognitive thinking and therefore the domain of skilled human labour could provide opportunity for this level of employee to become more productive and efficient by focusing on more pressing business issues while technology took care of the mundane tasks.

This led the interview participants to call an opportunity, through technology adoption, to improve employee wellness and create a work/life balance which in itself would lead to increased competitive advantage. Essentially shifting the view from thinking that competitive advantage was the technology to acknowledging that employees could be the competitive advantage in the fourth industrial revolution. Education, training, and skills development were seen as the bridge to close this gap.

Research question three supported the findings of research question one with the view that education systems in South Africa are in desperate need of an overhaul. Unemployment was again seen not to be caused by technology adoption but rather the inability of human labour to cope with the required skills of the technology. Competitive advantage within human labour was seen as an opportunity not only to maintain the relevance of businesses but also a solution to the unemployment challenges which South Africa faces.

7.3 Proposed Framework for Responsible Leadership
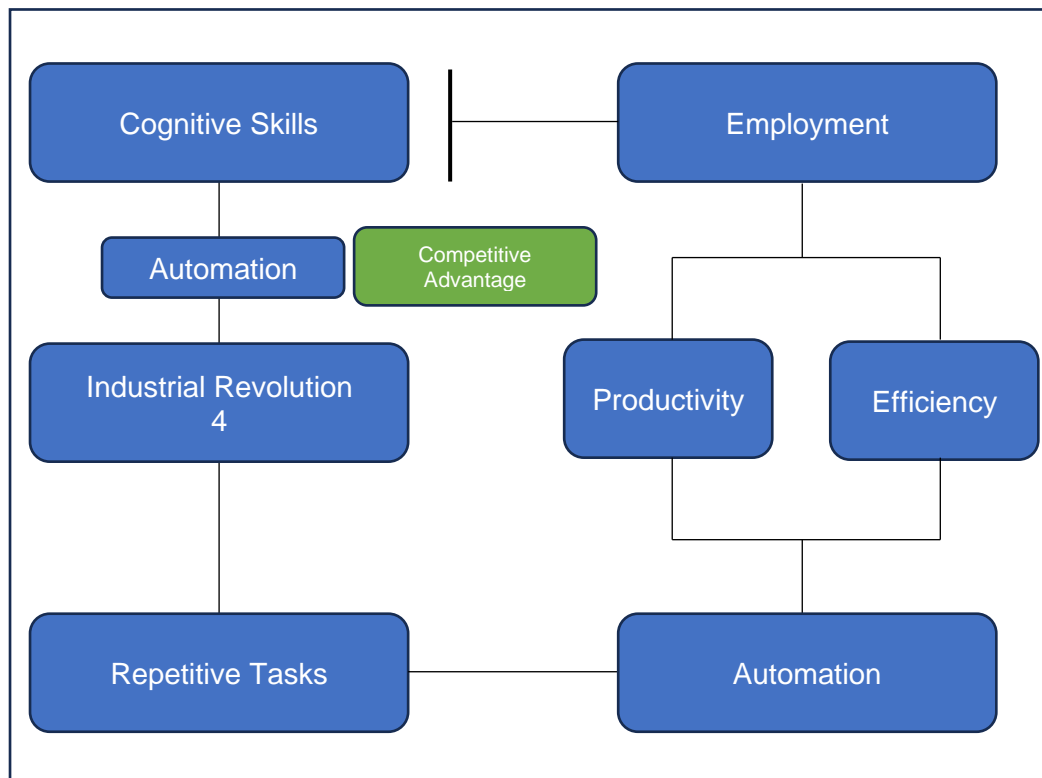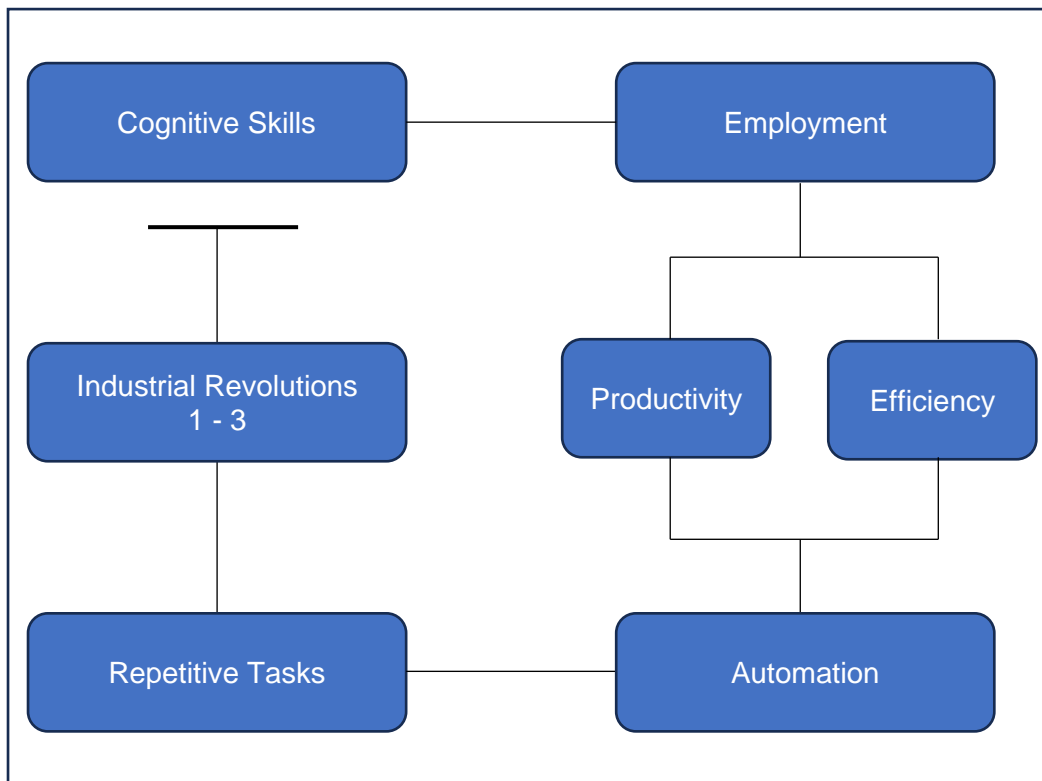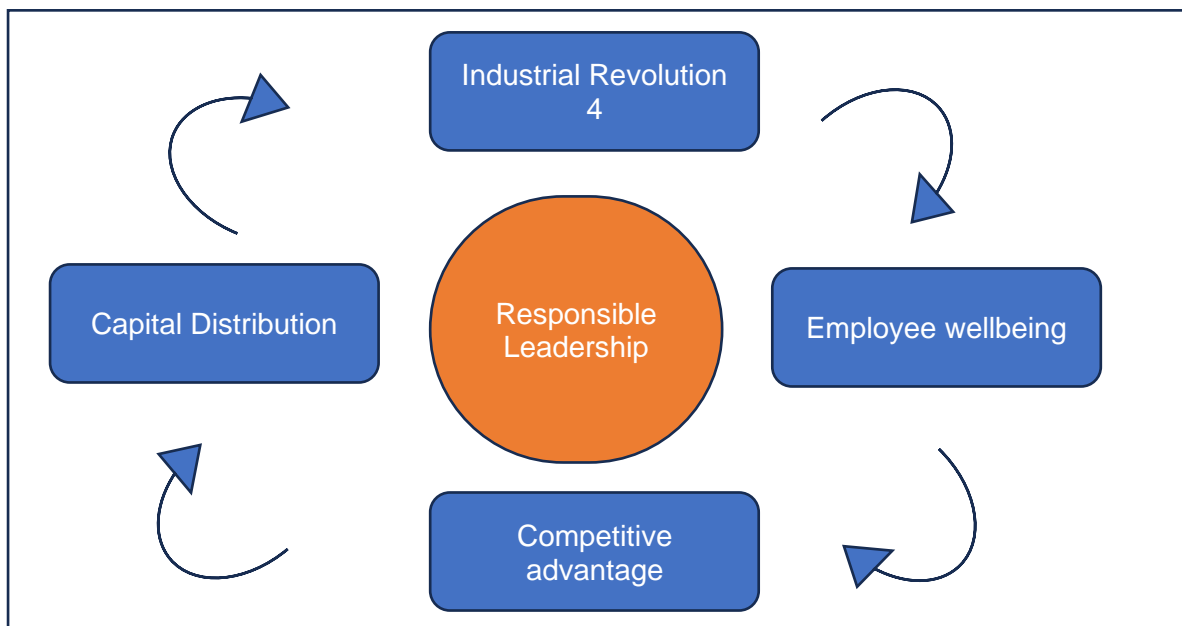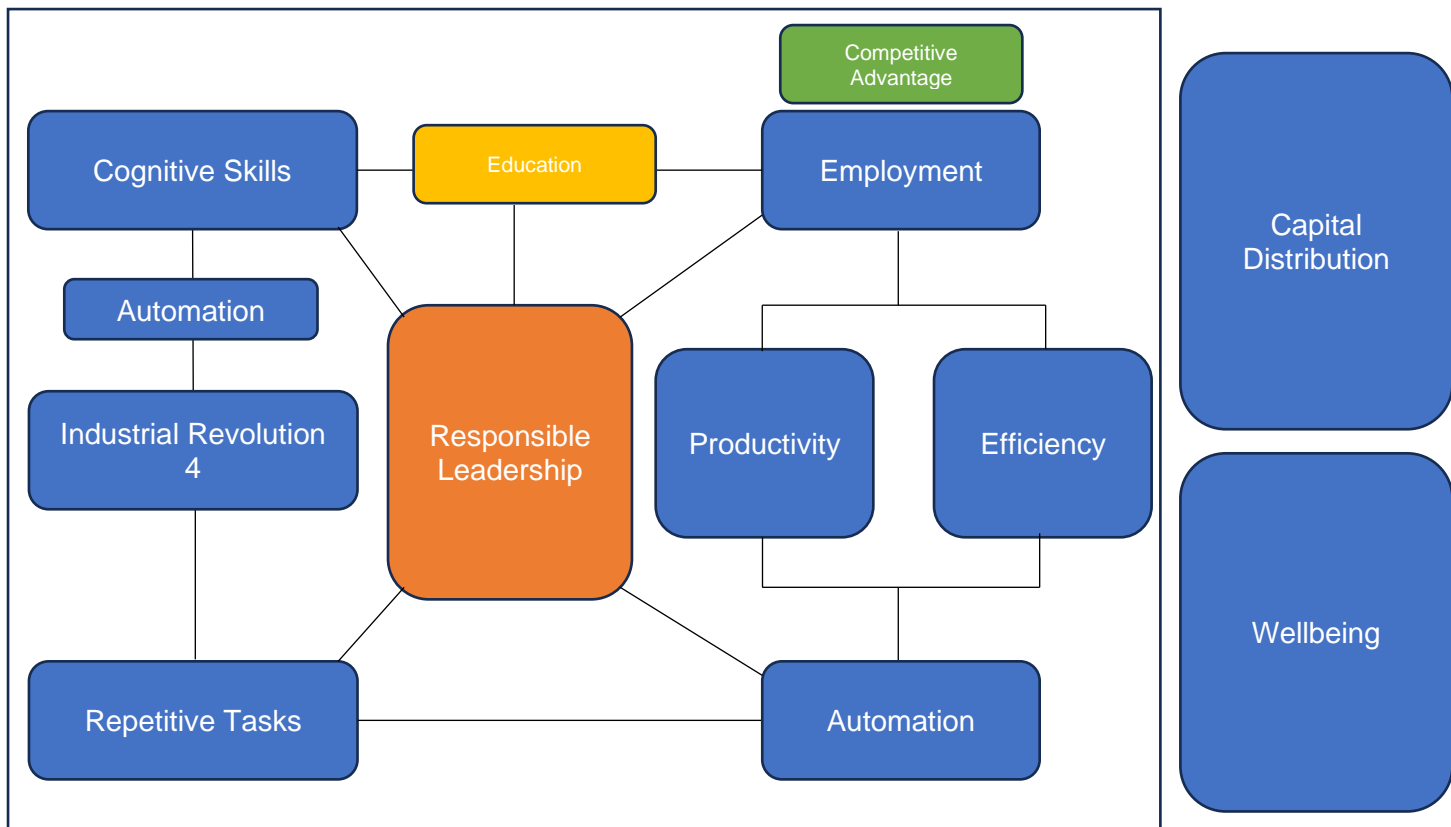
Through the process of a qualitative research study the researcher puts forward that while fourth industrial revolution technologies are bridging the capability gap of cognitive ability and in doing so providing a competitive advantage to business leaders, the long-term implications are reduced capital distribution.

Responsible leadership by business leaders who recognise their role in harnessing fourth industrial revolution technologies while protecting employment but who also create opportunities to upskill and relearn will benefit not only from increased capital distribution but also improved wellness in employees which ultimately creates a virtuous circle which in itself will help to ensure technological unemployment will again prove not to warrant the anxiety it is beginning to create

7.4 Research Contribution

The contents of this research study contribute towards raising the profile of the merits of technological unemployment through the fourth industrial revolution. The research study was designed with business leaders from South Africa in mind who also have to balance the challenges of operating within a country where unemployment levels are amongst some of the highest in the world.

The findings established through the study that unemployment is not necessarily the only outcome of technology adoption, nor is it solely driven by technology adoption. Developing countries, like South Africa possess many other macro and socioeconomic challenges which play a considerable role in driving unemployment levels up. However true this may be, it was concluded through the findings that the capability of fourth industrial revolution technologies and the speed at which these technologies are developing pose a renewed threat to technological unemployment and that business leaders, now more than ever, need to broaden their thinking when it comes to adopting technology and consider the role that such adoption could play to the longer-term impacts of rising unemployment.

Competitive advantage was found to be a key force in the decision tree of technology adoption even if such adoption were to result in increased unemployment. The relevance of an organisation and the product or service it provided ranked high in the consideration set of business leaders when thinking about the role they play in the technology versus human labour equation.

The standard of education and its relevance along with access to education was considered to be a critical factor to unemployment, more so than technology adoption. Business leaders showed a growing realisation that the gap in skills relevant to the fourth industrial revolution needs to be closed and the continued erosion of human labour in favour of technology solutions is not sustainable.

The framework constructed provides a foundation from which to work on when it comes to the role that responsible leadership can play in the

7.5 Research Limitation

The research study was conducted under an exploratory qualitative design making use of semi-structured interviews with business leaders within South African organisations. The views obtained are therefore biased towards the views of business leaders and do not consider the views of employees made redundant by technology adoption or who are inadequately skilled for the so-called future of work created by technologies of the fourth industrial revolution.

Understanding how business leaders view their role in the adoption of technology at the expense of human labour was the purpose of this research study, the design of the study based on this one-sided view is in itself a limitation. The subjective nature of quantitative research is a further limitation as unconscious biases unbeknown to the researcher are likely to have influenced the process.

Even though there was a cross section of industries represented in the study, the reach of the organisations cannot be taken as a representation of the whole of the South African business landscape and factors driving unemployment may differ across the country and is therefore a further limitation to the study.

South Africa is not the only developing country in the world and is also not the only country, developing or developed, which has unemployment challenges. It is for this reason that there is a limitation in the study when it comes to understanding the drivers of unemployment and the impact which continued technology adoption could have on unemployment levels.

The proposed framework calls our responsible leadership as a mediating variable to the technology versus human labour equation and further calls for a shift in competitive advantage from the technologies, which can be copied, to the employees themselves with education being seen as the catalyst to this thinking. The framework is an output from this study, created by the researcher and has therefore not been tested to determine validity of its assumptions.

7.6 Suggestions for Future Research

The research study was guided by existing literature on technological unemployment and the growing capability of technologies in the fourth industrial revolution. The extent to which fourth industrial revolution technologies can now be used for tasks beyond those of a repetitive nature is what generated the interest in the research topic. How capable the new technologies are and how comfortable business leaders may be in adopting technology for cognitive level roles within their organisations is an area of study which can be looked into.

Chapter two highlighted the bias of current literature on technological unemployment as it pertains to developed economies. The unique socioeconomic challenges that developing countries face and how technology adoption may compound these is cause for further studies into technological unemployment as it pertains to developing countries.

Responsible leadership was also highlighted as an underdeveloped area of research, even more so when joined up with the fourth industrial revolution and it stands to reason then that a useful area of future research will be into responsible leadership as a mediating variable to technological unemployment.

Government was seen as unable to provide a solution or even support business leaders in balancing the adoption of fourth industrial revolution technologies. The negative view was driven by feelings of incompetence and distrust. Putting these firmly held views aside there is merit in future research looking into the role of government in supporting human labour in the face of the growing capabilities of technology and how they (government) may look at incentivisation as a tool to support business leaders. Social grants such as universal basic income could also be a topic of interest to future research studies.

7.7 Concluding Remarks

This research study embarked on a journey to understand what impact technology adoption has on the employment of human labour and what role business leaders can play in ensuring unemployment levels are not exacerbated by this adoption. The research study was particularly interested from a South African context given the significantly high levels of unemployment.

Through the rich insights gathered through fourteen semi-structured interviews and the learnings garnered in chapter two's literature review, the researcher was able to generate a proposed framework to help provide some thinking around how business leaders can apply responsible leadership principles to think differently about technology adoption.

It is hoped that by applying a thoughtful approach to technology adoption in the age of the fourth industrial revolution, business leaders can not only limit the impact on human labour but also drive competitive advantage on both a local and a global scale and ultimately contribute to growing the South African economy which in turn will lead to a need for greater levels of employment. A virtuous circle of growth, employment, and wellbeing.

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APPENDIX 1: ETHICAL CLEARANCE

Gordon Institute of Business Science
University of Pretoria

Ethical Clearance Approved

Dear Simon Adams,

Please be advised that your application for Ethical Clearance has been approved.
You are therefore allowed to continue collecting your data.
We wish you everything of the best for the rest of the project.

Ethical Clearance Form

Kind Regards

This email has been sent from an unmonitored email account. If you have any comments or concerns, please contact the GIBS Research Admin team.

APPENDIX 2: CONSENT FORM

1) I am conducting research on *"Responsible Leadership and unemployment in South Africa: A managerial perspective on the impact of Fourth Industrial Revolution technologies on human employment"*.

2) Our interview is expected to last *90 minutes* and will help us understand how business leaders in South Africa see their role in tackling the unemployment crisis when looking to adopt technologies of the Fourth Industrial Revolution.

3) Your participation is voluntary, and you can withdraw at any time without penalty.

4) By signing this letter, you are indicating that you have given permission for:
    a. the interview to be recorded;
    b. the recording to be transcribed by a third-party transcriber, who will be subject to a standard non-disclosure agreement;
    c. verbatim quotations from the interview to be used in the report, provided they are not identified with your name or that of your organisation;
    d. the data to be used as part of a report that will be publicly available once the examination process has been completed; and
    e. all data to be reported and stored without identifiers.

5) If you have any concerns, please contact my supervisor or me. Our details are provided below.

Researcher name: Research supervisor name:

Email: Email:

Phone: Phone:

Signature of participant: _____   Date: _____

Signature of researcher: _____   Date: _____

APPENDIX 3: INTERVIEW GUIDE

Name:	Date:
Organisation:	Start time:
Job Title:	End time:
Gender:	
Age:	Industry:

Thank you for agreeing to this interview. Your time and input will be forming a substantial contribution to this research study, and both are greatly appreciated.

The title of this research study is "The role of Responsible Leadership in South Africa in mediating the relationship between humans and machines through the Fourth Industrial Revolution."

The pace of the Fourth Industrial Revolution has accelerated in recent years and the capabilities of its associated technologies continue to improve, making the once unimaginable now not only plausible but, in some cases, already demonstrable.

In more recent years we have seen the technologies of the Fourth Industrial Revolution pose an existential threat to the need for human labour in the workplace creating anxiety around the term Technological Unemployment.

To date, academic research on the topic of (wo)man versus machine holds its focus on how mass unemployment because of technological advances has not, in the long-run, materialised due to the net increase in overall job numbers. Where the academic research is light however, is the impact of such technological advances in economies, like South Africa, where more complex socio-economic challenges exist to say the United States, Great Britain, or mainland Europe.

The purpose of this research is therefore to explore:

- If unrestricted, will the adoption of Fourth Industrial Revolution technologies in the workplace improve or accelerate the rate of unemployment in South Africa?
- Against the pressures on business leaders having to maintain their organisation's competitive advantage in South Africa, can the principles of Responsible Leadership hold any relevance in mediating the relationship between humans and machines in the workplace?
- Do South African leaders see it as part of their responsibility to develop the requisite skills needed for the future of work?

This research has potential to be sensitive to the extent that it alludes to replacing human labour with machines and in the context of South Africa with its high levels of unemployment this topic can become emotive.

Despite the highlighted sensitivity, I would like to encourage you to please speak freely as the nature of this interview is both exploratory and conversational. All information shared will remain confidential.

Before we begin, I would like to draw your attention to the interview consent form which requires your signature for us to proceed. I would also like your permission to not only take notes during the interview but to also record this interview.

RESEARCH QUESTION 1

Interview question 1a:

What do you understand the following terminologies to mean:

1) Fourth Industrial Revolution

2) Automation Technologies

3) Technological Unemployment

4) Responsible Leadership

Interview question 1b:

To what extent do you believe the available technologies of the Fourth Industrial Revolution have permeated the South African workplace?

Interview question 1c:

With reference to the permeation by technologies of the Fourth Industrial Revolution into South African workplaces, have they had a positive or negative impact on the unemployment rate?

Interview question 2a:

To what degree has your organisation implemented technologies of the Fourth Industrial Revolution?

Interview question 2b:

Where technologies of the Fourth Industrial Revolution (particularly automation) have been implemented in your organisation what has been the impact on affected employees?

Interview question 3:

Should there be government legislation governing the adoption of Fourth Industrial Revolution technologies in the South African workplace?

RESEARCH QUESTION 2

Interview question 4:

How is the purpose of your organisation defined?

Interview question 5a:

What are the key challenges your organisation faces in maintaining its competitive advantage?

Interview question 5b:

Is the adoption of Fourth Industrial Revolution technologies in your organisation because of needing to maintain your organisation's competitive advantage?

Interview question 6:

Just because a job, task or process can be automated, does this mean that it should be and if so, why?

Interview question 7a:

Who would you define your organisation's stakeholder group as?

Interview question 7b:

Considering South Africa's unemployment crisis, what would be decisive factors in a business case for stakeholder theory to trump shareholder theory?

RESEARCH QUESTION 3

Interview question 8:

In your view, is the South African education system adapting to the technologies of the Fourth Industrial Revolution?

Interview question 9a:

What do you see as the role of business and the role of government in improving the unemployment crisis in South Africa?

Interview question 9b:

What do you think the role of business leaders is and/or should be in South Africa when it comes to the unemployment crisis?

Interview question 10:

In an approved business case for automation technologies within your organisation (past or current), what were the considerations towards affected employees?

Interview question 11:

Has your organisation considered reskilling its employees in the skills needed for the future of work?

APPENDIX 4: LIST OF CODES

1   the fourth industrial revolution is beset by a lot of jargon, catchphrases, buzzwords, etc.

2   the fourth industrial revolution refers to an economy which is driven by data

3   the fourth industrial revolution is about data generation which creates connections

4   becoming part of the fourth industrial revolution is not a one size fits all

5   robotic process automation (RPA) is commonly used as a proxy for automated technologies and the fourth industrial revolution

6   automated technologies drive digital transformation which is a data driven change

7   automation technologies are used to create data which can be commercialised

8   automation is the use of a fourth industrial revolution technology to generate data and insights

9   RPA converts repetitive logic in the physical realm to data

10   inanimate objects are able to use fourth industrial revolution technologies to generate data

11   technological unemployment is where humans are replaced by technology

12   responsible leadership is doing the right things for the right reasons

13   responsible leadership goes beyond functional responsibilities

14   responsible leadership is about balance across many aspects of one's life

15   digital personas are being created by organisations for critical people

16   personal information is being shared in data format

17   personal information in data format is being used to group people in terms of behaviours

18	organisations utilise the understanding of behaviour to assist the targeting of appropriate products and services
19	utilisations of data in targeting products and services is open to abuse
20	technologies are impacting efficiencies
21	digital identities give rise to an online presence through e-commerce, creating opportunity
22	platforms have been created allowing for greater access
23	platforms driven by data provide opportunities to influence behaviour
24	educational institutions and structures are not up to standard to address the fourth industrial revolution
25	technology and its advancements have the capability to reduce organisational cost structures
26	jobs involving fixed repetitive logic can be replaced by technology
27	technological advancements provide for opportunities to upskill and for redeployment of labour
28	job creation exists where technology has driven productivity
29	technology contributes to growth and growth leads to opportunities
30	attitude is more of determining factor in unemployment than technology
31	early stages of implementing fourth industrial revolution but investment has begun
32	RPA deployment to tackle routine tasks leads the way in fourth industrial revolution adoption
33	natural attritions in headcount does not require replacement due to investment in technologies
34	investments in fourth industrial revolution technologies have created capacity for staff to redirect their time and efforts to meaningful problem-solving endeavours

35	government legislation in fourth industrial revolution technology investments will hamper growth and limit the possible benefits
36	technology advancements can turn unemployment impact into job creation
37	due to complexity the fourth industrial revolution is easily misunderstood
38	technological advances allow for improved efficiency in education is an example of a data driven economy
39	efficiencies through technological advancements at reduced cost
40	virtual meetings have improved connectivity and efficiencies
41	technologies cannot take full blame for SA unemployment levels
42	there are a multitude of fourth industrial revolution technologies
43	immediate resistances to government involvement
44	what is needed from government is industry protection more so than regulation
45	technological innovations can spin-off to create indirect benefit for many industries
46	purpose of organisation is defined around capitalist principles
47	sustainability of organisation a priority
48	profitability a challenge in maintaining competitive advantage for organisations
49	access to the right skills a challenge in maintaining competitive advantage
50	macro environments also a major factor in being able to maintain competitive advantage
51	access to capital funding a challenge for competitive advantage
52	technology adoption viewed as a tool to maintain competitive advantage
53	there is a multitude of technologies available, choice is a challenge
54	agree with the statement that just because you can, doesn't mean you should

55	technologies should be used to improve
56	there is a responsibility to stakeholder groups to add value
57	there are consequences to technology implementations
58	there is a responsibility to fight barriers to change
59	there is a responsibility to consolidate duplicate technologies to drive efficiencies
60	understand who stakeholders are
61	intimates' uncertainty of what stakeholder and shareholder theory are
62	first responsibility is to be sustainable
63	looking after stakeholders is not only about financial returns
64	financial returns are not the only driver of a solid organisation
65	South African education system is not adapting fast enough
66	government are a barrier to improving the education system
67	government have over-regulated education through politicisation
68	the SA education curriculum is not geared towards innovation in technologies
69	unemployment will not be resolved unless there is ownership of the solution is taken on by business
70	government incompetence has created distrust
71	macro-economy contributes more to unemployment that technology
72	business operates within communities and has a responsibility towards upliftment of those communities
73	technology creates capacity to grow and in turn create more jobs
74	employee impact not a consideration in technology implementation
75	commercial proposition drives investment decision

76	efficiency improvements are a key consideration for technology investment
77	technology creates a data economy
78	skills for the future of work need to be created by business
79	uncertainties around what the skills for the future of work actually are and what they look like
80	education system is not teaching skills relevant to the fourth industrial revolution
81	corporate culture determines how an organisation thinks about its responsibility towards unemployment
82	effective stakeholder management is key to the idea of responsible leadership
83	leaders need to be part of the solution to the education lag when it comes to the fourth industrial revolution and its technologies
84	technology efficiencies provide opportunity to reduce the number of jobs if required
85	there is not always a direct correlation between technology and unemployment due to reskilling, redeployment, and wellness
86	lack of responsible leadership leads to government involvement
87	leadership responsibility extends beyond the corporate structures, with the company being priority
88	in some aspects SA is significantly advanced when it comes to technology adoption
89	cheap labour drives productivity down
90	inabilities to implement drives productivity down and negatively affects organisational business models
91	fear prevents SA from embracing the fourth industrial revolution
92	unions pose a unique barrier in SA to technological adoption

93   to replace outdated systems is a heavy capital investment and often a barrier to adoption of newer technologies

94   cost control to match economic pressures can be a cause of redundancies made possible by the adoption of advances in technology

95   industry competition is a key driver of the need to be productive and therefore competitive to survive. Technology allows for this

96   government aren't able to succeed at the basics, and should prioritise their focus

97   government's own adoption of technology is sub-standard and should not then look to get involved in the private sector. Rather stay out of the way

98   a need to survive can become an organisation's purpose

99   infrastructure (assets) requirement drives competitive advantage

100   relevance of business model competitiveness will drive rate of technology adoption

101   there is a responsibility to be productive, sometimes that means not implementing technology

102   shareholders provide capital and take the risk

103   stakeholder theory is more long-term focused

104   how educators are viewed requires rethinking

105   The time taken to teach the SA education curriculum is too slow

106   education system does not cater for genius

107   there needs to be a partnership between business and government to address unemployment

108   focus on communities within which business operates to address unemployment

109   unemployment considered in automation initiatives

110   technology allows for repurposing staff as business evolves

111   automation technologies are being used to automate production lines

112   automation technologies are predominantly used to automate administrative tasks

113   facilitating unemployment through automation

114   cheap labour inhibits adoption of technology in certain industries

115   if leaders are driving for technology implementation there is a responsibility to train, upskill and empower for redeployment

116   South African organisations do not operate in isolation, there is a global playing field to be aware of and the adoption of technology is a currency

117   global labour costs impact local decision making when it comes to technology implementation

118   labour unrest in SA impacts decision making around the implementation of technologies

119   jobs can be saved by maintaining competitive advantages through technology adoption

120   cyber security is a risk in the implementation of technology

121   new skills are required to be taught and made available because of technology

122   skilled labours versus un/semi-skilled labour is becoming more prevalent

123   slow to realise all the efficiencies of automation

124   considered approach to unemployment

125   wage growth still trumps technological unemployment with the union negotiations

126   purpose of an organisation is towards a broad range of society in South Africa

127   payscales in labour intensive businesses play a role in competitive advantage

128   responsibilities as leaders to create jobs

129   union activity a factor in adoption of technology

130   being listed creates an avenue of responsibility towards shareholders

131   sustainability of the whole supply chain and ecosystem can put pressure on shareholders in favour of all stakeholders

132   disparities in South African population is a factor in achieving relevant skills

133   public education system is lagging private sector

134   the responsibility of providing education sits with both private and public sector to address unemployment

135   automations can and should take care of routine tasks, allowing for focus on higher level thinking

136   skill shortage is what creates unemployment

137   leaders are responsible to upskill employees

138   community support by leaders will prevent unemployment

139   growths, upskilling, employment is a virtuous cycle between business and communities

140   automations have direct and indirect impact on employees and not all are considered

141   automation technologies can be used to automate human processes

142   technological unemployment is being made redundant through technology

143   education system and the level of education prevent technological adoption

144   fear of redundancies amidst high levels of unemployment prevent adoption of technologies in SA

145   in industries that are more services related adoption has been strong with less of an impact on unemployment

146   levels of manual labour determine appetite to adopt

147   technology adoption to remove human errors more than replace humans

148   decisions taken have led towards more balance for employees

149   levels of corruption create scepticism around government's ability to legislate and
       regulate responsibly

150   government could play a role in reversing structural unemployment and moving
       SA into the fourth industrial revolution

151   quality of product or service a key factor in competitive advantage

152   balances of fixed costs within a business model plays a key role in competitive
       advantage

153   technology adoption is not always driven by market competitiveness

154   there is a responsibility to educate and upskill in the face of technology

155   considerations for the macro-environment in technology adoption decisions

156   knowledge of the principle of stakeholder and shareholder theory

157   financial returns should be balanced with doing what is right

158   government responsibility is to create jobs

159   education system needs to be fixed to solve unemployment

160   it is the role of business to maintain employment and skill levels

161   consideration towards capacity and redeployment through technology initiatives

162   productivity was the consideration set in automation cases

163   upskilling to allow for growth

164   upskilling is different to skills for the future of work

165   business model and future growth strategies will determine the need to invest in
       future of work skills or not

166   due to technology, the speed at which we do things is so much faster

167   utilisation of technology's ability to learn faster than humans

168   automation provides efficiencies

169   employment versus employability

170   in terms of upskilling, humans have not necessarily responded well to the changing environment

171   a lack of skills drives unemployment

172   technology can never fully replace humans

173   is about understanding the challenge and aligning behind a course of action

174   responsible leadership is about a balanced approach to running an organisation. not only profitability

175   responsible leadership is about effective stakeholder management

176   responsible leadership is about a fiduciary duty to the company

177   regulation kills entrepreneurship

178   purpose is defined around your people

179   purpose can drive innovation

180   talent is a key challenge to competitive advantage

181   adoption of technology can be copied so it's not a sustainable competitive advantage

182   business models are reliant on global connections

183   technological advantage is short-term

184   stakeholder management is a balancing act based on business philosophy

185   managing all stakeholders in a balance way allows an organisation to gain competitive advantage

186   sustainability of stakeholder program increases investability of organisations

187   quality of education system is a problem

188   job creation needs to sit with government but must be sustainable

189   technology creates new jobs

190   sustainable competitive advantage protects jobs

191   playing to the strength of humans and machines will outweigh a 'one-sided' approach

192   the fourth industrial revolution has many definitions depending on the audience

193   the fourth industrial revolution is the positive modernisation of industry

194   the fourth industrial revolution and the impact of adoption is unavoidable

195   automation technologies reduce the need for manual labour

196   automation technologies systemise routine tasks in the attempt to gain efficiencies

197   intimation of not being familiar with the term

198   unemployment as a consequence of technological advancement

199   consideration of the effect of your decisions on more than just those in your employ

200   as a country, South Africa have not taken advantage of what is available and appropriate ito technology

201   access to education prevents development in the space of technology

202   fear of consequences around job loss inhibits adoption of technology in SA

203   technology can lead to job creation if thought about more dynamically

204   technology is not responsible for unemployment crisis in SA

205   poor productivity in certain industries has driven unemployment more than technology itself

206   industry risks have forced automation and as a result unemployment. But technology was not the driver of unemployment

207   labour unions inhibit technological advancements

208   technology provides opportunity for upskilling

209   failure to implement technology can lead to job-losses on a higher scale

210   the extent of implementation is advanced in certain areas of the services industry

211   automation of binary type tasks produces efficiencies

212   merging of human element into automated tasks is a balance of the two extremes

213   adoption of technologies can and is having an impact on productivity and efficiency of services firms

214   adoption of available technology is a mindset

215   the approach to technology will determine unemployment, not the technology itself

216   implementation of automations provides opportunity to make services more available

217   technological advancements have provided employment opportunity not eradicated it

218   new types of jobs are becoming available as a result of technology advances

219   technology advances free up time and improve productivity and wellbeing

220   mundane task get removed and provide more balance to an organisation

221   positive sentiment around technology advances and adoption

222   the next wave of technology advances is coming, whether that is liked or not

223   context is important to understand if government should or should not be involved in the fourth industrial revolution

224   needs to be with the aim of inviting investment not chasing it away

225   purpose should keep an organisation relevant

226   flexible working arrangements driven by technology can drive competitive advantage

227   technology allows for redeployment of skilled resources

228   government cannot be trusted to champion job creation in South Africa

229   responsibility of leaders is to provide education and/or skills to address unemployment

230   service driven industries consider enhancement of time and not impact of possible unemployment

231   industry standards drive investment in upskilling

232   the fourth industrial revolution is centred around robotics

233   automation is the replacing of human tasks with machines

234   is about balance

235   looking how to remove mundane tasks in caring for employees

236   application of ethical consideration towards employee's wellbeing

237   progress within industries where it is naturally a little more suited but still early stages

238   not as far along as one would expect

239   adopted technologies in SA have not yet had a mainstream impact on unemployment

240   societies like SA will take longer to adopt the kind of technologies that increase the rate of unemployment

241   societal class structures have an impact on employment rates more than technology

242   robotics leads the way in the type of technology implemented

243   initial impact is positive due to feeling part of progress

244   hard to see tangible benefits downstream from technology implementations

245   more time for critical thinking

246   creation of time to be more productive on additional tasks

247   possible benefits in ensuring risk management within the big industries

248   appreciation that government should be attempting to address unemployment, however regulation within the fourth industrial revolution may not be the right place

249   customer focus drives organisational purpose

250   if implementing/automating tasks will drive productivity without compromising customer experience it's hard to argue against

251   ethical considerations come into play, not just financial.

252   reskilling is considered

253   value-based leadership

254   when the underlying technologies become pervasive, adoption will likely follow

255   cause for greater unemployment

256   lack of suitable skills drives unemployment not technology itself

257   global competitiveness is eroded where technology adoption is low and as a result unemployment rises

258   limited adoption of fourth industrial revolution technologies

259   where there is cheap manual labour there has been less of a push for adoption

260   back-end services attract a greater level of adoption in the SA context

261   where implementation has occurred there has been human redundancy

262   regulate to protect. technological advancement is not a threat to employment

263   government should be looking at ways to help with competitiveness rather than regulate

264	government should be investing in skills development. not regulation
265	uncompetitiveness will cost more jobs than technology adoption
266	purpose to improve lives
267	levels of purpose differ across organisations
268	cost of adoption a barrier to implementation
269	risk appetite and management play a key role in automation
270	capitalism angle to business has not served society as it should
271	multiple technologies make up the fourth industrial revolution
272	an age of digital transformation
273	automation which creates efficiencies
274	technologies which create balance in human lives
275	an association between technology which automates tasks & processes and job loss
276	technology causes unemployment through lack of skills rather than the technology itself
277	unemployment versus unemployable
278	the fourth industrial revolution consists of a lot of jargon
279	irrelevant or outdated skills sets are driving technological unemployment
280	education standards have not kept up to date with modern society needs when it comes to technology and the fourth industrial revolution
281	technology creates employment opportunities
282	relevance of education system and syllabus in the digital era
283	providing opportunities to upskill and redeploy rather than create redundancy
284	technology has created employment

285   implementation has been driven by a customer centric mindset

286   if there is growth the impact on affected employees is positive due to job creation not redundancies

287   redeployment due to productivity gains through technology creates positive impact

288   technology has augmented human processes to produce efficiency

289   government involvement should look to support innovation

290   regulation can be an inhibitor to competitiveness

291   human interaction has a place to play in the business world

292   limited permeation due to fear of advancing

293   inability to understand the masses of a population and how technology can help rather than inhibit

294   positive impact as technology can create jobs for a population which is growing

295   skill sets need to be developed at a faster rate

296   change in business model facilitates significant adoption

297   negative perception around job loss managed through effective change management

298   generational nuances play a role in how affected employees are

299   government and regulators can be key stakeholders to consider in technology implementation

300   stakeholders and who an organisation is accountable to can be broad and far reaching

301   limited impact given the nature of skills base in SA

302   mostly automation tech has been implemented

303   incentivising to adopt certain kinds of technology

304   government needs to concern itself with the how of technology implementation