AT THE INTERSECTION OF AUTOMATION, UNEMPLOYMENT AND INEQUALITY IN SOUTH AFRICA

By

Fazila Farouk

Thesis presented for the degree of

DOCTOR OF PHILOSOPHY

in the Department of Sociology

UNIVERSITY OF CAPE TOWN

Supervisor: Ari Sitas

1 January 2024

I hereby declare that this thesis and the work presented in it is entirely my own. I also undertake that any quotation or paraphrase from the published or unpublished work of another person has been duly acknowledged in the work.

For my very special dad

Mohamed F Farouk

21 December 1940 – 1 January 2021

ACKNOWLEDGEMENTS

I wish to thank Prof. Ari Sitas for coming on board as my supervisor. I feel extremely honoured to have been supervised by such an esteemed scholar whose knowledge and brilliant insights about social change truly enriched this thesis. I am especially thankful to Ari for his professionalism, patience and quick turnaround on feedback, which greatly eased my PhD journey.

Few PhD journeys reach their end without encountering a few obstacles along the way and mine was no exception in that I got to a point where I felt completely stuck and uncertain about how to proceed. But I am very lucky to have a friend in Gareth Coleman who came to my rescue by wading through a big chunk of my incomplete work. Gareth's helpful advice was vital to getting me unstuck at a crucial moment in my journey for which I am very grateful.

I also wish to take this opportunity to thank my mom, Sarah Farouk, an avid follower of the news, whose interest in the world beyond my childhood home deeply influenced my curiosity about social change.

Finally, and most importantly, it takes a village to produce a PhD. My family is my village, and this PhD is as much theirs as it is mine. I could not have produced this thesis without the immeasurable support of my dear husband, Mohamed Motala and the precious help of our darling son, Adam Motala. I feel blessed to have a husband who engages with me in endless conversation about political economy and to have a son who enthusiastically geeks out with me on tech talk. This recognition of the wonderful men in my life would be incomplete without my acknowledgement of the tremendous sacrifices they both made to create the space for me to produce this thesis. I am eternally grateful and forever in their debt.

ABSTRACT

The emergence of the digital economy in the aftermath of the Global Financial Crisis and its intersection with the mainstream economy has led to significant labour market instability and social uncertainty. Heralding an ontological shift in the global economy, these changes coincided with the announcement of a Fourth Industrial Revolution (4IR) by the World Economic Forum, which, despite being riddled with inconsistencies as a theory of change, was adopted by the South African government as a policy guide. This gave rise to a sociological debate amongst South African scholars that problematises the 4IR as a historical force, whilst raising concerns about its neoliberal ideology. Despite the vital epistemic contribution of this debate, to date, there has been no evidence-based study that analyses the digital economy in relation to South Africa's post-apartheid transformation. This is the knowledge gap that this thesis addresses, whilst posing the question: Will the 4IR, as a metaphor for the digital economy, make a difference to how post-apartheid South Africa responds to its crisis of social and economic inequality? This question prompted a multifaceted study of three sectors, which includes: 1) an ontological study of the tech start-up sector as the driver of digital innovations; 2) a study of automation and technological unemployment in the banking industry as the fastest digitalising sector in the economy; and 3) a study of the platform economy both as a new source of jobs and as the ex-post manifestation of the sharing economy within which post-capitalist tendencies exist. This thesis is a study of technological and social change that draws on Marxist phenomenological and social constructivist theories to explore power and inequality in the digital economy. It applies mixed research methods and is initiated by a survey of 120 tech start-ups, which is an original contribution to the literature. This is augmented by 15 in-depth interviews across the three sectors. The significance of this study is that it moves the field forward by gathering empirical evidence to reveal the material expression of the 4IR in South Africa. The study finds that far from being a disruptive force that reduces inequality, the 4IR as a metaphor for the digital economy, instead extends historic injustices by inventing new technologies that amplify the destructive tradition of value extraction in the South African economy—thereby, preventing economic and social change for shared prosperity.

TABLE OF CONTENTS

ABBREVIATIONS

4IR	Fourth Industrial Revolution
AI	artificial intelligence
AR	augmented reality
AWS	Amazon Web Services
B2B	business-to-business
BANKSETA	Banking Sector Education and Training Authority
BASA	Banking Association of South Africa
BATs	Baidu, Alibaba and Tencent
CENTROW	Centre for Transformative Regulation of Work
CT	Cape Town
CTT	Critical Theory of Technology
DPCP	Digital Platform Co-operative Project
GAFAs	Google, Apple, Facebook and Amazon
genAI	generative AI
ICTs	information communication technologies
IT	information technology
IoT	internet of things
JHB	Johannesburg
M2H	machine-to-human
M2M	machine-to-machine
ML	machine learning
NDP	National Development Plan
P2P	peer-to-peer
PC4IR	Presidential Commission on the Fourth Industrial Revolution

SLP	Social Law Project
SRD	Social Relief of Distress
STS	Science and Technology Studies
TNCs	transnational corporations
UCT	University of Cape Town
UIBR	use-inspired-basic-research
UWC	University of the Western Cape
WEF	World Economic Forum

CHAPTER ONE: INTRODUCTION

Over the course of the past decade and a half, the emergence and consolidation of the digital economy has heralded remarkable advances in technological innovation, signalling an ontological shift in the global economy. This technological revolution has its origins in the fallout from the Global Financial Crisis, which resulted in the shift of financial speculation to digital innovation, thereby fostering a new capitalist model that acquired the label "platform capitalism" (Srnicek, 2017, Schor, 2020, Perez and Leach, 2021, Verdegem, 2022). This new variant of capitalism appeared as an outcome of the new technologies that emerged in the last decade during which time advances in digital innovation were marked by a mobile revolution in the first half of the 2010's, which transitioned into an artificial intelligence (AI) revolution at the midpoint of the decade (Perez, 2010, Ford, 2015, Kenney and Zysman, 2016, Schwab, 2017). These advances, scaffolded by AI, big data and cloud-based technologies, have enabled digital platforms with immense global reach to emerge as tech monopolies that dominate the world's economy, whilst disrupting labour markets and fuelling social instability (Collins, 2016, Schor, 2020). The sociologist Manuel Castells (2020) refers to the power and flexibility of these tech monopolies as an extreme form of capitalism.

The Dawn and the Dominance of the Fourth Industrial Revolution

This period of rapid digital innovation and its attendant impact on the economy and society, has also been accompanied by debates amongst scholars, business leaders and futurists who have engaged in a battle of ideas to define this new techno-socio-economic era (Gordon, 2012, Brynjolfsson and McAfee, 2014, Rifkin, 2016, Schwab, 2017, Perez and Leach, 2021). In the midst of this debate and launched with much fanfare at an annual Davos meeting in January 2016, the World Economic Forum (WEF) introduced the concept of the Fourth Industrial Revolution (4IR) in a book of the same title, authored by its founder and chair, Klaus Schwab (2017). The 4IR is a theory of change that defines and evaluates the origins and impact of contemporary technological developments from the WEF's perspective. Despite wider debate on the current technological paradigm, due

to its genesis in a powerful organisation with immense influence amongst global elites, the 4IR has emerged as the putative definition of the modern digital era.

Consequently, the 4IR dominates media and policy discourse in capitols all over world, including in Pretoria where President Cyril Ramaphosa, a keen advocate of the digital economy, embraced the 4IR early in his term of office, emphasising its importance for economic policymaking in his first State of the Nation Address, which he followed by establishing and chairing the Presidential Commission on the 4IR (PC4IR) (Shapshak, 2019, Sutherland, 2020, PC4IR, 2020). The principal outcome of the commission is a recommendation for the integration of the 4IR at the highest policy level within South Africa's National Development Plan (PC4IR, 2020).

However, the dominance of the WEF's theory of change with respect to innovation in South Africa has also galvanised a chorus of critique from academics and policymakers across the ideological spectrum. A typical response from South African analysts is concern about 4IR policy design and implementation within the context of a developing country characterised by high levels of inequality (Marivate et al., 2021, Mazibuko-Makena and Kraemer-Mbula, 2021, Olaitan et al., 2021). Left-leaning scholars, however, have emerged with a more strident critique, problematising and contesting the 4IR as a historical force as well as denouncing it for its neoliberal ethos and technological determinism (Sutherland, 2020, Moll, 2021b, Ngwane and Tshoaedi, 2021).

Schwabian Technological Determinism and the Inevitability of Winners and Losers

The problem with technological determinism is that it is grounded in a positivist perspective that disregards the social and political influences that inform and shape innovation, including how this translates to benefits for some and burdens for others. Technological determinists elevate technology as the driving force in history, readily accepting its impact on society as autonomous and inescapable, based on the belief that 'technology causes or determines the structure of the rest of society and culture' (Smith and Marx, 1994, Dusek, 2006, p. 3). Technological determinism is pervasive in business and policy circles (Wyatt, 2008). It is unmistakeable in Schwab's view of the 4IR, which

he frames as an 'ontological inequality (that) will separate those who adapt from those who resist – the material winners and losers in all senses of the word' (Schwab, 2017, p. 97-98). This view represents a 'triumph of technological rationality' within 'broader public discourse, which seeks to render technology opaque and beyond political intervention' (Wyatt, 2008, p. 176). In this regard, Schwabian technological determinism presents technology as an objective and inexorable force in society no matter the outcome.

The fact that the South African government has embraced the 4IR is hugely problematic. Schwab's (2017) framing of the inevitability of winners and losers, to say the least, is inappropriate for a country still reeling from the effects of both colonial and apartheid-era policies that produced the most unequal country in the world in which the majority of Black[1] South Africans remain stuck in the underclass, and for whom the socio-economic benefits of democracy have yet to materialise. In this regard, despite the demise of apartheid three decades ago, South Africa continues to be burdened by a racial hierarchy that persists in the country's class structure. This, along with the fact that the South African economy remains notoriously untransformed is widely noted not just by scholars and policy analysts (Terreblanche, 2018, Davies, 2012, Anwar, 2017), but also by the PC4IR, which attributes the 'triple scourge (of) poverty, unemployment and inequality' to the country's "historical scars" (PC4IR, 2020, p. 8).

However, while the presidential commission recognises the lack of transformation in South Africa and highlights the need for social inclusion as an important objective for technological development, it nonetheless aligns with the WEF's market-driven model by identifying a critical role for "capital markets" to catalyse innovation (PC4IR, 2020, p. 36). This signals challenges for the commission's social inclusion objectives, as it

[1] Whilst the capitalisation of race groups is a debated subject, this thesis takes its cue from an established mainstream publications that capitalises Black. For example, the New York Times recognises the history of Black oppression and recently started capitalising Black in deference to a race group with a shared identity of subjugation, whilst nonetheless referring to whites in lower case as this race group lacks a similar shared identity. This is notwithstanding the fact that the capitalisation of whites is advocated by supremacist groups. See Coleman (2020) in reference list.

endorses the idea of innovation being driven by venture capital, which privileges the role of financial markets in the country's future trajectory, thereby elevating the profit motive as the driver of development. This neoliberal approach to the country's development has been classified as the financialization of South Africa's economy (Ashman et al., 2011, Fine, 2012, Mohamed, 2016). Financialization is broadly defined as 'the increasing role of financial motives, financial markets, financial actors and financial institutions in the operation of domestic and international economies' (Epstein, 2021, p. 5). It is associated with extracting value from economies (Christophers and Fine, 2020), which in South Africa's case undermines fairer outcomes by inhibiting social and economic transformation, whilst upholding a racial and economic status quo that has its roots in the apartheid era.

21st Century Automation and Technological Unemployment

In the interim, AI technologies have penetrated diverse sectors of the economy, whilst introducing efficiency gains that have boosted productivity and GDP growth (Acemoglu and Restrepo, 2018, Bernstein and Raman, 2015). However, as businesses have increasingly adopted AI-driven technologies that automate jobs, these changes have also been accompanied by an increase in labour market volatility, social instability, and growing inequality as a consequence of technological unemployment, which some perceive as an existential threat (Frey and Osborne, 2013, Brynjolfsson and McAfee, 2014, Ford, 2015, Hawksworth et al., 2018, Peters, 2019, Acemoglu and Restrepo, 2018).

Technological unemployment is not a new concept and certainly not unique to the age of AI as the relationship between, automation, unemployment and inequality has been a concern of scholars for many decades (Keynes, 1931, Marcusé, 1941, Gorz, 1982, Acemoglu and Restrepo, 2018). In fact, the idea of unemployment induced by automation has been traced back to texts from the 18th century at the beginning of The Industrial Revolution (Campa, 2017). These longstanding concerns about automation's existential threat to livelihoods allude to an enduring structural problem, which Keynes (1931) got to the nub of in his definition of "technological unemployment", which refers to the

phenomenon of jobs being lost to automation at a rate outpacing the invention of new jobs.

Studies that have emerged in the era of 4IR technologies support this Keynesian definition of technological unemployment. For example, there are two teams of MIT economists that have highlighted the problem of jobless economic growth consequent to the introduction of 21st century automation technologies. On the one hand, Eric Brynjolfsson and Andrew McAfee note a "great decoupling" between economic growth and job creation (Bernstein and Raman, 2015). On the other, Daron Acemoglu and Pascual Restrepo (2020), who specifically focus on AI, argue that current innovations result in "insufficient" productivity gains, which, due to a preoccupation with inventing technologies that prioritise automation, has a "displacement effect" on jobs. Acemoglu and Restrepo specifically refer to the dominant digital innovation of this era as the 'wrong kind of AI', attributing its emergence to market failure (2020, p. 25). Their appraisal of AI can be described as a critique of technological determinism that echoes Marcuséan technological rationality. Marcusé's (1941) theory is critical of the widespread acceptance of technologies that pursue efficiency regardless of their cost to society. In this regard, what stands out with respect to contemporary technologies is that despite productivity gains - which is a common argument in favour of their adoption - the economic advantages that these new technologies generate are nonetheless increasingly concentrated, as their introduction has also resulted in the creation of fewer jobs, lower incomes and the erosion of middle class livelihoods, which is deepening inequality (Bernstein and Raman, 2015, Acemoglu and Restrepo, 2020).

Beyond the productivity debate, there are also studies with a specific focus on labour market dynamics, which also reinforce the Keynesian notion of technological unemployment by predicting the nature and scope of job losses, including the kinds of jobs that will be lost to automation and the people who will be most affected. In this regard, a South African study, which is modelled on the seminal Frey and Osborne (2013) study, found that 35% of private sector jobs across 380 occupations were at risk of automation and that those most likely to be affected would be 'previously disadvantaged groups' who are in 'low and medium-skilled white-collar' jobs (Le Roux, 2018a, p. 11, p.

13). The South African study reinforces the findings of the aforementioned international studies about the impact of automation on an increasingly beleaguered middle class. However, what sets the South African study apart is the racialised nature of its findings, as the Black African middle class is by far the biggest cohort amongst previously disadvantaged groups. Thus, highlighting the structural nature of racial and economic inequality in South Africa, which has an enduring effect on groups historically disadvantaged by apartheid.

New Jobs in the Platform Economy

Meanwhile, the threat of technological unemployment is mitigated by an opposing view, which is that new jobs have repeatedly replaced those made redundant by successive industrial revolutions over the last two centuries, which synchronously also signified tremendous progress for the human race (World Bank, 2019, Clemens, 2020). For example, James Manyika, emeritus chair of the McKinsey Global Institute, argues that the overall effect of the 4IR is that some jobs are being lost, while others are undergoing modification, but also - and quite significantly - that new jobs are being invented (Clemens, 2020). This view resonates with Prof. Tshilidzi Marwala (2019), who is a respondent in this study and at the time of being interviewed was deputy chair of South Africa's Presidential Commission on the 4IR. Consequently, the threat of technological unemployment is downplayed by influential voices.

Meanwhile, the platform economy is presented as a new frontier for job creation and a defence against widespread unemployment in South Africa. For example, a leading technology publication, *IT Web*, claims that the platform economy has the potential to lift South Africans out of poverty (Moyo, 2020). Correspondingly, the management consulting firm, Accenture, which partners with the WEF to produce research on the 4IR globally, has also argued that the 'platform economy…is the pathway that will drive growth and jobs across Africa' (Mzimba, 2017).

However, several studies contest this perspective whilst exposing the emergence of a precariat linked to the rise of monopolies in the platform economy (Srnicek, 2017,

Standing, 2018, Schor, 2020, Vrasti, 2021). In fact, the exploitation of workers in the platform economy is so extreme that it has given rise to an explosion of precarity scholarship under the banner "Future of Work", which highlights issues that exacerbate social and economic inequality as a result of insecure and low-wage jobs, unfair labour practices and the dismantling of social protections (Graham et al., 2017a, ILO, 2017, Balliester and Elsheikhi, 2018, Standing, 2018, Mawii and Aneja, 2020, Vrasti, 2021, Webster and Masikane, 2021).

Meanwhile, an interesting feature of the platform economy is its origins in the sharing economy, which is associated with impulses against the neoliberalism that fuelled the 2008/9 financial crisis. Viewed from a post-capitalist, post-work liberation theory perspective (Marcusé, 1941, Marcusé, 1964, Gorz, 1985, Gorz, 2010a), the sharing economy emerged as a dialectical response to the market fundamentalism of neoliberal capitalism, which it sought to de-reify by developing non-hierarchical and collaborative peer-to-peer (P2P) business models based on and facilitated by the distributed nature of the internet (Rifkin, 2012, Cohen, 2017a, Schor, 2020).

Scholars identify the emergence of tech monopolies and a precariat in the platform economy as the ex-post manifestation[2] of the sharing economy, which they argue has been co-opted by platform capitalism (Kenney and Zysman, 2016, Langley and Leyshon, 2017, Srnicek, 2017, Standing, 2018, Schor, 2020, Vrasti, 2021). However, despite the co-option of the sharing economy by capitalist monopolies, the literature on post-capitalism also identifies lingering post-capitalist tendencies in the platform economy as a source of radical ideation for post-work imaginaries that offer an alternative to the 4IR's neoliberal dogma and market fundamentalism, which this thesis explores (Srnicek and Williams, 2015, Mason, 2016, Cohen, 2017b, Scott, 2018, Bastani, 2019, Schor, 2020).

[2] This thesis' conceptualisation of the platform economy as an "ex post manifestation" of the sharing economy draws on a concept that originates in the work of Langley and Leyshon (2017) who refer to the dominant neoliberal platform business model as an "ex post construction".

Research Problem, Questions and Significance of Study

The acceptance of the 4IR as the putative definition of the digital economy, Schwab's (2017) framing of the inevitability of winners and losers, and the South African government's unequivocal endorsement of his theory of change, tips the scale towards an elite-driven strategy for economic and social development. Moreover, despite the leftist critique of the 4IR as neoliberal and technologically deterministic, on a broader scale, there are diverse views amongst academics and policy analysts leading to confusion about the nature and impact of digital innovation in South Africa (Marivate et al., 2021, Mazibuko-Makena and Kraemer-Mbula, 2021, Moll, 2021b, Ngwane and Tshoaedi, 2021, Olaitan et al., 2021). In the interim, given the increased adoption of AI, technological unemployment has been encroaching on the mainstream economy alongside the emergence of a growing precariat in the platform economy, raising concerns about the perpetuation of racialised social and economic inequality in a country still struggling with the lingering after-effects of apartheid era policies (Terreblanche, 2018, Le Roux, 2018a). Consequently, this study is concerned with identifying who the winners and losers are in South Africa's 4IR dispensation. In this regard, it poses the question:

Will the 4IR, as a metaphor for the digital economy, make a difference to how post-apartheid South Africa responds to its crisis of social and economic inequality?

This question invites an evidence-based response, which this study engages with by trying to get closer to the truth about the nature and impact of digital innovation in South Africa. In this regard, despite the significant contribution of the South African literature that identifies neoliberalism as a problem emblematic of the 4IR, this critique nevertheless emerges from a conceptual debate, which lacks an evidence base to support its claims as it is predominantly based on theoretical arguments. This is the knowledge gap identified by this thesis, which it addresses by presenting an examination of three sectors that provide a multidimensional perspective of the digital economy whilst engaging with questions about innovation and inequality in distinct contexts that intersect to present a richer picture of the impact of the 4IR in South Africa. These studies include:

- An ontological study of the tech start-up sector as the origin of the digital economy, which includes a focus on the people behind dominant innovations, thus enabling the winners in the 4IR to come into view. This study grapples with the question: What kind of digital technologies are being developed, who are the drivers behind them, what are their motives and how does this affect inequality in South Africa? This study is initiated by the systematic gathering of information on 120 start-ups, which is an original contribution to the literature on digital innovation in South Africa.
- A study of the banking sector as an early adopter of AI automation, thus highlighting the threat of technological unemployment to white-collar workers whilst bringing some of the 4IR's losers into view. The question that this study explores is: What is the impact of automation on white-collar jobs in the mainstream economy and what does this portend for the expansion of the Black middle class in South Africa? As a similar study has not been conducted, this study of the banking sector is also an original contribution to the literature.
- An examination of the platform economy as the ex-post manifestation of the post-capitalist sharing economy, which a wide literature focuses on as the source of precarious employment, thereby revealing additional losers in the 4IR. However, the platform economy is also a sector that retains latent post-capitalist impulses, which this study examines as an alternative to the 4IR's neoliberalism. In this regard, the question that this study addresses is: What are the characteristics of the platform economy as the ex-post manifestation of the sharing economy and what, if any, post-capitalist tendencies exist in South Africa's digital economy?

This study moves the field forward by gathering empirical evidence to reveal the material and substantive expression of the 4IR in South Africa. The significance of this study lies in the texture that it adds to debates on the 4IR via a multidimensional study that exposes the structural configuration of digital innovation in South Africa, whilst revealing the substance of technological innovation. Viewed from a Heideggerian (1954) perspective on the metaphysics of technological innovation, this revealing exposes some fundamental truths about the nature of South African society that are essential for grappling with questions about the dominant mode of technological development and its wider implications for South Africa's transformation.

Theoretical Framework and Research Methodology

In positioning itself ontologically and epistemologically in relation to technological innovation and social change, this study adopts a Marxist phenomenological and social constructivist approach based on three theories that are applied heuristically to analyse the data. In this respect, theory triangulation is used to enable the application of different theories in the analysis and interpretation of the data (Carter et al., 2014).

Firstly, this study deploys a theory of technology to engage in an ontological examination of the nature of technological development. In this regard, it applies Andrew Feenberg's Critical Theory of Technology (CTT), which merges the empiricist methodology of Science and Technology Studies (STS) with Herbert Marcusé's theory of technological rationality to delve into the inherent nature of technological artefacts from a teleological perspective (1991, 2017b, 2017a). CTT exposes the inherent bias of technological artefacts and reveals the flawed rationale underpinning technological determinism.

Secondly, this study applies the post-work liberatory social theory of André Gorz who presents proposals for dealing with technological unemployment and whose ideas align with the Frankfurt School's Marcusé (Granter, 2016a). As such, Gorz's work is associated with Critical Theory, albeit with an emphasis on Sartrean Existentialism (Harris et al., 2023). 'Critical theory perspectives are concerned with empowering human beings to transcend…constraints' (Creswell and Poth, 2016, p. 27). In this regard, Gorz's proposals for an emancipatory post-capitalist society include the reinvention of social policies based on radical ideation for reforms that fragment capitalism from within.

The third pillar in this theoretical framework is Manuel Castells' theory of the Network Society (2010, 2011), which deploys a social constructivist methodology to deconstruct the power of socio-technical networks in the digital economy. Castells' theory provides a heuristic model for understanding who is behind the innovations of the 4IR, including how power is mediated in the digital economy. Castell's critique of informational

capitalism and CTT's critique of technology synchronise to highlight a thematic thread, which is the relationship between capitalism, power and vested interests.

This study seeks to make discoveries about the digital economy in South Africa and can thus be described as an exploratory study. Exploratory studies are associated with a flexible research design (Al-Ababneh, 2020). As such, this study applies both quantitative and qualitative research approaches within a mixed methods research design. This methodology combines both "statistics and stories" to provide a deeper understanding of the research problem (Creswell, 2013). In this regard, this study's examination of 120 technology start-ups enhances its findings due to the fact that large samples are attributed with "statistical power", which lends credibility to findings (Jones et al., 2013). This quantitative study of start-ups based on systematic data gathering is complemented by qualitative research methods, which includes in-depth interviews with a small sample of 15 respondents. In-depth interviews are credited with being an important data gathering method for phenomenological studies as they allow researchers to draw on the meaning of phenomena for respondents (Creswell and Poth, 2016). In this regard, it is not uncommon for a small number of interviews to be held with respondents who have experienced a phenomenon (Creswell and Poth, 2016).

Outline of Thesis

Chapter Two of this study comprises the literature review. It discusses the adoption of the 4IR in South Africa. This is followed by an analysis of 4IR discourse in South Africa, which engages with the literature that critiques the implementation of the 4IR both from a policy response and a country readiness perspective. This chapter also engages with the literature that challenges the very notion of the 4IR as an industrial revolution. This includes a review of the international debate on industrial revolutions, which locates the 4IR amongst competing techno-economic paradigms. This is followed by a review of South Africa's conceptual debate, which, applying distinctive theoretical frameworks, contests the 4IR as a historical force. Finally, this chapter also reviews the literature on post-capitalism as an alternative to the neoliberal 4IR. The purpose of this literature review is to define the 4IR in relation to competing theories of change.

Chapter Three of this thesis engages in a discussion of three theories that inform this study from a heuristic perspective in terms of its analysis and interpretation of data. In this regard, this thesis deploys 1) a theory of technology to understand the influences shaping new technologies as well as the rationale underpinning them, 2) a post-work theory that responds to the issue of technological unemployment and 3) a theory of society that makes sense of the digital economy and how power is mediated within it. In this respect, the theories discussed in this chapter include Andrew Feenberg's Critical Theory of Technology, which incorporates Herbert Marcusé's theory of technological rationality; André Gorz's theory of a dualistic society and the need for radical post-work reforms; and Manuel Castells' Network Society theory, which deconstructs the power of socio-technical networks in the digital economy.

Chapter Four covers a discussion of the research methodology adopted by this study, which, as noted above, is based on a mixed methods research design. This includes both a survey as well as interviews and participant observation. In this regard, this study conducts a survey[3] of 120 start-ups, which is augmented by participant observation at two start-up events. The study also conducts interviews with 15 respondents in the tech start-up sector, in the banking industry and in the platform economy. Chapter Four provides an explanation of how the theoretical framework intersects with the methodological framework to inform research choices. In particular, it clarifies how scientific rigour is achieved by framing both qualitative and quantitative investigations within deeper philosophical questions, which this study strives towards.

Chapter Five of this thesis is the launchpad of this multidimensional study on the digital economy. The aim of this chapter is an examination of the start-up sector in South Africa in order to identify the technologies of the 4IR, the forces behind them and their

[3] The use of the term survey is applied in a metaphorical sense as the principles and the instruments of the survey method were used to systematically gather data on 120 technology start-ups from secondary data sources. Strictly speaking, surveys gather information from primary data sources. Refer to Chapter Four for further clarification.

implications for social change. In this regard, this chapter presents the findings of a survey of 120 South African start-ups that were launched during a period that coincides with the emergence of the 4IR as a concept. The findings of this survey include a sectoral analysis of technology start-ups, which identifies the dominant innovations emerging within the sector and the demographics of the people behind them, including the race and gender of founders. This demographic breakdown of start-up founders is essential to an understanding of transformation in the digital economy, which also has implications for the kinds of innovations that emerge in South Africa. This chapter also provides information about the kinds of financial support available to start-ups with an emphasis on the investor-entrepreneur relationship that exists in the venture capital ecosystem, which also has implications for the kinds of innovations that emerge. Appendix A contains a list of all the start-ups that were examined. While the online profiles of founders was examined to reveal the demographic profile of entrepreneurs in South Africa from a racial and gender perspective, despite this information being publicly available, their names are not published in this thesis or in the appendix for ethical reasons.

Chapter Six examines the issue of technological unemployment in relation to white-collar workers in South Africa. The threat of technological unemployment appeared abruptly in the second half of the 2010's when a number of white-collar jobs that were previously deemed stable suddenly became redundant in South Africa's banking sector, which is a major employer in the economy that embarked on systematic restructuring to digitalise its operations via the adoption of AI technologies (Marwala, 2019). This chapter maps the digitalisation of South Africa's banks in the latter half of the last decade based on interviews with representatives working in the industry who reflect on the pull and push factors that initiated the widespread restructuring of an entire industry. However, not only do shifts in the banking industry fuel automation anxiety amongst white-collar workers, they also signal new challenges for the emerging Black middle class in South Africa as the banks historically absorbed large numbers of Black women from disadvantaged backgrounds to perform white-collar work that has been de-skilled and proletarianized since the 1970's (Oppenheimer, 1972). These are the jobs that have been on the chopping block since the wave of digitalisation swept through the banks, reaching a peak between 2018-2019. In this regard, the dynamics of automation and technological

unemployment in the banking sector highlight underlying complexities with respect to South Africa's transformation project, which are explored in Chapter Six of this thesis.

Chapter Seven engages with the platform economy as the source of new jobs in the digital economy. It aims to examine how it came to be that the sharing economy was stifled by the platform economy, whilst also aspiring to identify potential levers of change from a post-capitalist perspective on dialecticism. This chapter draws on a wide literature that delineates the platform economy as a neoliberal fountainhead of monopolies and the source of labour market instability that takes exploitation to new heights (Srnicek, 2017, Schor, 2020, Papadimitropoulos, 2021). In this regard, this study draws on Future of Work literature to outline the challenges faced by platform economy workers in South Africa. This chapter also traces the evolution of the platform economy as the ex-post manifestation of the sharing economy (Schor, 2020, Rifkin, 2014). However, as this thesis is informed by critical theories, which are concerned with freedom from oppression, it examines responses to the exploitation of workers in the platform economy from two angles. Firstly, it describes legal cases, i.e., the litigation route as a challenge to unfair labour practices in the platform economy. In this regard, this chapter presents both an international and a South African example, each dealing with the issue of unfair dismissal. The litigation route, which is the most common response to unfair labour practises in the platform economy, is nonetheless inadequate to the task of structural reforms such as those evoked by the proposals of post-capitalist scholars such as Marcusé and Gorz, whose vision of shared prosperity is expressed in their liberatory social theories. Accordingly, this chapter also examines an under-researched aspect of the digital economy in South Africa, which is the emergence of post-capitalist tendencies in the platform economy. In this regard, this chapter explores the potential for post-capitalist innovation as a dialectical response to the neoliberalism of the 4IR.

Chapter Eight of this thesis presents the key findings from each of the data chapters as well as synthesising the results to offer an analysis of the digital economy in South Africa as a whole. This study of technological innovation finds an ingrained neoliberal ethos in South Africa and presents evidence that exposes South Africa as a one-dimensional capitalist society. The principal finding of this study is that the digital economy mirrors an

age-old custom in the South African economy, which is rooted in the colonial and apartheid eras that have a long shadow reaching into the cotemporary period. This is the extraction of as much value as possible from the South African economy. In this regard, this study finds that the 4IR as a metaphor for the digital economy, reinforces racial and economic inequality through neoliberal capitalist practice. Consequently, this study argues that there are clear winners and losers in South Africa's digital economy, which maintain a racial status quo that bodes poorly for South Africa's socio-economic transformation.

The Future is Moving Very Fast: Research Limitations

Until late 2022, AI's impact was largely felt by software innovations automating a variety of simple and repetitive administrative white-collar jobs. However, concerns about technological unemployment have intensified with the introduction of generative AI (genAI), such as Open AI's ChatGPT in November 2022, which even threatens to automate the work of skilled knowledge workers such as computer programmers. As this PhD study was conceptualised before the launch of genAI, the impact of this new technology does not form part of this study, albeit that there are some references to it in this thesis. Thus, despite the fact that a significant number of South African CEO's who were recently surveyed reported they are making genAI a top investment priority (Fraser, 2023), incorporating an examination of genAI, despite its implications for technological unemployment, is outside the scope of this study.

Secondly, the COVID-19 pandemic had significant implications for the migration of business activities to online platforms, which fast-tracked the digitalisation of economies all over the world, including in South Africa (Molabe, 2020). The pandemic is also an event that materialised after this study was conceptualised. As such, while there are references to the pandemic in this thesis, its interrogation as a factor that has fast-tracked automation does not form an integral part of this study. Thus, highlighting a second limitation of this study.

In essence, this PhD study was undertaken in response to the 4IR. As such, it does not respond to the impact of genAI or COVID-19, which respectively represent technological and social disruptions that have occurred in quick succession in recent years, indicating not just that the future is unpredictable but also that it moves very quickly in relation to technological change. This pace of change is difficult to keep up with, resulting in unease and confusion about the future of technological development and the future of society. This merely underscores the need for reflection on deeper philosophical questions, which this thesis attempts to do by interrogating the rationale underpinning technological development, which it views as perhaps more important than technological changes themselves.

CHAPTER TWO: A REVIEW OF 4IR DISCOURSE AND POST-CAPITALIST ALTERNATIVES

The view that contemporary technological innovations signal a paradigm shift for society is common. This has led to many scholars theorising the origins, meaning and implications of contemporary technologies in relation to the dawn of a new industrial revolution. For example, in the first half of the last decade, MIT economists, Erik Brynjolfsson and Andrew McAfee (2014) referred to the emergence of "brilliant technologies" causing an "inflection point" in technological and human development, signposting the emergence of the "second machine age". Similarly, U.S. public intellectual, Jeremy Rifkin, observed an acceleration in widespread and multi-tiered digitalisation, which he labelled the "Third Industrial Revolution" (Rifkin, 2016).

Against this backdrop, the World Economic Forum (WEF) introduced the concept of the Fourth Industrial Revolution (4IR) as a theory of change in a book authored by its founder and chair, Klaus Schwab (2017), to shed light on current technological innovations and their implications for society. In an online blogpost published by the WEF, Schwab argues that a surge of new innovations coalescing around artificial intelligence (AI) are producing cutting edge technologies, which are diverse and complex in that they '(blur) the lines between the physical, digital, and biological spheres' (2016b) of society—thereby signalling the emergence of a paradigm shifting new industrial revolution, which he labelled the 4IR.

As an immensely influential organisation coordinating the global business elite, it is the WEF's theory of change that has taken the lead shaping policy dialogue globally and in South Africa (Barton, 2020, Moll, 2021b, Ngwane and Tshoaedi, 2021, Selelo and Khwela, 2022, Perez, 2022, Sutherland, 2020, Cooper, 2021). Schwab and the WEF's influence, as evidenced by their access to powerful global platforms, is incontrovertible. For example, Schwab and other prominent business and political leaders are members of the advocacy caucus of the B20, which is an official business dialogue and policy advocacy forum that engages with the G20 heads of states (B20 Indonesia, 2022). In November 2022, at a B20 meeting alongside the G20 Summit in Bali, Schwab reportedly

continued to urge the adoption of the 4IR in his keynote address arguing, 'The groups that move first to adopt the Fourth Industrial Revolution will automatically win the race. The winners will "take it all"' (Athrappully, 2022). Schwab's characterisation of the 4IR as an "ontological inequality" that inevitably produces "winners and losers" has been the source of great consternation amongst scholars concerned about growing inequality. This is largely because the 4IR is catalysed through market-driven innovation fuelled by speculative finance. For example, one description of the WEF's model, which foregrounds the role of the market in relation to Schumpeterian creative destruction, defines the 4IR as 'the creative and open combination of technology and the market through open innovation' (Lee et al., 2018, p. 3).

The influence of the WEF as an elite pro-business organisation in South African digital policymaking (PC4IR, 2020) has generated significant critique from scholars and policy advocates concerned about its implications for a country mired by inequality. In this regard, two major themes have emerged in the literature. The first strand of this literature focuses on the implementation of the 4IR in South Africa as a country facing significant development challenges. As such, it is concerned about South Africa's ability to implement the 4IR from a policy response and country readiness perspective. The second strand of the literature engages in a conceptual debate that questions the very notion of the 4IR as a new industrial revolution. Both these strands of literature are reviewed in this chapter, as they make an important epistemic contribution to the discourse on the digital economy in South Africa.

However, as point of departure, this chapter commences with a discussion of the South African government's rapid adoption of the 4IR, as a precursor to the debate critiquing its implementation. Furthermore, South Africa's conceptual debate on the 4IR is preceded by a review of the international debate on industrial revolutions, which is important for providing context to the local discussion. Finally, while the WEF's 4IR dominates global policy dialogue with respect to innovation and social change, in recent years an adjacent literature based on post-capitalist models has also emerged. This literature critiques and challenges neoliberal market-driven innovation. Consequently, this chapter reviews the literature on post-capitalism, as an alternative economic development approach that

responds to some of the concerns raised by the South African critique of the 4IR. The purpose of this literature review is to locate the 4IR amongst competing theories of change.

The Adoption of the 4IR in South Africa

Schwab's survival of the fittest philosophy is fundamentally problematic in a country like South Africa, which suffers from structural inequality. Nevertheless, the 4IR has been endorsed at the highest level by President Cyril Ramaphosa who established and chaired the Presidential Commission on the Fourth Industrial Revolution (PC4IR). In turn, the PC4IR elevated the 4IR as a strategic policy consideration for South Africa, targeting its integration through "institutional frameworks" at the highest level (PC4IR, 2020, p. 10). Accordingly, the PC4IR argues that the 'possibilities and prioritisation of pathways presented by the 4IR are given material direction and purpose within the South African National Development Plan (NDP) towards 2030' (PC4IR, 2020, p. 10).

Moreover, the PC4IR is awash with the rhetoric of sustainable development and social inclusion. Highlighting South Africa's "historical scars" as the source of the 'triple scourge (of) poverty, unemployment and inequality', the PC4IR promotes a 'human centred agenda' (PC4IR, 2020, p. 8, p. 78). In this respect, the presidential commission recognises the structural nature of South Africa's inequality and signals the need for technological innovation to respond to this, if somewhat unpersuasively. It is an approach that social and political theorist Roberto Unger (2009) might describe as the promotion of compensatory measures to humanise the 4IR. In this regard, while the PC4IR supports social inclusion as an objective, it aligns with the WEF's market-driven model by identifying a critical role for "capital markets" to catalyse innovation (PC4IR, 2020, p. 36). This immediately signals challenges for the commission's social inclusion and development objectives. At the same time, South Africa's NDP itself is described as "neoliberal" and "deeply problematic" for its doublespeak on social inclusion as well as its promotion of economic proposals that reinforce "entrenched economic interests" (Alloggio and Thomas, 2013, Coleman, 2014). In this regard, the PC4IR's recommendations and the NDP complement each other as frameworks rooted in

progressive ideals, which are nonetheless captured by elite agendas that offer questionable prospects for closing the inequality gap.

Policy Response and Country Readiness Critique

The South African government's embrace of the 4IR provoked a significant response from both think tank and academic sources replete with questions and concerns about the 4IR's responsiveness to the needs a country facing significant development challenges (Cunningham, 2018, Sutherland, 2020, Marivate et al., 2021, Olaitan et al., 2021, Mazibuko-Makena and Kraemer-Mbula, 2021, Dwolatzky and Harris, 2021, Selelo and Khwela, 2022). However, to a large extent this literature does not question the 4IR's ideological premises. Moreover, with one exception that specifically critiques the recommendations of the PC4IR, the bulk of this implementation discourse engages with the 4IR from a general perspective. Overall, the implementation literature is split between supply and demand side critiques highlighting two themes. In this regard, the supply side literature evaluates South Africa's policy response to the 4IR (Mazibuko-Makena and Kraemer-Mbula, 2021, Marivate et al., 2021); while the demand side literature assesses the country's readiness for the 4IR in relation to conditions on the ground (Cunningham, 2018, Olaitan et al., 2021, Sutherland, 2020, Dwolatzky and Harris, 2021).

The policy response literature is concerned with grounding the 4IR in the South African reality, as it aims to influence 4IR policy objectives towards developing frameworks that are responsive to the needs of a country grappling with intractable development challenges. This literature largely assesses the 4IR from a political economy of development perspective, and a major theme that emerges is the need for interventionist supply side policies to offset market failure in relation to poverty, inequality and underdevelopment (Mazibuko-Makena and Kraemer-Mbula, 2021, Marivate et al., 2021, Selelo and Khwela, 2022). For example, Mazibuko-Makena and Kraemer-Mbula (2021) raise concerns about sustainability and inclusivity in South Africa's policy response to the 4IR, while Marivate et al. (2021) caution against the indiscriminate adoption of 4IR models implemented by developed nations. Meanwhile, focusing on a specific sector, Selelo and Khwela (2022) highlight the challenges that the 4IR investor-entrepreneur

model poses for small business development in South Africa, whilst stressing the need to develop an approach that is sensitive to local conditions, especially in townships and rural areas. The policy response literature aligns with the general tone and broad vision of the PC4IR with one caveat, i.e., it highlights aspects of market failure, which is something that is completely overlooked by the PC4IR. Nevertheless, the policy response literature does not reject the 4IR's market-driven model. Instead, it emphasises the need for sensitivity towards South Africa's needs as a developing country. As such, the policy response literature can be described as a critique that is cautiously optimistic about the 4IR's potential to contribute to South Africa's development.

In contrast, the country readiness literature is less optimistic, as it highlights South Africa's development deficiencies as obstacles to effective engagement with the 4IR. The two major development deficiencies that emerge are the skills gap and the digital divide (Cunningham, 2018, Sutherland, 2020, Olaitan et al., 2021, Dwolatzky and Harris, 2021). The underlying concern in the country readiness literature is that South Africa has fallen behind and must first make progress on crucial development indicators before it is ready to engage with the 4IR in any meaningful way. For example, whilst acknowledging the conceptual debate surrounding the 4IR, Cunningham nonetheless draws on the WEF's country readiness assessment as well as other technological and digital capability assessments to arrive at the conclusion that South Africa 'is not as prepared for technological and digital change as it should be' (2018, p. 4). Meanwhile, Olaitan et al. (2021) arrive at a similar conclusion highlighting the lack of digital literacy and digital infrastructure, amongst other issues, as critical challenges to effective engagement with the 4IR.

The most damning critique of South Africa's readiness to engage with the 4IR emerges from scholars that have engaged with the actual recommendations of the PC4IR. Examining the digitalisation of South Africa's justice system, Dwolatzky and Harris (2021) find 'a huge gap between what (they see) on the ground and the recommendations of the (presidential) commission'. In this regard, they identify a number of sector specific challenges ranging from skills deficits to infrastructure deficiencies to resistant organisational culture, which the PC4IR's recommendations inadequately respond to

(Dwolatzky and Harris, 2021). In this regard, they argue that the PC4IR was remiss to adopt a high-level policy approach as specific sectoral lenses would have improved the responsiveness of policies in relation to specific "4IR scenarios" (Dwolatzky and Harris, 2021). In their final assessment they argue,

> We do not believe that the recommendations submitted by the Presidential Commission on the Fourth Industrial Revolution provide a road map for moving us from where we currently are to where we want to be. (Dwolatzky and Harris, 2021)

In sum, the policy response critique and the country readiness literature are diametrically positioned. The policy response literature considers the value proposition of the 4IR, simultaneously exploring how it can be deployed in service of overcoming South Africa's development challenges. In contrast, the country readiness literature presents South Africa's development challenges themselves as obstacles to engaging with the 4IR. While the optimism of the policy response literature can be contrasted with the underlying pessimism of the country readiness literature, both perspectives overlook deeper reflection on the WEF's ideological hypothesis and its implications for South Africa's development trajectory.

In this regard, Sutherland (2020) critiques the ideological hypothesis of the 4IR, integrating this with his assessment of industrial development in South Africa, which he approaches from both the supply and demand sides, i.e., linking the policy response to conditions on the ground within a political economy critique of the 4IR. Sutherland (2020) briefly highlights the historical debate on industrial revolutions, simultaneously raising concerns about the 4IR's neoliberal orientation. He integrates this perspective with his analysis of the effectiveness of South Africa's industrial policy development, arguing that poor policy coordination as well as deficient skills, infrastructure deficits and high levels of socio-economic inequality are obstacles to effectively deploying the 4IR in support of the country's manufacturing sector. Overall, Sutherland's assessment of South Africa's industrial policy development in relation to the 4IR encompasses a critique of neoliberalism, which concludes that the "Schwabian vision" drives governments towards '(meeting) the needs of business' at the expense of a more equitable approach targeting

the economic challenges faced by the country (2020, p. 246). In this respect, he concludes that the '4IR is a rhetorical rather than an analytical device, boosting Davos rather than economic history' (Sutherland, 2020, p. 246). Sutherland's evaluation of industrial policy and implementation framed within a political economy critique of the 4IR intersects with South Africa's conceptual debate on the 4IR. This aspect of the South African literature appears after the review of the international debate on industrial revolutions, which provides context.

Has the World Entered a New "Fourth" Industrial Revolution?

Despite the global dominance of the 4IR, there remains no consensus on whether or not the world has indeed entered a new "fourth" industrial revolution (Rifkin, 2016, Lee and Lee, 2021, Moll, 2021b, Perez and Leach, 2021, Ngwane and Tshoaedi, 2021). For example, Perez (2022), treats the debate on the role of technological innovation in industrial revolutions as an academic question. For her, there simply is no correct answer to the question about which industrial revolution the world is in, as this depends on the focus, premise and interaction of technological, economic and social phenomena examined by scholars from a variety of disciplines. In this respect, her position can be compared to the Kuhnian notion of methodological incommensurability, which counteracts a common understanding of paradigms (Kuhn, 1970). She argues further that these diverse theories and analytical frameworks have distinctive socio-political and policy implications (Perez, 2022).

In general, however, there are two major themes that emerge within theories examining technology's role in industrial revolutions. These two themes can broadly be categorised as the *disruption thesis* versus the *incrementalism thesis*. Theories advancing the notion of disruption are typically located within technologically deterministic analytical frameworks, which argue that new industrial revolutions are marked by the discovery of new technologies or the cutting edge modification of existing technologies that result in a disruption of the prevailing socio-economic structure, leading to a paradigm shift (Brynjolfsson and McAfee, 2014, Schwab, 2017, Rifkin, 2012). Theories promoting the notion of incrementalism are typically located within a socio-technical analytical

framework, which applies long wave historical analysis to make the case that there are continuities and discontinuities in the emergence of new paradigms that manifest as cyclical patterns of evolutionary change over long time horizons (Perez and Leach, 2021, Gordon, 2012).

A common analytical framework – predominantly, though not exclusively applied by disruption theorists - highlights the convergence of a new technology with a new energy source as the marker of a new industrial revolution. This analytical framework is commonly applied to argue that the First Industrial Revolution emerged as a result of the introduction of the railways converging with steam power; that the Second Industrial Revolution was marked by Fordist mass production in factories powered by electricity; and that the Third Industrial Revolution (3IR) was propelled by the convergence of digital technologies with renewable energy (Lee et al., 2018, Moll, 2021b, Rifkin, 2012, Schwab, 2016b). While the WEF's 4IR introduces neither a new technology nor a new energy source (Moll, 2021b, Cooper, 2021), Schwab (2016b), not dissimilar to Brynjolfsson and McAfee's (2014) inflection point theory, adopts a velocity argument in relation to existing technologies, claiming that their complex, systemic and exponential growth has produced a paradigm shift, catapulting the world into a new industrial revolution, viz., the 4IR. Notwithstanding the lack of a new energy source associated with the 4IR, the WEF unequivocally stresses the significance of developing renewables as the main energy source in the 4IR (Mathuros, 2016). Despite the dominance of this analytical framework, there are many other schemas informing diverse theories of change regarding industrial revolutions. The discussion below highlights some of the most influential theories on paradigm shifts and industrial revolutions globally, followed by a review of similarly focused South African literature, which also tends to revolve around a critique of the 4IR. Both the international and the local literature provide examples of disruption and incrementalism.

Second Machine Age, 3IR, 4IR or Fifth Technological Revolution?

Perez and Leach's (2021) systematic review of the literature on industrial revolutions, which this section draws on heavily, identifies a variety of theories and analytical

frameworks on the concept of epochal change in relation to industrial revolutions. These theories adopt two dominant analytical frameworks highlighting disruption as a key force in epochal change versus incremental changes that are more evolutionary in nature. According to Perez and Leach, economists (focused on growth), economic historians (focused on periodisation), neo-Marxists (focused on socio-technical processes) and neo-Schumpeterians (focused on long wave analysis and the link between financial investments and innovation) develop various hypotheses to define the current era as either the second, third, fourth or fifth version of an industrial or technological revolution (Perez, 2022, Perez and Leach, 2021). The discussion below covers some of these different perspectives.

The Second Machine Age. MIT economists Erik Brynjolfsson and Andrew McAfee (2014) provide a technologically deterministic theory of disruption that draws attention to the nature of the work that is being mechanised, i.e., this theory hones in on the impact of technological change on labour. They argue that while machines replaced the physical labour of humans and animals in the early 19th century, two centuries later, it is the mental processing work of humans that is being replaced by software and machine learning (Perez and Leach, 2021, Brynjolfsson and McAfee, 2014, Brynjolfsson and Mitchell, 2017). Consequently, for the MIT economists, the world has entered a 'Second Machine Age', which roughly started at the beginning of the last decade (around 2010) and is denoted by an inflection point on the curve of human development similar to the one that occurred during the First Industrial Revolution, which they refer to as the 'First Machine Age' (Brynjolfsson and McAfee, 2014, Perez and Leach, 2021).

Comparing the two industrial revolutions, Brynjolfsson and McAfee (2014, p. 7) contend that 'computers and other digital advances are (currently) doing for mental power…what the steam engine and its descendants (once) did for muscle power'. In this respect, just as steam power became a general-purpose technology during The Industrial Revolution, machine learning is establishing itself in a similar manner in the Second Machine Age (Brynjolfsson and Mitchell, 2017). Thus, while Marx was concerned about the threat of unemployment for manual workers in The Industrial Revolution (Kline, 2001, Rosen, 2015), Brynjolfsson and McAfee highlight concerns about the threat of technological

unemployment for white-collar workers in the Second Machine Age (Brynjolfsson and Mitchell, 2017, Bernstein and Raman, 2015, Benanav, 2020). In this regard, a key concern of Second Machine Age theorists is the prevalence of declining wages due to a larger share of income being captured by capital in relation to labour, thus contributing to rising inequality (Benanav, 2020, Brynjolfsson and Mitchell, 2017).

The Third Industrial Revolution (3IR). Economic and social theorist Jeremy Rifkin's theory of technological change adopts a Schumpeterian cyclical perspective on disruption that applies a convergence analytical framework to argue that the integration of renewable energy with widespread digitalisation and the Internet of Things (IoT) has given rise to the 3IR (Rifkin, 2012, Cunningham, 2018). For Rifkin (2016), the recent growth in digitalisation is associated with the emergence of a three-tiered internet system based on the convergence of digitalised communications, digitalised renewable energy and the GPS-guided transport logistics internet. This systems-wide infrastructure sits on an IoT platform, which is produced by embedding sensors in a variety of appliances and devices that communicate with each other (Rifkin, 2016).

The main thesis of Rifkin's argument is that 'zero marginal cost', i.e., the cost of reproducing something for free or at negligible cost is creating a paradigm shift in capitalism, which is transforming economic relations to propagate a highly productive sharing economy built on lateral peer-to-peer (P2P) networks powered by small-scale independent producers of renewable energy (Rifkin, 2012, Rifkin, 2014, Rifkin, 2016, Acquier et al., 2017, Arcidiacono et al., 2018). For Rifkin (2012), these decentralised forces are creating a more 'sustainable era of distributed capitalism' based on a high-tech global commons. The P2P nature of the 3IR eliminates the "middle men" of the Second Industrial Revolution, resulting in the expansion of decentralised economic activity and a 'shift in the flow of economic power from the few' to the many (Rifkin, 2016). Thus, in Rifkin's 3IR, networks are based on a culture of collaboration in a post-carbon society where the drivers of change are hyperconnected millennials, i.e., digital natives whose identity and interactions are forged by the networks they belong to and not by market incentives—leading to the emergence and dominance of a not-for-profit civil society (Rifkin, 2014, Rifkin, 2012, Cunningham, 2018). The idea of collaboration alongside

withdrawal from neoliberal models of capitalism is common in post-capitalist discourse (Turner, 2007, Abromeit, 2010, Cohen, 2017b, Mason, 2016) and Rifkin's 3IR model aligns with this concept. However, his utopian business model has attracted criticism for hypothesising a departure from capitalism that lacks radical tendencies, leading to his theory being described as "apologetic" (Mason, 2016, Arcidiacono et al., 2018).

Economist Robert Gordon, described by Time Magazine as the new Thomas Piketty, also refers to the current era as the Third Industrial Revolution (Perez and Leach, 2021, Faroohar, 2016). For Gordon (2012), the 3IR started in the 1960's with the arrival of computer technology, and it is still evolving. He cautions about low productivity growth and its contribution to social inequality in the current era (Gordon, 2012). While his periodisation of previous industrial revolutions is based on the dominant disruption theory, i.e., the convergence of railways with steam power to signal the arrival of the First Industrial Revolution, and factories with electricity to herald the second (Gordon, 2012), the analytical framework that he applies to arrive at his theory of the 3IR can nonetheless be characterised as one that emphasises incrementalism, as his analysis examines the nature of productivity in relation to clusters of innovation and their impact on the quality of human life in the long-term as an indicator of progress (Perez and Leach, 2021, Gordon, 2012). Adopting this long wave approach, he places significant emphasis on the long-term spinoff inventions of industrial revolutions and their contribution to social progress, which is measured as a holistic improvement in the quality of human life (Gordon, 2012). For example, in Gordon's view, the Second Industrial Revolution was the most productive period in human history as spin-off inventions such as indoor plumbing and electronic domestic appliances contributed significantly to improvements in the quality of human life, especially liberating women from domestic drudgery (Gordon, 2012, Faroohar, 2016, Perez and Leach, 2021).

Gordon examines trends in the U.S. (Perez and Leach, 2021). However, his analysis has broader significance given its focus on the impact of digital technology associated with economic stagnation and increasing social inequality, which is universal. In this respect, Gordon correlates the expansion of computer-related technologies with a long run decrease in productivity (Faroohar, 2016), claiming that digital technology only resulted

in a ‘minor growth revival between 1996-2004’ (Gordon, 2012). Consequently, despite defining the current paradigm as the 3IR, Gordon does not hold much promise in it based on his argument that the most significant improvements to the quality of human life occurred in the Second Industrial Revolution (Perez and Leach, 2021). Consequently, Gordon downplays the significance of the information revolution in relation to earlier industrial revolutions, whilst issuing a warning about its contribution to decreasing productivity and rising inequality (Faroohar, 2016, Perez and Leach, 2021).

The Fourth Industrial Revolution (4IR). As noted earlier, the 4IR is a concept introduced by Klaus Schwab and the WEF at an annual Davos meeting in 2016 (Barton, 2020, Lee et al., 2018). The 4IR is a profusion of advanced and interrelated digital technologies fuelled by markets and open innovation (Schwab, 2017, Lee et al., 2018). Lee and colleagues list the technologies of the 4IR as ‘connectivity; big data; automatization; intelligent agents, robotics; machine learning; artificial intelligence; block chains; sensors; virtuality; 3D printing; and augmented reality’ (2018, p. 24). Schwab’s (2016b) core argument is that these advanced technologies, primarily driven by AI and the pervasiveness of data, are ‘blurring the lines between the physical, digital, and biological spheres’, thus ushering in a new industrial revolution signalling epochal change beyond the 3IR. Schwab (2016b) distinguishes the 4IR from the 3IR on the basis of the ‘velocity, scope, and systems impact’ of the changes being experienced, which have caused a disruption. Thus for Schwab, technological complexity as well as the speed of technological change are working hand in glove to produce a “paradigm shift” in society (Schwab, 2016b, Schwab, 2017). Accordingly, the WEF characterises the 4IR as a 'new chapter in human development, enabled by extraordinary technology' that represents 'a fundamental change in the way we live, work and relate to one another' (WEF, n.d.).

The 4IR is anchored in the fundamentals of free market capitalism characterised by a ‘combination of technology and the market through open innovation’ (Lee et al., 2018, p. 24). According to Schwab (2017), continuous adaptability and entrepreneurial drive are essential for success in the 4IR where those who “resist change” are condemned to failure. In this respect, Schwab issues an ominous warning about failure in the 4IR. For him, the 4IR represents an ‘ontological inequality (that) will separate those who adapt

from those who resist – the material winners and losers in all senses of the word' (Schwab, 2017, p. 97-98). Inequality and social polarisation are thus presented as lamentable but incontrovertible paradoxes of market-driven technological progress in the 4IR and "class conflict" is accepted as part of the calculus of risk (Schwab, 2017). This polarising perspective has generated widespread critique of the 4IR in South Africa (Cooper, 2021, Maharaj, 2021, Moll, 2021b, Ngwane and Tshoaedi, 2021, Sutherland, 2020).

The Fifth Technological Revolution. Carlota Perez adopts a neo-Schumpeterian view to argue that the world is currently in the midst of a "Fifth Technological Revolution" (Perez, 2022, Perez and Leach, 2021). Neo-Schumpeterian analysis is a strand of literature, which integrates Nikolai Kondratiev's theory of long wave or long-term business cycles known as "K-waves" with Joseph Schumpeter's theory of Creative Destruction (Köhler, 2012, Grinin et al., 2016) to explain long run patterns of economic fluctuation stemming from technological innovations – but with an emphasis on the complexities of transition periods due to the fact that socio-technical forces, which are strongly influenced by financial investors, have a determining impact on the technological forces propelling the world into new waves or cycles of economic growth (Perez, 2004, Perez and Leach, 2021, Grinin et al., 2016, Mason, 2016).

Perez focuses on the emergence and evolution of technological innovations highlighting their systemic integration into society as general purpose technologies to denote revolutionary change, i.e., her focus is on technologies including and beyond industry (Perez, 2010). Drawing on Kondratiev's techno-economic paradigms, Perez's five technological revolutions are described as: 1) The Industrial Revolution from 1771-1828; 2) The Age of Steam and Railways from 1829-1874; 3) The Age of Steel, Electricity and Heavy Engineering from 1875-1907; 4) The Age of Oil, Automobile and Mass Production from 1870-1969; and 5) The Age of Information and Telecommunications from 1971 to the present (Perez, 2004, Perez, 2010, Perez and Leach, 2021).

For Perez, a technological revolution takes place within a "techno-economic paradigm", described as the drawn-out period after the turning point, i.e., proceeding from the phase

of disruption to the different stages of a new technology's development and eventual maturity when it systemically integrates into the economy and society via the creation of new infrastructure to support its expansion and adaptation for general use (Perez, 2010, Perez, 2004). Different stakeholders have distinctive roles during the boom-and-bust phases of technological revolutions (Perez, 2004). While finance capital plays a critical role in the emergence of new technologies, which leads to the creation of financial bubbles followed by recessions that produce social strife and inequality, for Perez, it is government that must assume the primary role during post-bubble recessionary periods to restore balance to the economy and in society through regulation (Perez, 2004, Mason, 2016). Thus, not unlike the 4IR, the financial market is considered a catalyst for change in the Fifth Technological Revolution; however, whereas the role of the entrepreneur is accentuated in Schwab's 4IR (2017), Perez (2004), to a greater extent, places the responsibility for the emergence of disruptive technologies amongst investors. Finally, despite Perez's acknowledgment of the state as the restorer of balance in society, her theory is nonetheless questioned for not engaging with questions around wealth distribution and labour struggles (Mason, 2016).

Regardless of whether one aligns with theories of disruption or theories of incrementalism, and despite the variation in analytical frameworks resulting in such a diversity of epochal definitions, a common theme emerging in the Second Machine Age, 3IR, 4IR as well as the Fifth Technological Revolution is the issue of rising inequality (Schwab, 2017, Brynjolfsson and Mitchell, 2017, Faroohar, 2016, Perez and Leach, 2021). This issue is further emphasised in the South African literature on industrial revolutions and epochal change, which is discussed below.

Incremental or Disruptive Change: The South African Debate on the 4IR

In contrast to the 4IR implementation discourse in South Africa, the conceptual debate on the 4IR challenges the very notion of the Schwabian construct by drawing on different epistemologies to examine the ontology of the current techno-socio-economic-paradigm in an effort to determine whether current technological innovations and their reverberations indeed warrant the identification of an epoch changing new industrial

revolution (Ngwane and Tshoaedi, 2021, Moll, 2021b, Maharaj, 2021, Cooper, 2021, Mapadimeng, 2021, Sutherland, 2020). Contributors to the debate generally locate their analysis within a critique of capitalism's forward march, characterising the 4IR as technologically deterministic, ahistorical and steeped in neoliberal ideology (Ngwane and Tshoaedi, 2021, Selelo and Khwela, 2022, Badat, 2020, Maharaj, 2021, Sutherland, 2020, Moll, 2021b).

A dominant theme that emerges in the South African critique is the 4IR's ideological foundations and the motives of the WEF as a globally influential lobbying organisation beholden to corporate interests from the global north. For example, as noted earlier, Sutherland (2020) characterises the 4IR as a "rhetorical device" aimed at boosting markets and the Davos elite. Hlatswayo (2021) analogously raises concerns about the technologies of the 4IR originating in the Global North thereby undermining local development, while Ngwane and Tshoaedi (2021) criticise the 4IR's narrow focus on 'advancing capitalism and increasing profits'. Finally, both Cooper (2021) and Moll (2021b) characterise the 4IR as an ideological ploy engineered by the global elite, which detracts from the structural crisis of the 3IR.

Similar to the international perspective, the South African literature also characterises epochal change as either disruptive or incremental, with the former perspective integrating socio-technical and teleological critiques to examine the originality of technological innovations as ground-breaking scientific discoveries, while the latter emphasises the long-term complexities and dynamics in the relationship between technological development and social change. For example, *The Fourth Industrial Revolution: A Sociological Critique* (Ngwane and Tshoaedi, 2021), is a collection of essays delivered at an annual conference of the South African Sociological Association that critically examines the WEF's 4IR. Broadly, encompassing a neo-Marxist socio-technological perspective, this volume by Ngwane and Tshoaedi (2021), largely draws attention to the dynamic between the nature of technological change and its implications for labour. However, it also offers perhaps the most comprehensive contemporary collection of South African essays, including Maharaj (2021), Mapadimeng (2021) and Cooper (2021), examining epochal change by way of distinct critiques of the 4IR.

However, this volume is not the only commentary on the 4IR in South Africa. Moll (2021b) also makes an important contribution, which, while deploying a "socio-economic" analytical framework, also draws attention to the technologies associated with the 4IR.

Continuation of 3IR Technologies

A major theme that emerges in the South African literature is the critique that so-called 4IR technologies, are actually technologies that emerged during the 3IR. Both Cooper (2021) and Moll (2021b) adopt socio-technical analytical frameworks to analyse the 4IR and arrive at the conclusion that the world is still in the midst of the 3IR. Both scholars focus on the question of the distinctiveness of the technologies of the current era challenging the concept of the 4IR on the grounds that the technological artefacts identified by Schwab (2017) had already been introduced during the 3IR. The absence of a unique ground-breaking technology regarding the announcement of a new scientific discovery thus emerges as a major argument supporting the case for the persistence of the 3IR. This argument is supported by epistemological frameworks that focus both on the drivers and the impact of technological innovation. In this regard, Cooper (2021) engages in a teleological analysis of the drivers of technological innovation, while Moll (2021b) focuses on the impact of technology on social and economic change.

Cooper's (2021) model of the 3IR can be categorised as a theory of disruption, given its emphasis on the significance of new technological innovations as disruptors. However, his analytical framework diverges from the technologically deterministic convergence theory of Rifkin's 3IR (2012) as well as the technological incrementalism of Gordon's 3IR, which examines the long term impact of technology on society (Perez and Leach, 2021). In this respect, Cooper's long-wave socio-technical analytical framework hones in on a particular driver of technological innovation, which is the influence of capital at the locus of scientific research and development. Accordingly, he applies a social constructivist lens to critique the development of technology.

Cooper (2021) specifically examines the dynamic between two mutually dependent agents, which he argues are the driving catalysts of change in the current technological regime, viz., transnational corporations (TNCs) and universities. Drawing on the social constructivist epistemology of Castells' Network Society (2004a) theory, Cooper (2021) argues that from the 1970's onwards, neoliberal policies fuelling financialization and deregulation merged with ICT networks to reinvigorate globalisation, resulting in the spread of TNCs with immense power. Building on this argument, he positions universities as the locus of scientific research whilst deploying Stokes' (2011) use-inspired-basic-research (UIBR) theory to demonstrate how research aimed at practical application has come to dominate academic agendas (Cooper, 2021). Thus, Cooper's (2021) analytical framework combines Castells' Network Society theory (2004a) with Stokes' UIBR theory (2011) to argue that the post-1970's capitalist industry turned to "professorial research groups" that engaged in UIBR to develop new innovations in ICTs, biotechnology and nanotechnology, thereby interlocking TNC and academic research agendas. Consequently, for Cooper (2021), the technologies associated with the 4IR, such as self-driving cars, IoT and AI, are part of the post-1970's TNC-academic UIBR technological regime. He thus argues that the current juncture simply represents a deepening of the technological factors of production and not a "qualitative break", thereby merely signalling a shift into the second phase of a capitalist-driven 3IR, which he defines as the "Third Capitalist Industrial Revolution". Cooper (2021) thus applies social constructivism to expose the influence of money in technological innovations as a function of globalised capital. In addition to challenging the concept of the 4IR, Cooper's theory simultaneously highlights the undue influence of capital in scientific research at universities, which on the contrary are meant to be bastions of independent research.

Moll (2021b) arrives at a similar conclusion, which is that the technologies identified by the WEF as unique to the 4IR are in fact older technologies belonging to the 3IR. Moll (2021b) makes a significant contribution to the epochal change debate by conducting a systematic analysis of the technologies associated with the 4IR to demonstrate that they originated in the 3IR. However, contrasting with Cooper (2021), and drawing on Polyani's ideas about 'long-term socio-economic change at a…structural level' (2021b, p. 7), Moll also engages to a greater extent with the broader arguments made by Schwab (2017) about major structural changes in society as a consequence of these new

technologies. In this regard, in relation to other 3IR advocates, Moll's analytical framework diverges significantly from Cooper (2021) and Rifkin (2012), finding greater alignment with Gordon (2012) regarding the systemic impact of technology on society.

Moll (2021b) adopts a socio-technical perspective for his long-wave historical analysis and similar to Cooper (2021), invokes Castells' social constructivist epistemology to clarify his perspective. However, while Cooper (2021) deploys Castells to highlight the influence of TNCs on innovation, Moll (2021b) draws on Castells to demonstrate that many of the fundamental structural shifts claimed by Schwab as unique to the 4IR, are in fact changes initiated by the ICT technologies and infrastructure of the Network Society, thus locating current developments within the 3IR. In this regard, he invokes Castells' commentary on ICT technologies as a 'double-edged sword' to illustrate uneven capabilities and development between core and marginal networks, which fuels inequality both within and between economies (Moll, 2021b). He further notes the dominance of the Global North over the Global South (Moll, 2021b). Overall, despite Schwab's warning of a new ontological inequality as the fallout from 4IR technological developments, Moll (2021b), by way of systematically reviewing existing technologies and deploying Castells' theory, demonstrates that despite their sometimes revolutionary application, neither are the technologies of the 4IR new nor is their impact profound, as they simply deepen and accentuate the massive social reorganisation already underway as a consequence of the 3IR and its attendant technologies.

Moreover, aligned with Polanyi's theory of a great transformation, which highlights the complexities and significance of long term and broad institutional transformation for socio-economic change, Moll (2021b, pp. 7-8) identifies the following necessary conditions for the emergence of a new industrial revolution: 1) unprecedented technological change that has a systemic effect; 2) major labour market transformations; 3) changes in both workplace relations and worker-related politics; 4) changes in the structure of society and 5) changes that affect the global economy (Moll, 2021b). For Moll (2021b), the satisfaction of these criteria resulted in epochal change in earlier industrial revolutions. As these conditions are not evident to him, Moll (2021a, 2021b) concludes that the 4IR is a "myth" constructed by Schwab and the WEF to detract from

the crisis of the 3IR. In this regard, for Moll (2021a), the 4IR represents a Schwabian reinvention of neoliberal ideology that masquerades as a new and original blueprint for the elimination of poverty, inequality and joblessness, but in actual fact supports the status quo.

Absence of a New Economic and Social Order

The absence of a new economic and social order is emphasised in the critique of the 4IR emanating from Mapadimeng (2021) and Maharaj (2021). However, in contrast to the social constructivist epistemology adopted by Moll (2021b, 2021a) and Cooper (2021), Mapadimeng (2021) and Maharaj (2021) draw on Marxian theories in their critique of the 4IR. In so doing, they bring relations of production into focus by highlighting competing tensions in the construction of complex historical conjunctures (Mapadimeng, 2021, Maharaj, 2021). However, Maharaj (2021) also integrates a neo-Schumpeterian perspective on long-wave technological innovation and paradigm change, whilst also invoking Wallerstein's (1974) World Systems Theory to highlight the imbalance in global development. Finally, there is an underlying concern in the contributions of both Mapadimeng (2021) and Maharaj (2021) about the disruptive effect of current technological innovations on the labour market in relation to technological unemployment and the deskilling of labour.

Mapadimeng (2021) argues that Schwab's singular focus on technological innovation neglects complex issues such as social and environmental factors including their interplay, thus rendering the 4IR reductionist. For Mapadimeng (2021), there are always multiple histories at play as well as continuities and discontinuities underpinning transitional phases. He thus opts for a *longue durée* perspective, applying long wave historical analysis to dismiss not just the 4IR, but also the second and third industrial revolutions on the basis that current changes in the forces and relations of production are merely representative of capitalism's "internal revolutions" (Mapadimeng, 2021). In this respect, he argues that an industrial revolution can only be defined as epochal change when it is linked to the transformation of an economic system associated with the fundamental reorganisation of society, such as the transition from feudalism to capitalism. Thus,

rejecting not just the notion of a 4IR, but also that of the second and third industrial revolutions, Mapadimeng (2021, p. 73) concludes that society remains trapped in 'a recalcitrant world industrial capitalist economic system' that emerged after the age of feudalism and has yet to be replaced by a fundamentally new economic and social order. Thus, for Mapadimeng (2021), it is only the First Industrial Revolution that represents significant epochal change.

Maharaj's (2021) analysis of the current juncture similarly employs a long run perspective. However, he expressly adopts a historical materialist frame, emphasising the significance of class struggle against ever expanding and sophisticated modes of capital accumulation, including how this struggle fuels stages of development, which he aligns with the neo-Schumpeterian model of long-wave development, i.e., a Fifth Technological Revolution (Maharaj, 2021). However, for Maharaj (2021), the neo-Schumpeterian model does not sufficiently engage with the question of inequality and uneven global development. Thus, drawing on Wallerstein's World Systems Theory (1974) to emphasise the bias of the "global market" as a driver of technological innovation impelled by the Global North, he highlights north-south development disparities that continue to afflict Southern Africa as a consequence of western hegemony as well as historic and existing systems of discrimination such as slavery, colonialism and racial capitalism (Maharaj, 2021).

In addition, by integrating dialecticism into his analysis, Maharaj (2021) revises the notion of surges of development in long wave cycles popularised by neo-Schumpeterians, arguing instead that history is shaped by a 'series of conjunctures characterised by crisis'. This crisis emerges from the fluidity and ambiguity of change, which leads to class conflict (Maharaj, 2021). Thus, while Perez (2007) adopts a socio-technical perspective to make the case for surges of development, Maharaj's neo-Marxist perspective invokes Gramsci (1971) to elevate social contestation as a force for transformation during conjunctural periods that prefigure change. Crucial to the outcome of his theory of change is the question of where the balance of forces lie. Thus, for Maharaj (2021), the current conjuncture represents a Gramscian interregnum where the morbid symptoms of capitalist dogma overshadow a pre-embryonic post-capitalism.

Everything is Changing, Nothing Changes at All

While there is recognition in the literature that recent years have borne witness to noteworthy technological developments (Brynjolfsson and McAfee, 2014, Perez and Leach, 2021, Schwab, 2017, Ngwane and Tshoaedi, 2021), this review demonstrates that distinctive epistemologies have led to divergent ontological perspectives on the current techno-socio-economic paradigm. This debate has resulted in an inconclusive definition for the current techno-socio-economic paradigm whilst unambiguously presenting the 4IR as a contested concept. Nevertheless, a significant proportion of the recent debate on paradigm shifts has materialised directly in response to the emergence of the WEF's 4IR as the lodestar of policy frameworks globally (Moll, 2021b, Rifkin, 2016, Ngwane and Tshoaedi, 2021, Perez and Leach, 2021). An important critique emerging from this debate is that the Schwabian definition of the 4IR as an "ontological inequality" is driven by capitalist ideology, thus raising concerns about the persistence of neoliberal policy frameworks favoured by business and government elites (Mapadimeng, 2021, Maharaj, 2021, Moll, 2021a, Cooper, 2021, Sutherland, 2020).

As noted, scholars apply both Marxian and social constructivist epistemologies to examine the technologies of the 4IR, their emergence and impact on society. In this regard, scholars that evaluate the 4IR from a social constructivist perspective emerge with a strident critique of neoliberalism to emphasise the point that structural transformation remains elusive (Moll, 2021a, Cooper, 2021). Overall, this critique contends that today's techno-socio-economic paradigm is an extension of the globalisation and neoliberalism identified by Castells' in his Network Society theory. Thus, for South African scholars applying a social constructivist critique to the 4IR, the Schwabian construct is a mere continuation of neoliberal ideology within a mature stage of the 3IR (Moll, 2021a, Cooper, 2021).

In contrast, those adopting a Marxist critique have framed their analysis around potentialities for the demise of capitalism (Mapadimeng, 2021, Maharaj, 2021). Mapadimeng's (2021) historical materialist argument focuses on the relations of

production forged during the First Industrial Revolution as well as their endurance, thus enabling him to reject any evidence of the emergence of a new social order beyond the replacement of feudalism with capitalism (Mapadimeng, 2021). Mapadimeng's (2021) assessment is somewhat pessimistic. In contrast, Maharaj (2021) offers a perspective that is more optimistic, albeit marginally. Maharaj's (2021) neo-Marxist critique suspends the world in a transitionary phase that harbours the potential for change, but remains trapped in a Gramscian interregnum within which an alternative post-capitalist future is yet to develop (2021). Maharaj's (2021) reference to post-capitalism is fleeting. However, as discussed below, the idea of an interregnum signposting a post-capitalist alternative is not uncommon (Streeck, 2016, Salter, 2016).

A Post Capitalist Alternative to the 4IR

While the bulk of the epochal change critique is pre-occupied with the question of defining the current era in opposition to the neoliberal WEF-inspired 4IR, in contrast, the past decade has borne witness to the emergence of a parallel strand of literature on post-capitalism, which expressly examines opportunities for a paradigm shift by highlighting the immanent potentialities within contemporary technologies to bring about change. Predominantly, though not exclusively drawing on Marxian phenomenology and dialecticism as a theory of change, the literature on post-capitalism argues that the potential for a paradigm shift is both immanent and imminent. Thus, in contrast to the inherent cynicism of the 4IR debate, the discourse on post-capitalism is typically more optimistic about prospects for a challenge to the neoliberal capitalist order. Overall, the literature on post-capitalism concurs with the critique of neoliberalism within the 4IR debate. However, it goes a step further by proposing alternatives to replace it, and in this respect, a number of the more prominent publications on post-capitalism have been produced as manifestos.

The concept of a post-capitalist society was first coined in the 1990's by management theorist, Peter Drucker, to describe the growing influence of managers in corporations with flatter hierarchies, which is a phenomenon that emerged as a result of information technologies elevating knowledge as the principal resource in organisations (Drucker,

1993, Harris, 1993, Mason, 2016). Consequently, knowledge as opposed to capital came to be viewed as *the* resource in organisations, whereas it was historically treated as *a* resource amongst others, giving managers as knowledge proprietors, the edge over their bosses as well as leading to a more decentralised form of capitalism driven by the management class, which Drucker dubbed post-capitalism (Mason, 2016).

However, more than two decades later, it is the left that has appropriated the concept of post-capitalism. The current discussion on post-capitalism is closely related to the technologies and inequalities that emerged in the years following the 2008/9 Global Financial Crisis - an event that stands out as a significant marker for scholars and public intellectuals dealing with the fallout from automation in the 21st century, which also highlights the disturbing influence of financial capital in technological innovation (Srnicek and Williams, 2015, Mason, 2016, Bastani, 2019, Varoufakis, 2021). In this respect, the emergence of AI and the threat of technological unemployment alongside market concentration and growing inequality has stimulated discussion about prospects for a post-capitalist society amongst some within the left (Srnicek and Williams, 2015, Mason, 2016, Bastani, 2019, Varoufakis, 2021). This line of thinking can to some extent be traced back to 20th century neo-Marxist scholars, such as André Gorz (2013), who, detecting higher levels of automation, developed a post-work society theory.

This has resulted in the publication of a number of books on the need and potential for the emergence of a post-capitalist society based on the notion of a post-wage, post-work society in which finance capital, i.e., the market, is defanged. Amongst the most prominent titles to emerge in recent years are: *Inventing the Future: Postcapitalism and a World without Work (Srnicek and Williams, 2015), Postcapitalism: A Guide to our Future (Mason, 2016), Fully Automated Luxury Communism (Bastani, 2019)* and *Another Now: Dispatches from an Alternative Present (Varoufakis, 2021)*.

Varoufakis' (2021) contribution to the discourse on post-capitalism, *Another Now*, is unique in that it is a science fiction novel about a parallel post-capitalist universe, which the main characters in his book access via a computer program. However, while the novel's parallel world is fictional, the post-capitalist socio-economic model invented by

Varoufakis (2021) nevertheless offers a viable proposal that can be tested in the real world. Scholarly reviews argue that the book 'offers a rich account of concrete political and economic ideas' whilst addressing 'the big issues of how a post-capitalist society might emerge, how exactly it would operate and what problems might be encountered' (Ioannou, 2022, pg. 440, Jackson, 2022, pg. 14). Hence, its inclusion in this review, which presents it alongside the non-fictional manifestos produced by other advocates of post-capitalism.

Left Accelerationism and Autonomism

The literature on post-capitalism distinguishes between left accelerationism and autonomism (Justie, 2020). These two strands do not signal a definitive epistemological split, as both accelerationists and autonomists apply dialecticism in their empiricist frameworks (Justie, 2020, Gordon, 2021). However, accelerationists work towards the end goal of post-capitalism by accentuating progressive tendencies within late capitalism, which have the potential to transform the system (Srnicek and Williams, 2015, Bastani, 2019), whereas autonomists reject the fundamental principles of capitalism by proposing alternative socio-economic models, which primarily promote individual and collective autonomy while de-reifying institutionalised capitalism (Mason, 2016, Varoufakis, 2021).

Left accelerationists are described as "Creative Destruction Marxists" (Shaviro, 2015). Rather than oppose capitalism, left accelerationists propose seizing upon and intensifying late capitalism's tendencies in an effort to repurpose them in service of broad emancipatory goals, some form of socialism, social democracy or communism (Gardiner, 2017, Justie, 2020, Bastani, 2019). Left accelerationists thus adopt a constructivist epistemology alongside dialectical materialism to highlight and encourage latent impulses capable of fragmenting capitalism's more harmful tendencies (Gordon, 2021). For example, given the inevitability of higher levels of automation, Srnicek and Williams (2015) argue that automation should not be constrained, but accelerated to hasten the arrival of a post-work society in which productivity gains enable the adoption of a universal basic income (Rosamond, 2016). Williams and Srnicek (2014) as well as

Bastani (2019) are considered left accelerationists (Gordon, 2021, Rosamond, 2016, Justie, 2020).

In their accelerationist manifesto, Williams and Srnicek (2014) argue that Marx is the "paradigmatic accelerationist" who understood 'that for all its exploitation and corruption, capitalism remained the most advanced economic system to date. Its gains were not to be reversed, but accelerated beyond the constraints (of) the capitalist value form'. In line with this argument, Bastani (2019, p. 116) points to Spotify and Netflix to argue that the tendency towards a more community oriented economic model is already being seeded within capitalist enterprises by the shift away from property rights to the right of access, where instead of owning a video or audio tape, people buy the right to access music and movies. This is in addition to increased affordability and ease of access as a result of digital and mobile technologies (Bastani, 2019).

However, Bastani (2019) as well as Srnicek and Williams (2015) have also attracted criticism for lacking 'a properly and consistently dialectical epistemic framework', which has resulted in their adoption of a concept that is also associated with a right-wing version of accelerationism that drives 'vanguard processes of capitalist accumulation' (Gordon, 2021, p. 140, p. 147). Much of this critique relates to their de-emphasis of working class struggle (Gordon, 2021), which is discussed later in this chapter.

Diverging with left accelerationism, autonomism is rooted in two allied sources, i.e., in theories of "anti-work" as well as in dialectical materialism or negative thinking as a form of praxis (Van Trier, 2021, Feenberg, 2009). Autonomism can be linked to the cybernetic left of the 1960's and 1970's (Van Trier, 2021). Prominent autonomists of that era include the critical theorist Herbert Marcusé (1964) and the existential Marxist André Gorz (2013) – both associated with anti-capitalist, anti-authoritarian movements, which amongst other issues, promote workers' rights. Accordingly, the idea of anti-capitalist movement building is significant in autonomist thinking and it also highlights the link between autonomism and refusalism. For example, the "Great Refusal" is located in a critique of Fordism by the radical German left that inspired an anti-work movement supported by scholars such as Herbert Marcusé and André Gorz who highlighted the destabilising effect

of new cybernetic technologies on labour (Van Trier, 2021). Foreseeing greater levels of automation due to increasing "robotisation", these scholars developed sophisticated theories that questioned the value and purpose of work for humanity, whilst also refusing to buy into the idea of work as a necessary precondition for survival, instead developing proposals to move away from a wage-based society, which delinks livelihoods from employment (Marcusé, 1964, Gorz, 2013, Van Trier, 2021, Mason, 2016).

While Marcusé is largely overlooked, Gorz's ideas feature prominently in post-capitalist literature, especially in post-work treatises. However, the notion of autonomist thinkers reimagining technological development in a post-work society can be traced back to Marcuséan thinking (Bassett and Roberts, 2019), which Gorz borrows from (Granter, 2016a). Marcusé applied dialecticism to expose the contradictions of capitalism as well as to reimagine technological development such that it is imbued with a new sensibility that serves humanity - where a "new mode of being" informs a new mode of production (Marcusé, 1964, Feenberg, 1991, Gordon, 2021). This tendency is unmistakeable in contemporary autonomists' rejection of the dominant socio-economic paradigm. In this respect, while Marcusé is only fleetingly referenced by Mason (2016), his reasoning is nonetheless evident in the British intellectual's ideas. Meanwhile, Varoufakis' *Another Now* (2021) unquestionably channels Marcusé. Both scholars present economic models that embody a negation of capitalism based on Marcuséan critical thinking. In this regard, Varoufakis (2021) presents a proposal, which outlines measures to de-reify financial capital, while Mason (2016) identifies tendencies that lead to the dismantling of monopoly capital. Ultimately, however, while the notion of an anti-work ethic can be attributed to Marcusé (1964), it is Gorz's (1967, 2013) pragmatic policy proposals for a post-work society, such as an unconditional basic income and a shorter work week, that have given contemporary post-capitalist scholars something concrete to put on the table.

The Post-Work Society and Universal Basic Income

The concept of delinking employment from livelihoods is a common theme in post-capitalist discourse and is often highlighted to make the case for a universal basic income (UBI) as a form of social income rather than subsistence income (Srnicek and Williams,

2015, Mason, 2016, Varoufakis, 2021). Consequently, as most post-capitalist scholars envision it, the notion of tethering people's survival to their jobs would be offensive in a post-work, post-capitalist civilisation culturally grounded in an anti-work ethic. This has resulted in proposals for a post-capitalist society scaffolded by UBI to sustain livelihoods that allow people to pursue their passions, as opposed to being forced into unfulfilling and demeaning low-wage work simply to make ends meet (Srnicek and Williams, 2015, Mason, 2016, Varoufakis, 2021).

This post-work society proposal, i.e., a UBI, draws on the work of Gorz (1967), who, in response to declining employment opportunities, questioned the glorification and centrality of work as a source of rights in society. Gorz is noted for his ideas on the need to identify anti-capitalist reforms with revolutionary potential - a concept that he described as 'non-reformist reforms' (Gorz, 1967, Levy, 2000, Bowring, 2008, Gorz, 2013, Gollain, 2018, Engler and Engler, 2021). In this regard, he proposed a guaranteed basic income and a reduced work week as two non-reformist reforms (Gorz, 2013, Gorz, 1989).[4] Central to his conceptualisation of a guaranteed basic income was the principle that it should be unconditional and consist of a sustainable income to support dignified livelihoods, which gave people autonomy and agency over the work they chose (Van Trier, 2021, Gorz, 2013).

Mason (2016) endorses Gorz's post-work society theory and includes the concept of a UBI as an important pillar in his post-capitalist manifesto. And while Varoufakis' (2021) novel is fictional, there is nonetheless a discernible link between the UBI in his imaginary utopia and Gorz's (2013) ideas of a guaranteed basic income linked to the social integration of work. In this regard, an interesting concept in *Another Now* (2021) that resonates with Gorz (2013) is the revaluation of work, i.e., the idea that people ought to engage in work driven by passion (creative work) and/or altruism (care work), which should dictate their employment choices.

[4] Gorz's non-reformist reforms are discussed in detail in the next chapter.

Left accelerationists Srnicek and Williams' (2015) proposals overlap with those of the autonomists in that they borrow directly from the Gorzian concept of non-reformist reforms, calling both for a UBI as well as a four-day work week. However, the left accelerationist Bastani (2019) is critical of UBI as a concept. He views UBI as an expensive policy instrument as well as the fact that it presents a risky alternative given the absence of empirical evidence to support proof of concept (Bastani, 2019). He also argues that UBI could represent a 'capitulation to neoliberalism rather than an alternative to it' depending on how it gets implemented (Bastani, 2019, p. 225). The core of his argument is that in the wrong hands, the UBI could potentially be used to promote the marketisation of the welfare state as a form of 'Thatcherism on steroids', which in his view explains why it was so appealing to free market advocates such as Milton Friedman (Bastani, 2019). As a result, Bastani (2019) instead promotes universal basic services (UBS). His UBS package includes 'housing, transport, education, healthcare and information…(as) free public goods accessible to everyone' (Bastani, 2019, p. 215). For Bastani, promoting UBS in the form of free services, such as housing and healthcare as a human right 'begins the work of communism in the present' (2019, p. 226).

Dismantling Financial Markets and Monopoly Capitalism

The mercenary character of the financialised global economy as well as market concentration or monopoly capitalism are grave areas of concern for post-capitalist scholars. Autonomists identify their dissolution as a key requirement for the emergence of a post-capitalist society. In this respect, as noted earlier, Varoufakis (2021) presents a proposal that outlines measures to de-reify financial capital, while Mason (2016) identifies post-capitalist tendencies that lead to the dismantling of monopoly capital.

Varoufakis' (2021) proposal is based on a model of shared prosperity, which socialises property rights. He identifies two mutually reinforcing drivers of inequality, viz., the private ownership of firms and the financial sector (Varoufakis, 2021). For Varoufakis, the difference between capitalist and post-capitalist organisation for co-operation can be ascribed to the kind of relationship workers experience (DiEM25 TV, 2020). In an online discussion that preceded the publication of his book, he described existing relations

within corporations, including Big Tech as "despotic and hierarchical", arguing that the driving force behind post-capitalism is the potential for alternative worker-owned models of firms, which are built on democratic worker relations (DiEM25 TV, 2020). Accordingly, in *Another Now's* utopia, post-capitalist firms are worker-owned and managed (Varoufakis, 2021). At the same time, shareholding in firms is vested in the rights of worker-owners on the basis of one share per worker in a context where shares are non-tradeable, thus eradicating the stock market (Ioannou, 2022). Finally, banks are replaced by a decentralised blockchain ledger (Varoufakis, 2021).

Varoufakis' reconceptualization of firms and banks as well as the critical role he assigns to workers can be located in Lukács' theory of reification. For Lukács, the revolutionary agent of change is the worker; while the de-reification of capitalist practice takes place via conscientized human action, which ontologically transforms the meaning and functions of social institutions (Lukács, 1972, Feenberg, 2016). At the same time, Varoufakis' reimagination of blockchain technology can be associated with the Heideggerian theory of freedom from technological domination based on the inherent metaphysical potential to invent or deploy new technologies according to a new consciousness (Heidegger, 1954, Feenberg, 2013). These two theories, i.e., Heideggerian phenomenology and Lukác's theory of reification, have been synthesised in Marcusé's theory of liberation technology (Feenberg, 2013). Thus, it can be argued that Varoufakis channels Marcuséan liberation technology.[5] In this regard, both Marcusé and Varoufakis recognise the power and influence of capitalist forces in technological innovation, but argue for its reinvention under progressive social forces (Feenberg, 1991, Varoufakis, 2021).

In contrast, Mason deploys Hegelian dialecticism to demonstrate that information technology is 'a product of capitalism that is unfaithful to its origins…(in other words), although (information technology) is a product of capitalism, it's very logic is fundamentally opposed to it' (Scott, 2018, p. 83). This, according to Mason (2016), leads to the emergence of a post-capitalist society based on the fragmentation of capitalism by

[5] Marcusé's theory is discussed in greater detail in the next chapter under Feenberg's Critical Theory of Technology.

information technology. The core of his argument is that information is not a scarce product from which profits can be derived in the conventional sense, as information technologies are inventions that are infinitely reproducible at zero marginal cost, thus destroying capitalism's pricing mechanism (Mason, 2016, Wang, 2016, Cruddas and Pitts, 2020). In this regard, Mason's argument aligns with Rifkin's (2014) zero marginal cost thesis.

A notable outcome of this broken pricing mechanism is the subjective appraisal of a company's value, which is leading to oversized valuations of tech companies and the growth of monopolies in the digital economy (Mason, 2016, Wang, 2016). However, for Mason, the broken pricing mechanism i.e., zero marginal cost, ultimately leads to capitalism's demise, as it essentially drives the cost of labour to zero (Mason, 2016, Wang, 2016). In the long run, the combined effect of the broken pricing mechanism and increased automation results in capitalism's demise (Mason, 2016). Once labour is squeezed out of the system through automation, this leads to a situation where 'profit will flatline and prices will be driven to zero' due to anaemic demand owing to the fallout from technological unemployment, which ultimately leads to a post-scarcity world in which capital is unable to survive (Mason, 2016, Wang, 2016). In this way, capitalism is sowing the seeds of its own destruction by inventing an infinitely abundant technology that will ultimately 'dissolve markets, destroy ownership, and break down the relationship between work and wages' (Mason, 2016, p. 7).

> What we are witnessing here is (an) example of what Hegel called the 'disparity of the substance with itself' (1997, §37). Capitalism, like all things, is afflicted by an antithesis (i.e., information technology) that is not external, but wholly immanent; an internal contradiction which leads to its own (re)creation, its own demise and replacement, that is, with the postcapitalist economy. (Scott, 2018, p. 83)

Overall, the difference between Varoufakis and Mason can be summed up as follows. While Varoufakis offers a proposal to de-reify the financialised nature of the economy, which depends on its uptake by revolutionary forces within the working class, Mason is more optimistic in his perspective on the self-destruction of neoliberal capitalism, which,

in his view, is already on a path of self-annihilation. In this regard, he holds a similar view to Gorz (2010b) who held that there were considerable difficulties associated with measuring the knowledge economy's "immaterial products".

A New Social Subject and Agent of Change

Workers and/or the working class as the historical subject have largely been abandoned by post-capitalist scholars, with one exception. Varoufakis (2021) remains committed to workers as the revolutionary agents of change in his post-capitalist utopia. However, other post-capitalist scholars align with the ideas of Gorz (1982), who in light of increasing automation, presaged a diminishing role for workers as change agents alongside a growing role for social movements. Mason (2016) and to a lesser degree Bastani (2019) align with Gorz's views on the diminishing role of workers. However, diverging with Gorz, both identify an auxiliary rather than central role for social movements. On the other hand, substantially disagreeing with the views of other post-capitalist scholars, Srnicek and Williams (2015) adopt a critical stance towards social movements, envisaging a larger role for thinktanks, the media and political parties (Brown, 2016).

Mason's (2016) conceptualisation of movement building for post-capitalism elevates the role of highly networked individuals in a "peer economy" reminiscent of Rifkin's 3IR. However, while Rifkin's P2P networks are collaborative, Mason (2016) emphasises the role of networks in democratic engagement and contestation – or as he puts it, 'networks are for (arguing) things out and (modelling) alternative possibilities' (Mason, 2016, p. 237). Mason (2016) thus adopts a dialectical approach to identifying alternative tendencies and opportunities for change within the current system. For him, it is 'entirely possible to build the elements of the new system molecularly within the old' and in this respect, he identifies a nurturing role for the state to provide regulatory support for alternative models that emerge within the current system (Mason, 2016, p. 217). His roadmap to post-capitalism is thus incremental, but potentially scalable with appropriate policy support to connect bottom-up small-scale experimental models to top-down government programmes (Mason, 2016). In this regard, he highlights the potential for decentralised peer networks to develop valid and scalable post-capitalist alternatives,

citing Wikipedia and Linux as successful non-profit and open-source models, which are largely dependent on volunteers, but have nonetheless become mainstays of the digital economy (Mason, 2016).

Alongside this role that Mason (2016) has identified for P2P networks as incubators of new ideas, he also recognises the aspirations of disparate individuals culminating in a unified rejection of the status quo through activist oriented networks such as the Occupy Movement. For example, he characterises the rallying call of the Occupy Movement, "One No, Many yes-es", as incoherent, but logical given the failure of 20th century labour struggles associated with socialist blueprints (Mason, 2016, p. 5). Mason's elevation of self-determining individualism manifested as organised rebellion has not escaped critique. His confidence in highly networked individuals is criticised for being somewhat naïve in its optimism about the potential for peer networks to bring about change due to the fact that it ignores older forms of struggle in a world where labour's role has not entirely faded (Cruddas and Pitts, 2020).

In contrast to Mason's decentralised and bottom-up approach, left accelerationists appear partial to somewhat more vanguardist models for change. For example, Srnicek and Williams (2015) are critical of the "horizontalism and localism" of social movements such as the Occupy Movement, which they characterise as "folk politics" incapable of inducing change (Salter, 2016, Brown, 2016). Instead, they see a bigger role for an ecosystem of traditional frontline institutions such as the media, thinktanks and political parties to develop a counter-hegemonic project, which mimics the modus operandi of the Mont Pellerin Society that was established to displace Keynesianism (Salter, 2016, Brown, 2016, Gordon, 2021, Srnicek and Williams, 2015). Bastani, on the other hand, calls for a return to electoral politics and the 'building of a workers' party against work' (2019, p. 194). Bastani's political party would be scaffolded by a populist movement described as a 'collective subject with specific demands tied to the technological expansion of abundance, leisure and luxury' (Cruddas and Pitts, 2020). Nonetheless, despite this emphasis on an engaged collective subject, Bastani ultimately assigns agency to the nation state as the driver of change (Cruddas and Pitts, 2020).

Left accelerationism's vanguardist approach exposes an inconsistency with respect to its 'dialectical epistemic framework' (Gordon, 2021, p. 147). In this regard, despite Srnicek and Williams (2015) and Bastani (2019) drawing on Marx's *Grundrisse* (Gordon, 2021, Justie, 2020), labour as the historical subject disappears in accelerationism to be replaced by an "ideal subject" that spontaneously emerges 'once certain technological thresholds are passed' in a manner equated to 'Althusser's notion of history as a process without a subject' (Gordon, 2021, pp. 140-142). This approach is criticised for flattening history by disregarding the 'always in process' nature of grassroots political struggles as well as for ignoring the 'agency of subordinated subjects to collectively contest their class position' (Gordon, 2021, p. 140, p. 147). Left accelerationism is also denounced for its technological determinism and sanguine view of capitalist technologies, which appears to have blinded it to the possibility of reimagining technological development in the Marcuséan tradition of liberation technology (Bassett and Roberts, 2019). Its vanguardist approach can thus be interpreted as a form of promethean transhumanism.

Overall, while labour as the agent of change in the Marxian tradition of working-class struggle has largely disappeared within post-capitalist discourse, social movements play a surprisingly small role as change agents in the manifestos of leading post-capitalist advocates. For example, while Srnicek and Williams offer a strong critique of the Occupy Movement's "folk politics" (2015, p. 3), Mason is ambivalent about the movement's "piecemeal good ideas" (2016, p. 194). However, as the discussion in Chapter Seven argues, there is some empirical evidence to suggest that the Occupy Movement may well represent a wellspring of post-capitalist tendencies in the digital economy. However, despite the progressive ideas emerging from the Occupy Movement, it is largely perceived as the catalyst of an idea that was followed by a transmutation of outcomes. In this regard, similar to Mason's critique of Occupy, Castells (2015) argues that the social movement emerged in response to the financial crisis as a symbol of rising counter power fuelled more by outrage than by ideology—resulting in disparate ideological strands, which have contributed to a diffusion of ideas rather than real social change.

Overall, the literature on post-capitalism is divided on who the agents of change are in contemporary society. From the labour movement to activists and peer networks, to

political parties, the media and think tanks, the field is open in terms of possible catalysts of change. While this debate is typical of left contestation, what it also suggests is the fluidity of political currents in a period of intense change, where, despite the rejection of Schwab's velocity thesis, technological innovations are altering society in ways that are faster than people are able to make sense of them.

Conclusion

This literature review demonstrates that the 4IR's debut has stimulated widespread debate and discussion about industrial revolutions, paradigm shifts and epochal change, whilst generating a new body of knowledge about what technological development means for social progress. With particular reference to South Africa, the government's headlong dive into the 4IR as a policy lodestar has elicited widespread critique across the ideological spectrum, ranging from constructive criticism aimed at improving policy effectiveness and implementation to conceptual debates that question the very notion of a new industrial revolution as well as rejecting the 4IR as a theory of change due to its continuity with the fundamental tenets of neoliberal capitalism, which preserve the systemic drivers of inequality and neutralise the socio-economic reinvention of society. (Cunningham, 2018, Sutherland, 2020, Cooper, 2021, Maharaj, 2021, Mapadimeng, 2021, Marivate et al., 2021, Mazibuko-Makena and Kraemer-Mbula, 2021, Moll, 2021a, Ngwane and Tshoaedi, 2021, Selelo and Khwela, 2022).

The purpose of reviewing this literature was not to align with any of the alternatives presented by the conceptual debate on the 4IR and/or to arrive at a decisive definition for the current techno-socio-economic paradigm. The aim of this review was to demonstrate that despite its dominance in South African policymaking, the 4IR is a robustly contested theory of change. However, this contestation largely takes place in the domain of a battle of ideas. And while this debate makes an important epistemic contribution, there are few empirical studies that can be drawn on to assess its theoretical expositions with one notable exception, which is the explosion of scholarship on the hazards of working in the platform economy (Balliester and Elsheikhi, 2018, Mawii and Aneja, 2020, Schor et al., 2020, Webster and Masikane, 2021). The platform economy, which is paradoxically also

referred to as the "sharing economy" due to its roots as a dialectical response to the 2008/9 financial crisis (Schor, 2020), is the source of a significant number of the new jobs that are being created by the digital technologies of the current era. This issue is explored in detail in Chapter Seven of this dissertation. However, the platform economy merely represents a segment of the digital economy, and in this regard, there is a lack of research that brings the digital economy into full view. Consequently, this study identifies a knowledge gap in the literature regarding the ontology of South Africa's digital economy in that there are no empirical studies that demonstrate how it is manifesting in the country, both as a way to test the assumptions presented by the conceptual debate on the 4IR and as a way to contribute to a better understanding of new trends in technological innovation, including their drivers and impact on the economy as well as their implications for closing the inequality gap in South Africa.

Secondly, while automation anxiety related to the hollowing out of the middle class is a global concern (Frey and Osborne, 2013, Ford, 2015, Brynjolfsson and McAfee, 2014, Peters, 2019), the review of the South African literature only uncovered studies focusing on the 4IR's impact on industrial policy, small business development and the justice system (Sutherland, 2020, Selelo and Khwela, 2022, Dwolatzky and Harris, 2021). Thus, highlighting a second knowledge gap with respect to research on the digitalisation of the mainstream economy vis-a-vis automation and its implications for white-collar jobs. In this respect, the substitution of mental work with AI in white-collar occupations is important given that this technology discreetly operates in the background, whilst causing major disruptions in the labour market. Until recently, white-collar jobs were not only considered secure, but were also aspired to by South Africans pursuing upward mobility into the middle classes, i.e., amongst the emerging middle class. Thus, highlighting another challenge in South Africa's struggle against inequality as well as the second knowledge gap that this study seeks to address.

Finally, a parallel strand of literature dominated by international scholarship, has emerged adjacent to the 4IR literature, which highlights a resurgence of post-capitalist discourse associated with the emergence of post-work societies. This discourse seeks to identify post-capitalist solutions, including alternative economic development models in the

digital economy, as a countervailing force to the tech monopolies that increase wealth concentration, in addition to responding to the threat that automation technologies pose to livelihoods in a world where jobs are increasingly being lost and/or replaced by precarious work in the platform economy (Srnicek and Williams, 2015, Huckle and White, 2016, Mason, 2016, Cohen, 2017a, Cohen, 2017b, Kewell et al., 2017, Bastani, 2019, Varoufakis, 2021). However, apart from one small study that examines the emergence of platform co-operatives in South Africa (Farouk, 2022), there is a dearth of literature exploring post capitalist tendencies, including their origins as dialectical responses to the prevailing neoliberal order, which would be an important indicator of contestation. Thus, highlighting a third knowledge gap that this study seeks to explore, which is the identification of post-capitalist impulses in South Africa's platform economy.

In sum, these knowledge gaps inform three empirical studies on the digital economy that are listed below. The next chapter outlines the theoretical framework informing them.

- An empirical study of the ontology of the digital economy in South Africa in terms of its manifestation and implications for inequality.
- The impact of digitalisation and automation in the mainstream economy in relation to traditionally secure white-collar jobs, including what this means for the expansion of the Black middle class in South Africa's struggle against inequality.
- The identification of post-capitalist tendencies as an indicator of contestation in South Africa's digital economy in response to neoliberalism and precarity in the platform economy.

CHAPTER THREE: THEORIES OF TECHNOLOGY AND SOCIAL CHANGE

Despite the debate contesting the originality of contemporary innovations and their impact on society, the 21st century has nonetheless witnessed profound advancements in technological development after decades of steady progress following the invention of information communication technologies (ICTs) and the internet. Crucial to the momentum in the past decade is the end of the second artificial intelligence (AI) winter due to cheaper computation costs, which has accelerated machine learning (ML), enabling AI to mimic the way biological neurons signal each other in the human brain through artificial neural networks (Dickson, 2018, Jain et al., 1996). This development has leapfrogged hitherto unattainable AI capabilities such as image, voice and text recognition, human-machine dialogue and computer vision, triggering not just a boost for the AI industry, but also influencing widespread technological innovations in other sectors (Dickson, 2018, Medium, 2019). AI has thus emerged as the zeitgeist of the contemporary era, even capturing the attention of sociologist Manuel Castells (2020), who views it as qualitatively transformative. In a November 2020 lecture, which predates the launch of genAI, Castells commented on AI's significance arguing,

> Concretely speaking, I think now, really now, we have the full expansion of artificial intelligence, which until now was kind of science fiction, promise, possibility. Now, that's it! It's spreading all over and fundamentally transforming much of what we do (Castells, 2020, 9:03).

Artificial Intelligence

AI's revival in the past decade and the myriad technological solutions it scaffolds has led to the emergence of what is simultaneously referred to as the "algorithmic economy" (O'Reilly, 2021) and the "data economy" (Cheng et al., 2019) given the fundamental role that it plays extracting value from data, which is generated by the ever-expanding digitisation of human activities. The upshot is a conceptual shift in the understanding of human-technology interaction. Whereas sixty years ago the French philosopher Jacques Ellul described people as living in a milieu of technology that transcended their lived

experience in the natural environment (Ellul et al., 1964); today people's relationship with technology has surpassed their mere sensory immersion in it, as humans have become the actual data subjects of AI (Villaronga et al., 2018, Castells, 2017b). Thus, indicating humanity's insertion into capitalism as the very means of production.

The fact that AI is software also means that a fair amount of change is taking place in the background, both literally and figuratively behind the screen, signifying not just computations out of sight, but also an AI black box with a coded internal logic, which several analysts and scholars argue surreptitiously propagates technological unemployment as a result of market forces. For example, as already noted, Acemoglu and Restrepo (2020) note that the 'wrong kind of AI' is displacing jobs as a result of market failure. Similarly, Silicon Valley analyst and technology writer, Tim O'Reilly, cautions that the economy is 'running on the wrong algorithm' with the pervasive "master objective" to expand corporate profits at all costs, even at the expense of jobs (Turk, 2017, O'Reilly, 2021). Analogously, the growth of monopolies in the digital economy has been linked to an increase in automation technologies (Frey, 2020). Citing the profit-incentivised business plans of companies as the cause of labour-saving innovations, economic historian Carl Frey (2020) connects the corporate mission of monopoly status to the increased adoption of automation technologies, which increases profit margins and improve prospects for market domination.

At the same time, several studies argue that the algorithmic wave sweeping through the economy has had a particularly corrosive effect on what were once stable middle-class jobs (Ford, 2015, Frey and Osborne, 2013, Bernstein and Raman, 2015, Chelliah, 2017, Hawksworth et al., 2018). Consequently, the notion that AI is cannibalising white-collar jobs, is a common concern.

The Network Effect

In addition to concerns about AI, the architecture of the digital economy and its properties, i.e., its network effect raises both fears and hope. On the one hand, raising fears, scholars point to the network effects of the digital economy having harmful effects,

such as producing wealth concentrating monopolies (Choudary et al., 2015, Srnicek, 2017, Verdegem, 2022). On the other hand, signalling prospects for an alternative, the emergence of AI and the threat of technological unemployment alongside market concentration and growing inequality has revived the discourse on a post-work society based on post-capitalist economic models that emerge from the efforts of highly networked individuals in the digital economy—thus, highlighting a role for decentralised peer networks to develop bottom up technologies that foster hope for a socially inclusive digital economy as opposed to innovation that takes its cues from the financial market (Rifkin, 2012, Srnicek and Williams, 2015, Mason, 2016, Bastani, 2019, Varoufakis, 2021).

Theoretical Framework

The discussion of AI and the network effect highlights three themes, which inform the theoretical framework in this study. The first theme is that AI is the dominant technology in the contemporary era; the second theme is AI's role in the threat of technological unemployment leading to the emergence of a post-work society; and the third theme is the influence of the network effect in the digital economy both as a source of harms to society and as a potential conduit for positive social change. This study explores three theories to engage with each of these themes from an interdisciplinary perspective. In this regard, theory triangulation is deployed to enable the use of 'different theories in the analysis and interpretation of data' (Carter et al., 2014, p. 545). The selected theories have philosophical and empirical points of convergence and divergence, which enable the construction of a robust epistemological framework that engages with different aspects of the highlighted themes to provide a comprehensive analysis of the digital economy.

Firstly, given that AI has emerged as the dominant technology of our time, an important point of departure is understanding the substance of this technology. In this regard, this study embarks on an ontological inquiry into the nature of technological development by deploying Andrew Feenberg's Critical Theory of Technology (CTT). Located within the discipline of philosophy of technology, CTT exposes the inherent bias of technological artefacts by synthesising the social constructivist methodologies of Science and

Technology Studies (STS) with the critical theories of the Frankfurt School, specifically highlighting Herbert Marcusé's theory of technological rationality as Marxist phenomenology (Feenberg, 2017a, Feenberg, 1991).

Secondly, this chapter explores the ideas of the end of work theorist, André Gorz, who presents proposals for dealing with technological unemployment—and whose ideas, similar to Marcusé, can be located within the domain of Critical Theory, albeit with a focus on Sartrean existentialism (Granter, 2016a). Marcusé and Gorz are liberatory social theorists who, in a Marxian tradition, address the crisis of capitalism by promoting emancipatory strategies in pursuit of an alternative post-capitalist future.

Finally, this chapter explores Manuel Castells' theory of the Network Society for its ability to explain the structure and growth of a dynamically networked digital economy with AI at its core (Castells, 2010, Castells, 2020). Analogous to CTT, Castells adopts an empiricist approach based on social constructivism to analyse how power is mediated in digitally networked societies. However, in contrast to the liberatory social theories of Marcusé and Gorz, Castells' emphasis is on developing his theory as a descriptive device (Eriksson, 2005, Anttiroiko, 2015).

Critical Theory of Technology: A Critique of Technological Determinism

Processes of technological innovation and development are not free from bias nor are technological artefacts neutral objects. These tendencies are exposed by Science and Technology Studies, an anti-positivist discipline that examines external influences on the development of technology (Feenberg, 1991). Emerging out of STS, Critical Theory of Technology was developed by Canadian philosophy of technology scholar, Andrew Feenberg, who studied under the Frankfurt School's Herbert Marcusé. CTT concerns itself with human agency in technological development and social change (Feenberg, 1991). It merges the empiricist methods of STS with the Frankfurt School's Critical Theory to reveal the flawed rationale behind technological determinism. The discussion below covers a description of CTT as an amalgamation of STS and Critical Theory. Based

on these overlapping theories, CTT argues that there are hidden complexities built into the design of technological artifacts that are 'masked by the coherence of technical explanations' (Feenberg, 2015, p. 2). This discussion of CTT emphasises Marcusé's ontological critique of technology, which is elevated for its contribution to understanding AI and other digital technologies as artefacts that have an all-encompassing effect on society.

Critical Theory of Technology draws on Science and Technology Studies for its anti-positivist assumptions as well as its critique of technological determinism (Feenberg, 2017a, Feenberg, 2017b). A key assumption within STS is the notion of "technical underdetermination", which demonstrates how external influences, such as social and political interests eclipse purely technical considerations in decisions about the design of technologies (Feenberg, 2010). In this regard, STS is an interdisciplinary science that applies empiricist social constructivist methods to highlight the incidence of contingencies in the development of technologies, thereby exposing the prevalence of ideological, cultural and socio-political biases by highlighting the consequences of 'interpretation in the development of technologies' (Feenberg, 2010, Scharff and Dusek, 2013, Olsen and Engen, 2007, Feenberg, 2017b, Feenberg, 2017a, p. 6). According to Feenberg, social constructivist approaches 'have rediscovered the Marxian idea of the interdependence of the social and the technical through co-construction' (2010, p. 43). STS thus exposes biases by accounting for tacit influences in the design process as the outcome of interaction between contesting groups at the point of invention.

> The key point is the influence of the social on the content of the artifact and not merely on such external factors as the pace of development, packaging or usages. This means that context is not merely external to technology, but actually penetrates its rationality, carrying social requirements into the very workings of the device. (Feenberg, 2015, p. 3)

The social constructivist methods of STS can be observed in the work of Michel Callon (1987) and Bruno Latour (1990), the architects of Actor-Network Theory (ANT). ANT emerged in the 1980's in early STS amidst growing interest from sociologists and

anthropologists (Feenberg, 1991, Hughes, 2001). Theorists within the ANT tradition challenge linear teleological perspectives on the development of technology by focusing on the mutual influence of humans and objects working together. ANT specifically provides a basis for understanding the politics of technology by examining the concept of co-construction between animate and inanimate actors in technological networks, i.e., how 'people and things link together in networks and have effects on the networks to which they belong' (Hughes, 2001, Feenberg, 1991, p. 6). 'The concept of "program" in ANT does the work of the constructivist notion of interpretation' – it highlights the fact that objects/things also have programs, which results in 'their actions (also playing) a role in the life of the network' (Feenberg, 2017a, p. 6).

According to Feenberg, the 'network approach led to the widely adopted concept of co-production of society and technology' (2017a, p. 8). For example, Castells, whose Network Society theory is routinely cited in ontological discussions of the digital economy (Webster, 2006, Pirogan and Katzenbach, 2017, Caruso, 2018), draws on Latour's ANT to explain the connection between humans and technological networks (Castells, 2017b). Castells pinpoints ANT's concept of co-construction as significant, not only for identifying the teleological value of technological artefacts, but also for describing their subjective role in networks (Castells, 2017b). In this regard, the emergence of the highly networked platform economy (Kenney and Zysman, 2016, Langley and Leyshon, 2017) correlates with a renewed interest in ANT in contemporary sociological theory (Pulver, 2016).

Feenberg's theory draws on ANT for insights into the complexity of the interplay between humans and technology, especially on the work of Latour who 'uncover(s) the way in which substantive political choices are embedded into technology during the design process' (Thomson, 2000, p. 210). However, Feenberg's critique of STS, which includes ANT as a sub-discipline, is that while it initially introduced political analysis to the study of technology; as time went by, it took a 'detour into the academy' pursuing empiricist methods alongside an unequivocal aspiration to establish itself as a science, which contrived to circumscribe its engagement with broader socio-political issues (Feenberg, 2017b, p. 3). For example, despite its focus on co-creation, ANT is singled out for its

inadequate response to deep-seated forms of discrimination, such as gender and racial discrimination (Feenberg, 2017a, Feenberg, 2017b). Feenberg also critiques STS for its lack of concern with the contradiction between political agency and technocratic rationality, arguing that it neglects a key insight of early modernity theory, which is that 'modern societies have a rational culture' (Feenberg, 2015, p. 2). To close this gap, Feenberg's CTT incorporates the Frankfurt School's Critical Theory.

Feenberg does not discard STS in favour of Critical Theory. Instead, he develops CTT as a new theory based on a dialogue between STS and Critical Theory. In this respect, for Feenberg (2017b), the early Frankfurt School's 'rational critique of reason' is of great relevance today—but in need of renewal. In his view, the opportunity for this renewal is provided by STS, which is based on 'the very same technocratic and scientistic assumptions against which Critical Theory argues' (Feenberg, 2017b, p.3). Feenberg thus combines STS' anti-positivist critique of technology with the Frankfurt School's critique of culture to emerge with "Critical Theory of Technology".

Accordingly, CTT builds a bridge between empiricism and philosophy by merging the social constructivist methodologies of STS with the neo-Marxist critique of the Frankfurt School, emphasising Marcusé's theory of "technological rationality" (Feenberg, 2017a). Marcusé's work contributes to a deeper understanding of the culture within which technological artefacts emerge. In this regard, his work is useful for developing an understanding of AI's internal logic in contemporary society. However, more importantly, applying Marcusé's theory to the current era enables an understanding of the paradox of automation, as it offers a way to think through the conundrum of automation anxiety, which manifests as a passive response to the Schwabian trope of winners and losers and rising inequality.

Critical Theory of Technology and Marcusé's Critique of Technology

Herbert Marcusé's theory of technological rationality highlights the 'connection between science, technology, and capitalism' (Feenberg, 2013, p. 604). Marcusé challenges the idea that technology is neutral whilst also arguing that neutrality works in service of 'the

most powerful forces in society' (Feenberg, 2010, p. 46). A major theme in Marcusé's work is the contention that technological design is perpetually aimed at finding '"efficient" solutions to social and technical problems' (Feenberg, 2017a, p. 4). Marcusé (1941) thus identifies efficiency as an aspirational norm that dominates conventional thinking—but, with questionable social outcomes. His work thus exposes technology as 'a crucial part of the machinery of repression' (Granter, 2016b, p. 88), and he achieves this by developing a theory of technological rationality that highlights the crisis of social alienation under advanced industrial capitalism (Marcusé, 1941, Marcusé, 1964).

Marcusé's ideas about technology were formed during the early period of Fordism in his essay *Some Social Implications of Modern Technology* (Marcusé, 1941, Abromeit, 2010). Two decades later, he built on the ideas from this essay by developing a more sophisticated analysis of the experience of social alienation in advanced industrial societies in his seminal book, *One-Dimensional Man* (Marcusé, 1964, Feenberg, 2013). *'One-Dimensional Man* tried to show how ideology concealed the grip of domination and the reality of alienation' (Whitfield, 2014).

Marcusé's theory of technological rationality is 'derived from the practices of capitalism' and in this respect, there are synergies between his ideas and those of his Frankfurt School colleagues Max Horkheimer and Theodore Adorno who developed a theory on 'the impoverishment of experience under capitalism' (Feenberg, 2013, p. 604, p. 606). The early Frankfurt School, which emerged in the period between Taylorism and Fordism, argued that 'we live in a technocratic society with a culture colonized by technical rationality' (Feenberg, 2017b, p. 3). This perspective highlights two conditions of society, *viz.*, that not only do we live in a culture dominated by technology, but also that 'technology (itself) is adapted to technocratic control of the underlying population' (Feenberg, 2017b, p. 3). Thus, beyond simply addressing the socio-economic fallout from advanced industrialisation, the early Frankfurt School also engaged with 'the ideas that were formulated to defend the disparities of class and status' (Whitfield, 2014).

Viewed as the most radical of the early Frankfurt School scholars, Marcusé's ideas were considered controversial, resulting in their dwindling influence from the 1970's onwards

(Feenberg, 2013, Davis, 2014). Within the Frankfurt School itself, Marcusé's radical views were largely replaced by 'Habermas's more moderate position' (Dusek, 2006, p. 62). However, in recent years there has been renewed interest in first-generation Frankfurt School scholars, including Marcusé, whose ideas on technology and society are once again being defended and experiencing a renaissance in contemporary Critical Theory (Abromeit, 2010, Višić, 2019).

There is some debate about whether the emphasis in Marcusé's theory of liberation technology is on Heideggerian or Marxist phenomenology (Thomson, 2000, Abromeit, 2010, Feenberg, 2013, Farr, 2021). Born in Germany, Marcusé was a student of Martin Heidegger, but broke ties with him following the latter's support for Nazism (Thomson, 2000). Subsequent to the permanent breakdown in his personal and professional relationship with Heidegger as well as his exit from Nazi Germany into exile in the U.S., Marcusé turned decisively towards Marxism to develop his theory of technological rationality (Thomson, 2000). Nevertheless, Feenberg is accused of magnifying Heidegger's influence in his reading of Marcusé (Abromeit, 2010). Thus, while the post-Heideggerian Marcusé turned to Marx and Lukács' dialectical theories of alienation and reification for his philosophy of praxis, there remains some debate about whether Feenberg intentionally amplifies Heideggerian phenomenology or engages in an unsuccessful suppression of it in his Critical Theory of Technology (Thomson, 2000, Abromeit, 2010). Be that as it may, Feenberg is said to '(bring) out remarkable similarities between Marcusé's critique of technocracy, the technologically mediated production and maintenance of a one-dimensional society, and Heidegger's ontological critique of enframing, the technological understanding of being which turns everything it touches into a mere resource' (Thomson, 2000, p. 205). This discussion explores Marcusé's work both in relation to Lukács and Heidegger. Despite the breakdown in Marcusé's relationship with Heidegger, his work remains important for its enduring philosophical contribution.

Marcusé (1941, p. 1) views technology as a "social process". In this regard, he adopts a constructivist approach to technology. This is evident in his observation that humans are 'an integral part and factor of technology', not only as the individuals that invent it 'but

also as the social groups which direct its application and utilization' (Marcusé, 1941, p. 138). This understanding led to Marcusé developing a multi-dimensional definition of technology, as '[1] a mode of organizing and perpetuating (or changing) social relationships, [2] a manifestation of prevalent thought and behaviour patterns, [3] an instrument for control and domination' (Marcusé, 1941, p. 139).

Based on the growing influence of science and technology in the early 20th century, a version of rationality that came into being is one that was identified by Weber as "instrumental rationality", referring to a kind of "means–end rationality" in pursuit of efficiency goals that neglected an evaluation of their outcomes. Similarly, technological rationality, which resembles instrumental rationality, was identified by Marcusé as a 'lower form of rationality' in need of elevation to a higher philosophical mission to serve human values. Consequently, the post-Heideggerian Marcusé turned to Hegel and Marx to develop 'a dialectical approach to the criticism of modern industrial, capitalist, technological society', which ultimately led to him developing a new sensibility for existence based on an "aestheticized politics" that draws on art as the inspiration for a happy and beautiful life. (Kettler, 1982, Dusek, 2006, pp. 54-55, Feenberg, 2009)

Marcuséan Technological Rationality

Marcusé's theory of technological rationality modernizes 'earlier Marxist notions of market rationality' (Feenberg, 1991, p. 3). He updates Marx's theory of alienation by drawing on Lukács' theory of reification, which identifies technical manipulation as the source of social alienation (Feenberg, 2016). Reification embodies a type of alienation that is representative of technologized societies in which technical manipulation replaces commodity fetishism as the underlying ideology driving societies that are also becoming increasingly individualistic (Vancouver Institute of Social Research, 2014, 18:30, Marcusé, 1941, p. 138, p. 150). In this regard, Marcusé's theory of technological rationality echoes the essence of Lukács' theory of reification, i.e., 'the notion that capitalism imposes a rational culture that privileges technical manipulation over all other relations to reality' (Feenberg, 2017a, p. 5).

Reification is a ‘form of objectivity that is an a priori condition of meaning’ (Feenberg, 2016, p. 5). It demonstrates ‘action on the logic of action rather than technical action’ (Vancouver Institute of Social Research, 2014, 10:00). As Feenberg puts it, reification ‘operates at the level of the intelligibility of the world even as it plays a material role in the practical activities that constitute that world’ (2016, p. 5).

In this regard, Marcuséan technological rationality (1941) argues that individual achievement is entangled with the notion of people efficiently utilising technical apparatus in the execution of their jobs to achieve success, which is further equated to economic freedom. Marcusé (1941) argues that the mastery of technical devices is accepted as a rational choice by technocratic societies and is further internalised as a norm, resulting in the conversion of individual achievement to “standardised efficiency”. This rationale continues to prevail today. Not only does contemporary society continue to exalt efficiency as a standard, but it is also imbued with a deferential quality that is perceived as unassailably objective no matter the cost (Feenberg, 1991). Marcusé’s theory of technological rationality thus demonstrates how technical efficiency is elevated to a social norm and is fundamental to notions of individual achievement. It exposes “technical efficiency” as the ideological force shaping the economy and society within an ‘inexorable logic of capitalist rationality’ (Feenberg, 1991, Scharff and Dusek, 2013).

Drawing on Marcuséan technological rationality, it is possible to see how the labour-saving technologies of the current era are accepted as rational despite widespread anxiety about technological unemployment. Applying Marcusé’s theory to the contemporary era exposes the teleological value of AI, notably its efficiency gains, which prevail as a rational choice and desirable outcome. This validates the labour-saving technologies of the current era whilst presenting the Schwabian (2017) narrative of winners and losers as inevitable. In this regard, AI, as the foremost technology of the digital economy in its myriad and still growing applications, is far from a neutral influence in society. It has, in fact, become instrumentalised in the Marcuséan sense to discipline not just the labour market, but broader society itself. As Marcusé himself put it, ‘domination perpetuates and extends itself not only through technology but as technology’ (1964, p. 116).

Technological Domination as the Truth about Human Existence

Marcusé's view of technology as domination draws on Heideggerian phenomenology. In this regard, the metaphysics of technology is emerging as an increasingly important conceptual tool, as technology infiltrates every aspect of life in the 21st century, calling attention to a new way of living that is entirely mediated through technology. Accordingly, this section delves into a brief discussion of technology within Marcuséan technological rationality from a phenomenological perspective as read by Feenberg via Heidegger and Greek ontology (Feenberg, 2009, Feenberg, 2013). Feenberg's (2013) reading of Marcuséan technological rationality is ultimately framed as Marxist phenomenology due to the lack of social struggle in Heidegger's theory of change. He nevertheless acknowledge Heidegger's influence on Marcusé in relation to technology as a "mode of existence" (Heidegger, 1954). Thus, locating the relationship between humans and technology within the realm of universal truths.

Heidegger connects people to the world through technology by defining human beings 'not by what we are, but by our way of existing' (Zuckerman, 2015). Thus, based on a social ontological perspective, Heidegger's pre-ontological understanding of being is not related to consciousness, but to structure. This perspective draws on Greek philosophy, which conceptualises technology as the culmination of matter, form, knowledge and purpose (Heidegger, 1954). In this regard, Heidegger's view of technology considers both the metaphysical essence of objects and their sociohistorical context to reveal their a priori truth. Thus, for Heidegger, the substance of technology reveals "everything" about the essence of human existence, which is discoverable by examining how technology is manufactured because crafting, i.e., 'bringing-forth is grounded in revealing' (1954, pg. 12).

Heidegger's question about the essence of technology produced a totalitarian response, which defines it as a force that dominates reality because it '(turns) everything it touches into a mere resource' (Heidegger, 1954, pp. 14-18, Thomson, 2000, p. 205). In this regard, Heidegger was a substantive theorist (Feenberg, 2009). Substantivism posits that 'the values embodied by technology are the pursuit of power and domination' (Feenberg,

2009, p. 162). Thus, for Heidegger, ‘technology is a mode of existence within modern life’ that is endowed with ‘power over the surrounding world’ (Salisbury, 2019, p. 7). From this vantage point, not only is technology integrated into how we live, but it also controls society. This insight is intrinsic to Marcusé’s theory of technological rationality.

However, Heidegger’s understanding of how technological domination could be overcome was insufficient to the task of producing liberation from a Critical Theory perspective. In this regard, Heidegger constructed an ontological split in his understanding of how power works. According to him, ‘the technological a priori would be biased toward domination while actual machines would be neutral’ (Feenberg, 2013, pg. 612). Thus, Heidegger believed that ‘man drives technology forward’ (1954, p. 18). For him, freedom from an oppressive technological reality could only be achieved through a transcendental approach, which in accordance with hermeneutic phenomenology defines human existence as self-reflective (Zuckerman, 2015). Consequently, Heidegger's theory of change regarding freedom from technological domination was an appeal for deep reflection by people on how they existed in the world, which would have the effect of transubstantiating the pre-ontological truth for a different outcome. In this regard, Heidegger's ideas about liberation channel Aristotle’s theory of “potentiality”, which refers to the inherent capacity of things to become or be something else (Cohen and Reeve, 2021). In contrast, ‘Marcusé’s concept of essence is not transcendental but historical’ (Farr, 2021). In this regard, Marcusé refracts Heideggerian phenomenology through a Hegelian dialectical lens to develop a philosophy of praxis that highlights the significance of action in the struggle against a technocratic world order (Feenberg, 2009). Marcuséan reflection thus takes the form of negative thinking or critical thinking as praxis (Farr, 2021).

The Great Refusal

For Marcusé, negative thinking is the 'the critical power of reason' that must be deployed against the one dimensional technological reality of 'advanced industrial society (which) silences and reconciles opposition’ (Marcusé, 1964, p. 19). ‘The purpose of dialectical or negative thinking is to expose and then overcome by revolutionary action the

contradictions by which advanced industrial societies are constituted' (Farr, 2021). According to Marcusé, the way to achieve this is through *technics*, which he describes as 'the methodological negation of nature (not just) by human thought (but also by) action' (Marcusé cited in Farr, 2021). Thus, for Marcusé the potential for change 'emerges from the actual struggles of human beings' in addition to 'their imaginative capacity to project a better future' (Feenberg, 2013, pg. 609). In this regard, not only does Marcusé claim 'that technology has been shaped by the capitalist social forces that presided over its creation,…he (also argues) for the possibility of progressive technological change under the influence of more humane social forces' (Feenberg, 1991, p. 3). For Marcusé,

> Revolution will transform the historically evolved "a priori" conditions of experience that emerge from the capitalist project. A new mode of experience structured by a new a priori will reveal potentialities intrinsic to its objects, the second dimension. Just as reified "technological rationality" is derived from the lifeworld of capitalism, so a radically different rationality is promised by this new mode of experience. This dialectical rationality will incorporate the imagination as the faculty through which the reified form of things is transcended. (Feenberg, 2016, p. 7)

Thus, Marcuséan revolutionary action is expressed as an unequivocal refusal to accept the status quo by engaging in dialectical reasoning or negative thinking to reject the oppressive ideology of technological rationality in advanced capitalist societies, whilst asserting the right to envisage a different future (Marcusé, 1964). Marcusé referred to this as the "Great Refusal" (Marcusé, 1964). The Great Refusal is an impulse against the positivism of advanced industrial society (Marcusé, 1964). In this regard, Marcusé believed that the technological a priori could develop a "progressive alternative" that is not biased to domination (Feenberg, 2013). He turned to art for the inspiration to conceptualise an aestheticized politics to replace the technological rationality of capitalist ideology, and promoted this idea as a "new sensibility" for humankind aimed at 'an aesthetic lifeworld oriented toward needs rather than domination' (Feenberg, 2013, p. 608).

Marcusé's aestheticized politics draws on an awareness of art as 'the promise of happiness' (Kettler, 1982, p. 271). In this regard, he draws on the beauty of art as the motivation for a blissful life that inspires an idealistic worldview, which informs political thought and revolutionary action. He argues, 'art contains the rationality of negation. In its advanced positions, it is the Great Refusal -- the protest against that which is' (Marcusé, 1964, p. 55). The Great Refusal is thus a demand for the de-reification of the imagination and an appeal to envision an alternative future inspired by the beauty and creative freedom inherent in art. This is the idea that appealed to the May 1968 student rebellion against social alienation in technocratic capitalist societies, inspiring a revolutionary anti-capitalist movement that came to be known as the New Left, which is discussed below.

A New Radical Subject: The New Left

While Marcusé drew on Lukács' theory of reification to demonstrate the oppressive nature of technology in society, he did not align with Lukács' perspective on the working class as the revolutionary agent of change. According to Lukács, the de-reification of capitalist practice takes place through conscientized human action, which ontologically transforms the meaning and functions of social institutions (Feenberg, 2016, Lukács, 1972). For him, the driver of change in society is the working class, which becomes conscientized through a dialectical understanding of itself as subject-object (Lukács, 1972, Stahl, 2018). Lukács (1972) describes this self-awareness as "class consciousness", and his critique of reified capitalism calls for de-reification by the working class, which 'formulate(s) a vision of Marxism as (the) self-conscious transformation of society' (Stahl, 2018).

Similarly, the early Frankfurt School, including Marcusé, believed that socialism, as a Marxian model of change, could resolve the contradictions of capitalism. However, Marcusé and his Frankfurt School peers also held the view that the revolutionary potential of the proletariat was in "precipitous decline" (Feenberg, 2016). Thus, while Marx and Lukács' historical materialist perspective exclusively conceived of social change as a product of the conscientisation and action of the proletariat, Marcusé's conception of the

revolutionary subject went beyond the working class. In this regard, influenced by Heideggerian phenomenology, his theory of change approached the question of technology from a totalitarian perspective.

As noted, Heidegger's phenomenology abstracts modern technology as a universal "mode of being" (Feenberg, 2013). Similarly for Marcusé, society encounters technology in a generally oppressive manner in that 'the whole of society (is subordinated) to technological power, which becomes the new source of legitimacy' (Feenberg, 2013, p. 613). In other words, technological rationality reigns supreme. In this regard, 'capitalist technology fully unfolds its potential for domination not only at the level of its particular objects but generally, socially' (Feenberg, 2013, p. 613). This framing enables Marcusé to identify a range of socially alienated groups beyond the working class.

Marcusé thus identifies a new revolutionary social subject, which is a broad movement of the oppressed and alienated, *viz*., the New Left. However, he does not abandon the working class entirely. Instead, he sees an increasingly important role for other groups of oppressed people alongside the organised proletariat. As Marcusé himself put it in a televised 1978 interview on the political struggles of the day, the New Left includes, but is not limited to people affected by issues such as sexism, racism and environmental degradation (Marcusé and Magee, 2022, 4:23, 4:31).

Marcusé achieved unexpected fame as an activist scholar late in his career when this book *One Dimensional Man (1964)* became an inspirational text for the anti-establishment/anti-capitalist counterculture of the 1960's, turning him into the flagbearer of the New Left, which included the 1968 student movement in France that rose up against the tyranny of technocracy and spread across campuses throughout the western world (Farr, 2021, Thompson, 2013). In this regard, 'Marcusé's critique of American society as a highly integrated system governed by "technological rationality" resonated with the concerns of youth in the advanced capitalist world' (Feenberg, 2017a, p. 3). Thus, Marcuséan critical thinking or negative thinking encouraged a rejection of the oppressive status quo within technologically advanced capitalist societies, which he conceptualised as the Great Refusal.

The New Left was inspired by Marcusé's critique of institutionalised inequality, which highlighted indirect forms of aggression towards racial minorities in technologically advanced capitalist societies, alongside the commodification of labour, growing consumerism and the expansion of privatisation, which led to a general condition of social alienation (Thompson, 2013, Winter, 2017, Feenberg, 1991, Feenberg, 2010). Marcusé's phenomenological approach recognised that the experience of being in the world is felt differently by people belonging to different genders, race groups and socio-economic classes. This awareness of the fact that people experienced domination differently, resulted in his conceptualisation of the New Left as a broad movement that was not just inclusive in terms of its breadth, but also nuanced in its understanding of the distinctive struggles of people. Given his appeal to diverse movements, which included the struggles of oppressed people of colour, such as the Black Power movement in the U.S., Marcusé's publications were predictably banned by the apartheid regime in South Africa (Whitfield, 2014).

While it's been more than five decades since Marcusé highlighted racial inequality as a significant concern in technologically advanced capitalist societies, contemporary scholars such as McMillan Cottom (2020), Hamilton (2020) and Noble and Roberts (2019) highlight the need for critical race theory (CRT) in digital studies as well as the need to examine the intersection of platform capitalism and racial capitalism. This study acknowledges the concerns raised by these scholars, but maintains a focus on Marcusé's critique of technological rationality in advanced capitalist societies as an analytical framework for understanding institutionalised racism. In this regard, Calderón makes the connection between Marcusé's one dimensional society, the Great Refusal and CRT, arguing that the 'ideology of whiteness represents a key part of the normative order of advanced industrial society that must be "Refused"' (2006, p. 73). For Calderón, CRT 'represents the type of negative thinking that Marcusé calls for, which can expose the entrenched ideology of whiteness' (2006, p. 77).

Calderón (2006) layers the concept of whiteness onto Marcusé's work. In this regard, she draws on Bonilla-Silva's (2001, p. 22) materialist interpretation of racism, which

identifies “racial praxis” (racial social practices) and “ideology” as a way of holding onto racial advantages. For Calderón (2006) racial praxis is the ideology and practice of whiteness. Drawing on the Marcuséan theory of technological rationality as well as his concept of one-dimensionality in advanced capitalist society, Calderón (2006) argues that whiteness represents a flat epistemology.

> Whiteness represents what I call a flat epistemology in which the organization of knowledge is hierarchical, unidirectional, and reductive. A flattened epistemology is totalizing…(It) is one-dimensional because it is predetermined and disseminated in order to reproduce whiteness. Marcusé’s (1991) analysis in One-Dimensional Man provides a framework with which to further define this flat epistemology. The flat epistemic nature of whiteness is attributed to the unidirectional mode of capitalist relations, which always progress towards the reproduction of capital and disallow critical engagement of the system. Marcusé (1991) explains that modern society’s technological rationalism operates as an apparatus that ‘imposes its economic and political requirements for defence and expansion on the labour time and free time, on the material and intellectual culture. By virtue of the way it has organized its technological base, contemporary industrial society tends to be totalitarian’ (1991, pp. 2-3). These increasing economic and political requirements demand a flattened culture which flows singularly from the Establishment. (Calderón, 2006, p. 76)

Calderón’s (2006) analysis is an additional demonstration of the relevance of Marcusé’s work to questions of racial oppression and inequality, which is an issue that was first highlighted by his protégé Angela Davis. According to Davis (2014), Marcusé highlighted the concept of “politicised linguistics” to demonstrate how particular groups of people are cast in a certain light by the establishment, thereby rendering them more vulnerable to discrimination and oppression.

Marcusé’s work has been elevated within this discussion of Critical Theory of Technology not least because it resonates with the post-work theorist André Gorz, discussed below. Alongside Marx and Marcusé, Gorz has been labelled an “end of work” theorist who employed an emancipatory philosophy to post-work theories in pursuit of the meaningful

realisation of human potential (Granter, 2016a). While Marcusé's proposal for a post-work society is based on a radical thought experiment for a more humane approach to development that is demanded through protest, Gorz adopts a more pragmatic approach by proposing policy solutions. In this regard, Gorz has been described as the "French Marcusé" and is said to have developed his post-work ideas on a foundation built by Marcusé (Granter, 2016a). Gorz is argued to be 'well versed in Frankfurt School scholarship' and regarded as an interlocutor between first and third generation critical theorists, thus also cementing the relevance of his scholarship for contemporary sociological critiques of neoliberal capitalism (Harris et al., 2023, p. 229).

Andrè Gorz's Emancipatory Post-Work Theory

André Gorz's 'contribution to the sociology of work has a wide range of analysis that allows us to understand him as one of the main theorists of contemporary society and capitalism' (Camargo, 2021, p. 59). Long before the current "Future of Work" debates, Gorz (1989) observed a consistently low demand for work as well as the deskilling of jobs in advanced capitalist economies driven by technological development, which he argued was leading to a situation where the notion of full-time work was gradually becoming non-viable. As far back as 1985, he foresaw that the 'microelectronic revolution (heralded) the abolition of work' prompting him to call for a complete paradigm shift to deal with the social dilemmas foreshadowed by automation (Gorz, 1985, p. 32). In this regard, Gorz was not doctrinaire about his proposals, arguing that his model was just one amongst many that could potentially bring about a post-capitalist society (Gorz, 2010a). What he was most concerned about, however, was the importance of debating the future of society, which he strongly felt "would no longer be a work-based society" (Gorz, 2010a).

Resonating with Marcusé, Gorz's work is described as 'liberatory social theory' in that it is directed at an alternative utopian future aimed at highlighting 'the possible, rather than the actual' (Granter, 2016a). In this regard, one of Gorz's main arguments is that the 'the productivity gains made possible by capitalism could be used to enhance individual and

social life, rather than intensifying ruthless economic competition and social division' (Peters, 2019).

Gorz's ideas are based on a blend of Marxian political economy and Sartrean existentialism. Sartre's existential philosophy influenced Gorz early in life and remained an important thread throughout his intellectual life, inspiring a philosophy that melded humanist socialism with a brand of individual autonomy that elevated personal sovereignty (Bowring, 2005, Peters, 2019). Nevertheless, Gorz's critique of capitalism retained the 'political rigour of Marx's political economy' (Bowring, 2008). In particular, his later works produced from the 1980's onwards were greatly influenced by Marx's Grundrisse when the impact of computer technology was increasingly being felt (Granter, 2016a).

Gorz's interpretation of Marx is also considered to have added value to the applicability of Marxian theories for the 21st century. As sociologist Francoise Gollain (2009, p. 349) put it, Gorz's 'existentialist and phenomenological approach…made a major contribution to securing the contemporary relevance of the Marxian legacy by offering a heterodox reading of Das Capital and the Grundrisse'. Exemplifying this heterodox approach, Gorz argued that finding solutions to the problem of jobless economic expansion 'takes us beyond capitalism and socialism' in that the opportunity 'for several types of post-capitalist, post-socialist (societies exist)' (Gorz, 1985, p. 1, p. 32). Gorz's post-work ideas have thus been credited for 'creatively reconceptualising the socialist project' (Levy, 2000), and in this respect, his influence is unmistakeable amongst a range of contemporary post-capitalist thinkers such as Srnicek and Williams (2015), Mason (2016) and Varoufakis (2021). However, his work is also said to have inspired an earlier generation of anti-apartheid and labour movement activists in South Africa, including President Cyril Ramaphosa (Sitas, 2008).

Gorz had close relationships with and was influenced by both Marcusé and Ivan Illich. Gorz adopted some of Illich's ideas to cultivate his 'humanist critique of capitalism', and in this regard, both thinkers are described as 'degrowth pioneers' (Bowring, 2008). At the same time, Gorz's work was linked to Marcusé's and they were both identified as

liberatory social theorists (Granter, 2016a). While Marcusé is branded the "grandfather" of the 1968 student revolution, Gorz is described as a prominent figure that actively supported the uprising in Paris (Bourne, 1979, Little, 2007).

The events of 1968 are considered to be central to Gorz's focus on the emancipatory potential of social movements, as well as to have inspired his thinking on political ecology, which he wrote about over the next decade—a time during which he made prescient analytical connections between the developing ecological crisis, limits to economic growth, the commoditisation of production linked to consumer culture, the labour movement and an unconditional basic income (Gollain, 2009, Van Parijs, 2010, Leonardi and Benegiamo, 2021, Levy, 2000). This discussion, however, does not engage with Gorz's work on political ecology. Instead, it focuses on his ideas regarding the end of work within the broader context of the post-industrial society. Gorz (1989) was nonetheless able to integrate his knowledge of political ecology with his analysis of the post-industrial society by highlighting the tension between sustainable development and a deep-rooted consumerism that also afflicted the labour movement.

In general, Gorz's "end of work" theories developed from the 1980's onwards when the combined effects of computer technology and globalisation were increasingly being felt, resulting in his shift of focus from political ecology to the impact of automation in the workplace and its implications for society. In the years preceding his death in 2007, Gorz's work remained topical, keeping pace with early 21st century technological developments. During this time, he made notable contributions to knowledge work and the knowledge economy, which he characterised as "immaterial labour" and "cognitive capitalism" in his last book, *L'Immatériel (Gorz, 2003)*. In this book, 'Gorz grapples with the emergence of (a) new "intelligent" society' in flux, whose human subjects are undergoing significant change due to the introduction of new technologies, including but not limited to ICTs, AI and biotechnology (Kang, 2023, pp. 1-2). Thus, Gorz was also writing during a period on the cusp of the end of the AI winter, thereby elevating his relevance as a post-work theorist in the 21st century.

Delinking Income from Work and Dialecticism as Praxis

Gorz observed the unravelling of the mass based industrial workforce due to technological advances that caused a growing polarisation amongst workers into two distinct groups, i.e., he noted the emergence of a "dual society" denoted by a small group of elite knowledge workers in secure formal jobs alongside a majority workforce performing servile jobs as casual labour in an "anti-economy" that produces poorly paid jobs historically in the realm of social production - such as domestic work, shopping and organising the contents of people's fridges (Gorz, 1989, p. 155, Levy, 2000, Granter, 2016a, p. 132, Granter, 2021).

Gorz (1989) observed the refusal to disconnect people's material security from paid work, referring to this phenomenon as the "economic rationality" of the capitalist system. According to this rationale, any free time gained as a result of the efficiency gains introduced by automation, is not considered leisure time (Gorz, 1989). This contrasts with the notion of taking advantage of the free time created by labour-saving technologies to allow people to pursue their self-development. Instead, work that was historically in the social sphere is recast as paid work simply to absorb those affected by technological unemployment. Consequently, in the emerging post-work society, the "economic rationality" of capitalism divides the labour market, creating a dual society—with a servant class in unstable employment on one side, providing services to an elite group of permanently employed workers on the other side who are "cash-rich", but "time-poor" (Gorz, 1989, Granter, 2021, p. 214). Gorz's depiction of job creation in the anti-economy is redolent of David Graeber's (2013) polemic on "bullshit jobs", especially his observations on the emergence of ancillary industries, such as dog washing and round-the-clock pizza delivery. Recent history has indeed borne witness to a significant segment of the digital economy, i.e., the platform economy, inventing low-skilled, poorly paid, service sector jobs that some refer to as the growth of a "servant economy" (Vallas, 2019), as demonstrated by the kinds of jobs created in companies such as Uber Eats (on-demand food delivery service) and SweepSouth (on-demand domestic worker service).

Gorz noted the impact of work on 'every layer of society' as well as the significance that people attached to 'the dignity, value, social utility and desirability of work' (Gorz, 1982, p. 68, Gorz and Turner, 1999). This insight enabled him to identify cultural reorientation as a significant counterforce to the economic rationality of job creation at all costs. There was a distinct transition in Gorz's thinking before his arrival at this viewpoint (Granter, 2016a, Levy, 2000). In the 1960's, he called for "freedom within work", advocating that workers increase their agency by organising production themselves (Gorz, 1967, Granter, 2016a). However, from the 1980's onwards when the effects of labour saving technologies were increasingly being felt, his stance shifted towards advocating for "freedom from work" (Granter, 2016a). Accordingly, the argument that emerged from Gorz's major works from the 1980's onwards was that the end of work is not at the root of the crisis facing humanity (Gorz, 1982, Gorz, 1989, Gorz and Turner, 1999, Gorz, 2010a). Instead for Gorz, the problem facing humanity was the conceptual contradiction and grand ideological deceit of work as a source of rights and entitlement to income (Peters, 2019, Turner, 2007). Talking about the transition in his thinking in a published interview, Gorz argued that his books *Farewell to the Working Class (1982)* and *Paths to Paradise (1985),* 'helped to popularise the idea of disconnecting income from working time' (Bowring, 2000, p. 194).

Gorz (1985, p. 32) thus developed a phenomenological understanding of work, arguing that the 'right to an income' needed to be separated from 'the possession of a job'. Accordingly, he sought to disrupt the employment relationship to create a vision of society where work was no longer central and where the gains made by technological advancements were deployed to liberate people from work in a society that prioritised self-development and self-realisation as its primary goals (Granter, 2016a, Gollain, 2018). Gorz's vision for the transformation of society is thus based on the transition from a "work-based society" to a "culture-based society" (Gorz, 1989, Fourel and Gollain, 2013, Granter, 2016a, Gollain, 2018).

This goal, of course, highlights a tension between self-interest and social responsibility or as Bowring (2005, p. 135) put it, a tension between autonomy and equity, which was a 'permanent feature of Gorz's work'. However, this tension is resolved by the influence of

Sartrean existentialism in Gorz's work, which emphasises the importance of human subjectivity and individual autonomy in relation to social responsibility (Bowring, 1996, Bowring, 2000). Sartrean existentialism emphasises praxis rather than consciousness and in this respect is dialectical in nature, as it involves a process of constant self-examination and re-evaluation of one's values, needs and beliefs on a reflexive basis in relation to wider society (Reynolds and Renaudie, 2022). Gorz's response to the decomposition of the work-based society embodies this dialectical approach in that individual autonomy and human subjectivity is in tension with a person's responsibility to society, thus highlighting the significance of self-reflection as a form of praxis that equally values the freedom and needs of others (Bowring, 2000, Bowring, 2005, Reynolds and Renaudie, 2022). This results in a centring of human agency in processes of individual and collective efforts, which is pivotal to Gorz's theory of change.

Non-Reformist Reforms

Gorz went beyond the clichéd left-wing "reform versus revolution" debate to formulate a theory of change that could map the route to a post-capitalist society through unconventional reforms, which he labelled "non-reformist reforms" (Gorz, 1967, Levy, 2000, Bowring, 2008, Engler and Engler, 2021). For Gorz, non-reformist reforms are 'conceived not in terms of what is possible within the framework of a given system and administration, but in view of what should be made possible in terms of human needs and demands' (Gorz, 1967, p. 7). Put simply, he argued, 'a non-reformist reform is determined not in terms of what can be, but what should be' (Gorz, 1967, p. 7).

Despite his semantic use of the word "reform", which lacks a revolutionary tenor, the concept of "reform" is important to Gorz's methodology, which is about creating the conditions for change deep within the DNA of the existing system. Thus, while 'a reformist reform subordinates its objectives to the criteria of the rationale and practicalities of a given system', non-reformist reforms are about reprogramming the system through radical ideation and unorthodox solutions (Gorz, 1967, p. 7, Gorz, 2010a). At the same time, Gorz's non-reformist reforms, which he also referred to as anti-capitalist reforms, align with Critical Theory in that they're premised on a critique of the

capitalist system, which informs the identification of proposals that propagate an exit from capitalism (Gorz, 1968, Gorz, 1989, Gorz, 2010a).

For Gorz, realising the objectives of non-reformist reforms necessitates the implementation of a multi-faceted program predicated on the 'implementation of fundamental political and economic changes' in addition to cultural reorientation (Gorz, 1967, p. 7, Fourel and Gollain, 2013, Gollain, 2018). This multi-dimensional focus highlights the pluralistic nature of Gorz's objectives as well as his heterodox approach. In this respect, his theory of change comprises a triad of proposals: 1) cultural reorientation as praxis, 2) policy proposals, and 3) socio-political mobilisation (Gorz, 1982, Gorz, 1985, Gorz, 1989). Change is thus propagated through the synergistic integration of both targeted and broad interventions, which galvanise prospects for an alternative post-work society built on a new culture. Describing his pathway towards an alternative future, Gorz argues, 'changes can be sudden, just as they can be gradual' (Gorz, 1967, p. 7).

Universal Basic Income and a Shorter Work Week

Gorz's response to the dilemma of declining employment opportunities was to propose two non-reformist reforms, *viz.*, a shorter work week and an unconditional basic income (UBI). Both these policy proposals are linked to his thoughts on creating more time for people's self-development. Gorz's policy proposals are particularly relevant for contemporary society in which the threat of technological unemployment looms large. In this regard, his ideas about UBI are undeniably experiencing renewed interest in post-work treatise amongst both scholars and mainstream analysts in a wide range of publications released in the past decade. See for example, Frase (2016), Vrasti (2017), Gollain (2018), Peters (2019), Filgueiras and Cavalcante (2020), Pansera and Fressoli (2021), Camargo (2021) and Van Trier (2021).

Gorz made an important contribution to end of work theories by distinguishing between the "heteronomy of work" versus the "autonomy of work" where heteronomous work is not self-directed, but performed under financial duress in order to meet the objectives of capitalist expansion, whilst autonomous work is self-directed, personally satisfying and

socially conscious (Granter, 2016a). Whilst recognising that some forms of heteronomous work could not be entirely eliminated, Gorz nevertheless called for a "synergistic societal organisation" where the share of heteronomous work would decrease to be replaced by an increase in autonomous work (Boucas, 2020). During the last two decades of the last millennium when the West experienced an economic boom, Gorz argued that increases in productivity had already achieved the level of sufficiency to support autonomous work by way of a guaranteed social income (Granter, 2016a). In this regard, he placed 'special emphasis on the role of the state to enlarge the sphere of autonomy at the expense of heteronomy', alongside elevating the importance of investing in 'alternative technologies' and experimenting 'in social production' (Boucas, 2020, p. 52).

While a significant degree of contemporary discourse, especially mainstream debates on UBI, focus on sustenance relief in a world of growing automation and shrinking employment opportunities, Gorz's argument for an unconditional basic income was different. Gorz argued that an unconditional income, what he also referred to as social income, should not substitute for subsistence pay, but be of a sufficient value to enable people's self-actualisation (Gorz, 1985). As highlighted in the literature review, these ideas are evident in the works of contemporary post-capitalist thinkers such as Mason (2016), Srnicek and Williams (2015) and Varoufakis (2021).

Alongside this, Gorz proposed the idea of a shorter work week without a reduction in pay, arguing that 'more free time would inherently change the way we view work, society, and ourselves' (Gorz and Turner, 1999, Storer, 2011, pg. 51). While his home country, France, never instituted a four-day work week, it is argued that Gorz's ideas influenced the country's policy decision to opt for a 35-hour work week (Storer, 2011). However, in recent years, several countries have piloted a four-day week without a reduction in pay, including South Africa in which 27 predominantly small companies owned and staffed by the professional class participated as part of a global campaign in 2023 (4 Day Week Global, n.d., 4 Day Week Global, 2023, Gavigan, 2023).

Gorz's New Social Subject

Gorz was part of the New Left that had lost faith in the working class as the revolutionary agent of history and abandoned 'historical materialism as a mode of analysis' (Harvey, 1989, p. 354, Little, 2007, Mason, 2016). In this regard, his writing contrasted with the essentialist Marxist conception of labour's alienation and powerlessness. Instead, he drew on the Sartrean notion of 'degraded praxis' to develop a notion of alienation, not as a form of powerlessness, but as a kind of 'freedom turned against itself' (Bowring, 2005, p. 136). Influenced by his exposure to the environmental movement of the 1970's, Gorz viewed the working class as part of the structural problem within historical materialism that neglected the question of ecological sustainability. 'Driven by a desire to adapt Marxism to the insights and values of the ecology movement, Gorz described a working class being transformed into passive functionaries of a system-driven accumulation regime' (Bowring, 2005, p. 136). In other words, Gorz was disillusioned by the fact that work had evolved into a concessionary activity for organised labour, which traded quality of life and ecological sustainability for higher wages that buoyed demand in a highly commoditised economic system. However, similar to Marcusé, Gorz did not entirely abandon the labour movement, instead he diluted its significance in socio-political mobilisation and viewed 'trade unionism as one movement among many' (Gorz, 1989, p. 232).

Observing the increasing integration of computer technology alongside growing automation, Gorz introduced a new social subject, *viz.*, the post-industrial neo-proletarian, which he described as a "non-class of non-workers", (Gorz, 1982, Bowring, 2005, Granter, 2016a). At the time that he was writing about this new social subject in the 1980's, Gorz argued that the 'majority of the population now belong to the post-industrial neo-proletariat' (1982, p. 69).

> In contradistinction to the working class, this non-class has not been engendered by capitalism and marked with the insignia of capitalist relations of production. It is the result of the crisis of capitalism and the dissolution of the social relations of

> capitalist production - a process stemming from the growth of new production technology. (Gorz, 1982, p. 68)

For Gorz, neo-proletarians are indicative of the changing nature of work in post-industrial societies, which is characterised by growing incongruities. He thus applies negative thinking in the Marcuséan sense to construct two paradoxical concepts, *viz.*, the "non-worker" and the "non-class" in an effort to expose 'the contradictions by which advanced industrial societies are constituted' (Farr, 2021). With respect to the concept of non-worker, consequent to their exclusion from the social relations of production, 'the neo-proletariat does not define itself by reference to its work' (Gorz, 1982, p.70). In this respect, neo-proletarians do not consider themselves to be part of the working class. Neither do they identify with the label "worker", nor do they identify with its polar opposite condition, "unemployed" (Gorz, 1982). For them, work is merely 'a blank interval on the margins of life to be endured in order to earn a little money' (Gorz, 1982, p.70). Thus, the 'non-class encompasses all those who have been expelled from production by the abolition of work, or whose capacities are under-employed as a result of the industrialisation…of intellectual work' (Gorz, 1982, p. 68).

Gorz's neo-proletarians thus embody a new form of exploitation and alienation in post-industrial societies, simultaneously highlighting a rise in inequality associated with the transient nature of work. Post-industrial neo-proletarians are typically over-qualified for their jobs, which they perform out of necessity, not for self-realisation. In this respect, the jobs that they engage in offer neither meaning nor purpose nor any prospects for personal development and career advancement. Furthermore, lacking the conventional indicators of job security, i.e., long-term contracts and trade union membership, they are condemned to under-employment in the short term and a general state of unemployment in the long term. (Gorz, 1982, Gorz, 1985)

However, from the vantage point that post-industrial neo-proletarians are not defined by their work, they are not necessarily defeated by the changing context of work. Given the influence of Sartrean existentialism on Gorz's thinking, neo-proletarians are constituted as more than mere cogs in the machinery of capitalist production, instead they exist as ends

in themselves and as subjects that actively pursue self-development in the social and cultural realms of their lives—thus, subverting capitalism through practises that prioritise individual autonomy and collective freedom (Granter, 2016a, Bowring, 1996). Nevertheless, Gorz's neo-proletarians are not presented as social subjects with a particularly revolutionary character (Bowring, 1996). Instead, they are presented as subjects that will unleash the latent forces of post-capitalism through the development of a new anti-productivist culture (Bowring, 1996, Kang, 2023). In this regard, 'Ignoring the traditional organs of working-class mobilization, Gorz…made a romantic appeal to the "free subjectivity" of (the) "non-class of non-workers" – an appeal whose logical target was the new social movements' (Bowring, 2005, p. 136). In this regard, Gorz believed that the non-class of non-workers could challenge the concentration of power in society by participating in social and political movements resisting the economic status quo. He thought of social movements as potentially transformative, due to the fact that they could offer an alternative vision of society based on principles of solidarity, cooperation and social justice. For example, Gorz highlighted the significance of the ecological and environmental movements in the struggle against the extremes of capitalism.

However, one of the new social movements that captured Gorz's imagination in the era of the ascendance of computer technology was the hacker community. 'Gorz was among the first social theorists to see hackers…as part of the diffuse movement of digital capitalism's (dissidents)' (Heaton and Proulx, 2015, Kang, 2023, p. 12). His views on the hacker community were influenced by the significance he attached to computer software, which he thought of as a 'revolutionary innovation in the information era' (Kang, 2023, p. 11). Gorz specifically highlighted the function of computer software in network construction 'as a means of transmission, communication, pooling of resources, exchange and production' (Kang, 2023, p. 11). Not dissimilar to Rifkin (2014), he noted how this digital ecosystem enabled the formation of peer networks. However, in contrast to Rifkin who developed his idea of the peer network as a "collaborative commons", Gorz, in a critical theory tradition that summons the Marxian notion of conflict in society, instead emphasised the emergence of "digital dissidents", thus conceptualising the peer network as a "hacker community" (Rifkin, 2014, Heaton and Proulx, 2015, Feenberg, 2017a).

For Gorz, ‘hackers are “paradoxically” endowed with “inventive subjective power” that allows them to simultaneously influence and reproduce the mode of production’ (Heaton and Proulx, 2015, p. 30, Kang, 2023, p. 12). Valuing their autonomy and freedom within cognitive capitalism’s relations of production, hackers reject both their status as part of the digital elite as well as “any productivist principles” (Kang, 2023). Gorz thus perceived of the hacker community as an anarcho-communist IT-based social movement. Seeing them as subversive activists who are ‘products of the IT revolution’, he classified them in four distinct modes: 1) ‘high-level programmers who reject a condition of voluntary servitude’, 2) ‘graduates who refuse to sacrifice everything to their carriers’, 3) ‘entrepreneurs who reject…fierce competition’, and 4) ‘jobbers and downshifters who prefer to have low income but plenty of time’ (Kang, 2023, p. 12).

Gorz, thus, held hopes for the hacker community to subvert capitalism through the development of software products that de-reified capitalist customs and institutions (Kang, 2023). Examples of such movements already existed during his time, such as the ‘Linux-based hacker movement for copyleft’ and Wikipedia, the widely used free online encyclopaedia produced by a community of volunteers (Pansera and Fressoli, 2021, Kang, 2023, p. 12). Pansera and Fressoli (2021) refer to these as examples of “post-growth oriented organisations”.

Gorz’s conception of social movements is criticised for possessing a strong libertarian thrust, which hinders collective action towards the seizure of power on the basis that the ‘non-class of non-workers’, i.e., the base of his social movements, is a ‘disorganized mass of dissociated individuals’ (Hyman, 1983, p. 230). Gorz’s response to this was that the critique was ‘beside the point’ (Gorz, 1982, p. 8). For him,

> The definition of the 'non-class of non-workers' as the potential social subject of the abolition of work is not the result of an ethical or ideological choice. The choice is not between the abolition of work and the re-establishment of well-rounded trades in which everyone can find satisfaction. The choice is either a socially controlled, emancipatory abolition of work or its oppressive, anti-social abolition. (Gorz, 1982, p. 8).

In this regard, Akbar (2020, p. 106) specifically highlights the connection between Gorz's non-reformist-reforms and social movements. According to Akbar (2020, p. 106), social movements are 'contestatory exercises of popular power' from which non-reformist reforms emerge. Engler and Engler (2021) concur in their assessment of Gorz's theory of change, arguing, 'With non-reformist reforms, popular movements can win immediate gains that shift power away from elites — and clear the way for more radical transformations'.

Castells' Network Society as a Model for Understanding the Digital Economy

Manuel Castells is perhaps one of the most influential contemporary scholars exploring the impact of technology on society. In the last 25 years, his 'Network Society' theory, described as a macro-sociological theory, has been cited frequently for its analysis of the dominant role of ICTs, not just in redefining how we communicate, but also for constructing a new global social structure (Anttiroiko, 2015). Castells' theory is often referred to as a primer for understanding the rapid expansion of digitally driven globalisation and its effects on society. His theory is particularly useful for making sense of the WEF-endorsed investor driven model of technological development, which resonates in South African critiques of the 4IR (Moll, 2021b, Cooper, 2021). Alluding to the emergence of Big Tech, Castells (2020) himself has observed that the last ten years have indeed borne witness to the rapid extension of network platforms.

The term "Network Society" was first coined in 1981 by the Norwegian sociologist, Stein Braten, who also used the concept to describe the ascendant role of ICTs in society (Van Krieken, 2016, Yates and Hasmath, 2017). However, it is Castells that emerged as the foremost theorist of the Network Society following the publication of his trilogy, *The Information Age: Economy, Society and Culture* (Castells, 1996a), released in three volumes between 1996 – 1998, including the first volume, *The Rise of the Network Society*, which is pertinent to this study for its focus on the economy. A second edition of the trilogy with a substantially revised preface was released at the end of the 2000's in

response to a confluence of new events, including and perhaps especially following the 2008/9 Global Financial Crisis (Castells, 2010, Castells, 2020).

Castells' Network Society theory was re-examined in November 2020 to assess its ongoing relevance for the current era in a workshop titled, *"The Network Society Today: (Revisiting) the Information Age Trilogy"* (IN3 Editorial Team, 2021). At this event, identifying both changes and continuity with the nucleus of his theory, Castells argued that the technological, social and cultural developments and transformations of the past decade have been extraordinary, as internet-based social networks have become the platform of "literally everything" alongside the digitization of "all activities" with the expanding logic of networks affecting the social structure at multiple levels (Castells, 2020). Without doubt, Castells' Network Society remains a valuable theory for making sense of the forces shaping globalised capitalism, including its influence in the digital economy. However, in contrast to both Gorz and Marcusé, Castells' theory does not significantly engage with the question of automation and technological unemployment, which has become one of the most vexing social and political challenges of the current era.

Castells' Critique of Capitalism

Castells first developed his theory of the Network Society at a time when ICTs driven by the growth of the internet were radically transforming society, creating a new social structure as the world transitioned from hierarchical organisation and information dissemination to the development of networks producing multidirectional information exchange between individuals and groups located in dispersed nodes, with each node playing a role in the functioning of the whole network (Stalder, 2006, Webster, 2006, Ampuja and Koivisto, 2014a, Castells, 2020). This shift in the constitution and organisation of societies emerged as economies transitioned from the industrial age to the information age when capitalism redirected its focus from the production of goods and services to the production of information and knowledge leading to the emergence of informational capitalism (Webster, 2006, Stalder, 2006, Castells, 2020, Stalder, 2023),

where under the prevailing dominion of "the network logic", the 'firm (was) transformed into the network enterprise' (Boucas, 2020, p. 53).

Castells contends that the 'existence and deployment of the Network Society does not supersede capitalism' (Castells, 2020). Instead, capitalism is on a different axis in the Network Society. For Castells (2020), while the Network Society refers to the social structure, 'capitalism (refers) to the structure of the social appropriation of production and wealth'. This results in the emergence of "informational capitalism", as a concept to enable a focus on economic relations in the Network Society (Webster, 2006, Ampuja and Koivisto, 2014b, Stalder, 2023). In this regard, "informationalism" is an original concept that supplants industrialism (Stalder, 2023). It describes a mode of production that illustrates 'the action of knowledge upon knowledge itself as the main source of productivity' (Castells, 1996a, p. 17). Castells views informational capitalism as a voracious form of capitalism due to its ability to fuse 'flexibility with global reach' (Webster, 2006). Its core characteristics are that it is driven by neoliberalism, i.e., by decree of the market and scaffolded by extractivism (Stalder, 2023).

In recent years, Castells (2020) has described the global economy as one that exhibits an extreme form of informational capitalism. This extreme form, characterised by companies with incredible global reach, finds expression in the platform economy where Big Tech exemplifying network enterprises, such as Facebook, Amazon, Netflix and Google, have exploited the "network effect" to become monopolies of hitherto unimagined magnitudes within a system that promotes market dominance as socially and economically acceptable (Choudary et al., 2015, Srnicek, 2017, Petit and Teece, 2021, Stalder, 2023).

Power in the Network Society: The Global Financial Market, Elites and the State

Drawing on the Durkheimian concept of social organisation, Castells argues that networks 'constitute the new social morphology of our societies'. For Castells, networks comprise the fundamental nucleus of our time and the exchange of information within and between them is vital to the power relations shaping society. He thus contends that ICT powered

networks have become the ‘predominant organizational form of every domain of human activity’. (Castells, 2004b, p. 3, Castells, 2010, p. xliv, p. 500, Castells, 2020)

For Castells, power relationships are ‘the foundational relationships’ in all domains of society because of the critical role they play in the construction of institutions as well as in shaping the values that govern social life. Given the structure of contemporary society, for Castells, networks are the principal source of power. At the same time, power is exercised through network substructures in four different ways, *viz.*, networking power, network power, networked power and network making power. Castells’ typology of power is discussed below in relation to the global financial market, elites and the state. (Castells, 2011, p. 773, p. 775, Castells, 2016, p. 2).

The Global Financial Market. One of the most powerful networks identified by Castells is the global financial market, which he asserts ‘has the last word’ in global capitalism. The global financial market ‘exercises network power over the global economy’ through a diffused network that ‘disciplines and shapes the global economy’. Applying Castells’ typology of power, the global financial market has ‘network power’, which is the ability to impose the ‘rules of inclusion’ developed by those who program it. ‘Each network defines its own power relationships, depending on its programmed goals’. (Castells, 2011, p. 773, p. 775, p. 784)

This diffused network of power is operationalised via dominant actors within networks that have ‘network making power’ as they have the capacity to establish and ‘program specific networks according to (their own) interests and values’. This is notwithstanding the fact that they are able to use their privileged positions to connect different networks, thereby facilitating co-operation between networks. Castells draws on Latour’s ANT to emphasise the role of individuals who come together to build networks of actors that form interest-driven structural institutional networks. This application of ANT demonstrates how individuals and ICT technologies co-create networks. Network making power is thus maintained via the dual mechanisms of programming and switching by powerful individuals labelled as “programmers” and “switchers”. (Castells, 2004b, p. 32, Castells, 2011, p. 773, Castells, 2013, p. 425, Castells, 2020)

However, once a network is constituted, those with 'network making power' are subordinated to the overarching impulses of the network. In this way, the global financial market is presented as an "Automaton" and "self-organising system" that 'largely functions according to its own dynamic' (Stalder, 2006, p. 68, Castells, 2013, p. 44). Nevertheless, despite elevating the global financial market as a network with hegemonic power, Castells argues that there is no such thing as a global capitalist class as a result of the subordination of elites to the dynamics of the financial market (Castells, 2011, Castells, 2016).

Elites. Castells' rejection of a global capitalist class is based on a Weberian framing, which looks beyond the economic status of elites to emphasise their cultural bonds, thereby reducing their influence to a function of their management of the global economy (Stalder, 2006, Banet-Weiser and Castells, 2017). For example, by way of demonstrating how the network logic of network inclusion functions, Castells presents global elites as cosmopolitans, i.e., citizens of the world, who, while globally dispersed, are nonetheless 'culturally glued by attendance to similar educational institutions around the world (such as) business schools, law schools, and engineering schools' (Banet-Weiser and Castells, 2017, p. 13). Some named examples of these institutions include 'Boston's MIT, the London School of Economics, (and) the Singapore National University' (Stalder, 2006, p. 149-150). Elites are thus presented as a globally cohesive social group that connect via international network nodes (Stalder, 2006, Ampuja and Koivisto, 2014b, Castells, 2013, p. 425). Castells' views on the circumscribed power of elites have been challenged by Stalder (2006, p. 70) who argues that he draws "very strong conclusions" about the lack of a global capitalist class in the absence of sufficient empirical evidence to support the claim.

The State. Despite acknowledging the power of the global financial market and the elites that manage it, over the years, Castells has also maintained the view that the most powerful force in society is the state (Rantanen, 2005, Castells, 2020). Castells recognises that the forces of globalisation weaken the dominance of territorial nation states, but is adamant that the state's influence remains intact, ostensibly through its regulatory

function, its influential role in the co-ordination of important social institutions, and notably, its monopoly over the exercise of coercive power (Stalder, 2006, Ampuja and Koivisto, 2014b, Castells, 2016). In this regard, while power in the network society operates via exclusion, Castells draws on Weber to develop a definition of state power based on coercion (Stalder, 2006, Castells, 2016).

Castells' views on the power of the state are criticised for being paradoxical and uneven (Stalder, 2006, Ampuja and Koivisto, 2014a). His attachment to the notion of amplified state influence based on coercive power is also somewhat incongruous given that he himself uncovers a key mechanism unravelling the power of the state in the Network Society, which is that the 'power of flows takes precedence over the flows of power' (Castells, 1996a, p. 469). In this regard, Stalder (2006, p. 203) contends that Castells exhibits a blind spot regarding the 'transformation of power' in that he ignores an immanently stronger form of power, which is structural power. Structural power creates the conditions that 'induce people to behave in (certain) ways calling attention to the programming of network protocols…(which, has been) identified as the new locus of power in the network society' (Stalder, 2006, p. 139). In this regard, Stalder diverts attention from the state, highlighting the programmers of the network society - the global elite - as the most powerful social force in the network society. This interpretation also highlights the control that elites have over the global financial market, as opposed to being its mere managers.

The Disappearance of the Working Class in the Network Society

While some have described Castells' work as 'post-Marxist', he rejects the label, simply describing himself as 'not a Marxist anymore' based on his assessment that 'class is the least fruitful way' to examine social change, as well as the fact that Marxism is too narrow a philosophical approach for the kind of empirical research that he undertakes (Rantanen, 2005, Qiu and Castells, 2008, Roberts, 1999). Castells' rejection of class is associated with post-Marxist thinkers who are criticised for undervaluing the material causes of political mobilisation (Walsh, 2008).

Consequently, in contrast to the Marxian notion of dialectical materialism, class struggle between the working class and the capitalist class is not the engine of change in Castells' theory. The working class disappears in the Network Society, to be displaced by what Castells (2000) describes as a critical transformation of informational capitalism, *viz.*, 'the individualization of labour', which dissolves the social formation of the working class through the atomisation of work and casualisation of labour.

Thus, in Castells' Network Society, social divisions are not based on the class division between capitalists and labour. Instead, the individualisation of labour results in a new tension between highly skilled knowledge workers and excluded unskilled surplus workers (Stalder, 2006, Ampuja and Koivisto, 2014b, Ampuja and Koivisto, 2014a). Castells distinguishes between 'self-programmable labour' and 'generic labour', with the former referring to workers with adaptive capacities for the demands of informational capitalism and the latter, referring to those who are 'disposable, and co-existing in the same circuits with…unskilled labour from around the world' (Castells, 2000, p. 12).

This division of labour is not dissimilar to Gorz's (1989) characterisation of a "dual society". However, for Castells (2000, p. 18), it is 'the capacity to contribute to the value-producing chain that determines (a worker's) bargaining position' in informational capitalism, as opposed to their 'production-based class position'. In contrast, Gorz's neo-proletarian hackers, as noted earlier, are endowed with "inventive subjective power" that allows them to simultaneously influence and reproduce the mode of production' (Heaton and Proulx, 2015, p. 30, Kang, 2023, p. 12). Thus, while Castells' highly skilled knowledge workers embrace negotiation to strengthen their own positions within the system, Gorz's hackers take advantage of their position within the system to subvert and reconstruct it for greater good.

Castells identifies the skills deficit, which he refers to as the 'structural divide in information capacities', as a key driver of 'social polarisation and inequality' (Castells, 2000, p. 380). This highlights his emphasis on 'skills and education' for participation in informational capitalism, which is criticised for being 'unavoidably meritocratic as it presupposes that the stratification system of informational capitalism is unchallengeable

since it is deserved' (Webster, 2006, p. 115, Ampuja and Koivisto, 2014a, p. 455). In this respect, Castells views align with Schwab's (2016a) regarding the unavoidable existence of winners and losers in the 4IR.

The Levers of Change in the Network Society: Power, Counter-Power and Social Movements

Given the disappearance of class conflict in the network society, for Castells, the decisive process shaping society is instead formulated in power relations, which are built on communication and information exchange capabilities. For him, being able to effectively deploy the communication technologies of a particular era are essential to the formation of power relations and social change. Referring to the historical role of communication technologies in social change, notably the printing press, Castells argues that 'communication and information have (always) been fundamental sources of power and counter-power, of domination and social change' (Castells, 2007, p. 238). Accordingly, he identifies the pervasiveness of digital communication and information networks in the contemporary era as a "fundamental transformation of our time" (Castells, 2017b). In this regard, he presents ICTs as the Gutenberg printing press of the 21st century.

As noted earlier, Castells adopts Bruno Latour's Actor Network Theory, specifically his conception of co-creation to explain the relationship between humans and technology and their collective impact on social outcomes in networks (Castells, 2017b). To recap, ANT's central social constructivist idea is that 'people and things link together in networks and have effects on the networks to which they belong' (Feenberg, 1991). In this regard, the synchronicity between the neural network of the human brain and the network structure of digital communication systems, leads Castells to elevate ICTs as a significant medium connecting individuals and ideas to each other (Castells, 2011). Thus, according to Castells, 'In the network society, power and counterpower aim fundamentally at influencing the neural networks in the human mind by using mass communication networks and mass self-communication networks' (2011, p. 773). Castells thus focuses strongly on the individual, and in this regard his network society has been criticised

firstly, for being ‘very actor oriented’ and secondly, for its ‘over-use of neuroscience to talk about social and cultural processes’ (Stalder, 2006, p. 196, Sayers, 2014, p. 143).

Be that as it may, emphasising the fact that the ‘information retrieval system never ends and is in a constant dialectical relationship’, Castells (2011) highlights the potential for change to occur when people who reject the social order, start sharing information with likeminded people to ‘radically reprogram’ the network and influence or change the communication system in terms of their own interests in opposition to the dominant network structure. Here the emphasis is on the relationship between structure and agency, where structure alludes to the emergence of alternative organisational arrangements in the form of new networks; and where agency represents the practices adopted by people to create meaning and hold on to their social identities in a context of cultural attenuation as a consequence of increased globalisation (Sayers, 2014).

Castells deploys this dialectical approach to explain the emergence of social movements as a form of resistance and counter-power in the network society, drawing both on symbolic interactionism and social constructivism to clarify how meaning is constructed in the Network Society. In this regard, he argues that ‘(our) societies are increasingly structured around a bipolar opposition between the Net and the Self’ (Castells, 1996a, p. 3). Thus, for Castells, wherever power exists, there is always resistance to that power, a phenomenon he refers to as “counter power”, which for him also represents an important potential for social change (Castells, 2011, Castells, 2017b).

Castells argues that ‘(the) emergence of mass self-communication offers an extraordinary medium for social movements and rebellious individuals to build their autonomy and confront the institutions of society in their own terms and around their own projects’ (Castells, 2007, pg. 249). In this way, the working class as an organised political force is replaced in the network society by identity-based social movements such as feminists, environmentalists, LGBTQI communities and so on, which originate as a form of counterpower. However, it is important to point out that identity is a key driver in the establishment of these social movements, propelled by people on a quest for recognition and meaning, rather than any significant opposition to capitalism.

In this respect, Castells' Network Society theory is said to represent 'a neo-liberally restructured version of (the) information society that is associated with the rise of flexibility, individuality and a new culture of innovation' (Ampuja and Koivisto, 2014a, p. 447). Thus, entrepreneurs gifted with skills and adaptive qualities and driven by innovation are given a promethean quality. Ampuja and Koivisto argue that this stance is evident in a speech delivered by Castells to Finnish political elites about how to improve the productive capacity of the welfare state, during which he emphasized the need to '"connect policies of innovation and entrepreneurship" with venture capital investors for European Union countries to overcome their on-going economic crises' (2014a, p. 459). In this regard, despite Castells' (2011) critique of the power of the financial market, his views appear to correspond with the WEF's perspective on the creative application of market-based solutions in the digital economy. In contrast, Gorz (2010a) observed that networks and computerisation are not only causing a crisis of capitalism, but also creating the possibility for an exit to an alternative post-capitalist paradigm (Mason, 2016).

Conclusion

In positioning itself ontologically and epistemologically in relation to technological development and social change, this study's theoretical framework adopts Feenberg's Critical Theory of Technology, as its first pillar to expose the flawed rationale of technological determinism in the 4IR. CTT elevates Marcusé's theory of technological rationality as a valuable tool to analyse the ideological foundations of new technologies from a teleological perspective, which this study deploys in its analysis of innovations emerging from the digital economy. The value of Marcusé's theory is that it attacks 'capitalism not at its weak points…but at its strongest points: the rationality of its markets and management techniques' (Feenberg, 2016, p. 9).

There are important overlaps between Marcusé's Marxist phenomenology and Gorz's existential Marxism as dialectical theories that provide a framework for reimagining technological innovation for the realisation of shared prosperity in a post-work society towards the meaningful realisation of human potential. In this regard, as a post-work

society theorist, Gorz's proposals for an emancipatory post-capitalist alternative includes the reinvention of social policies based on radical ideation for reforms that deconstruct the dominant capitalist structure. Accordingly, Gorz's theory of change comprises the second theoretical pillar in this study.

The third pillar in this theoretical framework is Manuel Castells' theory of the Network Society, which deconstructs the power of socio-technical networks in the digital economy as a heuristic model for understanding who is behind the innovations of the current era, including how power is mediated in the digital economy. Castells' theory provides a macro-sociological framework for understanding the emergence of the digital economy as an automaton constructed by the meeting of wealth and technology.

Finally, whether referencing Marcusé's theory of technological rationality, Gorz's dual society or Castells' concept of inclusion and exclusion in the network society, all these theories raise a common concern about inequality, which is an entrenched problem within the current model of technological development and a cross-cutting theme in this study.

CHAPTER FOUR: A METHODOLOGY FOR INVESTIGATING THE DIGITAL ECONOMY

Due to the importance attached to the World Economic Forum's (WEFs) Fourth Industrial Revolution (4IR) in South African policymaking, the primary research question explored by this study is: Will the 4IR, as a metaphor for the digital economy, make a difference to how post-apartheid South Africa responds to its crisis of social and economic inequality?

As has been revealed by the literature review, apprehension about the impact of the 4IR in South Africa is hardly a unique concern and scholarly critiques that apply Marxian and social constructivist epistemologies to analyse the Schwabian construct, do indeed present important arguments against the continuation of neoliberalism and market fundamentalism, which is likely to endure as a result of the dominance of the WEF's theory of change (Ngwane and Tshoaedi, 2021, Cooper, 2021, Moll, 2021b, Maharaj, 2021, Mapadimeng, 2021). However, this analysis is circumscribed by its parameters as a conceptual debate, which does not present evidence to reveal the actual manifestation of the 4IR. This PhD study addresses this knowledge gap by embarking on an empirical study of the digital economy from an ontological perspective in an effort to reveal the true nature of the 4IR in South Africa. In this regard, this study undertakes a multifaceted examination of three separate sectors, which combine to provide a comprehensive view of the digital economy from diverse but intersecting angles. This includes three data chapters as follows:

First Data Chapter: Start-up Sector. The aim of this chapter is an examination of the start-up sector in South Africa in order to identify the technologies of the 4IR, the forces behind them and their implications for social change. As entrepreneurial companies whose primary business activity it is to bring software products and services to the market, the start-up sector is the wellspring of digital technologies adopted by the mainstream economy as well as those that are foundational to the formation of the platform economy (Funders Club, n.d., Maha and Morris, 2018a). Consequently, this study's point of departure is an ontological examination of the start-up sector in South Africa, as it is the engine of digital innovation. The question that this study seeks to

answer is: What kind of digital technologies are being developed, who are the drivers behind them, what are their motives and how does this affect inequality in South Africa? This study of the start-up sector makes an original contribution to the literature on the digital economy in South Africa. Originality is claimed by the fact that a similar evidence-based study has not yet been conducted.

Second Data Chapter: The Banking Industry. The aim of this chapter is to examine the effect of digitalisation in the banking sector as a microcosm of the impact of automation on white-collar jobs in the mainstream economy, including what this means for the expansion of the Black middle class in South Africa. The dismantling of the middle class is a frequent concern raised in 4IR and digital economy discourse due to advances in artificial intelligence (AI) that have swept through the mainstream economy resulting in the cannibalisation of jobs once considered safe from technological unemployment (Frey and Osborne, 2013, Brynjolfsson and McAfee, 2014, Ford, 2015, Brynjolfsson and Mitchell, 2017, Schwab, 2017, Benanav, 2020). This study explores this concern from a South African perspective, as the erosion of the middle class has serious implications for the social mobility of Black South Africans, which is an important aspect of overcoming enduring racial and economic inequalities. In this regard, this chapter examines one of the fastest digitalising sectors in the mainstream economy, i.e., the banking sector, which is a major employer of the emerging Black middle class. The banking sector is a microcosm of the white-collar economy and the issues examined within it call attention to the intersection of automation, unemployment and inequality in South Africa, which are cross-cutting themes in this thesis. From this vantage point, the question that this study explores is: What is the impact of automation on white-collar jobs in the mainstream economy and what does this portend for the expansion of the Black middle class in South Africa?

Third Data Chapter: Platform Economy. Large-scale job creation in the digital economy currently takes place in the platform economy, which has its origins in the sharing economy (Rifkin, 2014, Srnicek, 2017, Schor, 2020). However, studies have exposed the emergence of tech monopolies and the rise of a precariat in the platform economy as the ex-post manifestation of the sharing economy (Kenney and Zysman, 2016, Langley and

Leyshon, 2017, Standing, 2018, Schor et al., 2020, Vrasti, 2021). Despite platform capitalism's cannibalisation of the sharing economy, the literature on post-capitalism highlights enduring post-capitalist tendencies as a source of post-work imaginaries to challenge neoliberal digital innovation (Mason, 2016, Schor, 2020, Cohen, 2017b). Consequently, the third data chapter has two objectives. Firstly, it seeks to examine how it came to be that the sharing economy was stifled by the platform economy as well as what this means for the kinds of jobs that are available in this sector. Secondly, in an effort to identify potential levers of change from a dialectical perspective on contestation, this study seeks to explore whether post-capitalist tendencies exist within the South African platform economy. Consequently, this aspect of the study is informed by the question: What are the characteristics of the platform economy as the ex-post manifestation of the sharing economy and what, if any, post-capitalist tendencies exist in South Africa's digital economy?

Themes and Theories: Implications for Methodology and Research Focus

The three cross-cutting themes that inform both inquiry and analysis in this study are as follows:

- The Schwabian notion of "winners and losers" (2017) in the 4IR, highlights inequality as a foundational cross-cutting theme in this study. Moreover, given South Africa's history of apartheid and its enduring impact on social and economic inequality, this study pays special attention to the issue of racial inequality. In this regard, racial inequality is adopted as a lens and indicator of change in post-apartheid South Africa. A focus on this theme also responds to concerns within the literature, which highlight the significance of examining the intersection of platform capitalism with racial capitalism (Noble and Roberts, 2019, Hamilton, 2020, McMillan Cottom, 2020).
- Secondly, drawing on the vast literature highlighting it as a major crisis of our era (Brynjolfsson and McAfee, 2014, Ford, 2015, Srnicek and Williams, 2015, Mason, 2016, Bassett and Roberts, 2019, Granter, 2020, Acemoglu, 2021), the tension between automation and unemployment is the second cross-cutting theme in this study. In this regard, the first and second cross-cutting themes feed into the broad

outline framing this study of the digital economy in South Africa, which is the intersection of automation, unemployment and inequality.

- Thirdly, given the critique of neoliberalism as the driver of market fundamentalism and extractivism in the digital economy (Stalder, 2023) alongside the strident critique of the 4IR as a neoliberal construct (Sutherland, 2020, Cooper, 2021, Moll, 2021a, Ngwane and Tshoaedi, 2021), the relationship between capitalism, power and vested interests in technological innovation is the third cross-cutting theme in this study.

Marxist Phenomenological and Social Constructivist Exploration of Capitalism, Power and Vested Interests

Creswell (2013) argues that the merger of empiricism and philosophy enhances the quality of data. At the same time, Creswell and Poth (2016) argue that an approach grounded in hermeneutic phenomenology enables the researcher to make interpretations. In this respect, this study draws on Feenberg's Critical Theory of Technology (CTT), which merges the empiricist methodology of Science and Technology Studies (STS) with Herbert Marcusé's theory of technological rationality to delve into the inherent nature of technological artefacts from a teleological perspective. Marcusé's theory of technological rationality identifies "technical efficiency" as the ideological force shaping the economy and society within an inexorable logic of capitalist rationality (Feenberg, 1991, Dusek, 2006). It is a philosophy of praxis, which CTT defines as Marxian phenomenology, i.e., a synthesises of Heideggerian hermeneutic phenomenology and Lukacsian dialectics, which enables a focus on 'fundamental philosophical questions about science and technology from a critical, dialectical standpoint' (Dreyfus, 1990, Feenberg, 2013, Feenberg, 2016, p. 7). In this regard, drawing on Marcusé, CTT's Marxist phenomenology brings into view questions about the 'connection between…technology and capitalism as a system of domination' (Feenberg, 2013, p. 604), which are an essential aspect of this study's inquiry.

Turning to the issue of empiricism, STS incorporates the social constructivist methods of Actor Network Theory (ANT) to examine influences in the design of new technologies. These methods expose the prevalence of ideological, cultural and socio-political biases in

the design of new technologies (Olsen and Engen, 2007, Feenberg, 2010, Scharff and Dusek, 2013, Feenberg, 2017b). ANT specifically provides a basis for understanding the politics of technology by enabling an understanding of how 'people and things link together in networks and have effects on the networks to which they belong' (Feenberg, 1991, p. 6, Hughes, 2001). Consequently, ANT enables a focus on power, which Castells' Network Society theory draws on to expose the relationships between powerful individuals and social networks that are mediated by technology (Castells, 2017b). Thus, highlighting a methodological overlap between CTT and Castells. Accordingly, this study applies the social constructivist methods of ANT from a multidisciplinary perspective; firstly, to identify the dominant forces influencing the design of technological artefacts and secondly, to explore power relations in the digital economy. In this regard, the study focuses on particular actors within digital networks, such as investors and entrepreneurs, especially the dynamic in the relationship between the two as the driver of technological innovation.

CTT's Marxist phenomenological critique of technology and Castell's critique of informational capitalism synchronously highlight a thematic thread, which is the relationship between capitalism, power and vested interests. Thus, enabling a focus on questions about dominant institutions, actors, economic models and ideologies that influence technological development in South Africa's digital economy.

Technological Rationality as a Driver of Racial Inequality

Any study of South Africa would be remiss to ignore the legacy of apartheid within its framework of analysis in relation to winners and losers, thus emphasising the importance of questions that interrogate racial inequality. As noted earlier in this thesis, contemporary scholars such as McMillan Cottom (2020), Hamilton (2020) and Noble and Roberts (2019) highlight the need for critical race theory (CRT) in digital studies as well as the need to examine the intersection of platform capitalism and racial capitalism. 'CRT focuses theoretical attention on race and how racism is deeply embedded within the framework of…society' (Creswell and Poth, 2016, p. 28). In this regard, this study applies Marcuséan critical thinking and his theory of technological rationality as articulated by

Calderón who makes the link between Marcusé's one-dimensional society, the Great Refusal and CRT, in her argument that the 'ideology of whiteness represents a key part of the normative order of advanced…society that must be "Refused"' (2006, p. 73). For Calderón, Marcuséan negative thinking is a representation of CRT that 'exposes the entrenched ideology of whiteness' (2006, p. 73). In this regard, this study applies Marcusé's theory of technological rationality as an expression of the one-dimensionality of capitalist reproduction, which, drawing on Bonilla-Silva (2001), Calderón (2006) describes as a "flat epistemology of whiteness" that skews material outcomes towards the dominant race group in racialised societies. This enables a focus on questions that probe institutionalised and structural racial inequality in South Africa's digital economy. Moreover, noting that Marcusé identified a broad category of people that experienced discrimination, including women, this study incorporates gender as a secondary focus in its examination of inequality in the digital economy.

Finally, adding impetus to the relationship between critical theory and racial inequality from a methodological perspective, Creswell and Poth argue, 'Critical theory perspectives are concerned with empowering human beings to transcend the constraints placed on them by race, class, and gender' (2016, p. 27). This enables researchers to explore themes such as institutions and their transformation in relation to historical social struggles.

Dialecticism, Liberatory Social Theory and Post-capitalist Alternatives

The increase in automation and technological unemployment is a major social and political crisis of our time. In this regard, the liberatory social theories and post-work ideas of André Gorz and Marcusé explore post-capitalist solutions as an alternative response to this unjust outcome.

Marcusé's Marxist phenomenology and Gorz's Sartrean existentialism are expressions of dialectical reasoning aimed at exposing and overcoming the contradictions of capitalism through revolutionary action (Farr, 2021). Marcusé's proposal for a post-work society is based on the redesign of technologies 'to reflect the potentialities of both human beings and nature' (Feenberg, 2016, p. 7). This redesign is grounded in a new pre-ontological

sensibility, which emerges from revolutionary action that challenges capitalist exploitation (Feenberg, 2016). Marcuséan “dialectical rationality”, which de-reifies the capitalist model (Feenberg, 2016), has been associated with a demand for full automation and a new social contract for society (Srnicek and Williams, 2015).

Meanwhile, Gorz’s dialectical response to the decomposition of the work-based society is exemplified by radical ideation for reforms that reprogram the capitalist system deep within its DNA, thereby leading to transformation by fragmentation, which symbolises an “exit from capitalism” and the emergence of a post-capitalist society. Gorz’s pathway to post-capitalism is via anti-capitalist reforms, which he referred to as “non-reformist reforms”. They include unconventional policy interventions such as a shorter work week and a universal basic income, as practical examples based on radical ideation that have the potential to induce far-reaching changes. (Gorz, 2010a, Gorz, 1989, Gorz, 1968)

Drawing on the dialectical reasoning of Marcusé and Gorz, this study explores post-capitalist impulses in South Africa’s digital economy, as an expression of contestation in response to the exploitation begotten by neoliberal capitalism, which highlights a pathway towards an alternative future with better social and economic outcomes.

Methodological Framework

As this study seeks to make discoveries about the nature of change in South Africa’s digital economy, it can be described as an exploratory study. Exploratory studies are associated with a flexible research design (Al-Ababneh, 2020). Accordingly, the methodology adopted for this study can be described as qualitative with one divergence, which is that its point of departure is a survey, which introduces a quantitative aspect to the methodology, resulting in the application of a mixed methods approach to the study.

Mixed Methods Study

A mixed methods study combines both qualitative and quantitative research methods (Creswell, 2013, Al-Ababneh, 2020). While the model has been criticised for its "whatever works" approach, it has gained purchase over the past three decades, and is described as a methodology that combines both "statistics and stories" to provide a deeper understanding of the research problem (Bryman, 2006, Creswell, 2013). According to one of the foremost advocates of the mixed methods approach, John Creswell (2013), the rationale behind combining quantitative and qualitative approaches is that neither methodology on its own is able to provide the depth of understanding that a combination of the two is able to achieve.

The mixed method approach adds value to studies that probe unexplored or unfamiliar phenomenon, as it requires gathering information from multiple sources to obtain a full or fuller picture. In this regard, South Africa's tech start-up sector is largely unexplored, thus requiring a multidimensional approach to develop a deeper understanding of its general ecosystem. The mixed method design chosen for this study is a two-phase model referred to as an "explanatory sequential design" (Creswell, 2013). It comprises of quantitative data collection and analysis followed by qualitative data gathering to triangulate as well as add depth to the data (Creswell, 2013). In this regard, the explanatory sequential design is specifically applied to the first data chapter, which examines the tech start-up sector in South Africa. It involves conducting a survey followed by expert interviews and participant observation.

The second and third data chapters, which cover the banking sector and the platform economy respectively, rely solely on qualitative research methods comprised of in-depth interviews as well as content and discourse analysis. In this regard, the studies of the banking sector and the platform economy do not strictly form part of the explanatory sequential design, as each of these are qualitative studies in and of themselves. However, the interface between the start-up sector as the source of technological innovations does establish a connection between it and other sectors of the economy. Thus, while this PhD study, in the main, relies on qualitative data collection, the entire study is categorised as a

mixed methods study due to the relevance of the tech start-up survey as a launchpad that provides foundational insights throughout the study.

Making a Significant Contribution to Scientific Knowledge

For Creswell (2013), scientific rigour in mixed methods research is achieved by framing both qualitative and quantitative data within larger philosophical questions. In this respect, he highlights the significance of philosophy as a validator of scientific rigour in mixed methods research (Creswell, 2013). Creswell and Poth describe this quest for scientific rigour as "a search for wisdom" rather than an emphasis on "scientism", whilst arguing that 'phenomenology has a strong philosophical component to it' (2016, p. 58). This perspective can be linked to Feenberg's argument that the origins of Western philosophy can be traced back to the ancient Greeks who 'interpreted the essence of being through the concept of technical making' (2009, p. 161). Thus, by drawing on the Marxist phenomenology of Feenberg's CTT, this study's methodological framework approaches technological development from a philosophical perspective by focusing on questions related to the essence of technology including people's experience of it, as an approach to enrich the scientific rigour of its inquiry.

In addition to the emphasis on philosophy as a verifier of scientific rigour in mixed methods research, Aspers and Corte (2019) emphasise the importance of rational argument as well as the application of theory in "qualitative research" as a way to underwrite the generation of scientific knowledge, as well as to enhance the significance of new findings. In this regard, this study's claim of significance draws heavily on a definition of qualitative research developed by Aspers and Corte (2019) who specifically reviewed the literature within sociology, including major sociological journals, to arrive at a better understanding of what makes a study "qualitative". In other words, these scholars examined the concept of the "quality" of a study concerning its contribution to scientific knowledge. In this regard, they argue that qualitative research 'is an iterative process in which improved understanding to the scientific community is achieved by making *new significant distinctions* resulting from getting closer to the phenomenon studied' (Aspers and Corte, 2019, p. 139, emphasis added).

Note their emphasis on *distinctions*. Aspers and Corte equate distinctions to findings, whilst arguing that making new distinctions is 'a key part of obtaining new knowledge'. However, they differentiate between new distinctions and *significant* new distinctions in their assessment of what qualifies a study as a significant contribution to scientific knowledge. While they acknowledge that making new distinctions to the scholarly community is vital for the generation of new knowledge. For them, novel distinctions merely add complexity to the knowledge base. To attribute significance to new findings, Aspers and Corte, scrutinise the methodological features of qualitative research, which they argue enhances data in several ways. In this regard, they provide conceptual as well as concrete examples. (Aspers and Corte, 2019, pp. 150-151)

Conceptually, significant new distinctions are 'judged against the communal knowledge of the research community', which requires elevating the 'central elements of rational discussion' (i.e., clarity, consistency, relevance, evidence) in order 'to identify what is new and relevant scientific knowledge'. Relatedly, Aspers and Corte highlight the importance of coding and theory to enhance the significance of new data. Coding opens up 'avenues of inquiry' as the researcher identifies themes, and 'develops concepts and analytic insights through close examination of and reflection on data'. Theory enables 'new conceptual distinctions', as researchers 'adapt existing theories' or 'make new theoretical arguments to accommodate new data', which also enhances the significance of findings. (Aspers and Corte, 2019, p. 151)

Turning to the concrete aspects of qualitative research and how these contributes to the significance of new distinctions, the scholars argue that researchers are able to get closer to the phenomenon under investigation through text (e.g., content and discourse analysis), people (e.g., interviews, focus groups, participant observation), and pictures (e.g., still and moving), which by adding context and meaning enhances data and elevates the significance of studies (Aspers and Corte, 2019, examples added).

In sum, this PhD study strives to enhance the scientific rigour of its findings through the adoption of a philosophical perspective which encourages a focus on deeper questions; as

well as by drawing on a discerning theoretical framework to develop new conceptual distinctions that enhance the significance of its findings. Finally, this study makes an attempt to provide depth of understanding to findings by providing context, which is achieved by deploying a range of research methods that enable the researcher to get closer to the subject matter, such as expert and industry interviews, participant observation, as well as discourse and content analysis. For the latter research method, i.e., discourse and content analysis, it draws on a variety of web resources such as media articles, industry reports and databases, as well as audio-visual material such as online interviews and panel discussions, academic conference presentations and lectures. Overall, this study makes a concerted effort to discuss rationale, integrate data as well as highlight philosophical tensions, which Ortiz and Greene (2007) argue is important to substantiate mixed methods research.

Research Methods

As noted, by the discussion of the mixed methods model, the research methods deployed by this study include systematic data gathering modelled on a survey, expert interviews, in-depth interviews, participant observation and discourse analysis. The application of these research methods in this study is discussed below. The initial area of inquiry, i.e., the first data chapter is made up of a large data set comprising 120 tech start-ups. Large sample sizes are typically associated with quantitative research methods (Al-Ababneh, 2020). Thus, the decision to apply the mixed methods research model was informed by the scale of the tech start-up sector, which called for the use of a quantitative research method, i.e., a survey. The survey of start-ups was complemented by qualitative research methods, i.e., expert interviews and participant observation, to provide deeper analysis as well as triangulate the survey data (Jones et al., 2013, Creswell, 2013). Moreover, the second and third data chapters, examining the banking sector and the platform economy respectively, relied exclusively on qualitative data gathering methods including in-depth interviews and content analysis.

The Survey as a Metaphor for Systematic Secondary Data Collection

The concept of survey is used metaphorically in this study. In this regard, data on 120 tech companies was systematically gathered to develop a profile of the start-up ecosystem in South Africa. Strictly speaking, surveys gather data from primary sources. However, this study of tech start-ups gathered evidence from secondary sources for two reasons. Firstly, due to the size of the sample, i.e., 120 start-ups, face-to-face and/or telephonic interviews surveys would have been difficult to conduct. This would have been an expensive and time-consuming endeavour well beyond the scope of a PhD study. Secondly, questionnaires were not emailed to representatives of start-ups due to the declining rate of responses to email surveys that scholars have observed over many years (Sheehan, 2001, Stedman et al., 2019, Daikeler et al., 2020). As a result, data on the start-ups was gathered from secondary sources, i.e., through online research, which nonetheless comprised of information collection and categorisation based on the principles and application of the survey methodology.

This called for systematic data gathering informed by a structured questionnaire. In this regard, the data required was basic, such as the business activities of the start-ups as well as the names of their founders and investors[6]. This information is publicly available on the internet, and in this regard, there is a fair amount of information about South African start-ups available in online news reports from industry publications such as Venture Burn, Business Tech, Engineering News and Talk IoT, which monitor investments in the sector. In addition to examining news reports and start-up websites, the demographic profiles of start-up founders and funders in the sample, i.e., race and gender, was developed by gathering data from platforms such as LinkedIn (for founder profiles) and Crunchbase (for investor profiles). As a result, an Excel spreadsheet was developed, which contains data on 120 start-ups including their core activities, founders and funders. This aggregation of data enabled the identification of sectoral themes, i.e., it revealed the dominant technologies developed by the start-up sector and the people behind them. Thus, enabling a sectoral analysis of the start-up ecosystem in South Africa, which includes a

[6] The names of start-up founders and investors are not published in this thesis and its appendices for ethical reasons.

demographic profile of founders and funders. Refer to the discussion at the end of this chapter for more information about the kinds of start-ups that were included in the survey as well as the rationale informing sample size.

Survey questions were informed by ANT's social constructivist methodology, as articulated by Feenberg's CTT and Castell's Network Society theory. From this vantage point, the survey examined the concept of co-creation regarding the emergence and development of technological innovations. It did so by gathering information that highlights the relationship between individuals, social networks and the financial market. As a result, the survey focused on the kinds of digital technologies emerging within the start-up ecosystem in relation to the actors that drive their development, such as investors and entrepreneurs. In particular, Castells' theory of the Network Society was applied to reflect on how power relations are constructed and maintained in the digital economy. Power relations in South Africa are overlain by concerns about racial inequality and in this regard, the survey questions were also informed by Marcuséan critical thinking to enable a focus on institutionalised and structural racial inequality. Thus, questions were included to probe the racial profile of actors in digital networks. However, Marcuséan critical thinking has a broad focus on groups that are discriminated against, including women. This enabled a focus on gender dynamics in the start-up ecosystem. Thus, the survey included questions that enabled a demographic analysis of the start-up sector, which includes race and gender. In this regard, the following questions were included in the survey:

- What kind of business activity is this tech start-up involved in?
- What economic sector is this start-up working in?
- Who is/are the founder/s of the start-up?
- What is the South African racial classification of the founder/s?
- What is the gender of the founder/s?
- What is the country of origin of the founder/s?
- Is the start-up supported by venture capital funds or angel investors?
- What is the gender and racial profile of investors?

Participant Observation

It proved difficult to secure interviews with entrepreneurs from the tech start-up sector. Consequently, a decision was taken to participate in events that would allow me to get closer to people that work in the industry. In this regard, I participated in two start-up events as an observer. The purpose of participating in these events was to get a first-hand account of challenges and opportunities that start-ups face, as well as their motives.

The first event was a fireside chat between tech entrepreneurs and the owner of a start-up incubator hosted by *Startup Grind* on the 7th of August 2019. This was a large event attended by hundreds of hopeful entrepreneurs who participated to find out more about the criteria for inclusion in start-up incubators. Given the large scale of the event, I was not able to introduce myself or reveal my motives for attending, which resulted in my participation as an anonymous and silent observer.

The second event was a workshop hosted as a learning exchange between investors and start-up entrepreneurs to discuss what investors look for in potential investment opportunities. This event, which took place on the 3rd of December 2019, was also hosted by *Startup Grind*. It was a small workshop attended by approximately 30 participants. In this regard, I was able to introduce myself and the purpose of my participation as a PhD researcher who was participating to gather data, to which no objections were raised.

In-depth Interviews

In-depth interviews are said to be an important data gathering method for phenomenological studies as they enable the researcher to draw on the meaning of the phenomenon for the respondents (Creswell and Poth, 2016). In this regard, it is common for a small number of interviews to be held with people who have experienced the phenomenon (Creswell and Poth, 2016). This approach was specifically adopted by this study to examine the banking industry and the platform economy where a small number

of people, i.e., 11 respondents were interviewed due to their first-hand experience of working in the respective sectors. According to Creswell and Poth (2016), when the number of people being interviewed is small, this may result in multiple interactions with respondents to further enhance the data. In this regard, some respondents in the platform economy were open to ongoing engagement and were interviewed more than once.

A sub-category of the in-depth interview is the expert interview. Experts are known to 'have high insight in aggregated and/or specific knowledge', resulting in the adoption of the expert interview as an "explanatory tool" (Van Audenhove, 2007, p. 5, Bogner et al., 2009). Accordingly, expert interviews are associated with exploratory studies (Van Audenhove, 2007, Bogner et al., 2009, Döringer, 2021) because they 'serve to establish an initial orientation in a field that is either substantively new or poorly defined' (Bogner et al., 2009, p. 46). This highlights the applicability of this research method for the study of the start-up sector in South Africa, which as a relatively new sector that has only really started establishing itself in the last decade. Accordingly, this study conducted four expert interviews to triangulate and enrich the data gathered by the survey of tech start-ups.

In total, this study conducted 15 interviews. Interviewees commenting on the tech start-up sector were policy experts who were specifically asked to respond to the findings of the survey. In contrast, the in-depth interviews in the banking industry were semi-structured in orientation. In this regard, the discussion was guided by a set of similar open-ended questions to facilitate comparisons in the analysis phase of the study. However, after a certain point in the interviews, conversations were allowed to flow in the direction that respondents chose in order to draw on their broader knowledge, experience and reflections. With respect to the platform economy, these interviews were unstructured, relying on the evidence provided by respondents who worked in or on behalf of workers this sector. Appendix C contains the interview guides.

Content Analysis

This study engages in content analysis to augment the data gathered by the survey and in-depth interviews. This is done in order to enhance the data by getting closer to the

phenomenon being investigated in an effort to gain additional insights that support meaningful conclusions (Aspers and Corte, 2019). Content was gathered and analysed in line with the themes identified in the theoretical framework. Thus, alluding to the use of a "deductive approach" towards content analysis (Mayring, 2014). This study made use of a number of online resources to identify content. In this regard, information was gathered from websites, including academic, corporate and media sites. Beyond text, this study also made use of audio-visual content such as podcast discussions as well as YouTube videos of academic lectures, expert interviews and panel discussions.

Sampling Methods

This section on sampling methods describes the criteria that were used with respect to sampling choices for the survey and in-depth interviews. It is organised according to the respective studies that were undertaken, i.e., of the start-up sector, banking industry and platform economy. Overall, this study adopted a non-probability sampling method, which involves choosing a sample based on specific criteria, and is a common approach in exploratory and qualitative studies aimed at developing an initial understanding of an under-researched area (McCombes, 2023).

Tech Start-up Sector. Since this study is concerned about the nature of technological developments in the economy as a whole, and given the influence of the 4IR in South Africa's policy frameworks, the following three criteria were applied to identify start-ups to include in its sample: 1) tech companies that intersect with the mainstream economy (indicating the digitalisation of the mainstream economy); 2) tech companies that form the basis of the platform economy (highlighting the emergence and expansion of a distinct type of digital economy); and 3) the temporal manifestation of start-ups in relation to the emergence of the 4IR. Start-ups were included in the sample if they satisfied the above criteria and there were a large number that did. In this regard, despite the fact that non-probability sampling is normally used for smaller samples (McCombes, 2023), the large number of tech companies that satisfied the criteria, i.e., 120 start-ups, enabled the identification of patterns in the data. In this regard, surveys with large sample sizes are credited with having "statistical power" (Jones et al., 2013).

In addition to the above criteria, the concept of temporality was applied as 'a foundational concept for causal analysis' (Maggetti et al., 2013, p. 93) in relation to start-ups that were established during or around the genesis of the 4IR. Accordingly, this study specifically examines start-ups emerging both prior to and around the mid twenty teens, which is a period that coincides with a proliferation of disruptive technologies, including a rise in the application of AI and machine learning technologies. Collectively, the technologies that emerged during this period delineate an escalation in software innovation in addition to signposting the emergence of the 4IR as a concept that has dominated technological development and policy discourse. Consequently, the start-ups included in this study span those established in two overlapping 5-year periods. They include 70 start-ups founded between 2013 – 2017 in Cape Town and 50 start-ups founded between 2014 – 2018 in Johannesburg, resulting in a combined total of 120 tech start-ups established in the six years prior to and including 2018. The complete list of 120 start-ups can be viewed in Appendix A.

The sampling frame refers to the list that the sample is drawn from (McCombes, 2023). In this regard, there are two studies that examined networking support within the start-up sector, which provide a list of 289 tech start-ups established between 1999 – 2018 in CT and JHB (Maha and Morris, 2018a, p. 13, Maha and Morris, 2018b, p. 15). This PhD study consulted these two studies to identify start-ups to include in its sample. However, it is important to emphasise the fact that these earlier studies do not form of this PhD research as they were merely consulted as a sampling frame to identify technology start-ups in South Africa. In this regard, this PhD study gathers new and original data on the 120 start-ups included in its sample. Finally, in 2018, it was estimated that there were up to a thousand tech start-ups operating in CT and JHB (Maha and Morris, 2018a, Maha and Morris, 2018b), which represent South Africa's main economic hubs. In this regard, it is not implausible for a sample from these two cities to represent a broad perspective on the nature of the start-up sector in the country as a whole.

Staying with the tech start-up sector, the data generated by the survey was triangulated with information gathered from four expert interviews. In this regard, interviewees were

specifically targeted on the basis of their knowledge of issues related to the digital economy. Respondents were high-level experts and included two commissioners from the Presidential Commission on the Fourth Industrial Revolution (PC4IR), the Vice Chair of the International Labour Organisation (ILO) and ex-officio member of its Global Future of Work Commission, as well as the author of a book on digital entrepreneurship in Africa who has also assisted the World Bank to assess digital entrepreneurship ecosystems in South Africa. Appendix B contains the names and affiliations of all the experts that were interviewed by this study as well as the dates of the interviews.

The Banking Sector. The banking industry in South Africa is extremely concentrated with just six major banks, including the so-called "big four" that make a major contribution to the economy (Khumalo, 2018, Brown, 2019, BASA, 2021). In this regard, interviews were conducted with a representative from each of the big four banks. In terms of the criteria used to identify respondents, this study draws on a social constructivist methodology to examine influences in the design of new technologies. Accordingly, banking industry insiders were chosen on the basis of the role that they play in the development of new technologies or in relation to their decision-making authority regarding the digitalisation plans of banks. In this regard, respondents included senior executives from ABSA Bank and Standard Bank. Whilst two anonymous interviews were conducted with a male and a female manager working in the technology divisions of First National Bank (FNB) and Nedbank. In addition to the respondents working in retail banks, interviews were also held with two representatives from the Banking Association of South Africa (BASA) and veteran of the labour movement in South Africa. Interviews in the banking sector relied on the snowball technique, and in this regard, the BASA representatives were extremely helpful. Appendix B contains the names and affiliations of all the banking sector respondents that were interviewed by this study as well as the dates of the interviews.

The platform economy. This study develops a profile of the platform economy via a discussion of Future of Work literature, which highlights the harms engendered by this sector, including the dismantling of workers' rights. The Future of Work literature is complemented by four in-depth interviews, which offer a unique perspective on responses

to unfair and exploitative working conditions in the platform economy. In this regard, this chapter examines two examples of legal contestation in response to the "regulatory entrepreneurship" (Pollman and Barry, 2017) of platform companies. In this regard, this chapter highlights two cases of unfair dismissal brought against platform companies by workers. The first case highlights the litigation route as an example of dialectical materialism, i.e., legal contestation, which opposes the regulatory entrepreneurship of platform companies, whilst supporting the preservation of workers' rights. The second legal case, whilst starting from a similar premise, i.e., the preservation of workers' rights, is an example of Lukácsian dialectics as articulated by Critical Theory of Technology (Feenberg, 2016). This case highlights the emergence of post-capitalist tendencies within labour struggles as affected workers attempt to launch a post-capitalist enterprise, i.e., a platform co-operative in response to unfair working conditions.

The breakdown of interview respondents for the inquiry into the platform economy is as follows: Two of the respondents are lawyers and academic researchers who brought legal cases against Big Tech on behalf of platform workers. A third respondent is an academic researcher and social entrepreneur who is a founding member of a platform co-operative. The fourth respondent is a former Uber driver and the founding member of a platform co-operative whose experience of trying to establish a post-capitalist enterprise is highlighted as an example of Lukácsian dialectics in the digital economy. The fact that three of the four respondents are academic researchers, also highlights their engagement in the platform economy as praxis-oriented researchers. Overall, this small sample is emblematic of the niche status of post-capitalist models in the platform economy. Appendix B contains the names and affiliations of all the platform economy respondents that were interviewed by this study.

CHAPTER FIVE: START-UPS AS THE BEDROCK OF THE DIGITAL ECONOMY

In 2018, it was estimated that there were up to a thousand start-ups operating in South Africa's technology hubs, Cape Town (CT) and Johannesburg (JHB) (Maha and Morris, 2018a, Maha and Morris, 2018b). Start-ups are entrepreneurial companies that introduce software technologies into the economy as products and services (Funders Club, n.d., Maha and Morris, 2018a). As the engine of new technologies that are being adopted by rapidly digitalising sectors of the mainstream economy and as the source of innovations that scaffold the platform economy, the start-up sector provides a unique lens through which to view the manifestation of the Fourth Industrial Revolution (4IR), which has emerged as the putative definition of the modern digital era. In this regard, the start-up sector is examined from the vantage point that it is the source of digital innovations.

More specifically, the aim of this chapter is to examine the start-up sector in South Africa in order to identify the technologies of the 4IR, the forces behind them and their implications for social change. Accordingly, this study gathers empirical evidence to provide an ontological analysis of the start-up sector, both as a way to test the assumptions made in South Africa's conceptual debate on the 4IR, which denounces it as a neoliberal construct driven by market fundamentalism (Cooper, 2021, Maharaj, 2021, Mapadimeng, 2021, Moll, 2021a); and as a way to contribute to a better understanding of new trends in technological innovation, their drivers, their impact on the economy, and their implications for closing the inequality gap, which in the South African context is an important issue to focus on given Schwab's characterisation of the 4IR as an "ontological inequality" (2017).

This study is a Marxist phenomenological and social constructivist exploration of capitalism, power and vested interests in the digital economy. In this regard, it draws on Feenberg's (2017a) Critical Theory of Technology (CTT), which deploys Marcuséan technological rationality to examine the ideology behind the emergence of new technologies. Marcusé's theory enables a focus on 'fundamental philosophical questions about science and technology from a critical, dialectical standpoint' (Feenberg, 2016, p.

7). This study also deploys Castells' (2011) Network Society theory as a heuristic for modelling innovation systems within the start-up sector in terms of who the actors are, what their functions are, how they are connected in networks, and what the flow of money is within the digital economy. This chapter commences with a discussion of the dominant technologies that emerged in the last decade, followed by a sectoral analysis of 120 start-ups. This is followed by a discussion of the major themes that emerged from the data gathered as well as expert responses to them.

A Brief Note on Methodology

The fact that South Africa's start-up sector is largely unexplored called for a multifaceted approach to data gathering. Accordingly, this study of the start-up sector adopted a mixed methods research design based on a two-phase model, which involved quantitative data collection and analysis followed by qualitative data gathering for triangulation. In this regard, this study comprised of a survey[7] of 120 start-ups in CT and JHB followed by four expert interviews and participant observation at two start-up events to corroborate and enrich the data. The experts that were interviewed for this study include: Prof. Tshilidzi Marwala, Deputy Chair of The Presidential Commission on the Fourth Industrial Revolution in South Africa; Prof. Mthunzi Mdwaba, Vice Chair of the International Labour Organisation (ILO) and ex-officio Member of the Global Future of Work Commission at the ILO; Dr. Michael Gastrow, Commissioner on The Presidential Commission on the Fourth Industrial Revolution in South Africa; and Dr. Nicolas Friederici, author of a book on start-ups in Africa. This list of respondents also appears in Appendix B, which includes the dates that the respective interviews took place.

To avoid repetition of the methodological framework outlined in Chapter Four, this discussion does not provide an in-depth explanation of the process which led to the

[7] The use of the concept survey is used in a metaphorical sense as the principles and the instruments of the survey method were used to systematically gather data on 120 technology start-ups from secondary data sources, whereas strictly speaking, surveys gather information from primary data sources. Refer to Chapter Four for further clarification on how the concept of the survey is applied in this study.

inclusion of the start-ups in this study's sample, suffice to emphasise the fact that they were included due to their temporal manifestation in relation to the emergence of the 4IR in the mid-2010's, as this period coincided with a proliferation of disruptive technologies, such as new advances in artificial intelligence (AI) and machine learning, as well as the growth of blockchain technologies. The start-ups were identified via two studies, Maha and Morris (2018a) and Maha and Morris (2018b), which acted as the sampling frame. It is important to emphasise the fact that these earlier studies do not form of this PhD research as they were merely consulted as a source to identify technology start-ups in South Africa. In this regard, this PhD study is based on the systematic gathering of new and original data on 120 technology start-ups in CT and JHB. Appendix A lists the start-ups and their economic activities. The data sources, which are secondary, i.e., online data sources as well as the guiding questions are discussed in Chapter Four. Moreover, the guiding questions are also listed in Appendix C.

Start-ups and the Technologies of the 2010's

'The massive influx of venture capital to support the building and growth of technology companies over the last ten years has produced tools, which are now being leveraged by all industries, (including AI), machine learning, and the internet of things' (Ruffolo, 2019). Within this ecosystem, data has become the lifeblood of the digital economy. Data scientist Karen Lin (2019) accurately describes the situation in her assertion that a 'Google search, a passport scan, your online shopping history, a tweet. All of these contain data that can be collected, analysed, and monetized'. Thus, explaining the current gold rush for data, not just by the start-up sector, but also by traditional enterprises rapidly digitalising to take advantage of AI's powers of prediction.

Data, Artificial Intelligence and Cloud Computing

Data is analysed by AI using algorithms in a variety of contexts, including machine learning (ML), which 'is a branch of AI based on the idea that systems can learn from data, identify patterns and make decisions with minimal human intervention' (SAS, n.d.).

This type of AI 'provides systems with the ability to learn without being explicitly programmed. This enables computers to find data within data without human intervention' (Beal, n.d.). Consequently, the more data that AI has access to, such as big data, the more accurate are its powers of prediction (Dhar, 2013).

The scalability of cloud-based infrastructure also encourages the growth of the Internet of things (IoT) where machine-to-machine (M2M) and machine-to-humans (M2H) interactions generate massive amounts of information, i.e., big data that is stored on virtual servers in the cloud (Varma, 2018). Many start-ups that emerge as platform companies are fuelled by the current ease of digital connectivity, access to data and the availability of low-cost, cloud-based processing, storage and tools (Collins, 2016). Start-ups of the past decade have thus harnessed technology as an end-to-end solution by building platforms powered by AI and cloud computing, which are aimed at monetising data.

Blockchain

Blockchain is a new technology that emerged in the aftermath of the 2008/9 Global Financial Crisis (Herian, 2018, De Filippi et al., 2020). Given the role of banks in the financial crisis, a major motivation for the development of blockchain technology was the circumvention of traditional banks to find new ways of establishing trust between people transacting with each other (De Filippi et al., 2020). Blockchain is essentially a new basis for developing trust in the digital economy. New models for developing trust in online transacting represent a major threat to banks (see Chapter 6). As blockchain technology is built on the internet, two theories of technology and society come into view, including Rifkin's (2014) Third Industrial Revolution (3IR) from a methodological perspective and Lukács' theory of reification from a teleological perspective.

In this regard, blockchain is a bottom-up technology comprised of 'a digital ledger of economic transactions that is fully public (and) continually updated by countless users' (Carlozo, 2017, p. 29). Moreover, the structure of blockchain as 'a list of continuous records in blocks' is largely 'considered impossible to corrupt' (Carlozo, 2017, p. 29).

Thus, the core feature of blockchain is that it eliminates the need for a centralized storehouse of exchange by using cryptography (complex password keys) and a distributed ledger on the internet to enable peer-to-peer (P2P) transactions. In this respect, the basic premise of blockchain's methodology is not dissimilar to Rifkin's (2014) concept of the peer network as a "collaborative commons".

Due to the fact that blockchain technology is built on a secure P2P network, it eliminates the need for financial intermediaries. Thus, emerging as a technology with the potential to be a genuine disruptor because it bypasses a key mainstream financial institution, viz., the banks (Ammous, 2016, Rosic, 2016, Di Pierro, 2017, De Filippi et al., 2020). As Satoshi Nakamoto, the anonymous person or group that invented blockchain software explains in their original white paper, Bitcoin is a 'purely peer-to-peer version of electronic cash (that) would allow online payments to be sent directly from one party to another without going through a financial institution' (Nakamoto, 2008, p. 1).

In a presentation to the European Union parliament that can be viewed online, blockchain and circular economy advocate, Vinay Gupta (2017) explains that Bitcoin deploys the blockchain software platform to actualise what essentially amounts to the central bank of the internet (Gupta, 2017). In other words, Bitcoin is the central bank of the internet that issues "internet money" (Gupta, 2017). In Gupta's (2017) final analysis, Bitcoin as a piece of software that issues currency and makes payments. However, somewhat bizarrely, nobody knows who the author of this software is (Gupta, 2017).

Elsewhere, Gupta argues that blockchain technology has the potential to democratise society because its design is based on an alternative socio-technical culture that has the potential to de-reify monopoly capitalism. In this regard, blockchain technology facilitates frictionless interoperability amongst autonomous organisations in decentralised blockchain networks. This is due to the fact that rules or protocols co-established by participants in the early stages of blockchain networks, continue to be developed in a collaborative manner as blockchains mature and expand, resulting in continuous network interoperability based on a culture of bottom-up co-construction and sharing. This is in contrast to the monopolies that emerge in conventional networks based on the hub and

spoke model. In conventional networks, companies that own the biggest databases emerge as monopolies because smaller companies in their network are forced to interact with their larger database based on a top-down protocol or set of rules that is reified in the monopoly, thus giving it hegemonic status. In contrast, blockchain's cultural orientation towards decentralisation and collaboration, driven by bottom-up technologies, has the potential to democratise economies and societies. (Gupta, 2015)

This account of blockchain technology resonates with Lukács' view that the de-reification of capitalist practice takes place through conscientized human action, which ontologically transforms the meaning and functions of social institutions (Feenberg, 2016, Lukács, 1972). Lukács' critique of reified capitalism calls for a de-reification of capitalism that 'formulate(s) a vision of Marxism as (the) self-conscious transformation of society' (Stahl, 2018). In this regard, Huckle and White argue that blockchain technology enhances the possibility for socialist forms of governance because of its 'capacity for decentralised transparency and auditability in support of a Socialist model' (2016, p. 1, , p. 14).

Sectoral Analysis of Tech Start-ups

Despite their trademark image as disruptors and the prevalence of sharing economy rhetoric, South African start-ups are not transforming the economy in any way that may soften the sharp edges of capitalism. Overall, the neoliberal ethos of the 4IR (Moll, 2021a, Ngwane and Tshoaedi, 2021) is clearly discernible in South Africa's tech start-up sector. In this regard, there is little evidence to suggest that the inequality producing effects of the South African economy are being challenged by the innovations emerging from technology start-ups. As demonstrated by the sectoral analysis of the start-up sector below, finance (fintech) and e-commerce (two-sided market platforms) dominate the digital economy. Thus, replicating the dominant features of the mainstream economy.

Whilst Appendix A provides a detailed list of the 120 start-ups examined by this study, Figure 1 highlights the key economic activities that they were involved in. Due to the fact

that fintech, e-commerce and software development comprise 75% of the sample, they are discussed in some detail below.

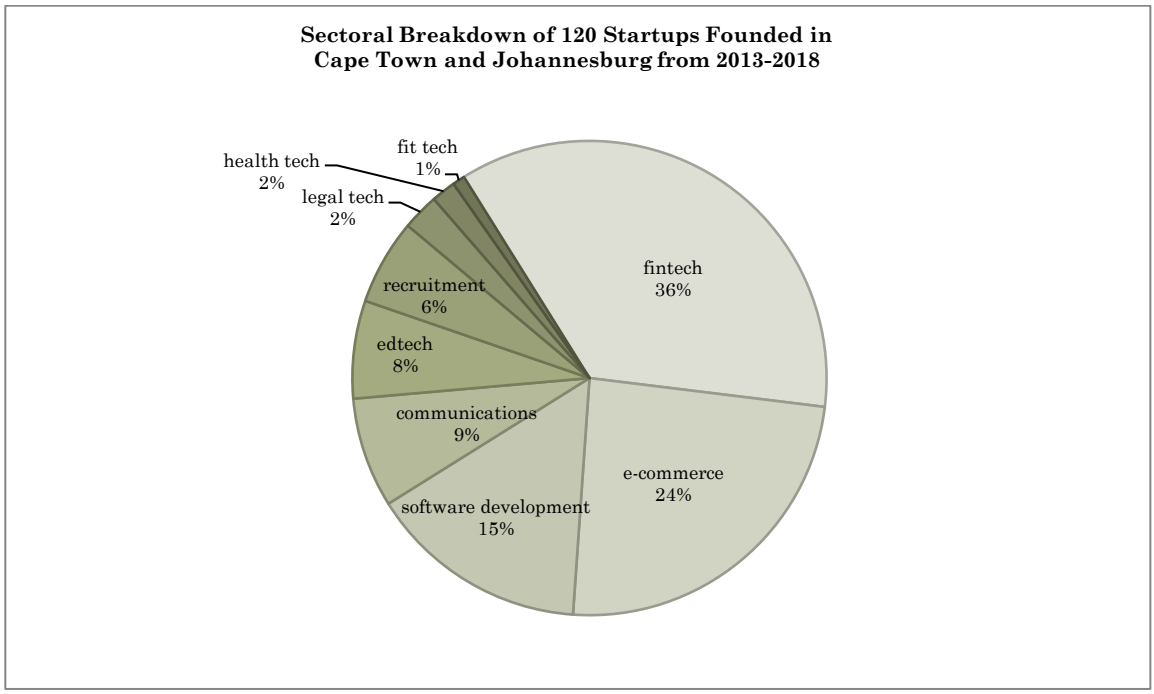

Figure 1: Sectoral Breakdown of 120 Tech Start-ups Founded in Cape Town and Johannesburg between 2013-2018.

Fintech Start-ups

Fintech typically refers to companies that use technology to provide financial services. Fintechs receive the highest level of investment amongst start-ups globally and in South Africa (Consultancy.eu, 2019, Malinga, 2022). This phenomenon was also observed in this study's sample as fintechs comprised more than a third (36%) of the start-ups.

Figure 2 highlights the types and number of start-ups involved in the fintech sector. There 11 types of fintechs that emerged in this survey, and they are all discussed below. The four most common fintech types revealed by the study are those operating as: 1) payment platforms, 2) credit and loan facilities, 3) insurtech, and 4) blockchain/crypto currency.

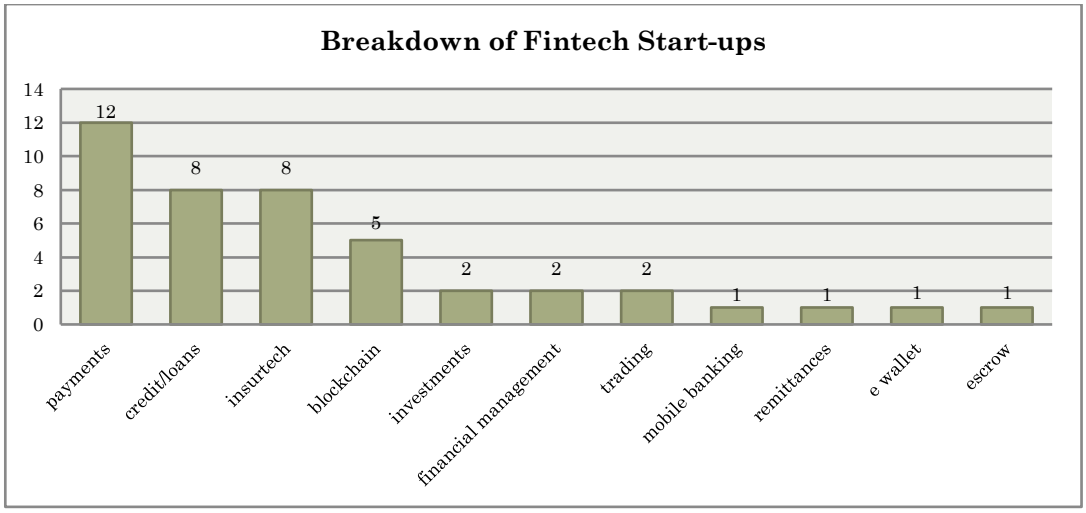

Figure 2: Activities of 43 fintech start-ups launched in Cape Town and Johannesburg between 2013-2018.

Payment platforms: Based on their dominance in the sample, payment platforms appear to be a common type of fintech in SA. These start-ups develop technological solutions to accelerate payments through mobile solutions in a variety of contexts. Thus, highlighting a focus on improving efficiencies with respect to facilitating payment. This study uncovered 12 payment start-ups in JHB and CT. However, just five examples are listed as they cover the range of activities pursued by all payment platforms in the sample. These are: 1) *Flickpay*, a QR code payment app; 2) *Karri*, a mobile payment app for various school payments; 3) *Ikhoka*, a company that processes credit card payments through mobile phones; 4) *Kaching Parking*, a cashless, ticketless, parking app that uses license plate recognition to open boom gates in parking lots; and 5) *Wax'd*, an electronic funds transfer (EFT) aggregator that processes mobile and online EFT transactions cheaply. Notably, 89% of these start-ups were founded by white South African men.

Drawing on Feenberg's Critical Theory of Technology, the examples presented above invoke Marcusé's critique of efficiency in his theory of technological rationality. In this regard, Marcusé highlights society's deferential view and unquestioning pursuit of efficiency as problematic (Feenberg, 1991). Drawing on Weber, Marcusé critiques the means-end rationality of efficiency as disconnected from broader social objectives (Feenberg, 2016). Technological rationality thus emphasises the point that 'capitalism imposes a rational culture that privileges technical manipulation over all other relations to reality' (Feenberg, 2017a, p. 5). From this vantage point, it can be argued that payment

platforms are driven by the objective to increase capitalism's efficiency by extracting value in increasingly discreet and immediate ways.

Credit and Loan Platforms. The second most common fintech in this sample was credit and loan platforms, which shared this position with insurtech. Traditional banks have captured the market at the upper end of the earnings spectrum, resulting in credit and loan start-ups focussing their efforts on the lower end of the market by targeting individuals that belong to low-income groups or small, medium and micro enterprises (SMMEs). Credit and loan platforms and pension and funeral cover start-ups have similar target markets, i.e., low-income groups. In this regard, the term "financial inclusion" is a common theme associated with the fintech sector (Makina, 2019, Bernards, 2019, Ngwenya, 2023).

In this regard, the penetration of mobile phones amongst the wider population has made it easier to target clients from poor communities, as people's online behaviour generates data to construct user profiles, which informs business decisions based on the predictive power of AI (MAPFRE Economics, 2020). As one group of financial inclusion advocates put it, 'A new category of digital lenders has emerged that taps into increasingly digitised and accessible customer data (as well as) advances in analytics and machine learning…to design and remotely deliver digital products in seconds…' (Stewart et al., 2018).

Examples of start-ups that belong to the fintech credit and loans group include *Lulalend* (n.d.), a digital lending platform that offers loans of up to ZAR5 million to SMMEs. The *FundingHub* (n.d.), a lending platform that matches businesses with a minimum annual turnover of one million Rand to marketplace lenders. *EduFund,* a start-up based on a crowdfunding model that was established in the aftermath of the #FeesMustFall protests to provide small loans to university students to cover living expenses (Mzekandaba, 2015). *FinCheck*, a financial comparison website that assesses the credit worthiness of users and matches them to loan and insurance products (Van Der Made, 2016). *CommuScore*, a start-up providing alternative credit scoring to people active in the informal economy, but excluded from the formal banking sector (Seedstars, n.d., CFO South Africa, 2017).

There were clear distinctions that emerged between Black and white founded start-ups in this category with respect to their activities and target markets. Black founders were concentrated in JHB and tended to focus their businesses on individuals from low-income backgrounds, such as *CommuScore's* targeting of people working in the informal sector and *EduFund's* focus on students from economically disadvantaged backgrounds. In contrast, white founded credit and loan fintechs such as *LuLalend* and the *FundingHub* tended to be concentrated in CT and their activities were focused on the provision of loans to small businesses.

Insurtech. Insurtech start-ups refer to companies that have digitised insurance products. Most of these start-ups within the sample were based in JHB and their main activities can be categorised as: 1) pension or funeral cover and 2) the provision of insurance for electronic and leisure goods.

Pension and funeral insurtechs targeted people belonging to low-income groups as well as SMMEs. Insurtech start-ups typically adopt peer-to-peer (P2P) models, which cluster people with similar risk profiles into groups for crowd-funded insurance. For example, *Nobuntu* is a digital P2P pension fund and funeral insurance platform aimed at providing cover for staff of SMMEs (Jackson, 2019a).

The other activity that insurtech start-ups were involved in is the provision of insurance cover for electronic and leisure goods. For example, *Granadilla* and *Jasure* insure items such as smart phones, golf clubs and bicycles. This type of insurance is targeted at the upper end of the consumer market, and is operationalised through AI and chatbots that power mobile apps for customer engagement. Retail stores use point of sale technology to activate the insurance cover, which similar to payment platforms, demonstrates the elevation of efficiency from a Marcuséan technological rationality perspective.

There was an even split between Black and white founders in the insurtech sample. However, there was a distinct difference in focus regarding their business activities. Start-

ups insuring electronic and leisure goods were exclusively established by white male founders. In contrast, most funeral and pension insurtechs were launched by Black founders or co-founders, including a Black woman who was a rare discovery in the fintech sample.

Blockchain. The blockchain fintech sector appears small in South Africa, as just five of these of start-ups were found in the sample. Despite the potential for blockchain technology to democratise the economy and society (Gupta, 2015), South African blockchain start-ups are not engaged in businesses that can be described as socially transformative, as they have largely honed in on blockchain's cryptocurrencies for currency trading purposes in the financial market. In this regard, Herian argues,

> In the hands of quasi-libertarian, self-interested and…'chaotic' entrepreneurs,…creative destruction has led, in the main, to myriad attempts at re-imagining (not disrupting) legacy financial systems over the last decade using cryptocurrencies. (Herian, 2018, p. 168)

This phenomenon is evident in South Africa. For example, all the blockchain start-ups within the JHB sample engaged directly in the mainstream economy as transaction or investment platforms. Examples of these blockchain initiatives include: 1) *African Coin Exchange*, that was launched in 2018 and appears to have ceased operating, but while still active was a blockchain crypto exchange and payment gateway for multiple crypto currencies that allowed people to buy crypto currencies with fiat currency (YellowSA, n.d.). 2) *Centbee*, a company that provides a digital crypto currency wallet service that enables people to make cross border remittance payments (BizzCommunity, 2022). 3) *Caesium Capital* (n.d.), a blockchain based digital asset investment fund that invests in initial coin offerings (ICOs).

White South African men founded all the JHB-based blockchain fintechs. In contrast, blockchain fintechs established by women and/or Black founders appeared to have a stronger focus on social impact. These fintechs were all based in CT and used blockchain

technology to create employment in disadvantaged communities. Users of these platforms were rewarded in digital tokens created by the blockchain software.

For example, *Zlto* (n.d.) is a community services platform registered as a non-profit company that encourages youth from disadvantaged backgrounds to participate in volunteer activities. Its blockchain platform has created a digital coupon, the "Zlto", to reward youth volunteers for services rendered, i.e., micro tasks such as mowing the lawn or organising books in the community library. The digital coupon is downloaded into an e-wallet, which can be redeemed at up to 3000 stores. Activities performed by users are recorded in a blockchain ledger. *Zlto* was launched by the Cape Flats based start-up, R-Labs, which was originally seed-funded by its founder who originates from the community. *Zlto,* which has expanded to Tanzania and Zimbabwe, has been the recipient of a challenge fund and social impact investment (E Squared, 2021, Zlto, n.d.).

Alternatively, *Wala* was a CT-based blockchain platform targeting financial inclusion in Africa through the provision of zero-fee financial services including insurance, transactional banking, remittances and loans. Wala's blockchain software created a currency, the *dala*, as a rewards incentive for those using the platform. Early adopters of the app used it to send payments to people, while the *dalas* that were received as a reward for transacting via the app could be redeemed for airtime and electricity payments. Wala, which was co-founded by a white South African woman and a Lebanese man, was active in South Africa, Zimbabwe and Uganda. In 2018, *Wala* was the recipient of a US$100 000 challenge fund. However, it ceased operating in 2019 citing infrastructure challenges, which affected internet connectivity in some of the participating countries. (Venture Burn, 2018, Ventureburn, 2019).

With respect to the rest of the fintech sector, there was a mixed bag of traditional financial services that start-ups were involved in, including financial management, investment, trading companies, mobile banking, remittance services, e-wallet and escrow services.

E-Commerce Start-ups

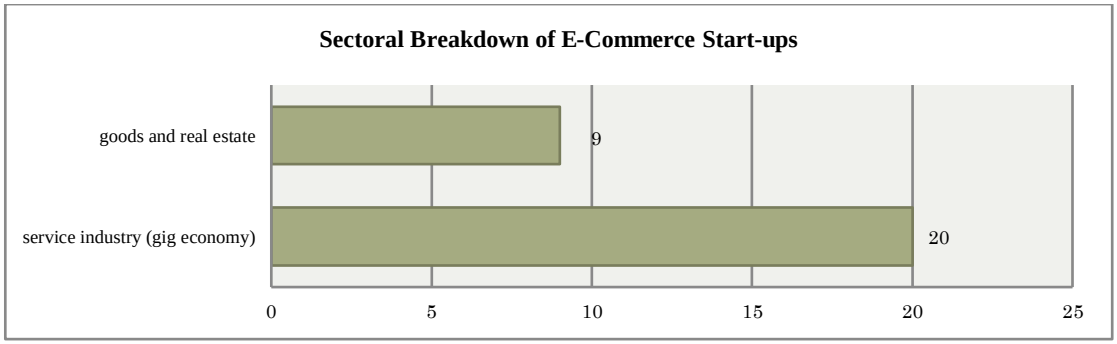

Figure 3: E-commerce start-ups launched in Cape Town and Johannesburg between 2013-2018.

This study's sample revealed 29 e-commerce start-ups. E-commerce involves the electronic purchase and sale of goods, services and information over the internet through 'computers, tablets, smartphones, and other smart devices' (Turban et al., 2017, Bloomenthal, 2023). This study's sample demonstrated a regional bias with respect to e-commerce start-ups given that 74% were located in CT. Moreover, well over two-thirds of these start-ups (69%) sold on-demand services in the gig economy, which can be compared to labour broking. These businesses commonly focused on providing transportation and courier services followed by artisan and domestic cleaning services.

These included: 1) On demand transportation and delivery through platforms, such as, *Jumpin Rides*, *Wumdrop*, *Picup, E Butler* and *Zapacab, which has ceased operating (Coetzee, 2014)*. 2) On demand platforms connecting clients to tradespeople such as hairstylists, handymen, artisans and photographers, such as *Picadoo*, *Kandua*, *Task Market* and *Tapsnapp*. 3) On demand domestic cleaning and laundry service platforms, such as *SweepSouth*, *Washr* and *Domestly*. The latter two have ceased operating (Cape Town Magazine, n.d., Farouk, 2022). In addition, the e-commerce sample also revealed an on-demand micro-jobbing platform, *M4JAM*, which is a start-up that employs gig workers to perform micro tasks that build awareness of big brands in township businesses (Malinga, 2020).

Start-ups such as the ones listed above, which produce low-skilled on-demand jobs, are often touted as companies that are large-scale job creators with the potential to lift people

out of poverty (Mzimba, 2017, Moyo, 2020). However, they have also come to be associated with the provision of precarious work in the platform economy, which as noted earlier, has emerged as a new area for academic research on the "Future of Work" (Balliester and Elsheikhi, 2018, Schor et al., 2020). For example, while a company such as *SweepSouth*, the domestic workers' platform co-founded by the daughter of a South African cabinet minister, has received accolades for creating job opportunities for domestic workers, some argue that it is unclear how the start-up meaningfully improves their working conditions (Timm, 2019b, Mawii and Aneja, 2020).

On-demand gig jobs invoke Gorz's theory of economic rationality with respect to the creation of an anti-economy that produces poorly paid servile jobs to service an elite minority, which a majority of the workforce is forced to perform in order to survive (Gorz, 1989, p. 155, Levy, 2000, Granter, 2016a, p. 132, Granter, 2021). This issue and the Future of Work literature are revisited in Chapter Seven, which examines the platform economy.

The rest of the e-commerce start-ups were involved in the exchange of property and goods. Examples of these goods include cars sold by *Carza*, music streaming by *Nichestream*, and flower sales by *Bloomable*. Examples of property focused e-commerce start-ups include platforms to rent accommodation such as *Ekaya*, the property sales platform You Realty, as well as the storage space rental platform *Wahi,* which appears to have ceased operating (Lunika, 2017).

Two-thirds (66%) of the e-commerce start-ups in the sample comprised of those founded or co-founded by white South Africans. This figure can be further disaggregated by gender to reveal that 56% of e-commerce start-ups in the sample were founded by white men and 10% by white women. Thus, demonstrating a gender disparity. Overall, White South Africans dominated as founders in start-ups that exchanged goods and property. While Black South Africans featured more as founders or co-founders of service industry start-ups targeting gig workers from low-income groups.

Software Development Start-ups

This study uncovered 17 software development start-ups, which make up 14% of the sample. South African software development start-ups deploy some of the most cutting-edge technologies through their work, including machine learning, cloud computing, blockchain, IoT and augmented reality (AR) solutions. The discussion below clusters them into three broad categories. The sample was dominated by software consulting and development start-ups. This was followed by start-ups that focused exclusively on machine learning. The third kind of software development start-ups were involved in building niche products as specialist software solutions. The examples discussed below cover selected start-ups from the sample.

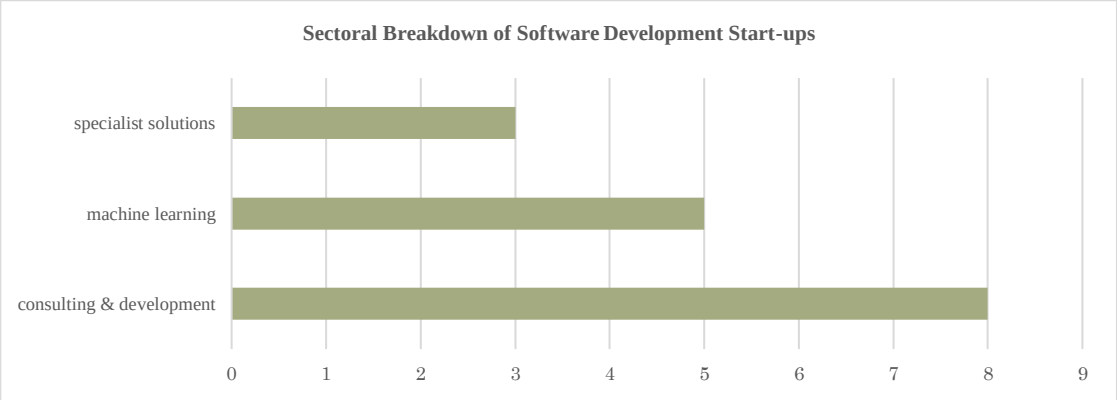

Figure 4: Software development start-ups launched in Cape Town and Johannesburg between 2013-2018.

Software consulting and development. The largest group of software development start-ups focused on providing software consulting and development services to other businesses, including but not limited to companies with legacy IT infrastructure in need of modernisation. Software consulting start-ups demonstrate that a diversity of software solutions are being applied across various sectors in the economy. In this regard, there was a diverse mix of start-ups deploying a range of technology solutions, which included app development, data analytics, blockchain, as well as mobile and cloud-based solutions. Some examples of start-ups working in this area include *Empire State*, *Prolific Idea*, *BankyMoon*, *Linum Labs* and *BuiSoft,* which appears to have ceased operating (Mthimunye, 2015).

Machine Learning. Given the immense role played by data in the digital economy, a number of software development start-ups focused on developing machine learning solutions. In this regard, more than 40% of the software start-ups in the sample developed data solutions to power AI for machine learning. For example, *WhereIsMyTransport* produced tech solutions to enhance the public transport experience in emerging cities through data acquisition, analysis and machine learning. This start-up has produced a route and schedule information solution for the Gautrain mobile app. Other machine learning start-ups in the sample included *Spatial Edge*, a software start-up that assists corporate clients in the financial services sector with data solutions, including machine learning models and data analysis; *Dataprophet*, a start-up that offers machine learning solutions to the manufacturing sector, such as computer vision to identify manufacturing defects; and *Soundsreal*, which uses machine learning for signal processing, which can be used in medical imaging and autonomous vehicles, amongst other applications. These examples demonstrate the diversity of sectors that machine learning is being applied to. Within the sample, this includes manufacturing, finance, healthcare and transportation.

Specialist Solutions. There were also software start-ups within the sample that focused on developing just one specialist product that could be used by other companies, such as *Sortd*, an email inbox organising tool and *Pageman* a digital signage service. Another specialist solution, which was also the only IoT example in the sample was *Fluss,* an app that allows mobile phones to function as keys to doors and gates.

White South African men dominated the sample as founders/co-founders due to the fact that they founded 88% of all the software development start-ups in both regions. The phenomenon was extreme in CT where white men founded all the software development start-ups. Women from all race groups were conspicuous by their absence as founders in this category of start-up. In the few cases where Black founders emerged, they tended to work in the less cutting-edge Web 2.0 development space.

Communications Start-ups

Start-ups in the sample that focused on communications, typically provided digital marketing, advertising, content distribution, public relations, instant messaging and social media services. They made up 7% of the sample. Examples of these start-ups include *Sudonum,* a mobile messaging app; *Ispani*, a marketing service that produces data insights on townships and informal settlements; and *Conversio*, a customer relations and marketing platform. There was an even split between Black and white founders amongst communications start-ups. White founders tended to establish companies with more advanced technologies, such as instant messaging and automated marketing. Black founders tended to work with simple Web 2.0 technology aimed at public relations. Overall, men made up 90% of the founders in the communications sector. Foreign nationals from other African countries dominated the group of Black founders in this category. A number of the Black founded start-ups in this category seem to be fledgling operations and/or appear to have ceased operating.

Ed-Tech Start-ups

Ed-tech start-ups work in the education sector. They comprised a small segment of the sample (7%) that can roughly be divided into two categories: 1) those that provide P2P learning platforms and 2) those involved in distance education. However, the sample also uncovered a coding school. Examples of ed-tech start-ups include *Uthini*, a CT-based language-learning platform supported by chatbot technology, which is a P2P learning platform that connects first language IsiZulu and IsiXhosa speakers to clients. An example of a distance education platform is *The Student Hub,* an e-learning platform for Technical and Vocational Education and Training (TVET) colleges. Within the sample, white South African men founded or co-founded 63% of the ed-tech start-ups, while female foreign nationals established the rest.

Recruitment Platforms

Since its launch in 2003, *LinkedIn*, the job search social media platform, has completely transformed how companies fill vacancies and it has become the driver behind the growth of other online recruitment platforms. The emergence of online recruitment platforms, which comprised 7% of the sample, is dramatically changing the hiring process. For example, there is an increase in specialist recruitment platforms targeting specific skills and sectors, as evidenced by the sample. Start-ups targeting high-skilled individuals include *Offerzen,* a recruitment platform that matches software developers to tech companies and *Leaply*, which matches graduates to companies. Notably, 85% of the recruitment platforms in the sample were established by white male founders/co-founders mainly focusing on specialist skills.

On the other hand, women were engaged as founders or co-founders of recruitment platforms targeting blue collar workers and/or township residents, i.e., people originating from low-income communities. For example, *Britecap,* is an employment platform that helps blue collar workers to become more discoverable to employers, co-founded by a white South African woman (Bizzcommunity, 2016). Similarly, *Bozza Media* was a mobile platform promoting township residents working in the creative arts field, such as musicians, actors and poets, founded by a white female foreign national (Kaye, n.d.). *Bozza* raised a first round of funding from social impact and venture capital funders, but ceased operating after failing to secure further funding rounds (Kaye, n.d.).

Legal-tech, Health-tech and Fit-tech Start-ups

Legal-tech, health-tech and fit-tech start-ups represented between one and three percent of the sample. The fields that these start-ups operate in were fairly specialised. For example, the legal tech sector deals with due diligence compliance and identity verification via platforms such as *Yuediligence, Libryo, and Thisisme*. Meanwhile, in the health-tech sector, *LifeQ* employs highly advanced Science Technology Engineering Mathematics (STEM) models to produce health risk analysis products. Finally, in the fit-tech sector, *Fitkey* was a subscription-based app that enabled non-gym members to find on-demand

exercise classes in any gym without having to purchase costly gym membership contracts (Jackson, 2015). *Fitkey* ceased operating in 2021 (Pitchbook, n.d.). All the legal-tech, health-tech and fit-tech start-ups were based in CT and founded by white men. In *Libryo's* case, the three South African male co-founders are London-based.

The Start-up Ecosystem and Racial Inequality

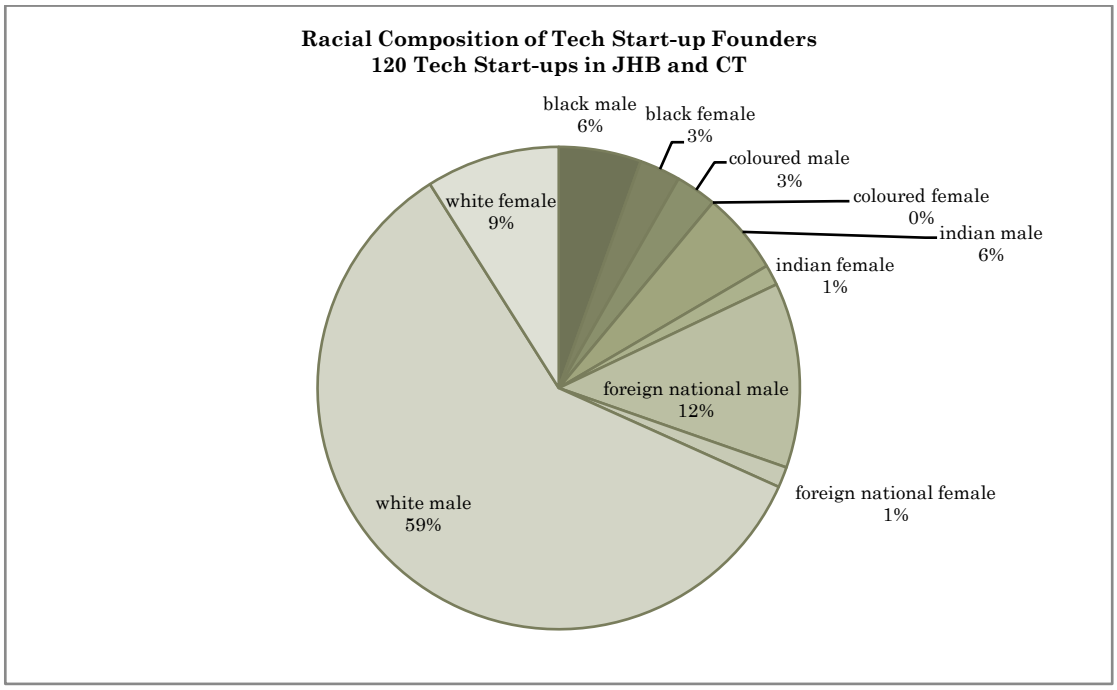

Figure 5: Race and gender of start-up founders of 120 Tech Start-ups in Cape Town and Johannesburg launched between 2013-2018. N.B. that only South African founders are disaggregated by race.

Despite the demise of apartheid three decades ago, South Africa continues to be burdened by a racial hierarchy that persists in the country's class structure. This, along with the fact that the South African economy remains notoriously untransformed is widely noted (Terreblanche, 2018, Davies, 2012, Anwar, 2017). This study reveals a corresponding lack of racial transformation in the tech start-up sector.

The statistical power of a large sample, i.e., 120 start-ups, provides strong evidence that white South Africans dominate the tech start-up sector. Figure 6 shows that white South Africans were involved as founders/co-founders in 68% of tech start-ups in JHB and CT.

Black African South Africans were involved as founders/co-founders in just 9% of the start-ups in the sample. Given that SA is a majority Black African country, this highlights a disturbing lack of demographic representation in the tech start-up ecosystem.

There were, in fact, more foreign national founded tech start-ups (13%) within the sample than Black African South African (9%). More than two-thirds of the foreign national founders/co-founders were people originating from the African continent who tended to be concentrated in the JHB sample. There was a higher incidence of foreign nationals from Europe, Latin America and Southeast Asia in the CT sample.

Figure 5 demonstrates that women across all race groups are underrepresented in the tech start-up sector. Women were involved as founders/co-founders in just 14% of the start-ups in the sample. White women made up almost two thirds of this figure, highlighting an underrepresentation of women of colour in the tech start-up ecosystem.

Racial and Gender Representation in CT and JHB

Overall white men and women dominate the tech start-up sector in South Africa. However, regional demographic representation varies, and racial diversity does improve in JHB, as demonstrated by the differences between Figures 6 and 7.

Racial representation is particularly distorted in CT, which is problematic in light of the fact that the city is known as South Africa's leading technology hub. Figure 6 shows that whites are involved as founders/co-founders in 80% of tech start-ups launched between 2014-2018 in CT. White men dominate, comprising 69% of this figure. Based on the sample, Black South Africans are involved as founders/co-founders in a mere 5% of CT's start-ups. Similar to the JHB sample, women are underrepresented. However, Indian and Coloured women are completely absent in the CT sample. The result for Coloured women (0%) and men (4%) is especially worrying given that Coloureds are the largest population group in the region (City of Cape Town, 2017, World Population Review, 2023).

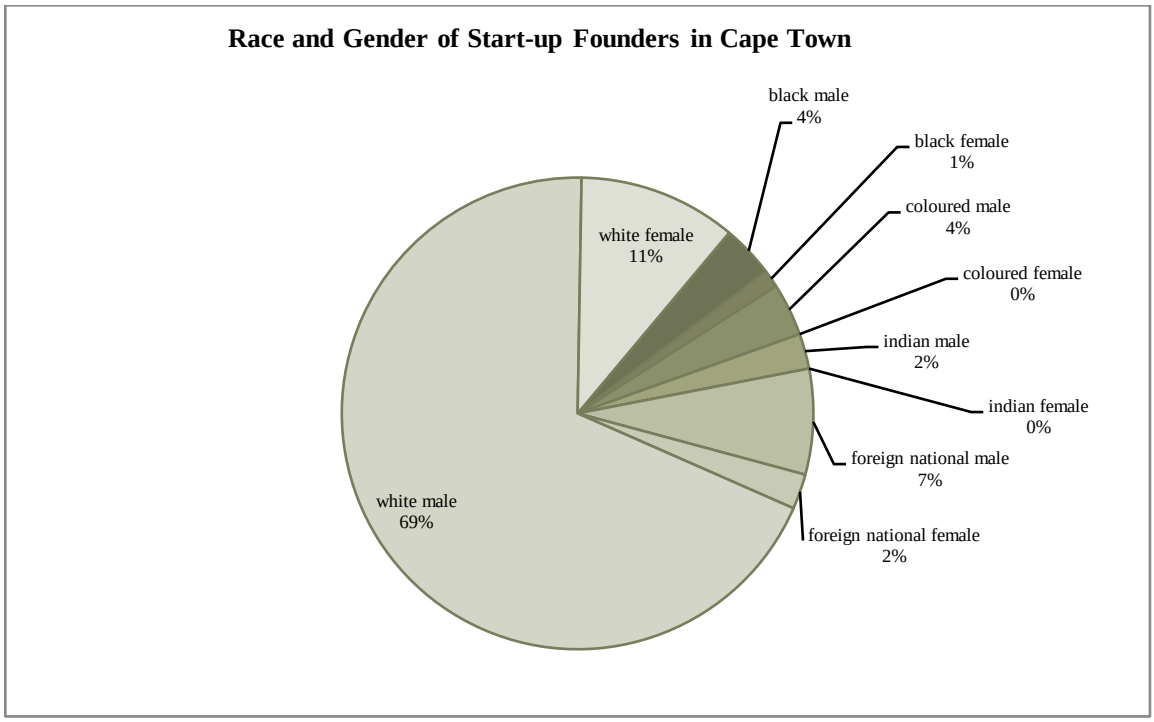

Figure 6: Racial and gender composition of founders in 70 start-ups launched between 2014-2018 in Cape Town.

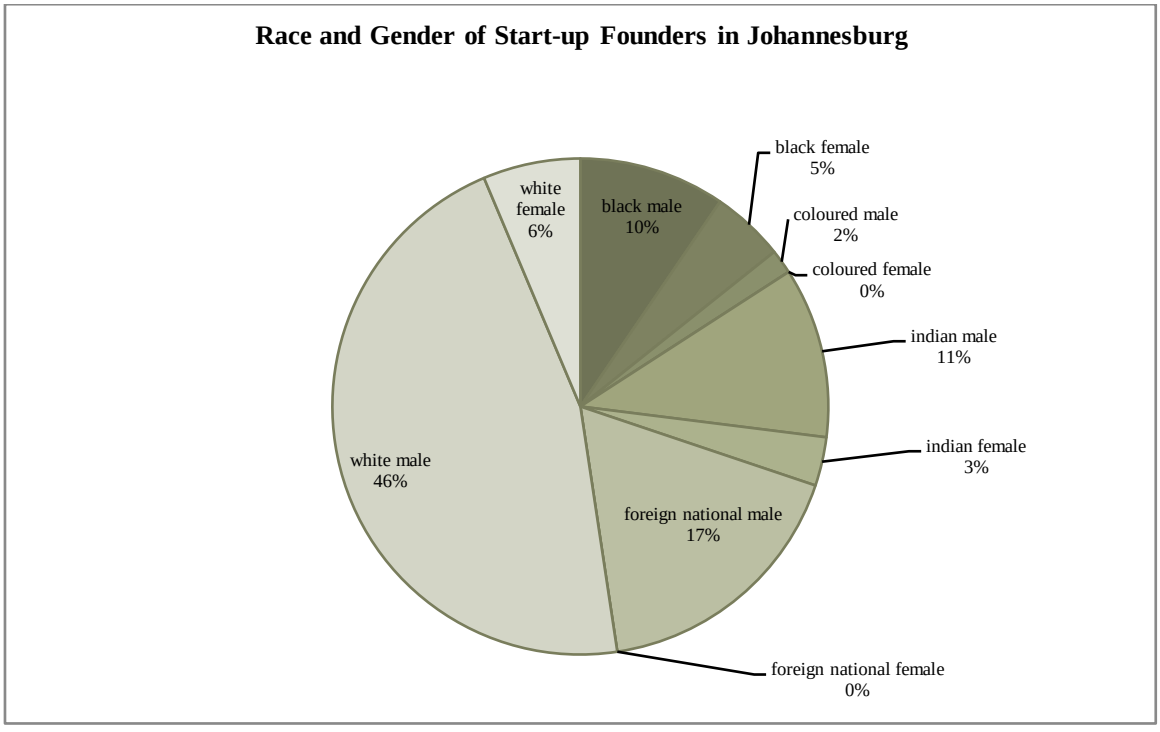

Figure 7: Racial and gender composition of founders in 50 start-ups launched between 2013-2017 in Johannesburg.

Figure 7 indicates that Black South Africans, including Indians and Coloureds, were involved as founders/co-founders in under a third (31%) of the start-ups in the JHB

sample. Despite JHB having a racially diverse and largely Black population, Black African South Africans were involved as founders/co-founders in just 15% of the region's start-ups, while white South Africans emerged as founders/co-founders in more than half (52%) of the start-ups.

Racial Disparities in Funding Support for Tech Start-ups

The evidence suggests that all Black South Africans, including Africans, Indians and Coloureds, face significant obstacles as entrepreneurs in the tech start-up sector vis-à-vis access to funding as it relates to venture capital and angel investments. This study found that white founded start-ups were more successful at attracting venture capital and angel investments than their Black counterparts. Moreover, there was a qualitative difference in the nature of the funding received by Black and white founded tech start-ups.

In this regard, this PhD study gathered demographic data on the founders of start-ups in the sample and their funders. Figure 9 demonstrates what percentage of start-ups in the CT and JHB samples were able to secure venture capital and/or angel investor funding based on the racial profile of the South African founders. Note that the category Black is inclusive of Africans, Indians and Coloureds. Foreign nationals are not included in this analysis. Finally, venture capital and angel investor funded start-ups were contrasted with those that were bootstrapped, i.e., self-funded by their founders.

This investigation found a racial correlation between those giving and receiving support. For example, *Naspers*, a historically white owned and managed company was an angel investor to *M4Jam*, which is a white founded start-up (Jackson, 2016). *Naspers* currently has a Black CEO. However, at the time that financial support was given to *M4Jam, Naspers* was managed by a white CEO. On the other hand, *WumDrop* and *SweepSouth*, which both have Black co-founders, received investment support from Black South African investors (Segev, n.d., Timm, 2019b, Alexander, 2017).

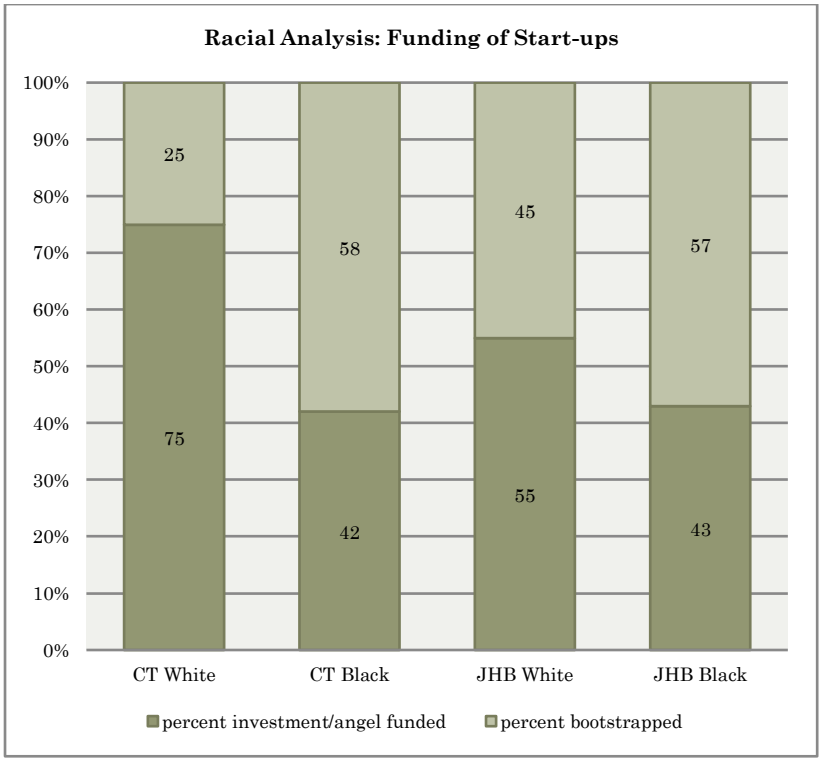

Figure 8. Racial analysis of start-ups launched in Cape Town and Johannesburg between 2013-2018.

With respect to the CT sample, the study found that 75% of white founded start-ups were able to attract venture capital and/or angel investments, while just 42% of Black co-founded start-ups attracted such funds. Note that these were Black co-founded companies. Start-ups that were exclusively Black African founded did not attract any angel or venture capital funding in the CT sample. In the only instance that a Black founded start-up managed to attract investment support, this was in the form of a social impact investment that was given to the non-profit start-up *Zlto*, established by Coloured founders (E Squared, 2021).

The outcome for JHB was more balanced. However, white South Africans were still more successful at securing investment support than their Black counterparts who struggled to attract investment support. For example, 'Several entrepreneurs noted that there is "not a level playing field" for raising capital in South Africa — women, immigrants, and people of specific ethnic backgrounds faced even more challenges in this respect than other entrepreneurs' (Maha and Morris, 2018b, p. 11). Interestingly, a number of white founded start-ups in the JHB sample deliberately opted not to pursue venture capital investments

due to the fact that they generated sufficient revenue (Maha and Morris, 2018b). Examples of start-ups that generated income via contracts with large corporate clients such as *Barclays* (News24Wire, 2016) and/or through commission and subscription-based services, include *Empire State Software Development,* the commission-based start-up, *Fincheck,* and *VAULT,* a subscription based fintech.

Black-founded Tech Start-ups	White-founded Tech Start-ups
Receive modest sums of money	Receive significant investment funds
Funding commonly from philanthropic foundations and incubators, social impact investors, challenge funds and crowdfunding	Funding via financial market venture capital, including international investors and angel investors
Funding more likely to be tied to social impact objectives	Funding for business ventures aimed purely at profit-making

Table 1: The qualitative difference in funding received by Black and white founded start-ups.

This study was also interested in establishing if there was a qualitative difference in the kind of investment support received by white and Black founders. This difference is summarised in Table 1. Black founded start-ups received modest investments. They were also more likely to receive funding via philanthropic initiatives and incubators, from social impact investors, by entering challenge competitions or through crowdfunding. These sources offer limited funding support. Consequently, many Black founded start-ups that use these sources of funding struggle to survive. For example, *EduFund* adopted a P2P crowdfunding model (Mzekandaba, 2015), while *CommuScore* received a challenge competition grant in 2017 worth one million Rand (CFO South Africa, 2017). However, neither *EduFund* nor *CommuScore* appear to be operational in 2023.

In contrast white founders are able to secure venture capital and angel investor funding both locally and abroad as well as grow their businesses over time. For example, *LulaLend* secured an investment of US$35 million (more than ZAR600 million) from international investors in 2023. This builds US$3.5 million (more than ZAR66 million) secured in Series A funding in 2019. Meanwhile, in a demonstration of monopoly growth within the sample, the *FundingHub*, which applies a business-to-business (B2B)

marketplace lending model, was acquired by *FinCheck* resulting in *FinCheck* becoming South Africa's 'biggest financial comparison site' in 2019 (Jackson, 2019b).

Overall, this study observed a dynamism in white founded start-ups that was missing from Black Founded start-ups. While white founded start-ups present a thriving picture of investor supported growth, the corresponding image for Black founded start-ups is one of a struggle for survival—at the heart of which appears to be a lack of investor interest. The discussion below explores some of the underlying characteristics of investor-entrepreneur relationships as well as how this affects investment decisions.

Venture Capital, Angel Investors and Tech Start-ups

Start-ups have been described as the "glamour projects" of venture capital with finance playing a distinct role shaping technology as a disruptive force (Sapienza and De Clercq, 2000, Kerr and Nanda, 2009). South African start-ups have also attracted 'the attention of local and international venture capitalists' (Mtongana, 2019). However, as the sample revealed, there is a racial imbalance in the way that venture capital is invested in South Africa with white male founded start-ups attracting the most capital. In this regard, the host of two start-up networking events I attended as an observer argued that people of the same race, cultural background and/or those belonging to the same academic networks were more likely to develop partnerships within investor-entrepreneur circles (Startup Grind, 2019a, Startup Grind, 2019b). This was attributed to the fact that they operate in an ecosystem that requires high levels of trust. This insight was reinforced at both events.

> *People give things to people they are familiar with. So, a lot of times women will back women…or white people back white people. (Comments by Sandras Phiri at Startup Grind, 2019a)*

> *Investors invest with people they trust. A lot of times they invest in people that they know. A lot of times they invest with people they have something major in common*

> *with. And that's why you get those (sic) where people are saying, okay white men only invest in white men because you know they hang out as friends, so you trust more. (Presentation by Sandras Phiri at Startup Grind, 2019b)*

This perspective connects the issue of trust to racial and cultural similarities as an objective reality, which is problematic on multiple levels due to its unwitting promotion of racial bias, indifference to power dynamics and inattention to inequality in racially stratified societies such as South Africa. Nevertheless, it is a view that persists in the mainstream as well as resonating in academia. For example, the views promoted by *Startup Grind* can be located in two theories emanating from management school literature viz., agency theory and identity theory, which examine dynamics in the relationship between investors and entrepreneurs (Sapienza and De Clercq, 2000, Stuart and Sorenson, 2007, Verver and Koning, 2018).

Agency theory highlights the difficulties caused by the information asymmetries between investors and entrepreneurs, whilst making the argument that personal networks matter significantly in financial markets because social networks 'provide the conduits through which private information flows' (Sapienza and De Clercq, 2000, Stuart and Sorenson, 2007, p. 213). From this vantage point, "whom you know matters" (Hochberg et al., 2007). On the other hand, identity theory highlights interaction biases based on similarities in the personal traits of the individuals involved in the investor-entrepreneur dyad. Consequently, the issue of "identity alignment" in the high-risk investment environment is elevated by identity theorists who argue that people feel more comfortable collaborating with partners that they can identify with culturally and/or ethnically (Bell et al., 2012, Fisher, 2012, Verver and Koning, 2018).

Both these theories highlight social, cultural and ethnic similarities between people within networks as objective criteria for establishing trust. These models, however, are based on rationalistic epistemologies, which are criticised for being ahistorical (Shapiro, 2005, Fisher, 2012). Moreover, a narrow focus on actors within networks - without an examination of network protocols - precludes a view of how networks themselves function to exclude certain groups by controlling access, thus neglecting questions about

power and inequality. In particular, these theories fail to engage with the question of the impact of investor-entrepreneur networks on society at large, which is crucial for making sense of how the tech start-up sector is shaping the evolution of the digital economy.

The Dominance of Financial Elites in the Start-up Ecosystem

In contrast, Castells' theory of the "Network Society" (1996b), which this study draws on as a model for the digital economy, provides a framework for understanding the power of financial markets as the dominant network in the start-up sector with a decisive influence on technological innovation. Castells' description of "informational capitalism" as a voracious form of capitalism that replaces industrialism in the network society, is based on the idea that the internet's infrastructure produces as a new kind of neoliberal capitalism with global reach and flexibility (Webster, 2006, Stalder, 2023). This neoliberalism, which is based on extractivism (Stalder, 2023), is invested in a culture of individualism, patriarchy, risk taking, wealth accumulation, and a notion of liberty that restricts the role of the state as a functionary that merely creates the conditions for the market to thrive as the ultimate arbiter in society (Banet-Weiser and Castells, 2017). Thus, in the Network Society, 'neoliberalism (provides) the ideological direction, installing markets as a superior way of coordinating complex actions' (Stalder, 2023, p. 878).

In this regard, the network that emerges as the most powerful is the financial market, which Castells argues, 'has the last word' (2011, p. 784). The 'global financial market exercises network power over the global economy' through a diffused network of power that is activated through dominant actors who use their 'network making power' to impose 'rules of inclusion' (Castells, 2011, p. 773, p. 775). Banet-Weiser and Castells describe these dominant actors as the financial elite, whilst arguing that this group of people 'could not care less about the broader picture, as their behaviour is guided by personal gain with a quarterly horizon for their lucrative bonuses' (2017a, p. 9). Global financial elites are connected by attendance to similar educational institutions around the world and their 'cosmopolitan culture…is crucial for their management of the global economy and their own interests' (Banet-Weiser and Castells, 2017, p. 13). Consequently, while the conventional wisdom of the start-up sector, supported by agency theory, views

social networks in a positive light as the conduits that address information asymmetries, thereby building trust between investors and entrepreneurs; for Castells, these social networks have a perverse outcome as they are the channels that financial elites use to orchestrate control.

Examples of how global financial elite networks operate in Africa can be found in two different studies on tech start-ups. In this regard, Friederici et al. (2020) who examined the start-up ecosystem in East Africa argue that investors use "pattern matching" to screen entrepreneurs. In this respect, the investors' scan of prospective partners is filtered through a bias for entrepreneurs with qualifications from Ivy League universities and elite MBA programmes, which tips the balance in favour of white male expat entrepreneurs who make up a majority of start-up founders/co-founders in East Africa (Friederici et al., 2020). In order to bypass this problem of racial bias, some East African tech entrepreneurs have adopted a practise known as "white fronting", which involves Black entrepreneurs deliberately partnering with or hiring white individuals to gain advantage in the venture capital investment ecosystem (Friederici et al., 2020).

However, not all Black entrepreneurs readily accept the status quo. There has been vocal criticism of the status quo in the African media. For example, a debate about investor racial bias in Africa erupted in the tech media after a Bill and Melinda Gates Foundation-funded study on fintech start-ups found that '90% of disclosed investments (over a two-year period) went to one or more European or North American (expatriate) founders' in East Africa (Mpala, 2018). Prior to the release of the Gates Foundation study, concerns were raised about the tech ecosystem in the South African press by Andile Masuku, a Black entrepreneur and media commentator who made the following argument about Ivy League educated investors and entrepreneurs in Africa: 'Via their handy Silicon Valley connections and strong affiliations to leading start-up accelerator programmes, they are well-positioned to set a continental investment agenda that favours people who look, sound and behave European or North American' (Masuku, 2017).

Thus, the evidence highlights the fact that financial elites are white. However, while Castells' network society theory and its critique of neoliberalism can be applied to make sense of the question of power and control in the tech ecosystem, it does not engage with the question of racial bias that the studies on East Africa expose. For this, I turn to Calderón's (2006) interpretation of Marcuséan one dimensionality. Calderón (2006) builds a critique of racism into her analysis of capitalism by layering the concept of whiteness onto Marcusé's work. Drawing on Bonilla-Silva's (2001) materialist interpretation of racism, she identifies "racial praxis", i.e. racial social practices, as an ideology that maintains racial advantages. Bonilla-Silva's (2001) materialist interpretation of racism is instructive for making sense of racially skewed outcomes in racialised societies such as South Africa.

> (The) materialist interpretation of racism (is) rooted in the fact that races in racialized societies receive substantially different rewards. This material reality is at the core of the phenomenon labelled as racism. Actors in superordinate positions (dominant race) develop a set of social practices (a racial praxis if you will) and an ideology to maintain the advantages they receive based on their racial classification, that is they develop a structure to reproduce their systemic advantages. Therefore, the foundation of racism is not the ideas that individuals may have about others, but the social edifice erected over racial inequality. (Bonilla-Silva, 2001, p. 22)

For Calderón (2006), "racial praxis" is the ideology and practice of whiteness. Drawing on Marcusé's (1964) theory of technological rationality, which highlights the concept of one-dimensionality in advanced capitalist societies as a flat rationality, Calderón (2006) argues that whiteness represents a flat epistemology 'in which the organization of knowledge is hierarchical, unidirectional, and reductive'. In this regard, she deploys Marcusé's (1964) analysis of technological rationality as a framework to demonstrate that the 'flat epistemic nature of whiteness' is expressed as the unwavering one-directional mode of capitalist relations, which not only 'always progresses towards the reproduction of capitalism', but also always discourages critique of the system (Calderón, 2006, p. 75).

In this regard, Marcusé highlights modern society's use of technological rationality as an apparatus that 'imposes economic and political requirements' on different aspects of people's lives in a totalitarian manner (Calderón, 2006, p. 75). This demands a flattened one-dimensional culture, i.e., a flattened rationalism that originates from and is controlled by the establishment—and for Calderón (2006), the establishment is white.

> In essence, the totalitarian or flattened rationalism is ideologically produced in the one-dimensional epistemology of whiteness. Individuals come to understand themselves, for the most part, only in relation to the universal or totalitarian notion of whiteness. Whiteness appears to be commonsensical, universal and value-neutral. (Calderón, 2006, p. 75).

In this regard, Calderón (2006) argues that whiteness is an unmarked category that is silent and powerful. Thus, by drawing on the Marcuséan idea of a flattened technological rationality and Bonilla-Silva's racial praxis, she demonstrates how whiteness is silently pervasive. In this regard, it can be argued that the selection bias of investors who prioritise Ivy League educated white men even in Africa, is a demonstration of how whiteness is subconsciously equated with performance and excellence in the investor-entrepreneur ecosystem. Thus, highlighting race as an important indicator of success in the start-up sector.

Financial Markets Driving Technological Development

The relationship between investors and entrepreneurs highlights the significance of entrepreneurial capitalism in the technology ecosystem. While entrepreneurial capitalism is dependent on financial markets (Sapienza and De Clercq, 2000), the kind of entrepreneurialism that attracts the most interest from financial markets is tech entrepreneurialism. This is demonstrated by the fact that start-ups are the "glamour projects" of venture capital investors (Kedrosky and Stangler, 2011, Ford, 2015). Thus, indicating a symbiotic relationship between entrepreneurs and investors, which further upholds the ideology of market driven development in the start-up ecosystem. This study

makes three observations about the dominance of financial markets in tech innovation in relation to: 1) the relationship between financial markets and the network effect; 2) reduced investment in research and development (R&D) by corporates, and 3) the merger of tech innovation with financial innovation.

Financial Markets and the Network Effect

The reasons underpinning the growing relationship between finance and technology go back to the days of the 1990's dotcom bubble when the financing of overvalued and unprofitable tech start-ups 'became an end in itself' (Kedrosky and Stangler, 2011). This investment frenzy and the overvaluation of technology platforms has re-surfaced in recent years given the appearance of network enterprises in the Castellsian sense, i.e., companies with immense power and reach, such as *Uber* and *Twitter* before it was acquired, delisted and renamed by Elon Musk (Castells, 2011, Reuters, 2013, DeChesare, 2019, Kerr, 2022, Trainer, 2022, Counts and Maloney, 2023). As one investment portfolio manager put it, 'In recent years, more investors have been understanding the impact of network effects, the effects of winner-take-all and the real explosion in value these businesses can deliver' (Howitt, 2018, 2:28). Chapter Seven, which examines the platform economy, goes into detail about the relationship between the network effect and the growth of technology platforms as well as their harmful effects on society. This analysis is not covered here to avoid repetition, suffice to argue that the growth of monopolies in the digital economy is an indicator of increased wealth concentration, growing inequality and an imbalance in political power.

Reduction of R&D in Corporations

The reduction of R&D in large corporations also spurs the overvaluation of technology start-ups. Big companies see tech start-ups as innovation labs that accept the risks associated with R&D that corporations can avoid. In this regard, there is a growing literature on the shift from internal R&D in big corporations to external investor-driven innovation (Clarysse et al., 2012, Judge, 2018, Bloch, 2019). This development is leading to the overvaluation of tech start-ups, as investors seek to ensure high market valuations

when buyouts take place. For example, within the financial services sector, 'almost 80% of financial institutions are engaging with fintech companies...(through) mergers and acquisitions…with traditional firms opting to pay high premiums to participate in fintech's growth, which ultimately benefits the shareholders of these fintech firms' (Palandrani, 2019).

Consequently, the idea of an exit plan accompanied by large profits looms large in the minds of tech entrepreneurs and investors, and is often pre-planned (Cumming and binti Johan, 2008). Indeed, the discussion in one of the start-up events I participated in as an observer revealed that the exit strategy is an ongoing conversation between investors and entrepreneurs (Startup Grind, 2019b). This results in a celebrated cult of serial entrepreneurship. For example, more than 10% of the companies in this PhD study's sample were launched by serial entrepreneurs who in some cases sold their companies for huge profits. Two examples of start-up buyouts within the CT sample are *Wumdrop* and *M4Jam*. *Wumdrop*, an on-demand courier service was acquired by retail giant *Makro*, for its 'last mile delivery service' (Mpala, 2017). Meanwhile, *M4Jam*, a micro-jobbing platform, was acquired by marketing company, *Informal Solutions* (Thomas, 2016). This micro-jobbing platform was also acquired for a short period of time by the Chinese tech giant *Tencent*, which is partially owned by South Africa's *Naspers* (Jackson, 2016).

The Merging of Financial Innovation and Technological Innovation

Financialization is broadly defined as 'the increasing role of financial motives, financial markets, financial actors and financial institutions in the operation of domestic and international economies' (Epstein, 2021, p. 5). While financial markets have a powerful influence on the trajectory of technological innovation, the growth of the financial services sector itself is conversely linked to advances in technology, resulting in a feedback loop between the two (Kedrosky and Stangler, 2011, Ford, 2015, Drummer et al., 2017). According to some policy analysts,

> the rapid expansion of financial services over the past few decades has been directly tied to continued advances in information technology. As a result, there are new and

> growing pressures to increase the size of the sector and increase the financial-centricity of modern economies. (Kedrosky and Stangler, 2011, p. 4)

The financialization of the South African economy is well documented (Ashman et al., 2011, Fine, 2012, Mohamed, 2016), and is a phenomenon that finds expression in the dominance of fintechs in the South African start-up ecosystem as revealed by this study's sample, media reports and expert commentary. For example, fintechs accounted for more than a third of start-up investments in the first half of 2019 (Timm, 2019a). And while investments in fintechs dipped slightly in the past year, they continued to attract the largest share of venture capital; thus, maintaining their reign of the South African start-up ecosystem in 2023 (Statista, 2023).

Somewhat peculiarly in South Africa, Black economic empowerment (BEE) legislation has been singled out for tilting tech innovations towards financial innovation. In a podcast discussion, the late Prof. Barry Dwolatzky, founder of *Tshimologong*, a start-up incubator established as Africa's answer to Silicon Valley, argued that the distortion of the South African start-up scene can be attributed to BEE legislation (Farouk, 2020). According to Dwolatzky, one of the big score items on the BEE scorecard is enterprise and supply development, which obligates companies to invest a certain amount of money in supporting start-up businesses that feed into their ecosystem (Farouk, 2020). In this regard, the dominance of fintechs in South Africa's tech ecosystem can be attributed to the fact that banks invest heavily in start-ups to boost financial innovation, i.e., fintech solutions that can be adopted by the banking sector. Thus, providing a clear example of the merger between financial and technological innovation, which simultaneously also demonstrates the reduction of R&D in large corporations that have outsourced the function.

This skewed pattern continues within the fintech sector itself, which is dominated by payment platforms followed by credit and loan platforms as the most common innovations (Rand Merchant Bank, 2019, Statista, 2023). The dominance of payment platforms in South Africa has even prompted some business analysts to wonder whether this limited innovation focus could be attributed to a skills deficit (Rand Merchant Bank,

2019). However, given the financialization of the South African economy, this fixation with payment platforms can also explained by Marcusé's theory of technological rationality as an example of technology and society both being manipulated by profit motivated efficiency goals—leading to value extracting innovations that are automatic, immediate and inconspicuous. This is the dominant mode of technological development driving capitalist reproduction in South Africa's digital economy.

Meanwhile, Drummer et al. (2017) contend that one of the drivers behind the growth of credit and loan fintechs is the fact that investors now have direct access to consumer credit as an asset class of its own. Consequently, while South Africa's credit and loan fintechs may argue that they are promoting financial inclusion (Sahay et al., 2020, Makina, 2019), what they are really doing, to quote Anand Giridharadas, author of *Winners Take All: The Elite Charade of Changing the World* (2019), is 'profiting from a systemic cruelty'. Giridharadas made these remarks while critiquing *Even*, a self-insurance fintech app that provides pay-day loans to the working poor (Giridharadas, 2015, VPRO Documentary, 2020). Whilst conceding that *Even* offers a useful service, he nonetheless argues that it is only able to deliver it 'because of structural conditions in the economy that are not right and should be ended' (Giridharadas, 2015, VPRO Documentary, 2020). Thus, it can be argued that financial innovators are discovering novel ways to leverage new technological capabilities for rent-seeking and value extraction from society, which includes profiting from the insecurity of the underprivileged. This new form of rent extraction is paradoxically packaged as financial inclusion.

Expert Responses to the Ontology of the Start-up Sector

As noted by the review of the literature on the policy response to the 4IR covered in Chapter Two, scholars and policy analysts caution about South Africa's special needs as a developing country that requires supply side interventions to offset market failure (Mazibuko-Makena and Kraemer-Mbula, 2021, Marivate et al., 2021, Selelo and Khwela, 2022). Thus, highlighting a need for the prioritisation of social impact technological innovation. However, as the sample in this study reveals, social impact is deprioritised in

the engine of technological innovation, which is instead driven by financial motives. This places a country like South Africa with substantial development needs at a disadvantage. In this regard, experts that were interviewed were encouraged to reflect on the dominant role of financial markets, the lack of social impact technology, the impact of automation technologies, and the demographics of the start-up ecosystem.

On the Demographics of the Start-up Sector

The lack of demographic representation amongst founders in the tech start-up sector was confirmed by a majority of the experts interviewed by this study (Mdwaba, 2020, Friederici, 2020, Gastrow, 2020). Some experts drew directly on their knowledge of the tech industry to elaborate on its demographic imbalance. For example, Dr Nicolas Friederici (2020), lead author of a book on tech entrepreneurialism in Africa reported that his research on tech start-ups in Stellenbosch, which is just outside of Cape Town, only brought him into contact with companies founded by white men. Meanwhile, evocative of the discourse on the financialization of the economy, Michael Gastrow (2020), a commissioner on the Presidential Commission on the 4IR (PC4IR), elevated both race and financial speculation in his definition of start-up founders, who he described as

> *Privileged White South African millennials that are in a social space in which they have access to large amounts of capital. They don't necessarily need to work for a living. All they're trying to do is turn money that they've inherited or can tap into, into more money. (Gastrow, 2020)*

On the other hand, Mthunzi Mdwaba (2020), deputy chair of the International Labour Organisation (ILO) and ex-officio member of its Global Future of Work Commission, was more direct in his analysis of the extractive nature of the economy, which he located within a neo-colonialist frame. For Mdwaba (2020), there was a clear link between the racial imbalance in the tech start-up ecosystem and overall white control of the economy. Euphemistically referring to white South Africans as people with dual citizenship, Mdwaba (2020) linked their control of the economy to its extractive nature, arguing,

> *The thing that is very wrong with the way that the economy is structured is that we don't have many value creators. We don't have many people who are bringing something new to the world of work. Everybody is taking from it and those who would take from it—I remember picking up a statistic somewhere and I cannot tell you now where it was…but the biggest difference between South Africa and some of the countries in Asia, for example, is that the majority of businesses or people who own businesses, who make money in South Africa, do not reinvest that money in South Africa. It leaves the country whether through bank accounts they have overseas to hedge their—you know, the people who have two passports and three passports…because, you know, if things don't work, they go somewhere else. Whereas some of us that got nowhere to go, got to make this thing happen. And that's the biggest challenge that is in South Africa. (Mdwaba, 2020)*

Talking specifically about start-ups he argued,

> *So even with the fintechs that you're talking about, you don't find—I mean if you look, for example, at the transformation of sectors in South Africa, the majority of which are still all white owned. And then we have this thing again of using the Gupta regime to say white monopoly capital was a creation of the Guptas and that communications PR firm (Bell Pottinger) from the UK. But the reality of it is that we do have white monopoly capital. For me, I'm happy for you to quote me as many times—we have white monopoly capital. (Mdwaba, 2020)*

In contrast, the PC4IR's deputy chair, Tshilidzi Marwala (2020) disapproved of the of white monopoly capital frame, arguing that it was unconstructive because it pits *"us against them"* and hinders prospects for an inclusive approach, which from a leadership perspective, ought to *"mobilise all the forces in society"* for a new social compact.

On the Role of Financial Markets

Marwala's (2020) social compact is orientated towards creating an enabling environment for the market to lead technological innovation. The pillars of his social compact include strengthening education and skills development for the wider population as well as building a functional and accountable state that prioritises foreign direct investment (FDI) as the driver of economic growth and development. Marwala (2020) was silent on the extractive nature of financial markets, instead stressing the significance of venture capital for technological innovation as well as linking South Africa's need for FDI to an inadequate domestic capital market. In this regard, he argued,

> *I think that it is very important for us to understand that in terms of technological development, there is still a great deal that we need—more—to get. There are pockets of excellence in South Africa, and I acknowledge it. But you don't have equivalence of economy. It simply does not exist…If we want our tech industry to become internationally competitive, we have to have access to tech staff and we have to have access to money. And the South African capital space is not large enough and the South African market is not large enough. (Marwala, 2020)*

Drawing attention to the fact that most investors viewed South Africa as the gateway to Africa, Marwala (2020) highlighted the importance of integrating this expectation into his proposed social compact, which he argued *"should not be nationalistic in nature"*. Consequently, he called for a social compact that not only prioritised FDI, but was *"embedded in the African continent"* Marwala (2020).

Adopting a tougher stance towards the market, Mdwaba (2020) questioned South Africa's prevailing obsession with FDI, characterising it as a *"beauty contest"*. Instead Mdwaba (2020) proposed an interventionist and active role for the state beyond policy and regulation as the funder of first resort and implementor of programmes in the digital economy. As such, Mdwaba (2020) proposed a bigger role for the state and a smaller role for the financial market as the driver of technological innovation in South Africa. In this

regard, his stance aligns somewhat with Mazzucato's (2011) notion of an "entrepreneurial state".

Interestingly, while both Marwala (2020) and Gastrow (2020) participated in the PC4IR, the former as its deputy chair and the latter as a commissioner, they had diverging views on the role of financial markets. Marwala (2020) was uncritical of the extractive nature of financial markets; while Gastrow (2020) argued that the role of the commission was to mitigate the inequality inducing outcomes of the market. In this respect, he suggested a role for the state from a regulatory perspective, arguing,

> *There's all kinds of things that we need to do. But, put it this way—if government stepped back and did nothing, if the market was left to resolve all this, I have very little doubt that it would drive unemployment and inequality. For me, that's the significance of the Commission in this space. Gastrow (2020)*

Despite diverging perspectives on the commission, it is evident from the discussion in the next section that Marwala's (2020) views prevailed, as the recommendations emerging from the PC4IR identify a central role for the financial market to drive start-up innovation. Meanwhile, it is not evident from the report of the presidential commission that there are sufficient guidelines in place to steer venture capital towards the state's social inclusion priorities as articulated by the PC4IR.

On Technological Disruption and Automation

Given that automation anxiety is an important theme in this thesis as well as the fact that it is a by-product of the technological innovations emerging from the start-up sector, experts were asked to reflect on the relationship between technological disruptions and unemployment.

Marwala (2020) argued that technological disruptions do not always result in job losses. For him, technological innovations transform old jobs whilst also creating new ones. Focusing specifically on the creation of new jobs, which would require skilled labour, he contended that whites and Asians stood to benefit most (Marwala, 2020). In this regard, he argued,

> *The fact that many jobs are going to disappear is a given. The fact that many jobs are going to change is also a given. And the fact that many new jobs are going to emerge is also a given. Now let's just tackle the issue of new jobs that are going to be created. I think many of the jobs that are going to be created are going to require higher skills and much more education than the jobs in the past…Now if you look at the distribution of skills in South Africa, you realize that there is an obvious racial characteristic in terms of distribution of skills. And because of that when these new jobs are going to emerge, the people who are going to benefit the most are going to be the people who are educated—and as things currently stand, this will be white people and Asians. And the people who are going to be negatively impacted most, is going to be Africans. Now the same argument holds about old jobs that are going to change. (Marwala, 2020)*

Building on this issue, Marwala (2020) was probed on whether he thought South Africans were ready to have a conversation about a post work society in which nobody was left behind. The question was put to him in the context of studies, which have identified an empathy gap in societies with high inequality levels (Goleman, 2013). His response was that South Africans were not ready for such a conversation (Marwala, 2020). As an alternative, he proposed a bigger role for the South African government as a developmental state that focused on job creation to expand the ranks of the employed to build a bigger tax base to take care of its people (Marwala, 2020).

Similarly, for Mdwaba (2020) technological disruptions were unavoidable and a necessary part of development. Mdwaba's (2020) exposure to future of work debates and discussions at the ILO as well as his experience as chairperson of the Productivity Board underscored the importance of job creation for him. He thus prioritised job creation as a

critical intervention, whilst arguing that South Africa needed to be agile in adapting to the needs of a digitalising economy by investing in its people to develop resilience in the face of unavoidable technological disruption (Mdwaba, 2020).

Both Marwala (2020) and Mdwaba (2020) were dedicated to focusing on the relationship between technological disruptions and automation from a demand side perspective, i.e., focusing on skills and/or human capital development, whilst minimising the impact of supply side structural constraints, i.e., job scarcity as the overriding and inevitable outcome of the disruptive technologies of the 21st century. This emphasis on job creation as the foremost solution to automation in digitalising economies is oxymoronic, as digital technologies, especially AI, produce fewer jobs on aggregate, as several studies argue (Frey and Osborne, 2013, Frey, 2020, Le Roux, 2018a, Acemoglu and Restrepo, 2020).

However, Gastrow (2020) who recognised the problem, argued that a critical intervention would be the introduction of a universal basic income (UBI). In this respect, Gastrow (2020) was the only expert to propose a Gorzian solution to the problem of job scarcity in the age of automation. Moreover, and ostensibly in response to South Africa's past, he proposed the UBI as a redistributive justice intervention. Nevertheless, Gastrow (2020) also argued that the political will to implement a UBI in South Africa was lacking.

4IR Policy and Legislation in Relation to Start-ups

Marwala (2020) and Gatrow (2020) were interviewed while the PC4IR's report was still under review. However, two years after its release, the commission's policy recommendations have lagged behind the "regulatory entrepreneurship" (Pollman and Barry, 2017) of the start-up sector as well as the disruptions caused by their innovations. For example, while government has not yet developed start-up legislation, a "Start-up Act Position Paper" (Digital Collective Africa, 2021) has emerged from a lobby group predominantly comprised of venture capitalists and business organisations that describe themselves as the Digital Collective Africa working group. The origins of this position paper in a venture capital lobby group is cause for concern both from a Castellsian and a

Marcuséan perspective given the influence of financial elites and their penchant for profit seeking, which is embedded in a capitalist pre-ontology—this is notwithstanding the overall power of the financial market as the most powerful network in the digital economy (Banet-Weiser and Castells, 2017, Feenberg, 1991). The discussion below engages with the Start-up Act Position Paper as well as the recommendations emerging from the PC4IR insofar as they relate to the start-up sector.

Presidential Commission on the 4IR Recommendations

As noted in Chapter Two, while the recommendations of the PC4IR are driven by social inclusion as an objective, i.e., social impact innovation, they nonetheless align with the WEF's market-driven model of development by identifying a critical role for "capital markets" to catalyse innovation (PC4IR, 2020, p. 36). In this regard, responding directly to the need for financial support to start-ups, the PC4IR appeals for more early-stage risk capital from the financial market, including the establishment of a "4IR-specific risk capital fund" as a public-private-partnership (PC4IR, 2020, p. 37). Given venture capital's dedication to the profit incentive, this highlights a tension between the PC4IR's social inclusion objectives and its proposal for partnership with investors. What is worse are the PC4IR's efforts to expedite the "ease of doing business" by increasing South Africa's appeal to international investors by prioritising concerns typically highlighted by the business community, such as policy uncertainty, governance challenges and tax inefficiencies (PC4IR, 2020). Thus, demonstrating an obsequious attitude towards priorities set by investors.

Given the evidence gathered by this study, the commission's recommendations appear to be out of touch with the risks associated with market driven innovation, as the discussion below demonstrates. This is evidenced by the proposals emanating from the Start-up Act Position Paper, which undermine the PC4IR's social inclusion objectives. It is also demonstrated by original evidence gathered by this study. For example, Janine Basel, the head of Akro Capital, made some telling remarks as the keynote speaker at a start-up networking event (Startup Grind, 2019a).

Akro Capital was the recipient of what has been described as a "monster investment" from the SA SME Fund (Startup Grind, 2019a). The SA SME Fund (n.d.) emerged out of an initiative that is a collaboration between government, business and labour, which states amongst its objectives "sustainable employment" and "value creation". In other words, the fund has social impact objectives. However, despite the large injection of capital into her company from the SA SME Fund, Basel downplayed social impact investing (Startup Grind, 2019a). Framing her company's investment philosophy as capitalist, she argued,

> *Investors are looking for a return on investment. It's not a feel-good NGO…Our investment philosophy is—we're not—I know impact investment is a big thing and it's got its place, but we feel if we are helping a start-up to get really good viability in growth, then there's the impact. Period. So, is that capitalist? (sic) So, we're very focused on growth, scale and tech. We feel tech is the way to do it. (Startup Grind, 2019a)*

Moreover, in response to a question about setting priorities in line with government programmes, Basel argued that while open to the idea of collaboration, her fund nevertheless functioned autonomously and was only motivated by the desire to support businesses with "growth potential" (Startup Grind, 2019a). Thus, reasserting the profit incentive as her company's core objective whilst distancing it from the state's development priorities.

A further problem that emerges from this example can be attributed to the SA SME Fund itself, which despite making much about its roots in a collaboration between government, labour and business is governed by a board of directors drawn completely from the private sector. The fact that the fund's capital is drawn from the private sector may account for this arrangement. Nevertheless, business's complete control of the fund and the fact that it determines the metrics to measure "sustainable employment" and "value creation" ostensibly dilutes the concerns and objectives of other important social stakeholders with respect to an issue that is essentially a socio-economic challenge that affects the whole country.

The fact that the SA SME FUND financed Akro Capital, which is dismissive of social impact investing, is a cautionary tale of the dangers lurking behind arrangements that put the investor class in the driver's seat in relation to addressing development challenges, which the PC4IR's demonstrates little awareness of in its recommendations. Meanwhile, the proposals contained in the Start-up Act Position Paper offer a starker warning of the motives driving venture capital.

Start-up Act Position Paper

The Start-up Act Position Paper (Digital Collective Africa, 2021), as its name suggests, targets legislation affecting the start-up sector, and as alluded to earlier originates from a venture capital dominated business lobby group. Accordingly, the position paper's proposals are informed by a business-as-usual approach underpinned by the neoliberal tenets of deregulation, financial liberalisation and flexible labour regimes (Digital Collective Africa, 2021). Recycling a familiar refrain, the position paper calls for the elimination of red tape, which it argues constrains growth and job creation (Digital Collective Africa, 2021). In this regard, the position paper calls for releasing 'qualifying start-ups from…compliance costs, inhibiting policies, and bureaucratic practices that prohibit South African domiciled start-ups from attracting foreign investment' (Digital Collective Africa, 2021, p. 19). While this aligns with the PC4IR's "ease of doing business" objectives, the Start-up Act Position Paper also calls for a flexible regulatory environment to hire and fire staff "without fear" of 'penalties and pro-labour rulings' by the Commission for Conciliation, Mediation and Arbitration (CCMA) (Digital Collective Africa, 2021, p. 17). Thus, highlighting challenges for the PC4IR's people centred approach to innovation.

Essentially what this lobby group is calling for is a reduced role for the state in digital innovation, as an enabler for venture capital to invest in start-ups that are given complete autonomy to innovate outside of South Africa's social inclusion and development priorities with the added power to exploit labour in their single-minded pursuit of growth, which is simply a euphemism for profits that can be extracted by their founders and their investors. Most concerning in this case, is not the demands of the investor class, which are

unexceptional in their predictability, but the blindness of the PC4IR to business' agenda and its recommendations, which pander to them. This is a clear example of regulatory capture in South Africa. Regulatory capture is defined as 'an arena in which special interests contend for the right to use government power for narrow advantage' (Levine and Forrence, 1990, p. 167). In this regard, the outcome is the regulatory capture of the South African state, which creates fertile ground for venture capital to drive innovation that is extractive and unresponsive to South Africa's development challenges.

Conclusion

Overall, this study demonstrates that there is an imbalance in technological innovation in the digital economy, which skews heavily towards fintechs followed by e-commerce platforms, as these emerged as 60% of the 120 the start-ups surveyed by this study. One of the major contributors to their dominance is the financialization of the economy, which due to the feedback loop between digital innovation and financial innovation, has turned the attention of venture capitalists and entrepreneurs to financial activities as a principal source of revenue. Financialization has also given the financial market, which is an extremely powerful global network (Castells, 2011), significant control over national economies including South Africa's, resulting in the supremacy of venture capital as a controlling force in the start-up ecosystem.

This mode of innovation, influenced by a one-dimensional neoliberal capitalist pre-ontology, has dire consequences for closing the racial and economic inequality gap in South Africa, as it is underwritten by a survival of the fittest doctrine that is steeped in racial praxis and expressed as a 'social edifice erected over racial inequality', which skews rewards towards the dominant race group in racialised societies (Bonilla-Silva, 2001, p. 22, Calderón, 2006). In South Africa's case, the dominant race group is white. In this regard, this study finds that the most successful entrepreneurs in the start-up ecosystem are white founders who have the easiest access to venture capital. Within this study's sample, this resulted in 68% of start-ups being established by white founders, which from a gender perspective further disaggregated to 59% men and 9% women. In contrast, Black South African men and women respectively made up just 6% and 3% of

the total sample and had limited to negligible access to investment capital. The study also found a discernible gender disparity amongst start-up founders. In this regard, White male founders as well as their innovations are clear winners in the start-up ecosystem.

Interestingly, the study also found a correlation between innovations with a focus on social inclusion and founders who were people of colour and/or women. For example, this demographic was more likely to develop digital innovations targeting the township economy or solutions aimed at supporting access to credit for the poor. In this regard, the low numbers of Black and/or women founders correlates with a low incidence of social impact technological innovation.

In sum, this study finds that the digital economy is dominated by white founders and investors who are predominantly male, whilst digital innovations skew towards value extracting activities that intersect with the financialization of the South African economy. Meanwhile, the incidence of social impact innovation, however debatable current model are, is negligible. In this regard, as the source of digital innovation, the potential for the start-up sector in its current form to contribute to addressing South Africa's inequality is insignificant. This is most concerning in light of the fact that the future is digital.

The next chapter, i.e., Chapter Six, examines the impact of fintechs and digital innovation in the banking industry and what this means for technological unemployment. Meanwhile, Chapter Seven examines the impact of job creating gig economy platforms, which had a strong showing in this study's sample as e-commerce service provision platforms. These chapters demonstrate the connection between start-up innovations, the mainstream and the platform economy as well as their implications for social change.

CHAPTER SIX: BANKS AS A MICROCOSM OF DIGITALISATION IN THE MAINSTREAM ECONOMY

Digital technology in the Fourth Industrial Revolution (4IR) has dramatically changed the way all manner of industries conduct business. One industry at the forefront of digitalisation is the financial services sector, which includes retail banks that have arguably 'seen the most significant overhaul with the Fourth Industrial Revolution' (Marwala, 2019). This is notwithstanding the fact that banks were early adopters of technology even predating the 4IR (Akhavein et al., 2005, Lappetito, 2019). At the same time, banks contribute nearly a quarter (23%) of South Africa's GDP (BASA, 2021). In this regard, they are extremely important players in the economy, resulting in the South African Reserve Bank identifying six banks - Standard Bank, ABSA, First National Bank (FNB), Nedbank, Investec and Capitec - as systemically important financial institutions because of their potential impact on the economy (Donnelly, 2019). Consequently, this study examines the banking industry as an illustrative sector to gain a better understanding of the impact of digitalisation and automation on unemployment and inequality in South Africa.

The surge of digitalisation that swept through the banks during the late 2010's resulted in the automation of internal operating procedures as well as the migration of customer interaction to mobile and online platforms. While this led to efficiencies for both the banks and their customers, a significant after-effect was the prospect of technological unemployment for large numbers of bank staff. Concerns about job losses in the banking sector came to a head in September 2019 when finance trade union, the South African Society of Bank Officials (SASBO), which is affiliated to the Congress of South African Trade Unions (COSATU), threatened a national strike (Kokela, 2019). While this strike was halted by a court interdict (Jansen, 2022), the future of bank employees remains unclear as the union has since retreated, whilst the banks have been quietly reducing their headcount on an ongoing basis.

Despite the banks being evasive about the manifestation of technological unemployment, this chapter demonstrates that this issue is in fact a fait accompli. One issue that has

remained vague due to its obfuscation by the banks, is the question of who exactly is affected by technological unemployment. However, as the banks historically absorbed large numbers of Black women from disadvantaged backgrounds to perform clerical support work that is easily automated, this study examines the current wave of digitalisation in the banks in relation to what it portends for the expansion of the Black middle class, as the white-collar jobs occupied by these women represent a stepping stone to a better socio-economic position that is currently under threat.

Consequently, the aim of this chapter is to examine the effect of digitalisation in the banking industry as an illustrative white-collar sector in the mainstream economy, including what this means for the expansion of the Black middle class in South Africa in relation to inequality. It commences with a description of the history of adoption of technology in South Africa's banks. This is followed by a discussion of contemporary technological changes sweeping through the banks as a result of the 4IR, including their implications for automation and technological unemployment as well as who exactly is affected by it.

A Brief Note on Methodology

This chapter is based on a reading of banking industry literature as well as in-depth interviews predominantly with senior staff in the banks. Given that it is a fairly new area of research, the academic literature on the impact of the 4IR on banking in SA is limited. This has resulted in greater reliance on media reports as well as industry reports emanating from the banking and management consulting sectors. Meanwhile, the original empirical data for this study is gathered from qualitative interviews with seven respondents. This includes interviews with six respondents working directly in the banking industry, and a seventh interview with a respondent who is a veteran of the labour movement that has been monitoring changes in the banking industry for many years. Overall, the outline of this chapter is based on a framework that derives from the conversations held with these interview respondents.

The banking industry in South Africa is extremely concentrated with just six major banks, including ABSA, Standard Bank, Nedbank, FNB, Investec and Capitec. Investec targets high net worth individuals, i.e., it services an elite clientele, which is very small and on this basis was excluded from the sample as it does not sufficiently represent the demographic profile of South Africa. On the other hand, Capitec largely services low-income earners that represent the vast majority of South Africans. Capitec was included in the original sample. However, it proved extremely difficult to secure an interview with a representative from this bank, resulting in an exclusion of data from this source. However, to offset this exclusion, interviews were also conducted with representatives from the Banking Association of South Africa (BASA) in order to gain a macro perspective of the banking industry as a whole.

Nevertheless, the four banks that were included in this study, i.e., Standard Bank, Nedbank, ABSA and FNB are old institutions, which represent two thirds of major retail banks in South Africa, and also happen to have their roots in the apartheid era. These banks are also commonly referred to as the "big four" because they dominate the banking sector (Khumalo, 2018, Brown, 2019) in addition to the fact that they are the largest employers within the industry (BANKSETA, 2018). Thus, establishing their relevance as a sample in this study of automation, unemployment and inequality in South Africa's banking industry as an illustrative sector, not only because of their prominence in the sector, but also because transformation is an important challenge facing these old institutions that have their roots in the apartheid era.

Respondents from the banks were chosen on the basis of the role that they play in the development of new technologies or in relation to their decision-making authority regarding the digitalisation plans of banks. In this regard, the banking industry respondents that were interviewed included Paul O'Flaherty, Chief Executive of Engineering Services at the group headquarters of ABSA Bank. O'Flaherty is a high-profile individual in corporate South Africa. He is the former Chief Executive Officer of South Africa's largest steel company ArcelorMittal as well as the former Finance Director of Eskom, South Africa's energy utility company. Gwenaël Trotel, head of Payments Digitisation and Open Banking at the corporate headquarters of the Standard Bank Group

was the second executive interviewed. Two further interviews were conducted with middle managers working in the technology divisions of FNB and Nedbank. These respondents opted to remain anonymous. One was male (Respondent A) and the other female (Respondent B). Respondents from the Banking Association of South Africa (BASA) included Kumaran Selvarajalu, Business Development Manager and Dr. Abba Omar, Head of Strategy and Communications. Please refer to Appendix B for the list of respondents including the date and time of interviews.

History of Technology in South African Banks

According to Kumaran Selvarajalu (2019), Business Development Manager at the BASA and a technology expert who was interviewed for this study, South African banks already made the switch to digitisation in the 1970's when they built mainframes and in so doing, connected the entire country to a banking network. Selvarajalu (2019) argues that this was a complex phenomenon signifying quite an advance because the only other network in the country, at the time, was a simple telephone landline network. However, with the introduction of their mainframes, banks developed the ability to conduct complex transactions over vast geographic areas.

This historical adoption of technology in the banking sector is commonly referred to as legacy information technology (IT). According to Selvarajalu (2019), most banks are locked into mature environments with legacy IT that has capabilities that were developed in the 1980's and 1990's—and the banks are still trying to stretch that legacy given that initial investment costs were high. Similarly, Paul O'Flaherty, Chief Executive of Engineering Services at the ABSA Bank head office, who was also interviewed for this study argued,

> *The mainframes are still going to be around for some time. You don't just move off it in a year. It takes a long time to move. (O'Flaherty, 2019)*

Due to their legacy IT, banks have been storing information for a many years and learned to develop algorithms to deal with large numbers at an early stage (Selvarajalu, 2019). However, even though they had the data and could handle massive complexities, most banks didn't see the value of data. Thus, foregoing the opportunity to develop predictive data science technology, the hallmark and driving force behind the 4IR (Selvarajalu, 2019).

Digitalisation: Intensification of New Tech in South African Banks

The big shift towards the adoption of new technologies in banks took place more or less at the onset of the last decade. However, the adoption of 4IR-related technologies only took place in the latter half of the decade. Periodizing exactly when the banks adopted the latest wave of technology is important to identify their connection to the 4IR. In this regard, Respondent A and Respondent B who were interviewed in 2019 when the banks underwent major restructuring, both highlight 2017 as the year that major disruptions ensued.

For example, Respondent A, a male manager and technical lead at the head office of one of the big four banks who chose to remain anonymous argued,

> *I remember very clearly when the shift to increased technology took place because it was around the time that the FIFA Soccer World Cup came to SA. The focus started on Internet banking. So, that was the initial start and people said, 'This is the future of banking; you're going to be using the Internet'. And then they talked about mobile, and people said, 'There's no way you're going to do things on mobile'. But today, that's where it's all happening. Mobile is taking over. It was round about 2017 that we were told that mobile is now the future, and we need to think out of the box. In fact, now, everything that we do is for mobile…all our green screens and all our branch banking are shutting down. (Respondent A, 2019)*

Similarly, Respondent B, a female tech manager at the head office of one of the big four banks who chose to remain anonymous said,

> *We started jumping on technology about ten years ago. In the last two years, it's become quite critical that we get there. (Respondent B, 2019)*

What distinguishes changes in recent years is a general digitalisation of the sector and the adoption of mobile products, widely acknowledged as a response to the emergence of fintechs (Coetzee, 2018, King, 2018, Khumalo, 2018). O'Flaherty, in particular, emphasized the fact that recent technological changes are a direct response to innovations introduced by fintechs when he argued,

> *Financial services need to be able to open their products to all sorts of fintechs and many people who want to be able to access loans, etc. So, there's no doubt if you don't go with the changes, you will fail. This has been accelerated, over, I'd say, the last two or three years…and I'd say, it's a global thing in which it's happening. (O'Flaherty, 2019)*

The Role of AI and Predictive Analytics in Banking

The technology that is radically transforming the manner in which banks conduct business today is artificial intelligence (AI). It became apparent during the interviews that banks are enthusiastic about their embrace of AI, especially in relation to software that enables the prediction of their clients' behaviour. According to Respondent A (2019), AI currently plays a vital role in banking as it is used to improve customer experience; manage credit risk and exposure as well as affordability; monitor spending pattern behaviours; and track money laundering. Powerful AI tools also manage banks' credit ratings and financial bad debt books (Respondent A, 2019). Alluding to the threat of technological unemployment, Respondent A argued,

> *Previously, all of this was managed by credit staff, credit managers and relationship managers. (Respondent A, 2019)*

Both Respondent A (2019) and Respondent B (2019) highlighted the significant role that AI plays in business prospecting, with Respondent B arguing,

> *Understand and realize that everything can get tracked. Part of the AI is about tracking which website you visit often, so that we can entice you to do something you don't want to do or give you an opportunity to look at something you wouldn't normally look at. (Respondent B, 2019)*

Consequently, while respondents highlighted the important role AI plays streamlining internal processes and enhancing customer experience, what emerged as essential was its role in business consolidation. As argued by Selvarajalu,

> *Banks are focused on predictive analytics and data science to reduce operational losses and cost - and various banks have different ways of doing this - but ultimately, they want to lock customers into a financial ecosystem. (Selvarajalu, 2019)*

This situation is not unique to South Africa, as evidenced by remarks made by the Chief Digital and Technology Officer of Eurobank, who argued that the ultimate goal of a bank's digital strategy is to transition to end-to-end digitisation to achieve operational excellence and enhance customer experience whilst becoming "digital masters" that lock customers into financial ecosystems (Sirmakezis, 2017).

AI, Big Data and a New Basis for Developing Trust

Banks may be deploying AI to lock customers into their ecosystems. However, the fact that they are followers and not leaders in AI innovation in relation to big data analytics, is

a harbinger of existential threat to traditional financial services institutions, especially banks. This stems from the fact that the traditional manner in which banks established trust with their customers is being eroded by a new digital approach pioneered by fintechs and Big Tech. In this regard, the deployment of AI, big data and massive computing power on digital platforms as well as how these new technologies work in concert to establish identity and trust, is turning traditional financial services on its head.

Evolution of Digital Identities and the Transformation of Trust

Selvarajalu (2019) argued that identity is a difficult thing to pin down in the digital world where it is developing as a complex phenomenon, because *"how digital identity works"* is fundamentally transforming *"how trust is established online"*. Trust has historically been an important issue for banks in the running of their businesses, which is associated not only with banks offering credit, but themselves also being trusted by the public as institutions where people deposit their money for safekeeping.

According to Selvarajalu (2019), we've come from an age where one's identity was a token that was ceded by the national government, for example, through an identity document recognized by the legal system. However, in the online environment, trust develops in a complex manner disassociated from one's legal identity. Here, tech platforms such as Google, Amazon and Facebook, are transforming the very notion of trust, as online identity is increasingly influenced by the current exponential growth in computing power, big data as well as complex cyber connectivity.

Referring to Brynjolfsson and McAfee (2014) on the exponential expansion of computing power Selvarajalu argued,

> *The 4IR represents a numerical exponentiation in terms of productivity. Exponential change is highlighting something that has probably been with us for thousands of years, which is the notion of who am I, what is my identity, what am I to another person? How do I communicate that across great distances if you haven't seen me or*

> *met me before? And that's becoming quite an amazing problem to solve. You know, it seems that we've never really solved the problem in the legal environment. (Selvarajalu, 2019)*

Highlighting this conceptual identity challenge, Selvarajalu (2019) referred to the development of a new identity based on data generated from people's online interaction. The idea has its roots in the early days of Internet usage when U.S.-based scholars Ananda Mitra and Ray Schwartz (2001) argued that the Internet redefined people's identity by transcending their physical reality and merging their lived experiences in the real world with their virtual experiences on the Internet. This created a space where the real and virtual worlds intersected and seamlessly synthesized to become a "cybernetic space", thus forging a new identity for people in a space that transcended the physical realm and national boundaries (Mitra and Schwartz, 2001).

This vestige of synthesised real and virtual "cybernetic space" provided a useful model to build upon in the era of peak social media, which preceded the contemporary era of big data. In this regard, Mitra (2010) identified the "narrative bits" of information revealed by people on different social media platforms, which viewed in isolation are meaningless, but combined, have the ability to create a compelling personal profile. For example, by identifying the work people do via LinkedIn, their aesthetic preferences on Pinterest and having the ability to glimpse into their personal life and social networks through Facebook (Mitra, 2010).

However, in the contemporary age, given the confluence of AI and big data, a personal profile extends even beyond a composite synopsis based on an individual's social media interaction. In the era of AI, there's a plethora of know your customer (KYC) software available to a range of businesses that track every click, swipe and transaction that a person engages in online to develop a personal profile and digital identity (King, 2010, Lipton et al., 2016, Rand Merchant Bank, 2019). Consequently, the current situation is that a 'person's digital identity is an amalgamation of any and all attributes and information available online that can bind a persona to a physical person' (Turgeman, 2018, in Forbes Magazine online). This, combined with massive computing power and an

abundance of digital information, because of 'the number of relatively cheap devices that are continually talking to each other' (Pearlstein, 2014, in Washington Post online) in a hyper-connected virtual space, enables online platforms to develop real time identities of people that are more accurate and entirely different from their legal identities.

The Emergence of Real Time Identity

What appears to be emerging as critically important in the digital realm is the notion of real time identity. It is no longer a question of who a person is, but also where they are and what they are doing at any given moment of the day that contributes to a composite identity of that person. In this regard, Selvarajalu explained how global tech platforms are deploying new technology and data to develop real-time identities of people, as follows:

> *How many people just switch on their TV's and say it's okay, let me give my details? So, the credit card number is just a proxy. Ultimately, the bank could simply become a dump store value in the background. But the real interface into your financial world is through Netflix and Amazon. All that happens in the background is that you have this data store sitting somewhere. But even that data store is not that important because if you look, for example, at the partners on Facebook's Libra coin, one of the partners is Uber - and that's a very strategic partnership because they can leverage each other's data. Facebook has big data. It has information about people and their socio-demographic data. But at a point in time, Uber has transactional information. It has information about a person in flight in real time. (Selvarajalu, 2019)*

Referring to the power of exponential computing, he continued,

> *We now have the computing power to hold the records of every single individual in the world, simultaneously at every second of their existence. This is real now. (Selvarajalu, 2019)*

As a result, Selvarajalu (2019) contends that there's a shift towards a more mathematical and algorithmic basis for trust, as opposed to a reliance on legal documents. In his view, anyone who can purchase a trust algorithm can do what a bank does. And that has become the root of the new problem that banks face. With a new basis for establishing trust in the digital realm, a different model for conducting business in financial services is also starting to emerge, which represents a threat to banks. In this regard, Brett King (2018), author of *Banking 4.0: Banking Everywhere, Never at a Bank*, illustrates the challenge facing banks via the example of U.S. fintech, Affirm, a consumer finance company founded by PayPal's Max Levchin, which provides credit to people based on their buying patterns, geo-location and online behaviour. Consequently, it is becoming increasingly difficult for banks to compete with tech companies that have substantial amounts of information about people based on their online engagement. This is notwithstanding the fact that it is the tech platforms that are currently deploying AI most effectively to lock people into online ecosystems.

The following section examines how both supply and demand side technological disruptions, including the rise of fintech, the incursion of Big Tech into financial services and the emergence of instantaneous consumerism, are fundamentally transforming, if not systematically eroding the banking sector.

Banks and 4IR Technologies: A Complex Relationship

Given the disruptions heralded by the 4IR, the fluidity of the situation for South African banks became palpable in a comment made by the CEO of Nedbank and chair of BASA, Mike Brown, who argued, 'The road ahead for banks is filled with uncertainty and complexity' (Brown, 2019). This uncertainty stems largely from the fact that banks are on the backfoot developing business strategies in response to fintech and Big Tech innovation. Indeed, the biggest challenge that banks currently face is that they've lost control of financial services innovation. The vast majority of today's financial services innovations have their origins in fintechs that are unencumbered by legacy IT

infrastructure, and are using easy to customise off-the-shelf solutions to develop new products every few months (Cuesta et al., 2015). In this regard, the speed at which fintechs are able to develop new products gives them an "unassailable advantage" over banks (Camarate and Maritz, 2019). Andy Wilson, director and partner at Price Waterhouse Cooper (PWC) in SA argues,

> While traditional banks make the bulk of their money by charging a fee for banking services, the new breed of digital banks use the insights from processing customer banking transactions to develop highly accurate and individualised customer insights that can inform the development of a broader ecosystem of products and services, which is a fundamentally different business model. (Wilson, 2019, in PWC Blog)

For their part, companies that traditionally operated in the technology sector, i.e., Big Tech such as Google and Apple, are bold about their intentions to expand into financial services. For example, a group of five employees from some of the world's biggest technology companies, including Google, co-authored the study, 'Technology and Banking', published by the University of California Berkley. In it, they boldly assert the intention of Big Tech in relation to financial services, which is that '(banks) have the money and other industries want it' (Khayrallah et al., 2015, p. 37). The authors describe the various ways in which tech companies are leveraging their 'core strengths to carve out…banking territory', which amongst other things includes exploiting 'social networks to assess credit worthiness' (Khayrallah et al., 2015, p. 37).

The Relationship between Banks and Fintechs: A Mixed Blessing

While technology companies appear bold about their incursions into financial services, interviews with bank representatives did not reveal that local banks were overly concerned about fintechs representing a significant threat. This includes the new challenger digital banks, such as Discovery Bank, Tyme Bank and Bank Zero in South Africa. However, the management consulting firm PWC strikes a more cautionary note arguing that banks that underestimate the potential impact of fintechs, run the risk of 'death from a thousand cuts' (Wilson, 2019, in PWC Blog).

Be that as it may, Selvarajalu (2019) was completely unperturbed by any notion of fintechs posing a threat to the banking sector in South Africa, arguing that they simply don't have the kind of algorithms that, for example, Google has or the size of investments that are needed. Indeed, interview respondents routinely highlighted M-Pesa's failure in South Africa as evidence of the local banking industry's resilience. M-Pesa is the globally recognised Kenyan fintech, which is a third-party payment app that was hugely successful amongst the country's unbanked population (Hughes and Lonie, 2007).

O'Flaherty also didn't perceive fintechs as a significant threat, instead viewing them as a collaboration opportunity and arguing,

> *Look, I think they are disruptive and the way you need to manage disruption is to identify those fintechs that can really help answer the business questions that we have, and can do it in an agile way to scale. That's how we see partnering the fintechs. Because fintechs don't have a banking license, you can collaborate with fintechs to be able to access banking products to satisfy the customer. (O'Flaherty, 2019)*

There is, of course, a power differential at play between banks and fintechs in the South African financial services sector due to the long history and established track records of traditional banks as well as the formidable resources banks have at their disposal. In this regard, local banks are also using their financial muscle to establish incubators and research and development (R&D) labs for fintech start-ups in support of banks' objectives. For example, Rand Merchant Investments (RMI) has launched the fintech incubator AlphaCode to nurture a new generation of financial services entrepreneurs (Rand Merchant Investments, 2015). Incubated fintech start-ups that achieve success are often acquired by banks (Harte, 2015). Meanwhile, as noted in Chapter Five, banks in South Africa also take advantage of Black economic empowerment (BEE) legislation to incubate fintechs (Dwolatzky in Farouk, 2020).

The Existential Threat Posed by Tech Giants

While the banks may adopt a somewhat tolerant attitude towards the fintechs, their stance on Big Tech is not the same. This includes Western technology companies such as Google, Apple, Facebook and Amazon (also known as the GAFAs), and Eastern tech giants such as Baidu, Alibaba and Tencent (also known as the BATs). Banks are extremely anxious about the existential threat posed by the GAFAs and BATs because of their global networks, massive computing power and access to vast amounts of user data. In this regard, Selvarajalu argued,

> *I don't see fintechs as a threat to the banking sector. I see the large tech giants as more of a threat simply because they've figured out how to deal with huge amounts of complexity by throwing huge amounts of computing power at it.(Selvarajalu, 2019)*

This view resonates with a number of bankers, analysts and scholars (Harte, 2015, Hascher, 2016, King, 2018, Menon, 2018, Ziady, 2019). For example, the former Managing Director for Global Digital Strategy at Citibank, Aditya Menon, originally argued in a 2016 report that fintechs represented a threat to banks. However, he revised his view in a 2018 paper, which argued that the 'real threat to banks was not the Fintechs, but big-techs' (Menon, 2018, p. 8).

Tech giants are all but breaking the traditional banking model, notably by entering the digital payments sector. This is especially the case in emerging economies where tech giants have flourished in mobile payments that completely bypass banks. This is largely due to the fact that these companies have developed financial service innovations for masses of unbanked people in parts of the world that have underdeveloped banking infrastructure. By 2015, nearly three billion people in the developing world were using mobile telecom operators to manage their money, completely circumventing traditional banks (Khayrallah et al., 2015). For example, in 2018 more than 90% of mobile payments in China were handled by the two tech giants, Ant Financial and Tencent's WeChat (King, 2018). Similarly, Big Tech has entered the digital payments market in the West with

Google Pay and Apple Pay processing a significant number of payments in the region (Harte, 2015, Wall Street Journal, 2020).

Meanwhile, the Wall Street Journal (2020) contends that 'banking is (just) another way for tech companies to draw customers into their universes'. In this regard, there are three forces of value emanating from the tech sector that banks are competing with. These are the ability to acquire customers at scale at zero marginal cost; the ability to compute at scale; and the capability to use the insights from data to create real time customer value (Harte, 2015). With banks starting to feel the pressure from Big Tech, Selvarajalu argues,

> *We are likely to see increased calls from the banking sector for protection from the state. (Selvarajalu, 2019)*

The Rise of On-demand Consumerism and Banking

While tech giants and fintechs represent a source of concern for the banking industry as a result of supply side technological innovations; on the demand side, the always-online consumer is also disrupting the banking industry. 'All customers…want simple, anytime, anywhere transfer of value' (Harte, 2015, 11:12). To this end, being able to provide services in real time or near real time has become vital for the survival of banks, as customers have become accustomed to the instantaneous nature of service provision via internet platforms, which have popularised on-demand services. This change in customer behaviour and expectations isn't lost on South African banks that are transitioning to on-demand services, as noted by Respondent A, (2019) as well as Standard Bank's head of digitalisation, Gwenaël Trotel (2020), who was interviewed for this study.

This transition to on-demand services facilitated by the internet and digital technology is explained by Castells' (2010) concept of "timeless time", which allows people to perform multiple tasks in various locations at different, even odd, hours. Castells describes timeless times as 'the penetration of all time/spaces by wireless communication devices

that blur different practices in a simultaneous time frame through the massive habit of multi-tasking' (Castells, 2010, p. xli).

At the same time, while customers migrate towards on-demand digital experiences, the systems used by technology companies are 'forcing greater intimacy of customer', which also requires banks to be in a position where they neither extract rents for transacting nor for holding deposits, whilst only charging fees for the creation of value (Harte, 2015, 18:25). Big Tech is already moving in this direction with Apple promising to eliminate fees on its credit card, while the Facebook-backed Libra Association, despite facing difficulties with U.S. regulators, announced plans for a blockchain platform to enable cheaper cross border transactions (Wall Street Journal, 2020). When probed on whether ABSA would consider low-fee or no-fee transactions, O'Flaherty withheld a conclusive response, arguing,

> *I can't speak to that. It's tricky. I can just cover it in the general comment that I make, which is that customer is king. (O'Flaherty, 2019)*

This perspective is supported in a report released by management consulting firm PWC, which heralded 2019, the year that saw the most dramatic changes in South Africa's banks as "the year of the customer", (Prinsloo and Roopnarain, 2019). In this regard, the social constructivist Actor Network Theory (ANT) comes into view, as it demonstrates the mutual influence of people and technology working together (Feenberg, 1991, Feenberg, 2017b) within the banking industry. In other words, customers influenced by their access to technology are themselves driving technological changes in the banking industry.

Africa: A New Frontier for Tech Giants Entering Financial Services

Meanwhile Africa has become a new frontier for tech giants entering the financial services arena, and this could notably present a challenge to South African banks with aspirations to expand their businesses on the continent. In this regard, banks and technology companies are expanding into the global mobile payments market under the

aegis of financial inclusion. Africa is set to witness the largest population growth globally, promising an expanding youth bulge that is extremely appealing to both Western and Eastern tech companies. With Africa representing fertile ground for the mobile payments market, it also potentially represents a proxy war between the West and China as the GAFAs and BATS compete for market share.

For example, Ant Financial Services' founder, Jack Ma, who visited four African countries in 2017 and 2018, including SA, does not see Africa's lack of infrastructure as an obstacle, but an opportunity to leapfrog the continent's development directly via mobile technologies (Adegoke, 2019). At the same time, a number of high profile founders and CEO's of Western tech companies also made visits to the African continent in recent years, including Facebook's Mark Zuckerberg, Google's Sundar Pinchai and Microsoft's Satya Nadella (Adegoke, 2019). However, the tech founder most likely to give South African banks sleepless nights is Twitter founder, Jack Dorsey, who is also founder of the fintech, Square. Dorsey spent an entire month visiting African countries in 2019 (Rooney, 2019).

In this regard, South Africa's ABSA bank may well be affected by Big Tech's incursion into Africa. According to O'Flaherty (2019) ABSA is expanding into Africa as part of the bank's key strategic plan moving forward, which to some extent is also influenced by the prevalence of mobile technology on the continent. According to O'Flaherty,

> *Our play is Africa and not just South Africa. And so, we see significant opportunity in Africa because of the growth in mobile usage and technology usage in Africa and because of the significant unbanked population in Africa. And so,* we *see tremendous opportunities and are paying tremendous attention to trying to capture more market share in various countries in Africa. (O'Flaherty, 2019)*

Another signal of the significance of mobile banking comes from mobile network operator MTN, a South African company that has relaunched the once-failed mobile payments app, MoMo, which was originally launched in 2012 and discontinued in 2016

due to low uptake in South Africa (Business Tech, 2019c). MTN has since reversed its decision, re-launching MoMo in 2020 in an effort to reach 17 million unbanked South Africans (MyBroadband, 2020).

Consequently, the mobile payments sector is fast becoming a hotly contested arena for the banks and Big Tech, as digital innovation enables expansion into African markets once considered risky. With international tech companies signalling their intentions on the African continent, South African companies are taking steps to protect market share.

Impact of Digitalisation on Staff in South African Banks

The emergence of fintechs, the incursion of Big Tech into financial services as well as their related impact on customer preferences, are working in concert to drive banks towards intensifying technological solutions. Moreover, the disruption caused by the COVID-19 pandemic, which includes lockdowns and the shift to working from home simply intensified digitalisation processes for many white-collar industries. In this regard, as a result of the pandemic, the digitalisation plans of banks were expedited, resulting in the hurried adoption of automation technologies. Indeed, in an op-ed about the impact of the pandemic on his bank, Khomotso Molabe, the chief information officer at Standard Bank in South Africa argued,

> Standard Bank has accelerated its digitalisation and client-centricity drive, and we have reimagined the workplace. Like other industries, the banking sector may well have advanced five years in its digitalisation journey in the space of just a few months. (Molabe, 2020)

Given the brisk pace of digitalisation alongside the fact that their employment equity targets are under scrutiny, South African banks represent a key site to assess the impact of automation on the white-collar labour market, including as a bellwether for South Africa's transformation project. In this regard, as far back as a decade ago when digitalisation

started appearing in many sectors of the economy, the widely cited Frey and Osborne (2013) study on the impact of computerisation in the U.S. labour market found that nearly half the jobs (47%) across 702 occupations were at risk of automation, spurring a slew of similar studies globally, including one by the World Bank Group (2016) on developing nations, which found that more than 60% of South African jobs were susceptible to computerisation.

Also taking its cue from the Frey and Osborne (2013) study, a local study found that the jobs performed by 35% of South Africans working across 380 occupations in the economy are automatable, potentially causing job losses for 4.5 million workers (Le Roux, 2018a). This study argues that 'low and medium-skilled white-collar occupations are in decline in the South African private sector' (Le Roux, 2018a, p. 13). It also found a significant correlation between such jobs and their prevalence amongst "previously disadvantaged" South Africans who are in occupations that carry the highest risk of automation as result of new technologies such as AI and robotics (Le Roux, 2018a). At the same time, the study argues that a significant proportion of white South Africans are in professions with the lowest risk of technological unemployment (Le Roux, 2018a).

In an op-ed, Le Roux (2018b) cautions that the skills bias in technological advancement supports the existing status quo, warning further that 'many South African business owners will seize the opportunity to limit their dependency on human labour'. Agreeing with this contention, in its analysis of the digitalisation strategies of South Africa's major banks, the Black Business Quarterly (2019) emphasizes the fact that the earnings growth strategy of banks is innately linked to "reducing headcount" as an "embedded" approach. This is not dissimilar to the analysis emanating from the work of MIT scholar, Carl Frey (Frey, 2020), who cites the profit-incentivised business plans of companies as the cause of labour-saving innovations.

This PhD study indeed provides some evidence to support these critiques as evidenced by the response from O'Flaherty (2019), who argued that job cuts at ABSA were linked to the realignment strategy of the bank. Moreover, talking about job losses and linking this to a wider capitalist agenda, Respondent B argued,

> *I don't think it's going to be redundancy because of AI, there could be other reasons for it. Personally, I think we are using these things as an excuse to do what we want to do, which is making sure that the bottom line and the profit is up to par for the board and our shareholders. (Respondent B, 2019)*

Overall, however, given the sensitivity around South Africa's unemployment crisis, the banks are reluctant to admit to their embrace of technological solutions and its implications for retrenchments in the sector. Indeed, specifically in relation to retrenchments in the banking sector, the relationship between banks and the unions appears tenuous. For example, the banking sector trade union has accused the banks of not acting in good faith with respect to the impact of automation on retrenchments. Addressing the banking union's 2019 congress, Joe Kokela (2019), General Secretary of the South African Society of Bank Officials (SASBO), informed delegates that SASBO organised an international study tour in 2017 when the "spectre of automation loomed". Bank representatives joined SASBO on the study tour at the union's invitation. A year later, SASBO also hosted a 4IR seminar attended by IT experts, bank representatives as well as government and civil society delegates to discuss the impact of automation (Kokela, 2019). Despite these overtures, SASBO was spurned by the banks, as reported by its general secretary.

> Odd though it may seem, given that foresight and diplomacy by the union, the banks have shown no reciprocal goodwill. They immediately began retrenching staff (in Standard Bank's case with such haste that it apologized to the nation), steadfastly spurning SASBO's request for a top-level meeting to devise the most humane possible methods of downsizing. (Kokela, 2019, p. 2)

Despite SASBO's study tour and the 4IR seminar it hosted, Martin Jansen, the executive director of Workers' World Media Productions, who was interviewed by this study, criticised the banking union's response for being too reactive. In this regard, Jansen (2022), a veteran of the labour movement in South Africa, contends that the adoption of technology in banks is an ongoing saga that employees and the banking union have been

dealing with for many years. However, he argues that the union tends to adopt a defensive posture to retrenchments by limiting its actions to negotiating around the number of jobs that the banks intend reducing—and furthermore that the banking union only seems to spring into action once the threat of retrenchments looms. This is in contrast to the international labour movement, such as some British trade unions, which adopt a more proactive stance regarding research on technological developments, which enables these unions to develop model agreements on how technology should be incorporated into workplaces with the least possible harm to workers, thereby also keeping labour one step ahead of companies (Jansen, 2022).

Jansen (2022) acknowledges that the strike, which SASBO intended to embark on in response to the threat of retrenchments in 2019 was blocked by a court interdict. However, he expressed disappointment that there was no subsequent action taken by the union. In this regard, Jansen (2022) contends that the banking union does not lack the resources to be more proactive about conducting research to identify trends about technological developments, which feed into enhanced education, stronger campaigns and better planning for the future. He attributes the current response of the banking union to a lack of capacity and vision to reimagine the role of the trade union in a world rapidly moving towards a post-work society. However, it can also be argued that unions that service middle class and white-collar workers, such as SASBO members, are also less inclined to be militant, as they tend to support specific labour relations and/or human resource cases brought against companies in response to the demands of members. For example, SASBO reported that it supported individual members in 1650 disciplinary hearing, 370 grievance hearings and 321 cases against employers at the Commission for Conciliation, Mediation and Arbitration over the period of a year (Venter, 2019).

At the same time, union membership has been in decline with SASBO itself arguing that its membership ‘figures (are) under pressure’ (Venter, 2019, p. 7). In this regard, while SASBO, a financial services union, had 73 000 members in 2019 (Kokela, 2019), this figure shrunk to 67 000 in 2023 (Soobramoney, 2023), indicating a decline of 8,2% over four years. SASBO’s decline in union membership is part of a broader global trend attributed to the changing nature of work (ILO, 2023). Nevertheless, union density in

SASBO is weak on the whole. In this regard, while South Africa's financial services sector employs approximately 2,5 million people (Brederode, 2023), SASBO's 67 000 members across the entire sector (Soobramoney, 2023), which includes but is not limited to banks, is indicative of a low penetration rate.

Job Losses at South Africa's Top Banks

The exact number of people employed by South Africa's top five banks, including Nedbank, Standard Bank, ABSA, Capitec and First Rand (which includes FNB) is a fluid figure. During the period under review, i.e., between 2018-2019, when restructuring was at its peak, estimates put the number of people employed by South Africa's banks at somewhere between 175 000 to 180 000 people (Business Tech, 2019b, Mathe, 2019, Wessels and Henderson, 2019, BANKSETA, 2018). Two years later, the Banking Association of South Africa reported that the top six banks employ 154 000 people (BASA, 2021). Thus, indicating a significant loss of jobs within the banking industry in the years following peak digital realignment.

Reports of impending job losses in the banks first started appearing in the media in 2018. The first bank to attract media attention was Nedbank, which announced the installation of 59 software robots in the second half of 2018 with plans to increase these to a total of 200 by the end of the year, raising fears about the impending loss of 3 000 jobs (Brown, 2018). Following this development, Nedbank also closed 18 branches in 2019 (Black Business Quarterly, 2019). Similarly, ABSA bank's intention to improve its competitiveness specifically in response to digitally savvy competitors, included cutting back 827 jobs as part of a new strategy, which it referred to as a "realignment" (Cameron, 2019).

The bank that attracted most attention, however, was Standard Bank, which came under significant scrutiny as a large number of its branches were decommissioned over a short period of time, prompting even the business-friendly media to label it a "radical" strategy (Whitfield, 2019). In 2019, concerned about the loss of a possible 1 200 jobs, several media reports informed the public about Standard Bank's plan to shut down

approximately a hundred of its branches nationwide as well as accelerate the migration of its technology platform to the cloud hosted by Amazon Web Services (AWS), which opened a large regional office in Cape Town (Business Tech, 2019d, McKane, 2019, Omarjee, 2019).

The year 2019 was one that witnessed big changes in banks and by the end of it, the impact of new digital strategies on staffing adjustments became clearer. Three of South Africa's big four banks reduced headcounts dramatically. Nedbank shrunk its staff by 1 196 people, Standard Bank reduced staff by 2 154 people, while ABSA reduced its headcount by 1 940 people (Business Tech, 2019b, Black Business Quarterly, 2019, Mathe, 2019). ABSA more than doubled earlier estimates of job losses, while Standard Bank overshot estimates by approximately 90%. The only bank in which earlier estimates of job losses were overstated was Nedbank, which, however, still reduced its headcount by more than a thousand people.

However, what became apparent in the feedback from banking sector respondents is that automation related job losses were being swept under the carpet even as media reports painted a different picture. In this regard, all the banking sector representatives interviewed by this study were extremely cautious in the manner that they answered questions about retrenchments linked to automation. For example, even when presented with media reports of significant job losses at ABSA, O'Flaherty (2019) was guarded in his response as to why his bank had retrenched almost 2 000 people over an 18-month period, couching it instead as a cost-to-income ratio alignment, rather than as a response to digitalisation, as reported by the media. However, when probed further, he did not deny the fact that half of ABSA's retrenchments took place over a six-month period in the first half of 2019 when the bank intentionally embarked on a *"digital realignment"* strategy (O'Flaherty, 2019). Thus, inadvertently highlighting the link between digitalisation and job losses at ABSA.

Gender and Racial Profile of Staff Affected by Technological Unemployment

All respondents were reticent in their responses to questions about the gender and racial profile of staff losing their jobs. The higher up the banking hierarchy the respondent was located, the greater their reluctance to engage with the topic. For example, Trotel (2020) of Standard Bank chose to frame transformation in relation to the image of the bank, arguing, *"We are an African bank"*, while Selvarajalu (2019) deferred to the employment equity targets of the banking industry. Meanwhile, ABSA's O'Flaherty said,

> *I don't really want to unpack that. We obviously are very aware of our transformation targets and what it means for us, so I'd prefer not to quote on those. (O'Flaherty, 2019)*

However, the management tier within the banks was more forthcoming, though their responses seemed carefully calibrated to present a neutral perspective. On the question of racial disparities, all management level respondents coalesced around the argument that by virtue of South Africa being a majority Black African country, this naturally translated to a condition where the bank staff most affected by job losses would be Black. However, this response does not align with the lack of structural transformation in South Africa's banks and the prevalence of systemic institutional racism, which is an issue that emerges in reports from the Banking Sector Education and Training Authority (BANKSETA, 2020) and the Banking Association of South Africa (BASA, 2019). Somewhat worryingly, these reports, which note a lack of racial transformation, were released in the years after the BASA (2017) testified to the Parliamentary Portfolio Committee on Finance about the slow pace of transformation in South Africa. Thereby, highlighting the sluggish response of South Africa's banks to the issue of transformation.

In contrast to the feedback received from interview respondents, banking industry reports highlight the fact that it is the positions held by Black South Africans that are most susceptible to automation, and not necessarily the volume of Black South Africans employed by banks, which translates to the potential for higher levels of technological unemployment amongst this particular race group. For example, in a report that assesses

the sector's human resource requirements for "skills of the future", the banking sector's training authority 'observed low levels of transformation based on racial (and) gender occupational discrepancies in managerial and professional positions within the banking sector' (BANKSETA, 2020, p. 31).

In this regard, Black South African women appear to be greatly at risk of technological unemployment, as there is a correlation between the number of Black women occupying low-level clerical jobs and the high number of people with low educational attainment in the banking sector. The deskilling of clerical work linked to the proletarianization of white-collar jobs can be traced to the 1970's when a large number of women entered the workforce (Oppenheimer, 1972). Accordingly, large numbers of Black women with low educational attainment tend to be corralled into clerical support jobs in South Africa's banks performing tasks susceptible to automation (BANKSETA, 2020). The training authority argues further that the general educational level of bank employees provides a rather bleak picture of a sector that ought to be at the forefront of cutting-edge technology (BANKSETA, 2018).

In this regard, specifically responding to a question about the impact of automation on gender, and highlighting greater susceptibility of female staff to technological unemployment, Respondent A (2019) argued that women were most likely to lose their jobs both at the entry-level as well as at the managerial level. Respondent B (2019) was more cautious, arguing that the impact was a *"mixed bag"*.

Despite their cautious responses to the gender question, all banking sector respondents agreed that the jobs most susceptible to automation were administrative jobs that are easily digitalised. For example, the female tech manager argued,

> *It's the basic, starter, entry-level that will be impacted because that's the stuff that can be repeated. (Respondent B, 2019)*

This indicates not just that women's jobs are at risk, but based on their dominance in clerical support roles (BANKSETA, 2020), Black women, in particular, are most at risk of technological unemployment. Moreover, due to the closure of so many of its branches, it was perhaps unsurprising that Standard Bank's Trotel (2020) also highlighted the fact that frontline staff would be affected by digitalisation. Frontline posts, such as bank tellers, tend to be occupied by Black women (BANKSETA, 2020).

Tech Bro Culture in a Rapidly Digitalising Sector

Another development indicating a shrinking role for women is the fact that the division expanding most rapidly in South Africa's banks is the technology department, which is dominated by men, including in management positions. This was alluded to by all banking sector respondents and specifically emphasized by Respondents A and B (2019). Thus, as banks are increasingly digitalising their operations, they are also expanding their human resources in a male-dominated division. Respondent B (2019) argued that this pattern appears to be locked in for the moment, or at least until the overall gender gap in technology is addressed. Meanwhile, the banking authority contends that the fact that technology is a male-dominated division in banks is also a deterrent to Black women considering it as a career option (BANKSETA, 2020). Thus, highlighting an endemic cultural phenomenon preventing women from transitioning to digital jobs.

As things stand, the exclusion of women in the tech industry is systemic. Not only is there a dominance of men in technology, but the embeddedness of "tech bro" culture is also disparaging of women's aptitude (Little, 2020). Men simply think that women are incompetent with respect to technology. This, coupled with a general lack of support from male tech managers for women's advancement, are major obstacles to closing the gender gap in technology (Little, 2020, Michie and Nelson, 2006, Miller, 2019).

As South African banks transition towards becoming institutions increasingly driven by technology, tech bro culture may well influence employment patterns, if Respondent A's (2019) views on the impact of technological unemployment on female employees are an

indication of the general culture within banks. This male tech manager based in the head office of one of South Africa's leading banks argued,

> *Women tend to be less flexible - that's my opinion - in terms of wanting to change their mindsets and whatever. Men tend to reskill themselves if they are put into a corner. Women are less likely to take the risks and the chances. So, to me, I would think that women would be more affected by technological unemployment. (Respondent A, 2019)*

This response provides some substance to the critique raised in the literature about the underestimation of women's competence as well as the lack of male managers' support for women's advancement in technological fields. It also lends credence to BANKSETA's (2020) findings on the cultural barriers preventing women in general, and Black women in particular, from transitioning to digital jobs in South Africa's banks.

The Dismantling of Middle and Junior Management

While pointing out the obvious casualties of technological employment in the lower ranks of the banks, respondents also highlighted a growing trend towards the dismantling of management jobs. Redundancies in management level jobs are creeping in as a result of three developments: 1) the deployment of new technologies such as AI, 2) a new organisational culture creating flatter operating structures in banks, and 3) the decommissioning of banks' branches. In this respect, Selvarajalu (2019) of BASA argued that AI has resulted in managers becoming redundant because '*the notion of people managing other people'* is becoming out-dated. Similarly, Respondent B argued,

> *I think the management level is going to be impacted because you won't need that many managers to manage people. (Respondent B, 2019)*

Moreover, as banks increasingly transform into companies with a stronger technological focus, their human resource arrangements are also starting to emulate those of the tech industry, heralding a new organisational culture. Banks are now deploying self-managing autonomous teams to collaborate on projects, which provide end-to-end services. Citing his own bank as an example, Respondent A (2019) noted the emergence of flat team structures, fewer managerial positions, more open-plan offices and open office policies. In this regard, he argued,

> *This is the new trend, the new way of working. The flatter the structure, the less likelihood of mess ups. So, we want more people on ground level to do the work, as opposed to creating hierarchical structures. (Respondent A, 2019)*

Finally, in response to the demand-side cultural shift stemming from their clients' embrace of mobile banking, banks are also increasingly digitising client interface, leading to the closure of branches. This affects junior managers that are often assistant branch managers whose responsibilities include the supervision of non-managerial client services personnel, such as bank tellers and loan officers (Society for Human Resource Managment, n.d.).

While Black South Africans, including men and women, comprise 54% of all bank staff, only 8% of Black staff were in management posts in 2020, and they tended to dominate junior and middle management positions (BANKSETA, 2020, Musonda et al., 2019). Black men are generally underrepresented in the banking sector, but are channelled towards junior management positions along with their female counterparts (BANKSETA, 2020). According to the Banking Association of South Africa's *Transformation in Banking Report 2017-2018*, junior management is 85% Black, however, banks are struggling to replicate similar rates of transformation in senior and executive management (BASA, 2019).

The management posts most at risk of technological unemployment are those related to branch closures, the introduction of algorithmic management, and the shift towards

collaborative autonomous teamwork. In the South African context, these happen to be the management posts, which constitute a high number of Black staff. However, it was also argued that the banks were keen to hold on to their so-called "BEE appointments" in the management cohort, and were even providing mentorship support to Black incumbents to achieve transformation targets (Omar, 2020). In this regard, Dr Abba Omar (2020), who at the time of being interviewed for this study was the Head of Strategy and Communications at the BASA, noted that a significant number of Black South Africans were starting to enter middle management positions—almost equivalent to whites. In this regard, the management cohort appears more affected by attrition than by retrenchments. However, whether this approach is sustainable remains an open question, as the technologies of the 4IR are simultaneously introducing structural changes, which signal challenges to the banking sector's transformation agenda.

New Skills Required by Banks

As technology marches forward, banks are being forced to respond to revolutionary concepts introduced by fintechs and Big Tech by adjusting their business models not just to ward off competition, but also to remain relevant. Indeed, the very essence of banking is being challenged as conventional notions of financial value are increasingly upended by the data economy. In this regard, the radical nature of change in the banking sector has highlighted the need for new, higher-level as well as different skills sets. These skills appear to be categorised in two broad areas, viz., digital skills and complex thinking skills, including some overlap between the two.

Firstly, due to the expansion of technological solutions, the desire to work with fintechs and the need to compete with Big Tech, banks are expanding staff complements in their technology divisions. In this regard, (O'Flaherty, 2019) indicated that all banks in South Africa are competing to attract talent from the same pool, which made the market extremely competitive. In this regard, banks are holding onto staff that historically developed and maintained their old mainframe infrastructure, as they can be retrained to work with the new technology. As a result, technical skills in programming and systems engineering are in high demand. This is notwithstanding the fact that there is a strong

management dimension to systems engineering jobs. Historically, these positions have been white male dominated. Consequently, white men dominate professional, technical and senior managerial positions with a significant 74% of white men in senior managerial or professional positions (BANKSETA, 2020).

Secondly, due to the fact that any repetitive task can be done by AI, all banking sector respondents as well as BANKSETA (2020) refer to the need for complex thinking as a new skill required by banks across the board. With the situation being as fluid as it is and the banks themselves on a learning curve, staff that remain safe from the threat of automation appear to be those with adaptive skills supported by complex thinking, innovation and entrepreneurial drive. Respondent B (2019) and Trotel (2020), in particular, highlighted the need for "design thinking" as a critical qualification. Trotel (2020) further argued that banks were currently also interested in hiring staff with behavioural sciences qualifications. Thus, also indicating the increasing integration of AI as a predictive technology in banks.

Conclusion

South African banks, along with banks all over the world, have been swept by a tide of change directly related to the new technologies of the 4IR. While banks have embraced these new technologies, they have simultaneously lost control of innovation in financial services given that AI and the data economy is transforming how business is conducted, opening the way for new players to enter the financial services arena, such as fintechs and Big Tech.

While fintechs are upending traditional approaches to banking, their fledgling status relative to established financial sector incumbents, still allows well-resourced banks to buy them out, thereby integrating fintech innovations into the existing banking sector infrastructure. It is, however, giant tech companies, such as Facebook and Google, with their global platforms and considerable resources at their disposal that are the cause of greatest concern to the banking industry, as Big Tech is brazenly launching a methodical

incursion into financial services provision aimed at keeping hundreds of millions of people, i.e., their users, locked into their platform ecosystems. In this respect, payment services, such Apple Pay and Google Pay, which mirrors payment platforms as the dominant innovation in the start-up sector (see Chapter Five), is also the most common financial service offered by Big Tech.

Meanwhile, banks that have spent centuries extracting value from clients for simple transactions, are now being forced to respond to this rapidly changing environment, which demands a complete re-examination of their business models as technological innovation and new institutional forms in the data economy are leveraging information to revolutionise how trust is established as well as how value is created for businesses and their clients. In this regard, also aiming to lock people into their ecosystems, banks are moving towards the data driven models pioneered by Big Tech. However, Big Tech, especially companies that have had almost two decades to hone their data-driven models, surpass banks not just in understanding how the data economy works, but also in moulding it to their advantage.

The result is that banks, facing an existential crisis, are in a state of flux, while acutely aware of the need to remain relevant as well as ward off highly skilled and well-resourced competitors. As South African banks make far-reaching changes to adjust to this new situation, their staffing requirements are in need of a substantial overhaul, which is also bringing the banks under intense scrutiny. However, South African banks are also constrained by the legacy of apartheid, which continues to affect the labour market. Thus, changes taking place in South African banks must also be understood in the context of a racialised staffing hierarchy within a sector struggling to meet its transformation targets, as 'the data depicts low levels of transformation within the banking sector' (BANKSETA, 2020, p. 30). Meanwhile, '(top) and senior management remains too white and male' (BASA, 2019, p. 2).

Given the sensitivities related to racial transformation as well as the fact that banks remain under pressure to meet employment equity targets, respondents were reluctant to explore the relationship between the digitalisation strategies of their respective banks and

the staff affected by technological unemployment. When specifically probed about the racial composition of staff losing their jobs, all banking sector interviewees side-stepped the question, instead vaguely referring to the employment equity and/or BEE targets of their banks. Moreover, while respondents were uncomfortable talking about race, they also refused to engage directly with figures quoted by the media about actual job losses in the banks, preferring instead to engage more speculatively about the kinds of positions that would be affected by technological unemployment. In this regard, it is important to point out that none of the respondents unequivocally refuted the figures quoted by the media. They simply exercised their right not to answer questions about job losses. The lack of engagement with this question suggests an obfuscation of the facts on the ground in relation to the staffing situation in the banks.

However, by piecing together digitalisation trends highlighted by the literature, demographic statistics from industry reports, analysing the feedback from respondents and reading these against the job losses reported by the media, the picture that is emerging is that it is Black, predominantly female staff in the lower ranks of South Africa's banks that are most at risk of technological unemployment, if not already significantly affected by the dramatic structural changes that occurred between 2018-2019 when banks closed branches and digitised simple administrative functions, leading to the retrenchment of thousands of staff.

This trend must further be juxtaposed against the fact that as banks increasingly imitate technology companies, they are seeking to expand their human resources in highly specialised skills-dependent technology divisions that are currently male dominated and predominantly white, which all women in general, but Black women in particular find difficult to break into. Thus, highlighting a new transformation challenge for South Africa's banks, which, based on the evidence gathered by this study, they do not seem to have a plan for. Consequently, this study argues that automation in the banking industry bodes poorly for the expansion of the Black middle class who, due to their historical disadvantages, are at the battlefront of technological unemployment. This, however, is further exacerbated by the slipperiness of South Africa's transformation agenda, of which there is ample evidence in the banking industry.

CHAPTER SEVEN: FROM POST-CAPITALIST UTOPIA TO PLATFORM ANTI-UTOPIA

While the past decade has borne witness to a spike in concern about technological unemployment (Lanchester, 2015, Rus, 2015), these fears have been assuaged by the notion that artificial intelligence (AI) cannot entirely replace human labour (Marwala, 2019, Clemens, 2020). In this regard, the platform economy is offered as a new frontier for job creation in the digital economy and a defence against widespread unemployment in Africa and South Africa (Mzimba, 2017, Moyo, 2020). Accompanying this idea is the notion that the platform economy not only creates jobs, but also opportunities for entrepreneurs (Kuhn and Maleki, 2015, Cutolo and Kenney, 2019). In this regard, the platform economy is presented as a way to forge the future of the South African labour market as a "workforce of micro-entrepreneurs" (Kuhn and Maleki, 2015). In 2022, it was estimated that South Africa's platform economy employed 135 000 people, making up one percent of the labour force (Mokofe, 2022).

Mainstream commentary further shrouds the platform economy in the positive attributes associated with its forerunner, the sharing economy, including borrowing from its collaborative and egalitarian language to present it as a force for good in society. In this regard, due to the adoption of "deceptive peer rhetoric" (Srnicek, 2017), the platform economy is misleadingly presented as an opportunity for freelancers and independent contractors to easily opt in and out of work, thereby increasing individual agency and work-life balance (Scholz, 2014, Schor, 2020). This obfuscation hides the true nature of the platform economy.

As the literature below indicates, far from delivering on the experience of "freedom within work" (Granter, 2016a), the platform economy has instead imposed an unfreedom on workers due to its exploitative characteristics. Self-employment in the platform economy is, in fact, a forced imposition due to the on-demand nature of the work, which offers poor remuneration whilst attracting some of the most vulnerable workers in society (Lewis et al., 2015, Srnicek, 2017, Schor, 2020). In this regard, the platform economy

introduces a complexity to current socioeconomic challenges due to its binary characteristics of autonomy versus exploitation.

There is mounting evidence of the erosion of workers' rights and the weakening of social protections in the platform economy as a result of its disruptive business model that has emerged in a policy and regulatory vacuum. The situation is exemplified by the "regulatory entrepreneurship" and "regulatory capture" of platform companies, which introduce new practices that regulations have yet to catch up with and/or that aim to change existing laws to their advantage (Levine and Forrence, 1990, p. 167, Pollman and Barry, 2017). For example, a former Uber lobbyist, Mark MacGann, leaked more than 124 000 confidential documents to the Guardian newspaper, which amongst other misdeeds, revealed that Uber 'put pressure on governments to rewrite laws to help pave the way for an app-based, gig-economy model of work' (Davies et al., 2022). We see similar pressure from a venture capital lobbying group in South Africa making demands on the government to set aside labour protections in the digital economy (PC4IR, 2020). Thus, far from embodying a solution for workers, the platform economy has come to symbolise a threat to workers' rights.

This chapter has two objectives. Firstly, it examines how it came to be that the sharing economy was stifled by the platform economy in order to develop a better understanding of what this means for the kinds of jobs that are available in the digital economy. Secondly, as noted by the literature review and theoretical framework informing this study, the digital economy presents opportunities to identify post-capitalist tendencies based on Marcuséan liberatory technology and Lukácsian dialectics, as articulated by Critical Theory of Technology. In this regard, this chapter also explores the potential for post capitalist tendencies to emerge within workers' struggles, as an example of dialecticism, i.e., conscientized human action aimed at re-imagining technological development and de-reifying capitalist models of economic development. Thus, as this thesis is informed by critical theories that are concerned with freedom from oppression, this chapter identifies potential levers of change in the platform economy as a response to the exploitation of workers from a dialectical perspective. In this regard, it highlights legal contestation as dialecticism, i.e., the litigation route as a challenge to unfair labour

practices in the platform economy. Moreover, it also explores conscientized human action as dialecticism fuelling post-capitalist tendencies aimed at re-imagining technological development. Accordingly, this chapter also explores the presence of post-capitalist enterprises in South Africa by examining efforts to establish platform co-operatives as dialectical responses to exploitation in the platform economy.

A Brief Note on Methodology

Due to a proliferation of precarity scholarship (Schor, 2020), this chapter predominantly engages with Future of Work literature to outline the major characteristics of the platform economy, including its manifestation in South Africa. This review of the literature is complemented by four in-depth interviews to provide nuance and depth to the information gleaned from the literature sources, with a focus on examining dialectical responses to the harms engendered by the platform economy from two perspectives. Firstly, this chapter explores examples of legal contestation in response to the "regulatory entrepreneurship" (Pollman and Barry, 2017) of platform companies aimed at dismantling workers' rights. In this regard, the interviews offer a unique perspective by reporting on two different court challenges brought by workers in the platform economy. Both these legal cases examine the issue of unfair dismissals by platform companies. However, while the first case highlights the litigation route as dialectical materialism, i.e., legal contestation to preserve workers' rights. The second legal case, whilst starting out from a similar premise, i.e., the preservation of workers' rights, evolves into dialecticism from a Lukácsian perspective as it evolves into an effort to de-reify the capitalist enterprise model. Elaborating further on this second legal response, which specifically examines a case of unfair dismissal brought by seven Uber drivers against the company in South Africa. While this is a well-documented case that has received significant scholarly and media attention, it nevertheless also has an underexamined connection to post-capitalism, which is explored in this study. In this regard, the Uber case is connected to the emergence of two platform co-operatives that exemplify dialecticism as praxis in South Africa's platform economy. Thereby, highlighting post-capitalist tendencies in the platform economy, which emerged as a dialectical response to labour market exploitation.

To this end, four in-depth interviews were conducted with respondents that engaged in the platform economy in various capacities. Of these, two informants engaged in work that interfaced with the platform economy. Whilst the third and fourth respondents worked directly in the platform economy. Three of the four respondents were academic researchers, highlighting their engagement in the platform economy as praxis-oriented researchers. The breakdown of interview respondents is as follows: Two of the respondents interviewed for this study are lawyers and academic researchers that have brought legal cases against platform companies on behalf of platform workers. They are Prof. Darcy du Toit and Dr Ruëdiger Helm. A third informant, Fairuz Mullagee, is an academic researcher and social entrepreneur who is a founding member of a platform co-operative. The fourth informant, Faiza Haupt is a former Uber driver as well as the founding member of a platform co-operative whose experience of trying to establish a post-capitalist enterprise is highlighted as an example of Lukácsian dialecticism in the digital economy. Appendix B contains the names and designations of all respondents interviewed for this study as well as the dates that the interviews took place.

Defining the Platform Economy

Srnicek (2017) examines the economic history of capitalism and digital technology in an attempt to probe ownership and profitability in the digital economy. He defines the "digital economy" as 'those businesses that increasingly rely upon information technology, data, and the Internet for their business models' (Srnicek, 2017, p. 10). Srnicek's (2017) definition uses the broader "digital economy" as a reference point, as opposed to the "platform economy". Kenney and Zysman (2016, p. 65), on the other hand, define "digital platforms" as 'a set of online digital arrangements whose algorithms serve to organise and structure economic and social activity'. Both the abovementioned definitions are descriptive, thus highlighting the need for enhancement to reveal the motives and purpose of platform companies. This is provided by Langley and Leyshon (2017, p.2, p.8) who highlight intermediation as the primary function of platform companies, which they describe as "socio-technical intermediaries" that create "multi-sided markets" to pursue economies of scale that align with venture capital's market domination objectives.

This study integrates the aforementioned definitions to argue that the platform economy is comprised of platform companies, which function as socio-technical intermediaries that use algorithms to organise economic and social activities through multi-sided marketplaces that pursue economies of scale. Within this framework, there are a variety of platform company types which include marketplaces for goods and services (e.g. Amazon and Airbnb), social media platforms (e.g. Facebook and Instagram), cloud platforms (e.g. Amazon Web Services and Microsoft Azure), and gig work and crowdsourcing platforms (e.g. Uber and Upwork) (Kenney and Zysman, 2016, Schor et al., 2020, Langley and Leyshon, 2017).

Post-capitalism and the Roots of the Platform Economy

While there continues to be debate on the left about what post-capitalism is or ought to be, the decade following the 2008/9 financial crisis did indeed bear witness to the emergence of post-capitalist tendencies within the platform economy (Cohen, 2017a, Cohen, 2017b, Schor, 2020). In this regard, there are two main strands of literature highlighting post-capitalist tendencies - one highlighting the "sharing economy" as the predecessor to the platform economy (Schor, 2020) and the other focusing on "post-capitalist entrepreneurship" (Cohen, 2017a). Both strands of literature attribute the emergence of post-capitalism to the influence of the Occupy Movement. For Cohen (2017a, 2017b), post-capitalist entrepreneurship was inspired by the Occupy Movement, which called for a 'rethink of the dominant economic paradigm' amidst 'widespread dissatisfaction with market-based' capitalism in the immediate aftermath of the financial crisis. Meanwhile, Schor's (2020) research on the gig economy finds evidence of Occupy Movement activists who turned to the sharing economy as self-identified members of the 99 percent eschewing the one percent.

In general, the concept "sharing economy" is associated with the work of Schor (2020) whose contribution to the literature can broadly be located within the purview of the post-work theories of André Gorz (2010a) and Herbert Marcusé (1941) given that she

identifies a liberatory role for technological innovation, i.e., a person-to-person gig economy in which people work less and are more socially connected. Implicit in the notion of the sharing economy is the idea of caring for the planet and its people, thus also elevating its role as an economy that reduces environmental degradation and economic inequality (Schor, 2020). Schor's concept of the sharing economy emerged around the same time as Rifkin's 3IR and in this respect, both concepts are indicative of the prevailing anti-neoliberal sensibility in the immediate aftermath of the 2008/9 financial crisis (Rifkin, 2011, Schor, 2020). Both the 3IR and the sharing economy are based on the idea that the distributed nature of the internet has the potential to build social relations as people connect more with each other in a non-hierarchical and collaborative manner, whilst also promoting sustainability by sharing resources and using renewable energy (Rifkin, 2011, Rifkin, 2012, Schor, 2020).

Meanwhile, Cohen (2017b) aligns post-capitalist entrepreneurship with Mason's theory of post-capitalism, which he argues does not foresee "a return to Marxism", but instead envisions economic development as something driven by "a third way" free of excessive state control and the undue influence of financial capital. For Cohen (2017a, 2017b), a post-capitalist economy is driven by collective, cooperative and/or autonomous organisations that frequently leverage non-government backed fiat currencies. He identifies a number of post-capitalist organisational forms within the digital economy including commons-based peer production, platform cooperatives, blockchain-enabled distributed autonomous organisations and alternative currencies (Cohen, 2017a). While Cohen (2017b) associates his work with Mason's (2016) theory of post-capitalism, there are also strong parallels with Varoufakis' (2021) alternative economic development model in *Another Now*, which, published four years after Cohen's book on post-capitalist entrepreneurialism, also emphasises the significance of co-operatives and blockchain technology. In this respect, similar to Varoufakis (2021), Cohen (2017a) exemplifies Marcuséan negative thinking as a form of status quo rejection that reimagines the technological a priori (Feenberg, 2013) leading to the de-reification of the capitalist organisational form.

Despite the emergence of two post-capitalist tendencies, it is the sharing economy or rather its ex-post manifestation as the platform economy that attracts greater interest. This, as discussed below, is largely due to the fact that the sharing economy has been eclipsed by the platform economy (Kenney and Zysman, 2016, Langley and Leyshon, 2017, Srnicek, 2017, Schor, 2020). In this regard, it can be argued that the sharing economy, symbolised by a liberatory pre-ontological impulse in the Marcuséan tradition, has been overcome by a stronger prevailing neoliberal ideology, which is driving the platform economy.

The Platform Economy as the Ex-post Manifestation of the Sharing Economy

Defining and deconstructing the platform economy as the ex-post manifestation of the sharing economy has emerged as an important counter narrative for digital economy scholars critiquing the excesses of platform capitalism (Langley and Leyshon, 2017, Srnicek, 2017, Schor, 2020, Kenney and Zysman, 2016). For example, Schor's (2020) research, viewed through the prism of dialecticism, specifically focuses on the relationship between labour and capital in the sharing economy, which she sees as the predecessor to the platform economy. In this regard, Schor (2020) argues that the influence of the Occupy Movement is important for making sense of how the sharing economy became conflated with the platform economy. For her, the platform economy is rooted in the "idealist discourse" of the sharing economy inspired by the Occupy Movement (Schor, 2020, p. 5). The core of her argument is that technology companies tuned into the discontent following the financial crisis, artfully appropriating the language of the sharing economy as a smokescreen for less worthy objectives (Schor, 2020). This perspective resonates with other critiques of the platform economy. Srnicek (2017), for example, argues that platform companies cunningly exploited the dissatisfaction of the post-financial crisis moment by promoting the idea of personal freedom, not as a new ideal for labour relations, but in pursuit of a hidden agenda designed to escape social protection for workers.

In the past decade, the experience of working in the platform economy has indeed generated a host of new problems for labour. This, in turn, has influenced the emergence

of new research under the "Future of Work" banner. According to an International Labour Organisation (ILO) review of Future of Work literature, inequality is the overriding concern of scholarship in this area, which focuses on three major themes: 1) technological unemployment and its impact on the labour market; 2) working conditions in the digital economy; and 3) new threats to social protection consequent to the digitalisation of economies (Balliester and Elsheikhi, 2018).

The second of the three themes identified above, i.e., working conditions in the digital economy, has stimulated enormous research interest, resulting in an explosion of precarity scholarship. Findings from a wide variety of sources, including ethnographic studies in South Africa, characterise working conditions in the platform economy as extremely precarious, a race to the bottom targeted at vulnerable and hyper-exploitable workers, as well as undermining of collective bargaining rights (Srnicek, 2017, Graham et al., 2017a, Standing, 2018, Hunter et al., 2019, Sandoval, 2020, Peticca-Harris et al., 2020, Schor et al., 2020, Mawii and Aneja, 2020, Vrasti, 2021, Webster and Masikane, 2021). Despite these problems, Schor (2020) contends that the current misinterpretation of the platform economy as the sharing economy persists because of the peer-to-peer nature of interaction between people mediated by software that remains in the background. This creates an illusion of individual agency and connection between people, inadvertently increasing the platform economy's appeal amongst those seeking an alternative to hierarchical working arrangements (Schor, 2020).

However, workers are not the only victims of exploitation in the platform economy. The perversion of idealist discourse is also evident in the business models of platform companies targeting the public in general. For example, while Uber and its competitor Lyft refer to themselves as ride-sharing services, this is a distortion of the concept due to the fact that "sharing" is the least of their intentions. Instead, crowdsourcing platforms such as Uber and Lyft have merely found ways to monetise the "consumer assets" and "value-creating human activities" of those interacting through their platforms (Kenney and Zysman, 2016). Thus, the fact that Uber is referred to as the largest taxi company that doesn't own any cars or that Airbnb is the biggest hotel company that doesn't own any hotel rooms, is only possible because platform companies function as intermediaries that

have perfected the art of extracting rents from users that transact via their digital infrastructure (Langley and Leyshon, 2017). Srnicek (2017) refers to these asset-free companies as “lean platforms”. Based on rentier business models that extract maximum value whilst making minimal inputs, these companies are common in the platform economy (Brynjolfsson and McAfee, 2014, Ford, 2015, Standing, 2016, Langley and Leyshon, 2017).

How Network Effect and Network Power Create Winners and Losers

The ability to achieve scale and super profits at low cost makes platform companies extremely attractive to investors, resulting in a flood of venture capital that drives market dominance as a mission amongst platform companies. For Srnicek (2017), platform companies have “monopolization built into their DNA”. Monopolisation, euphemistically referred to as “winner take all”, is in fact considered a rational objective and aggressively pursued by tech platforms and their investors (Howitt, 2018, Athrappully, 2022). For example, expanding on his problematic perspective that “competition is for losers” as well as setting the tone for the development of the platform economy in the past decade, venture capitalist and PayPal co-founder, Peter Thiel (2014) argued that technology platforms should aim for and deserve monopoly.

At the same time, mainstream business analysts argue that large business empires in the platform economy are fuelled by the “network effect”, which is the “new driver for scale” (Choudary et al., 2015). From this vantage point, the sought after “network effect” takes on a harmless quality as it is about achieving scale vis-à-vis the number of users on a platform, which is associated with an increase in a company’s value (Choudary et al., 2015, Howitt, 2018). This, however, is a one-dimensional perspective that overlooks the complexity of the platform economy as a network economy with powerful forces operating within it—notably financial investors pursuing market dominance as the underlying motive for achieving scale.

In this regard, Castells' (2011) Network Society theory offers some insight into the role of investors as power brokers in networked economies, such as the platform economy. Castells (2011) argues that power is mediated in the platform economy through the "network power" of the financial market, which 'disciplines and shapes the global economy' (2011 p. 784). Castells (2011) thus enables a different understanding of network dynamics by highlighting the concept of "network power", which can be applied as a critique of the prevailing "winner take all" culture of the platform economy. For example, MIT scholars, Brynjolfsson and McAfee (2014) highlight the financialised nature of the digital economy as a phenomenon that produces winners and losers.

Castells' theory also enables the dynamic between the network effects of the platform economy and the network power of financial markets to come into view. In this regard, analysts argue that the financial market puts higher valuations on platform companies due to their network effects (Howitt, 2018, Norris, 2020). This results in massive overvaluations of tech companies that have global reach and large user bases such as Uber, which despite being unprofitable, was valued at US$62 billion in November 2022 (Kerr, 2022). Uber is a prime example of shareholder value being created from an inflated valuation rather than company profits (Standing, 2016). Market dominance, i.e., monopoly status thus becomes vital for oversized valuations, which have become an important source of shareholder value in the platform economy.

Thus, while the pursuit of the network effect is routinely advocated as a rational choice and goal for platform companies, it is driven by "network power" in the Castellsian sense, which functions as an insidious force creating winners and losers as well as fuelling inequality in the platform economy. In this regard, and as the discussion below demonstrates, the biggest losers in venture capital's pursuit of monopoly status and wealth extraction are gig workers who plug into the platform economy as surplus on-demand workers. As succinctly argued by Papadimitropoulos (2021, p. 251), 'The big money goes to the oligarchy of the shareholders and owners, and the scraps to on-demand workers'. The discussion below examines the implications of this wealth extraction for workers in the platform economy.

Work in the Platform Economy

Scholars distinguish between those on the higher end of the socio-economic spectrum who turn to platform work as a source of supplementary income and those on the lower end who are economically dependent on platform work for their livelihoods, with the former enjoying the benefits of flexibility and individual agency promoted by advocates of gig work and the latter registering high levels of dissatisfaction, less autonomy and low hourly wages (Popescu et al., 2018, Schor et al., 2020). This distinction resonates with Gorz's (1985, 1989) conceptualisation of autonomous work versus heteronomous work. Highlighting her misgivings about claims of employment flexibility for workers in the platform economy, Schor (2020), who has conducted research in the U.S., finds that more people plug into the platform economy as a source of full-time employment, i.e., are economically dependent on platforms, compared to those seeking part-time flexible working arrangements. This finding resonates with a study of gig workers in South Africa, which indicated that "a large majority" of those interviewed were economically dependent on their jobs (Fredman et al., 2020).

In general, however, platform work can be divided between online crowdsourcing work and location specific gig work (Standing, 2018, Vallas, 2019). Online crowdsourcing tends to require higher skill levels (e.g., providing transcription services via Upwork), while location specific gig work commonly comprises low-skilled service sector jobs (e.g., providing food delivery services via Uber Eats). Both types of platform jobs are available to workers in the Global South. However, notwithstanding the skills required for online crowdsourcing work, evidence points to an emerging hierarchy in the global labour market based on the North-South divide, indicating greater exploitation of workers in the Global South. In this regard, evidence has surfaced of non-Western workers being channelled into less-skilled and poorly remunerated crowd work referred to as "microtasks" (Beerepoot and Lambregts, 2015, Vallas, 2019). For example, a Time Magazine investigation found that OpenAI, the company that launched ChatGPT, paid Kenyan crowd workers less than US$2 per hour to label problematic content, such as racist and sexist language, which was used to train the chatbot to avoid offensive language (Perrigo, 2023).

At the same time, location specific gig work is the most exploitable in the platform economy (Standing, 2018) – and it is common in the platform economies of the Global South, including in South Africa, which has witnessed a proliferation of location specific platform jobs in the past decade. For example, while the COVID-19 pandemic elevated the demand for food courier services (Webster and Masikane, 2021), earlier media reports in pre-pandemic South Africa also highlight food delivery apps as the most prolific in the country. For example, there were 14 such platforms operating in South Africa in 2018 (De Greef, 2019b, Business Tech, 2019a).

Overall, however, whether platform workers are engaged in cloud work or location specific work, their exploitation as well as the dismantling of social protections is so extreme that the term the *'uberisation of work'* (Nurvala, 2015, Kaine et al., 2016, Fleming, 2017, Webster, 2020), has entered labour market discourse as a pejorative term describing a race to the bottom for gig work across a spectrum of digital platforms. The discussion below elaborates on the multiple dimensions of precarity in the platform economy, including but not limited to low earnings consequent to an oversupply of workers in the Global South, many of whom are the most vulnerable and exploitable in society.

How Precarity Manifests in the Platform Economy

Oversupply of labour results in lower earnings for workers and higher profits for companies: Earnings for workers in the platform economy are characteristically low. Pivotal to the entrenchment of the low wage regime is the fact that the period after the 2008/9 financial crisis also coincided with a depressed labour market, followed by a decade of jobless economic growth during which time competition over jobs increased, placing downward pressure on earnings (Srnicek, 2017). Accordingly, there is typically an oversupply of workers registered on digital platforms alongside an undersupply of jobs, resulting in a competitive work environment in which platform workers find themselves self-exploiting by underbidding to secure work (Schor, 2020, Graham et al., 2017a, Standing, 2018). This oversupply of workers also results in higher profits for platform

companies that earn additional commissions from an expanded user base (MacMillan, 2022). Thus, indicating a split in outcomes for platform owners and platform workers, which demonstrates the dynamic between the network effect and network power. In this regard, Uber has developed a reputation for being one of the 'biggest tech start-ups in history built on old-fashioned exploitation' (Merchant, 2020). For example, the Uber File leaks revealed a deliberate strategy by Uber's management to increase the number of drivers on the platform in South Africa, resulting in the company becoming profitable in both Johannesburg and Cape Town within two years of launching in the country, despite being unprofitable globally (MacMillan, 2022, Kerr, 2022). Thus, also highlighting the benefits of operating in Global South labour markets for platform companies seeking to capitalise on the network effect by achieving scale through a massive network of underpaid workers. In this respect, a Washington Post report on Uber in South Africa contends, 'Uber (has) access to a deep pool of (labourers) willing to endure challenging work with few benefits' (MacMillan, 2022).

However, this was not always the case. When Uber first arrived in South Africa a decade ago, it offered drivers a generous cash bonus to sign up to the app while also subsidising trip costs, which boosted drivers' earnings (MacMillan, 2022). It wasn't long after Uber's launch in the country that these perks were rolled back (MacMillan, 2022). However, while the cash incentive and subsidy were in place, they enabled Uber to attract drivers from South Africa's middle-class. For example, Faiza Haupt (2022), who was interviewed by this study, gave up a stable job in jewellery retail to purchase and drive a BMW for Uber as one of its earliest drivers in Cape Town. This netted her approximately three thousand Rand per day as an Uber Black driver. However, trouble was on the horizon for Haupt (2022) as Uber not only rolled back driver subsidies, but also increased its commission rate, as well as introducing cash payments via the app and boosting the number of drivers it signed up (MacMillan, 2022). These measures effectively reduced earnings for drivers while the introduction of cash payments exposed the drivers to the risk of being robbed (MacMillan, 2022). By 2016 when Haupt (2022) was deactivated from the Uber platform following an altercation with a passenger, her earnings had dipped to a third of its original take. Thus, what was once a job that offered flexibility and decent earnings that supported a middle-class lifestyle, became a daily grind of long hours just to make ends meet.

On demand work, the erosion of employment continuity and labour protections: A distinguishing feature of the platform economy is that it offers on-demand work, which means that people are paid per task (Vishwanath, 2020, Standing, 2018). On-demand work diminishes employment continuity due to the fact that platform workers are routinely engaged as independent contractors, thus shifting the risk away from the platform as employer and liberating it from compliance with labour protection laws (Drahokoupil and Piasna, 2017, Graham et al., 2017b). Wood (2020) refers to this phenomenon as "despotism on demand" in his book of the same title, which highlights flexible scheduling as a new domain of inequality due to excessive managerial control via algorithms—or as Standing (2018) describes it, "extreme Taylorism".

Control by algorithmic management: Platforms maintain strong control over workers' performance through algorithmic management (Graham et al., 2017a, Popescu et al., 2018, Schor et al., 2020). Within this context, power over the workers' future is centralised on the digital platform, while control over their work is distributed to platform customers through the "evaluative infrastructure" of the platform's rating system (Kornberger et al., 2017). Thus, platform workers perform their work under constant anxiety of losing their jobs, as every task that they perform is potentially their last gig based on customer ratings and the deactivation powers of the platform owner. Uber and its competitor Lyft are said to have the most "intrusive algorithmic control" over so-called independent contractor drivers (Vishwanath, 2020). Even in cases where platform companies ostensibly strive towards decent workplace norms and standards, companies still fall short due to the evaluative infrastructure of their platforms. For example, in South Africa, while SweepSouth, a domestic workers' labour broking platform, is positively rated for fair working conditions (Fairwork, 2023), an ethnographic study of the platform found that its workers still experience many of the negative aspects of platform work, noting especially that "flexibility and autonomy" are "notional" for workers on the platform (Mawii and Aneja, 2020). This includes vulnerability to the evaluative infrastructure of the platform as a source of constant insecurity. Three consecutive ratings of less than two stars results in automatic deactivation from the platform (Mawii and Aneja, 2020). Thus, while SweepSouth itself may strive to offer decent working conditions, the technology, i.e., the evaluative infrastructure of the platform follows its

own internal logic based on predetermined parameters. In this regard, based on Heidegger's substantive theory of technology, we see the concept of technology as a controlling and oppressive force come into view (Feenberg, 2009). Similarly, as Marcusé whose work in part draws on Heidegger argued, 'domination perpetuates and extends itself not only through technology but as technology' (1964, p. 116).

Location specific gig work dominated by vulnerable cross-border migrants. People who engage in low-skilled, low paying jobs tend to be those with limited options, and in this regard, there is an influx of cross-border migrants in location specific gig jobs in the platform economies of in-migration countries, such as Canada and the U.S. (Markham, 2018, Pesole et al., 2018, Van Doorn et al., 2020, Lam and Triandafyllidou, 2021). This phenomenon is also evident in South Africa, which is an in-migration country. For example, a 2019 media report indicates that the majority of platform workers providing food courier services in South Africa are cross-border migrants from the African continent (De Greef, 2019a). Meanwhile, a more recent comparative study of similar platform workers in three African cities including Johannesburg (South Africa), Nairobi (Kenya) and Accra (Ghana) indicates that in contrast to the other two cities which attracted local labour, 90% of the workers in Johannesburg were "foreign nationals" and predominantly male (Webster and Masikane, 2021). A similar though less extreme pattern emerges for women working in the platform economy. For example, while domestic work was traditionally dominated by poor Black South African women, in 2020 more than half (51%) of the domestic workers registered on the SweepSouth platform comprised of Zimbabwean women predominantly, followed by Cameroonian and Malawian women (SweepSouth, 2020). In general, cross-border migrant workers are more likely to endure difficult working conditions without complaint due to their vulnerable citizenship status. For example, as an in-depth media investigation into food courier services in the gig economy put it,

For many immigrants in South Africa, food delivery is an enticing prospect, offering flexible hours and lenient background checks. People who don't meet the requirements for the job, including undocumented migrants, can easily obtain fake licences, vehicle registration papers and roadworthy certificates. Waiting for asylum or refugee status can

take years, with few interim opportunities for legal work. The hands-free approach of the gig economy has opened a new avenue for employment — but also for exploitation. (De Greef, 2019a)

Location specific gig work can be dangerous. The most common form of transportation used by food courier workers in South Africa's platform economy is the motorbike. However, cross border migrants often arrive in the country not knowing how to ride motorbikes (De Greef, 2019a). Beyond their lack of riding experience, affordability constraints also result in couriers purchasing or renting motorbikes of questionable roadworthiness, thereby increasing the potential for road accidents, which can be fatal (De Greef, 2019a). The perilous situation in South Africa has even prompted the New York Times to provide coverage in an article poignantly titled, "One More Way to Die: Delivering Food in Cape Town's Gig Economy" (De Greef, 2019b). The article cites the Motorcycle Safety Institute's statistics, which claim that 70, predominantly food delivery couriers, lost their lives on South African roads in the year running up to August 2019 (De Greef, 2019b). However, threats to safety in the platform economy are not merely limited to food courier riders. Uber drivers in South Africa are also at risk of being attacked and/or robbed of the money they carry as a result of the introduction of cash payments, whilst they are also at risk of being kidnapped by criminal syndicates (MacMillan, 2022).

Moreover, female Uber drivers are particularly vulnerable, as the attack on Haupt (2022) demonstrates. Haupt (2022) reports that she stopped driving for Uber after being physically attacked by a female passenger who lost her temper. Haupt (2022) explains that she was summoned by the passenger via the Uber app. However, the app's navigation system directed her to the back entrance of the pick-up point instead of the front entrance where the passenger was waiting. By the time Haupt (2022) made her way to the front entrance of the pick-up location, she noticed that the passenger was annoyed, ostensibly as a result of being kept waiting. The situation quickly deteriorated when the passenger insisted on providing directions, despite Haupt (2022) preferring to use Uber's navigation system. An argument ensued whereupon the passenger became hostile towards Haupt who became uncomfortable with the situation and cancelled the trip to remove herself from the confrontation. This angered the passenger who refused to leave the car. From her position

behind the driver's seat, the passenger then proceeded to beat Haupt's head with her cell phone whilst yelling, *'You Coloured bitch!'* (Haupt, 2022).

The passenger only left the vehicle once Haupt activated the panic button on the Uber app, which in 2016 when the incident occurred, merely functioned to alert the police and the platform company that an emergency was in progress. Haupt (2022) tried to reach the nearest police station after the passenger disembarked, but was extremely upset and disoriented, which led to her getting lost. She subsequently made her way home whereupon a family member took her to a doctor for treatment, which in the weeks following the attack also included trauma counselling (Haupt, 2022).

Meanwhile, Haupt (2022) was contacted by Uber's local office as part of a routine follow-up given that she had activated the panic button on the app. This was followed by a call from Uber BV in the Netherlands who informed her that Uber would not intervene as she was an independent contractor who was personally responsible for such events. Uber BV initially deactivated Haupt (2022) from the app, but reactivated her after a period of time. However, she was left to deal with the attack from the passenger in her individual capacity as an independent contractor.

Haupt (2022) reported the attack to the police and the passenger was summoned to court. Unlike Haupt, the passenger had the means to appoint a lawyer who apparently adopted a strategy to drag the case out over a number of years, thereby frustrating Haupt's (2022) efforts. As a result, the passenger who attacked Haupt (2022) repeatedly missed court appearances. However, just before the statute of limitations ran out, the passenger acceded to mediation during which she agreed to cover Haupt's (2022) medical costs. Be that as it may, Haupt (2022) reports never receiving any financial compensation from the passenger. This is despite the sheriff of the court issuing several notices. Reflecting on her experience, Haupt (2022) emphasised the fact that it was not just Uber that let her down, but the entire system, which from her perspective includes South Africa's legislative framework and justice system.

Commodification of Data: A New Frontier for Rent Extraction from Vulnerable Workers

A distinctive feature of tech monopolies is their extraction of user data for market control and profit maximisation. Given that algorithms are able to predict user behaviour, advertisers are given access to user data (Srnicek, 2017, Bourreau et al., 2017). Thus, in addition to poor working conditions and low earnings, platform workers also face the threat of having their privacy violated due to the sharing of their data with third parties. In this regard, digital platforms hand over their users' data to companies advertising products and services, such as insurance companies operating in the vulnerable workers' sector, for a share of their profits.

One of the respondents interviewed for this study was Fairuz Mullagee, co-ordinator of the Social Law Project (SLP), a research and training unit in the Centre for Transformative Regulation of Work (CENTROW) at the University of the Western Cape (UWC). Embodying a research as praxis initiative, the SLP is the co-creator of a domestic workers' platform co-operative (co-op). This platform co-op, referred to as the Digital Platform Co-operative Project (DPCP) is being launched to promote sustainable workplace democracy in support of a rights-based culture (Social Law Project, 2020). It was initiated as an alternative economic development model to two conventional labour broking domestic worker platforms in South Africa, SweepSouth and Domestly. However, Domestly has since gone out of business (Fairwork, 2020).

For Mullagee (2019), one obvious problem for those who view the vulnerable workers' sector as a business opportunity is that products and services don't make money in this sector. She was intrigued by SweepSouth's success, as it is a start-up that appears to have attracted a great deal of investor support.

> *They didn't make money before platforms. So, what is the source of capital accumulation and the extent of that capital accumulation now? Why would Naspers invest R30 million in SweepSouth? The question haunting those of us that work in this sector is about the commodification of data, but we don't have the hard evidence for it. (Mullagee, 2019)*

Mullagee (2019) conducted her own investigation to make sense of the interest in SweepSouth by reviewing the information on the company's website. She identifies SweepSouth's business partnerships as an area of interest, particularly, a partnership that the platform has with an insurance company with whom its members sign up for funeral insurance. Reflecting on the discovery that SweepSouth has a partnership with an insurance company, it dawned on Mullagee (2019) that the SLP was also wooed by a funeral insurance company in the early days of designing their platform co-op. Over a period of two years, Mullagee (2019) attended meetings with this insurance company that operates in the vulnerable workers' sector. Her interest in those meetings was merely to find out how SLP's domestic worker partners could benefit from the relationship. While the lengthy engagement didn't lead to anything, Mullagee (2019) did uncover how insurance packages are structured to deliver significant profits to the companies involved in the partnership despite operating in the vulnerable workers' sector.

Based on the model that was presented to her, Mullagee (2019) reports that the monthly insurance fee charged to domestic workers is relatively affordable. However, profit margins are huge because of the low cost of producing the insurance product as well as the marginal cost of scaling its distribution. In this regard, insurance companies are able to achieve economies of scale given the large size of the vulnerable workers' sector in South Africa. The way it works is that digital platforms share their users' data with insurance companies that they have partnered with in return for a share of the profits from insurance fees. Somewhat repelled by a model that commodifies users' data, the SLP walked away from the partnership opportunity (Mullagee, 2019).

This is another example of the network effect generating rents for companies operating in the platform economy. In this regard, the platform economy has introduced a new formula for the exploitation of workers, which extends beyond the mere suppression of labour costs by building onto it the commodification of workers' data for rent extraction. It demonstrates that workers in the platform economy are exposed to heightened forms of exploitation as a result of data extraction for profit maximisation. Not only does this put

platform users' privacy rights at risk, but it also represents a new avenue to exploit vulnerable workers.

Regulatory Vacuum in Platform Economy Fuels Worker Exploitation

Platform companies currently get away with exploitative labour practises because existing labour legislation lags behind their disruptive business models. National policy and regulatory frameworks have proven insufficient to govern platform companies operating transnationally via the cloud, creating, amongst other things, dilemmas around nationally defined sectoral legislation, labour legislation, competition regulation and taxation.

Due to the phenomenon of first user advantage, innovative business models and the complicated corporate structures of platform companies, policymakers and regulators have been caught flat footed, resulting in the emergence and entrenchment of platform companies in a regulatory vacuum. This, of course, has worked in platform companies' favour with companies using their pioneer status to redesign 'existing (laws) by introducing practices with their platforms that essentially set new standards' (Kenney and Zysman, 2016, p. 67), which Pollman and Barry (2017) have labelled "regulatory entrepreneurship" due to the fact that the business models of platforms are effectively intended to change the law.

A worrying example of such regulatory entrepreneurship in South Africa is the appeal for 'a more flexible employment regime that underpins the ability to appoint and dismiss without fear of…penalties and pro-labour rulings' (Digital Collective Africa, 2021, p. 17) by the Commission for Conciliation Mediation and Arbitration. This appeal was made in a Start-up Act Position Paper produced by a business lobby group to influence digital economy legislation in South Africa. In this regard, the group has been proactive about seeking to engage policymakers at the highest level. This includes President Cyril Ramaphosa who participated in a meeting with the pro-business lobby group to discuss the Start-up Act Position Paper (BizCommunity, 2021).

The international response to globalised platform companies is equally concerning. Despite noting that platform companies contribute to the weakening of labour rights and social protection (ILO, 2017), the International Labour Organisation has been slow to respond to the rapid changes in working conditions affecting gig workers. For example, the ILO's Centenary Declaration for the Future of Work (2019) was only adopted in 2019, a full decade after companies such as Uber were launched. This Centenary Declaration flows from a report produced by the ILO's Global Commission on the Future of Work, which was co-chaired by President Ramaphosa, and in which Mthunzi Mdwaba, vice chair of the ILO as well as a respondent in this study, participated as an ex-officio member (ILO, n.d.).

While the ILO's Centenary Declaration for the Future of Work contains recommendations for work to be decent, sustainable as well as provide adequate wages and social protection, it is important to note that "declarations are not subject to ratification", nor are they binding (ILO, 2019). As such, the Declaration remains a statement of intent to encourage good labour policies, but it is not enforceable. Thus, a massive task still remains for trade unions, labour lawyers, social protection advocates and policymakers to create, support and entrench the labour protections that are much needed by gig workers in the platform economy.

Platform Companies Redefining Labour Relations to Operate Outside of the Law

As platform companies innovate, they do not appear to be above adopting deception to avoid paying taxes and complying with labour laws. Platform companies commonly refuse to define themselves in relation to the sectors that they work in, choosing to function at a supranational level as technology companies, commonly locating their headquarters in tax havens. For example, having registered its platform in the Netherlands (a tax haven) and while operating in the taxi industry, Uber refuses to describe itself as a transportation services company, instead insisting on its status as a software company (Dawkins, 2020). It is also common practise for platform companies to circumvent labour laws by requiring workers to function as independent contractors on zero-hour contracts (Borkin, 2019, Browne, 2020). For example, Uber refuses to identify the drivers that work

for it as employees, choosing instead to describe them as self-employed independent contractors (Fredman et al., 2020, Browne, 2020).

Due to its global reach, Uber has become the subject of many courtroom challenges by drivers as well as governments in many parts of the world. For example, in Germany, the regional court of Frankfurt banned Uber in the entire country over anti-competitive practices, also demanding that if Uber were to operate in the country that it would have to register as a vehicle rental company, as it ran its service in the country via car rental companies in the country (Reuters, 2019). Meanwhile, a court in California ordered Uber and Lyft to classify their drivers as employees; however, the companies threatened to discontinue providing services rather than comply (Roth and Mulvaney, 2020, Conger, 2020). In this particular case, Uber and Lyft proceeded to appeal the ruling in a higher court, which halted the decision by the lower court (Bellon, 2020). At the same time, both companies were also in the process of sponsoring a ballot, Proposition 22, to the tune of $200 million (O'Brien, 2020) to exempt themselves from legislation that would enable their drivers to "acquire sick leave, overtime and other benefits" (Conger, 2020). Proposition 22 "defines app-based rideshare and delivery drivers as independent contractors instead of employees" (Maruri, 2021). Following a massive and well-funded public relations and lobbying campaign by the platform companies, Californians voted in favour of Proposition 22, allowing Uber and Lyft to continue engaging their drivers as independent contractors, thus denying them labour protections such as minimum wage, paid sick leave and unemployment insurance. Perhaps most egregiously Proposition 22 does not allow independent contractors to unionise (O'Brien, 2020).

Thus, by deploying innovative definitions and mobilising the massive financial resources at their disposal, platform companies are circumventing existing social protection laws as well as changing them—and they are doing it on a planetary scale, as the legal cases discussed below demonstrate.

Lessons from Germany: The Platform as a Digital Factory

Dr. Rüdiger Helm, a lawyer based in Germany and a research affiliate of the Southern Africa Labour and Development Research Unit at the University of Cape Town (UCT) who conducts both research and litigation work, was interviewed by this study. Helm (2020) is the architect of the *Mangold-Helm Case* to the European Court of Justice, which led to a new interpretation of age discrimination laws in Europe.

Helm represented a platform worker (hereafter referred to as the plaintiff) in the German Federal Court of Labour after his employment was terminated by the platform company, Roamler. In this litigation case, the platform worker went to court in an effort to establish an employment relationship between Roamler and himself. Similar to Uber in South Africa (see case discussed below), Roamler declared that there was no employment relationship between itself and the plaintiff as he worked of his own volition, opting in and out of tasks at his own convenience. (Helm, 2020)

Helm believes that the Roamler case has relevance for South Africa, arguing,

> *The criteria for the definition of worker are similar in South Africa and Germany, highlighting the significance of the Roamler Case for making similar arguments in South Africa. (Helm, 2020)*

Roamler is a company that sends secret shoppers to retail outlets on behalf of its clients in an effort to gather information about where and how their products are displayed in stores, such that the platform can produce customised analysis tools for its clients. Modelled on the idea of crowdsourcing, the secret shopper, i.e., the platform worker deployed to gather this information is labelled a “crowd worker” by Roamler and viewed as an independent entrepreneur with whom the company claims no employment relationship. (Helm, 2020)

However, the plaintiff was completely economically dependent on his job at Roamler, working in a contractual relationship with the company over an uninterrupted 14-month period, averaging between 15-20 hours of work per week and earning approximately €1,749.34 or ZAR32,330 per month at the time of writing. The plaintiff was unexpectedly deactivated by Roamler following a payment dispute over a minor amount of money. Under normal circumstances in a company with traditional management structures, it appears that some kind of amicable agreement might have been reached between the two parties. However, due to algorithmic management, which offers no room for flexibility or margin for error, the Roamler app deactivated the plaintiff. Thus, in the blink of an eye, the plaintiff lost his only source of income. (Helm, 2020)

According to Helm, the decisive question tested by the German Federal Labour Court in the Roamler case was,

> *Can the fact that the micro jobber picks his work from the Roamler app be an argument against an employment relationship? (Helm, 2020)*

In setting out his argument, Helm argued that the plaintiff would have been unable to perform his tasks without Roamler's digital infrastructure, which in effect functions as a digital factory. In this regard, Helm argued that the infrastructure of the Roamler app integrates workers into its process by strictly controlling their movements through precise instructions while tasks are being fulfilled. As such, it was argued that the plaintiff was dependent on the digital infrastructure (the virtual place of work), which was necessary for performing tasks in physical environments. Accordingly, it was argued that the virtual interface (the app) was a digital factory. (Helm, 2020)

The German Federal Court of Labour agreed with Helm's argument that the Roamler app represented a digital factory. According to their press statement, the court found that an 'employment relationship is deemed to exist if the client controls the cooperation via the online platform operated by him in such a way that the contractor is not free to organise his activities in terms of place, time and content' (German Federal Labour Court, 2020).

Thus, the court found that there was indeed an employment relationship between the plaintiff and Roamler (German Federal Labour Court, 2020). However, beyond establishing the employment relationship, the plaintiff was not reinstated in his job, making this a limited victory for labour protection.

Nevertheless, Helm's astute conceptualisation of the platform company as a digital factory, enabled the German court to focus on the concept of "control" in a Focauldian sense in its finding that 'an employment relationship is deemed to exist if the client *controls* the cooperation via the online platform' (German Federal Labour Court, 2020, emphasis added). This finding augments a finding by a Californian court that explicitly quotes Foucault in its judgement against a platform company, thus highlighting the emergence of a standard to determine the employment relationship in the digital economy. In this regard, in a class action suit brought against Uber, which is similar to the Roamler case, a Californian judge ruled as follows:

> In an impressive show of erudition, California judge Edwin Chen cited Michel Foucault in his 2015 ruling that Uber had a case to answer in a class-action suit brought on behalf of drivers claiming they should be classified as employees. Remarking that the ratings system gave Uber a 'tremendous amount of control over the manner and means of its drivers' performance', he noted Focault's words in *Discipline and Punish* that 'a state of conscious and permanent visibility assures the automatic functioning of power'. (Standing, 2018, p. 122)

Platform Companies as Amorphous Legal Entities: The Case of Uber in South Africa

Prof. Darcy du Toit (2020), an Emeritus Professor and former Dean of Law at the University of the Western Cape (UWC), who I interviewed for this study, specifically emphasized the significance of new definitions and how these are being deployed by platform companies to avoid complying with existing legislation in South Africa. Du Toit, who coordinates a new niche area in the Faculty of Law at UWC, focusing, amongst other things, on the impact of digitalisation on labour rights and changing forms of work; is also a practitioner who works as a consultant to Bradley Conradie Halton Cheadle Attorneys, a

firm specialising in labour law, in which capacity he was part of the team that represented former Uber drivers in the first litigation case against Uber in South Africa.

Du Toit (2020) explained that seven drivers brought a case against Uber in South Africa due to the fact that the company deactivated them from the app. He makes an important distinction when describing how the drivers lost their jobs.

> *It started with virtually two or three drivers being deactivated not by the app, but by Uber pressing the button. (Du Toit, 2020)*

As such, based on testimony from the drivers, he locates responsibility for deactivation from the app with the management team of the company—and not as an outcome of algorithmic discretion. In support of this contention, Du Toit argued that prior to the drivers being deactivated from the platform, they had actually established an organisation to negotiate better working conditions with Uber. He believes that there is some connection between the drivers being deactivated by Uber and the fact that they were challenging the company's policies internally. (Du Toit, 2020)

His first meeting with the drivers occurred after they had originally initiated legal action against Uber. According to Du Toit,

> *I happened to come across these drivers at an academic event where for the first time I heard about this matter, which seemed to be a very important matter because around the world, cases were being fought by drivers to try and prove that they are employees and entitled to protection of minimum wages, maximum hours, paid leave and, of course, protection against dismissal. (Du Toit, 2020)*

For Du Toit (2020), the matter had immense significance as this was the first time that such a case was being brought in South Africa. He got involved in the case on a pro bono basis because the union representing the drivers, the National Union of Public Service and

Allied Workers (NUPSAW), was under-resourced. He also secured the services of an advocate with the Cape Bar who was willing to act on a pro bono basis, as the drivers and NUPSAW would not have been able to afford legal support had the lawyers not volunteered free services (Du Toit, 2020). This is in stark contrast to Uber, which had the resources to hire an expensive legal team (Cliff Decker Hofmeyr, 2018), immediately highlighting the power imbalance between vulnerable workers and platform companies.

Uber won its case against the drivers in South Africa on a technicality. According to Du Toit, whilst the drivers brought a case against Uber, NUPSAW did not understand Uber's complex global corporate structure, which includes divisions around the world, including Uber South Africa (Uber SA). Thus, the key obstacle became the fact that NUPSAW initially lodged a case against Uber SA, whereas the Uber platform, i.e., the software or app which represents the company's intellectual property, is owned by Uber BV, which is based in The Netherlands. A further demonstration of its complicated corporate structure is the fact that Uber is headquartered in California. (Du Toit, 2020)

In this instance, a case of unfair discrimination was brought against Uber SA, which proved to be the deciding factor in the outcome of the case. However, due to the fact that Uber engages drivers as independent contractors, it is important to note that the case lodged at the Commission for Conciliation, Mediation and Arbitration (CCMA) was simply to get the drivers recognised as employees of the company, such that they could actualise the protection offered by South Africa's Labour Relations Act (LRA), Act No. 66 of 1995. Thus, it is important to note that this matter was not a hearing on whether or not the deactivation of the drivers from the app amounted to unfair dismissal. It was simply that Uber had raised a preliminary objection claiming that the drivers were not employees—that they were independent contractors, who therefore could not bring a case to the CCMA. Thus, this case became about the preliminary issue, i.e., to establish an employment relationship. On this particular point, the CCMA commissioner ruled in favour of the drivers and held that they were employees of purpose and therefore could proceed with their claim against Uber SA. (Du Toit, 2020)

However, Uber challenged this finding. According to Du Toit,

> *Predictably Uber then took this on review, which is almost like an appeal asking the labour court to set aside the ruling. Uber went through complicated pleadings on all sorts of technical points and at the end of the day, the judgment went in their favour. (Du Toit, 2020)*

Du Toit explained the outcome as follows:

> *The judge found - and on a strict interpretation of the law one can't really fault this - that there was no contract between the drivers and Uber SA. That Uber SA and Uber BV were in law separate entities and therefore the court found it was not possible to find that Uber SA, as opposed to Uber BV, was the employer. (Du Toit, 2020)*

According to the court's findings, 'Uber BV is the contracting party to all of the agreements relating to the provision of intermediary services and the use of the Uber App with the partners/drivers and the users within South Africa,' (Labour Court of South Africa, 2018). Thus, on the basis that Uber SA merely provided administrative and marketing support to Uber BV, the court found that there was no contractual relationship between Uber SA and the drivers. Consequently, the drivers lost their case as a result of a technicality.

Thus, whether Uber acted appropriately to deactivate the drivers was never tested by South African labour law, as the case became confined to the preliminary issue of simply establishing an employment relationship. It appears that had Uber BV been named in the case initially lodged at the CCMA, the outcome may have been different. According to Du Toit,

> *The Labour Court did very expressly leave open the question of had this claim been against Uber BV, it would have been a very different matter, which would have had*

> *to be treated on a different basis. But that was not the issue, which the court was called upon to decide—so there this matter ended. (Du Toit, 2020)*

Nevertheless, the struggle for labour protection for Uber drivers in South Africa continues. In February 2021, a class action case was brought against Uber SA and Uber BV to have drivers classified as employees (eNCA, 2021). The UWC's CENTROW led by Du Toit, is involved in this case, which is still unfolding. This issue of establishing an employment relationship between workers and platform companies is an important new terrain of contestation in the digital economy, as indicated by the Uber and Roamler cases—but while these cases are both important examples of dialecticism, they also demonstrate that legal contestation takes place over narrow and technical interpretations of the law. Thus, even when workers win cases against platform companies, outcomes often represent narrow victories. In this regard, legal victories against platform companies represent important, but incremental progress against unfair labour practises. However, as the discussion below demonstrates, there are complementary efforts underway to structurally transform the platform economy in support of workers' rights and total liberation from oppressive working conditions.

Dialecticism in the Digital Economy: Post-capitalist Impulses in the Platform Economy

While the Uber drivers' legal challenge against the company in South Africa was unsuccessful, the fact that their lawyer, Du Toit, was attached to a research unit at UWC presented an opportunity for the drivers in the form of possible support for the establishment a platform co-op, which the Social Law Project was exploring (Platform Cooperativism Consortium, 2020). According to the SLP's co-ordinator, Fairuz Mullagee (2019).

> *Darcy was involved with the Uber case, defending the seven Uber drivers who undertook to challenge Uber and through our interaction with that group of workers, we realized that they wanted to form an alternative and they were looking at the idea*

of a co-op. We thought that this is probably a way for vulnerable workers that we've been working with over the years…(to use) tech, which has now become so prominent as a tool for organizing and a whole range of issues that could be addressed in terms of social security. (Mullagee, 2019)

With reference to the vulnerable workers that the SLP had been working with, the academic unit spent many years researching domestic work, including providing support to the local domestic workers' trade union, the South African Domestic Services and Allied Workers Union (SADSAWU) and its president, the late Myrtle Witbooi, who was also the president of the International Domestic Workers Federation, resulting in her participation at ILO conferences (Mullagee, 2019). Moreover, given that South Africa is a signatory to the ILO's Convention 189, which addresses decent working conditions for domestic workers, the SLP also provided research support to ILO processes, including conducting a 2015 study for the ILO on the potential for domestic worker co-ops in the country (Mullagee, 2019).

The SLP was initially interested in exploring a partnership with the Uber drivers and the domestic workers to establish a joint platform co-op (Mullagee, 2019). However, the unit ultimately opted to work exclusively with one group only, i.e., the domestic workers given their longstanding relationship with these workers as well as their research in this sector (Mullagee, 2019). However, despite its ties to the domestic workers' trade union and its leadership, the SLP also expanded its reach beyond the trade union in its search for domestic workers to join the co-op project. The choice not to work exclusively through the trade union was based on the fact that the SLP had identified deficiencies in the union model, which concerned them. According to Mullagee,

It is hard to see growth in the organised segment of this sector. For us we have come to the conclusion that it is a combination of serious bureaucracy that has set in and also the disparate nature of the sector. These are two inhibiting features of the sector and as I have said earlier, we have had to gently communicate to the leadership in the (union) that as an academic organisation we have to be seen to be working with a wider audience. (Mullagee, 2019)

A study on the emergence of platform co-ops in South Africa, which tracked the progress of the SLP's domestic workers' platform co-operative project, found that the research unit defined its role as that of development facilitator and not as platform co-owner alongside the domestic workers. As such, the SLP functioned more as an incubator for the platform co-op. As development facilitator, the SLP secured seed funding from a German funder - *DGB Buldingswerk* - for the launch of the project. These funds were allocated to: 1) building a digital platform; 2) exposing the enlisted domestic workers to the governance and management model of a co-op; and 3) providing technical/digital skills training to the domestic workers. (Farouk, 2022)

After a three-year period of co-designing the project, the SLP and its domestic worker partners finally settled on launching a digital platform as an information exchange and advocacy tool, which it named the Digital Platform Cooperative Project (DPCP). In this regard, the DPCP would in essence not function as a platform co-operative - at least not initially – but as a space for engagement and activism. However, the team also decided to build a marketplace component into the app as an optional secondary phase of the project, should the domestic workers choose to initiate the co-op business in the future. However, launching the business side of the co-op is an endeavour that the domestic workers would have to fulfil independently, as the SLP has limited its role to that of development facilitator. Thus, whether the platform co-op eventually gets off the ground or not remains an open question. Nevertheless, concerns have been raised about the capacity of the domestic workers to launch and manage a platform economy business without the support of the SLP. (Farouk, 2022)

Meanwhile, despite the SLP not developing a formal partnership with the Uber Seven, the drivers decided to go ahead with their idea to launch a platform co-op independently (Mullagee, 2019). The driving force behind their initiative was Faiza Haupt (2022). While Haupt was not part of the Uber Seven, she was nonetheless sympathetic to their cause given her own difficulties with Uber, which, as discussed earlier in this chapter, include deactivation from the platform following a violent physical attack from a passenger. Moreover, following her deactivation from the platform as a driver, as well as in a

demonstration of her interest in business management, Haupt (2022) became an Uber partner, i.e., the owner of a fleet of cars that she rented to Uber drivers. While she took advantage of the opportunity provided by Uber to start her fleet business, Haupt (2022) was nevertheless drawn to the idea of a co-operative as a democratic worker-owned business model that could offer fairer outcomes to drivers. While Haupt's (2022) class consciousness developed over many years of being exploited as a worker, including and especially by Uber, it is to some extent also informed by her personal networks, which includes close family ties to a trade unionist as well as a friendship with one of the Uber Seven drivers, a former truck driver with a labour movement background who played a critical role trying to organise workers inside Uber, which ostensibly led to his deactivation from the platform. As Du Toit (2020) pointed out, Uber initially deactivated two or three drivers from their platform before deactivating a total of seven drivers in relation to the "Uber Seven" case. In this regard, the former truck driver and labour movement activist was amongst the first to be targeted for deactivation by Uber (Haupt, 2022).

Keen to extricate herself from dependence on Uber as a fleet partner, Haupt (2022) joined forces with the Uber drivers leading to the registration of *Trip Rider SA*, a ride-sharing platform co-operative. Haupt (2022) was the only founding member of the co-op with some financial means. This, however, resulted in the group leaning heavily on her to cover its start-up costs and carry much of the administrative burden associated with registering a co-op in South Africa. Nevertheless, Haupt (2022) and her co-collaborators also managed to recruit a programmer who joined the co-op as a member and assumed the responsibility for developing the digital platform, i.e., the app. Ultimately, however, after three years of trying to get it off the ground, *Trip Rider SA* failed to launch.

There were many factors that led to *Trip Rider SA's* failure. These included limited financial resources; differences in the founding members' business management capacity and experience leading to fraught group dynamics; as well as a policy and legislative framework for co-op development in South Africa that is flawed in general, but particularly inadequate to the task of supporting co-op development in the digital

economy. Ultimately, however, it was a lack of institutional support, i.e., the lack of incubator support that led to *Trip Rider SA's* failure to launch. (Farouk, 2022)

Despite the Uber drivers' failed attempt, their effort is nonetheless a demonstration of dialecticism in the digital economy, expressed as Lukácsian working class consciousness (Feenberg, 2016, Lukács, 1972). In this regard, while the drivers contested their working conditions on the Uber platform and failed, they nevertheless took their struggle to another level outside the company by attempting to establish a co-op, as a model that challenges the very system of capitalism. |From this vantage point, the Uber drivers' efforts to establish a platform co-op was an attempt to overcome a highly exploitative form of capitalism by endeavouring to transform it into a "product of their collective action" (Stahl, 2018). Thus, despite a tendency to be dismissive towards the working class in post-capitalist discourse, *Trip Rider SA* is an example of post-capitalist entrepreneurship rooted in worker struggles. At the same time, the domestic workers' platform co-op, i.e., the DPCP, while driven by research praxis, is nonetheless also rooted in worker struggles, as the research unit that co-developed it is itself grounded in the struggles of the labour movement in South Africa.

Conclusion

While the platform economy is presented as a suitable vehicle to address South Africa's unemployment crisis, in reality, it is based on an extractive rent seeking model that takes the exploitation of labour to hitherto unimagined levels, highlighting even greater challenges for South Africa's struggle against inequality. In fact, the platform economy mutates to exhibit even harsher forms of precarity, as a consequence of exploitation that feeds off people's desperation in a highly unequal country, as demonstrated by the fact that South Africa was the only country in the world in which Uber produced profits.

What the literature as well as the outcomes of the legal cases demonstrate is that platform companies exploit their first user advantage to maintain dominance in a world trying to keep abreast of the liberties they have usurped. However, given the formidable resources

that these technology platforms have at their disposal, it seems likely that labour protection advocates will continue to face an uphill battle in the digital economy for the foreseeable future.

Finally, while post-capitalist impulses have emerged in response to precarity in the platform economy, these are weak and largely unsupported in South Africa. What the South African examples of post-capitalism demonstrate is that the pursuit of alternative economic models remains a niche issue pursued by those within progressive spaces, such as by leftist academics engaged in praxis or by those within the labour movement. Thus, indicating the need for exposure to post-capitalist models amongst wider audiences.

CHAPTER EIGHT: DISCUSSION AND CONCLUSION

The question that this thesis attempted to answer is: Will the Fourth Industrial Revolution (4IR), as a metaphor for the digital economy, make a difference to how post-apartheid South Africa responds to its crisis of social and economic inequality?

This question was motivated by the burst of technological innovations in the twenty-tens that bore witness to the reinvention of artificial intelligence (AI) technologies, which automated increasing categories of work, presaging an ominous future for the labour market, including and especially for workers in middle-class occupations traditionally considered safe from technological unemployment. While this development not only revived interest in studies on technological unemployment, the comprehensive ways in which AI and related technologies were being integrated into economies, their penetration into numerous aspects of life as well as the underlying shifts that society experienced, also led to the emergence of several theories of change regarding the onset of a new industrial revolution, including Klaus Schwab and the World Economic Forum's declaration of a Fourth Industrial Revolution (Schwab, 2017, Perez and Leach, 2021), which the South African government adopted as a theory of change and a lodestar for policymaking at the highest level.

However, while the World Economic Forum (WEF) promises a bright future to nations whose governments buy into its theory of change, this study highlights a tension between the 4IR's human development objectives and its outcomes. This tension is ascribed to the origins of the 4IR in an elite business facing organisation that locates technological development within a market driven approach to innovation that inherently propagates inequality due to its winner take all mindset, which yields to the inevitability of the 4IR as an ontological inequality based on a survival of the fittest creed. By adopting the 4IR as a theory of change, the South African government replicates this tension. South Africa is a post-colonial and post-apartheid nation with deeply entrenched social and economic inequalities that the Presidential Commission on the Fourth Industrial Revolution (PC4IR) acknowledges as "historical scars" (2020), which ostensibly require addressing. In this regard, this study argues that it is impossible to reconcile the PC4IR's objective of a

socially inclusive “human-centred agenda” (2020) with the 4IR’s theory of change, which creates winners and losers as an inevitable outcome of its market-driven approach to innovation—thus, driving rather than reversing inequality.

In this regard, this study agrees with the consensus amongst left leaning South African scholars that the 4IR is a bulwark for neoliberal capitalism that furthers the agenda of global elites (Sutherland, 2020, Cooper, 2021, Hlatswayo, 2021, Maharaj, 2021, Mapadimeng, 2021, Moll, 2021a, Ngwane and Tshoaedi, 2021). Moreover, drawing on Marcusé’s theory of technological rationality with respect to the drivers of innovation, this study argues that in South Africa’s case, the ‘one-dimensionality of neoliberalism not only cancels the future under the guise of TINA (“There Is No Alternative”), but also imposes its logic on the everyday lives of citizens’ (Stevenson, 2022, p. 90).

The trouble with neoliberalism is that it runs deeper than a mere belief in the market as the ultimate authority in the economy. Neoliberalism is also dedicated to the idea that market mechanisms can solve all of society’s problems. Consequently, what sets neoliberalism apart from classic liberalism is that it is about more than market autonomy, but also about reconfiguring the state in the image of the market (Ahmari in Illing, 2023). Neoliberalism is thus the ideological force that establishes ‘markets as a superior way of coordinating complex actions’ (Stalder, 2023, p. 878). This study finds that technological development is evolving within such a neoliberal policy framework as the state has handed over all power to the financial market concerning the future direction of South Africa’s digital innovation, foreshadowing new challenges for achieving shared prosperity, social inclusion and post-apartheid transformation.

Findings

Social Inclusion Impaired by Market Fundamentalism

Whilst Marcuséan technological rationality demonstrates how neoliberalism infiltrates mainstream consciousness, applying Castells’ Network Society theory to the digital

economy as a heuristic model demonstrates how this ideology affects policy and practice. Castells' theory highlights the parallels between the 4IR and informational capitalism as neoliberal models based on a culture of individualism, patriarchy, risk taking, wealth accumulation and a notion of liberty specifically expressed as a restricted role for the state (Banet-Weiser and Castells, 2017, Stalder, 2023).

These characteristics are evident in the Start-up Act Position Paper (Digital Collective Africa, 2021) that was drafted by a venture capital lobby group in South Africa, which calls for innovation in the digital economy to be driven by the financial market whilst limiting the role of the state to that of an enabler whose only role is identified as removing constraints to doing business by reducing red tape whilst sanctioning a flexible labour regime. These are familiar refrains from the private sector and their incorporation in this position paper on start-up legislation is an example of "regulatory capture" demonstrated by 'special interests (contending) for the right to use government power for narrow advantage' (Levine and Forrence, 1990, p. 167).

Be that as it may, the recommendations of the PC4IR were published before the Start-up Act Position Paper was released, and in this regard the presidential commission's stance on activating innovation in the start-up sector is in complete alignment with the venture capital lobby group in that they both view the financial market as the driver of technological development, whilst also concurring on the view that expediating the "ease of doing business" (PC4IR, 2020) or "removing constraints" (Digital Collective Africa, 2021) is a priority area for government to attract foreign investment. In other words, both the presidential commission and the venture capital lobby group are aligned in their objective to make it as easy as possible for innovation to take place through the financial market whilst limiting the role of the state. This crude objective highlights discrepancies with respect to what it means for a human-centred approach to social inclusion, which is the corresponding social objective of the PC4IR—and for that matter, what its implications are for inclusive growth and economic transformation, which is a policy of the National Treasury that the Start-up Act Position Paper apparently seeks to "echo" (Digital Collective Africa, 2021).

In this regard, what this PhD study does is present evidence that there are hidden elements in the details of how one achieves elevated goals, which may in fact and in this case, do undermine them. For example, by demanding "relaxations" such as increased labour flexibility, tax breaks and the removal of exchange controls (Digital Collective Africa, 2021), the Start-up Act Position Paper outlines measures, which in fact weaken the state's control over capitalist forces that exploit labour, undermine public investment in social programs by reducing the tax base, and extract value from the economy through capital flight.

Notwithstanding the harms associated with financial liberalisation, a flexible labour regime, highlighted as essential by the venture capital lobby group to support the growth of the start-up sector (Digital Collective Africa, 2021), is one of the most destabilising features of neoliberal capitalism that is diametrically opposed to a human-centred approach to social inclusion and economic transformation. In this regard, this study highlights a vast literature on the precarity of work in the platform economy that clearly exposes the harms associated with inadequate labour protections in the digital economy (Mawii and Aneja, 2020, Schor et al., 2020, Webster and Masikane, 2021, MacMillan, 2022).

Meanwhile, dismantling labour protections to attract foreign investment is a flawed strategy that is irreconcilable with economic inclusion goals. In this regard, the pursuit of foreign investment, which has been equated to little more than a "beauty contest" (Mdwaba, 2020), yields limited domestic rewards that mainly accrue to local elites, whilst the lion's share of value is extracted from the country for the benefit of international investors. One clear example of weak labour legislation in the digital economy that fuels corporate profits leaving the country is the fact that South Africa is the only country in the world in which Uber's business model is profitable, whilst its drivers are amongst the most exploited workers due to the high levels of inequality in the country, which has in fact bolstered the tech giant's profit expansion plans (MacMillan, 2022, Kerr, 2022).

By adopting an innovation model that single-mindedly pursues venture capital to catalyse innovation, it is evident that the PC4IR underestimates just how much would need to be

sacrificed to achieve this goal, as it has adopted a stance that aligns with a venture capital lobby group that has the same objective, but seeks to achieve it by weakening the state by dismantling regulations that protect the country and its citizens. At the same time, the PC4IR's close alignment with the proposals emanating from this business lobby group, is also a grim reminder of the essentiality of the neoliberal rationale that prevails in South Africa today.

Digital Economy Skews Towards Innovations that Extract Value

As noted in the literature review, scholars and analysts have raised concerns about the implementation of the 4IR in South Africa from a developing country perspective (Mazibuko-Makena and Kraemer-Mbula, 2021, Marivate et al., 2021, Selelo and Khwela, 2022). However, the data gathered by this study reveals that financial markets as well as their agents are not motivated by a development agenda. This is indicated by the prioritisation of "growth" (a euphemism for profits) and "scale" (a euphemism for monopoly status) as the principal goals of a market-driven innovation model that is dogmatically promoted within the start-up ecosystem (Startup Grind, 2019a, Startup Grind, 2019b).

Accordingly, this study's survey of the start-up sector reveals that innovation is overwhelmingly geared towards profit maximisation and rent extraction. In this regard, a major finding of this study is that technological development skews towards innovations that extract value from the economy, thereby extending the inequalities that hinder South Africa's social and economic transformation. This is in contrast to economic activities that add value to society through social impact innovations that target underserved communities and/or that have developmental goals. In this regard, this study finds that the start-up sector is dominated by fintechs as the most common type of digital innovation followed by e-commerce platforms. Together, these companies emerged as 60% of the sample in this study's survey of 120 technology start-ups in South Africa.

The general dominance of fintechs in the start-up ecosystem and the rapid digitalisation of the banking industry correlates with the financialization of the South African economy,

which, is exemplified by the growing role of financial markets and financial institutions in the economy that pursue profits through financial activities (Epstein, 2021). Thus, highlighting a mutually reinforcing feedback loop between financial innovation and technological innovation. This feedback loop also revealed itself in the study of South Africa's banking sector that responded to innovations emerging out of the fintech sector by embracing those that increased efficiencies, whilst supporting the emergence of similar start-ups via the establishment of incubators that nurture financial innovation (Rand Merchant Investments, 2015).

In this regard, the leading fintech innovations are payment solutions followed by credit and loan platforms and insurtech. Payment platforms and insurtech often intersect in a web of financialised value extraction through digitalised point-of-sale transactions that instantaneously combine profit generation and rent extraction in a single purchase that merges the payment and insurance of goods. Thus, increasing the efficiency of the financial transaction in terms of its ability to extract value. In this regard, Marcusé's theory of technological rationality brings the teleology of digital payment systems into view as innovations single-mindedly focused on fast profits through increased efficiency. From this vantage point, technological rationality highlights the privileging of technical manipulation within capitalist culture as an implicit means-end rationality that relentlessly promotes efficiency in isolation of social objectives (Feenberg, 1991, Scharff and Dusek, 2013). Layering Castells' critique of informational capitalism and financial elites over Marcusé's theory of technological rationality brings the feedback loop between entrepreneurs and venture capitalists into view as a merger of efficiency targets and value extraction reified in capitalist rationale.

Marcuséan technological rationality problematises society's a priori acceptance of efficiency as unassailably objective (1941). In particular, technical efficiency is elevated to the status of a social norm within capitalist culture (Marcusé, 1941). This combined with the orthodoxy of profit maximisation, influences generous investments in payment platforms, thereby guarantying returns to investors and entrepreneurs who pursue innovations that fuel businesses, which grow by increasing the volume of their transactions. At the same time, there is a strong showing of e-commerce as the second

most popular type of start-up in South Africa's digital economy. As a result, payment platforms represent a crystallisation of fintech and e-commerce as the dominant mode of capitalist reproduction in South Africa's digital economy. For venture capitalists and entrepreneurs, these innovations are low hanging fruit in an economy purposefully built for value extraction.

Fintech in South Africa Is Not Quite About Financial Inclusion

The capitalist rationale intersects with inequality in South Africa's start-up ecosystem in paradoxical ways. Promoted as financial inclusion models, credit and loan platforms are the second most popular fintech innovation in South Africa. However, the influence of venture capital in fintech innovation has significant implications for the kinds of financial inclusion models that emerge in South Africa. Leaving aside the critique that financial inclusion fintechs prey on the weaknesses of the vulnerable rather than addressing the systemic injustices that fuel their difficulties (Giridharadas, 2019, VPRO Documentary, 2020), this study did not find investor support for financial inclusion models that target marginalised communities in South Africa. This is despite the fact that consumer credit has become an asset class of its own (Drummer et al., 2017). Thus, whilst there is evidence of investors backing fintechs that provide credit support to low-income earners in the Global North, in contrast, this study finds that the financial market does not support similar investments in South Africa.

How then have credit and loan platforms as financial inclusion models emerged as the second most common fintech innovation in South Africa? The answer lies in differentiating between the target markets of these fintechs. This study found that fintechs, which exclusively provided loans to small businesses with high annual turnovers were the most successful at attracting venture capital. These fintechs, which within the sample were established by white founders, continue to thrive due to sustained interest from international investors who are guaranteed returns as they only invest in businesses with a demonstrated record of sales success. For example, the white male founded fintech, *Lulalend,* raised more than ZAR66 million in Series A funding in 2019 and an additional ZAR600 million in Series B funding in 2023 to provide loans to small businesses.

In contrast, this study found that fintechs that attempted to extend credit to individuals from disadvantaged communities received no venture capital support. These fintechs were largely founded by Black South Africans whose inability to attract venture funds resulted in their closure. For example, *Commuscore,* a Black female-led fintech, received a trifling one million Rand from a challenge fund in 2017 to provide alternative credit scoring to people working in the informal economy. *Commuscore* is no longer operational and there is no evidence that it managed to secure additional rounds of funding. Thus, demonstrating a lack of investor interest in financial inclusion models that target disadvantaged Black communities in South Africa. This is despite the fact that financial inclusion is often used as an inducement to justify and encourage the establishment of fintech start-ups (Makina, 2019, Sahay et al., 2020).

Consequently, this study finds a bias in financial inclusion innovation in South Africa, which skews towards loan support for small businesses rather than access to credit for the working poor. The fact that similar fintechs are supported by venture capital in the Global North points to an incongruity in South Africa, which indicates racial bias in the investor-entrepreneur ecosystem, as local fintechs targeting marginalised communities are typically founded by Black entrepreneurs. In this regard, in addition to *Commuscore*, there are several other examples of Black founded start-ups in this study's sample whose funding sources were confined to challenge funds, crowd funding, as well as social impact and philanthropic initiatives, which inevitably resulted in their closure as these sources typically provide limited financial support.

Despite these outcomes, the emphasis on financial inclusion in mainstream and policy discourse combined with Black economic empowerment (BEE) targeting by challenge funds, as well as their own sensitivity to the difficulties faced by marginalised communities, remain pull factors for Black entrepreneurs in the fintech ecosystem. In this regard, Black entrepreneurs are not just targeted, but also motivated by challenge funds, which are typically established by institutions with a development agenda. However, the value of challenge funds is insignificant compared to venture capital. Consequently, this study argues that Black entrepreneurs, lured by the availability of seed funding from

challenge funds, naïvely enter the fintech space. However, as the data reveals, very few Black founded fintechs progress beyond the seed stage as further development and sustainability requires engagement with a financial market, which in practical terms is unresponsive to Black entrepreneurs. In this regard, this study finds that despite evidence of racial bias, there is a general lack of recognition that the financial market neglects certain demographic groups. This results in a great deal of effort by Black entrepreneurs to establish start-ups that are doomed to failure as a result of opaque discriminatory practises. The consequence of this racial bias is not just a shortage of Black founded start-ups, but also a minimising of issues that Black entrepreneurs are interested in, which, as this study found, commonly involves grappling with social inclusion and development challenges.

The Normalisation of Racial Bias in the Digital Economy

Largely due to the fact that they are able to access venture capital funds from the financial market, this study found that the most successful founders in the start-up ecosystem are white entrepreneurs. In this regard, 68% of this study's start-up sample were established by white South Africans, which from a gender perspective disaggregated to 59% men and 9% women. In contrast, Black South Africans who had negligible access to venture capital funds, only made up 9% of the sample, which further disaggregated to 6% men and 3% women. Thus, demonstrating that by virtue of their domination in the start-up sector, white male entrepreneurs as well as their innovations are the clear winners in South Africa's digital economy. In this regard, this study finds that while race emerges as the most significant indicator of success in South Africa's tech sector, gender materialises as a notable second.

Belonging to the right networks is an important indicator of success for start-up founders. This is by no means a ground-breaking finding. Nor, given South Africa's history and slow pace of transformation, is the fact that a racial hierarchy persists within the country's investor-entrepreneur ecosystem. However, what is unexpected is the fact that this racial hierarchy is considered to be a natural by-product of the investor-entrepreneur dyad by people working in the start-up sector (Startup Grind, 2019a, Startup Grind, 2019b). In this

regard, this study found strong echoes of behavioural economic theories in the justifications offered at start-up events that defended personal networks and ethnic similarities as objective criteria for establishing trust in the digital economy ecosystem, resulting in the pervasiveness of racially defined investor-entrepreneur relationships (Stuart and Sorenson, 2007, Fisher, 2012, Startup Grind, 2019a, Startup Grind, 2019b). Thus, the data gathered by this study reveals that white investors, originating both locally and internationally, typically invest in white founded South African start-ups and that despite embodying discriminatory practise, this behaviour is considered rational within the purview of capitalist relationships. In other words, racially skewed outcomes in the tech ecosystem are simply considered a form of market failure consequent to rational behaviour that does not produce balanced outcomes.

This rationalisation, of course, does not engage with questions of power and structural inequality in relation to racialised outcomes in market-based economies that this study brings into view by building a bridge between Castells' critique of the financial market and Calderón's theory of a flattened white epistemology, which is in dialogue with Bonilla-Silva's theory of racial stratification (Calderón, 2006, Bonilla-Silva, 2015, Banet-Weiser and Castells, 2017). A synthesis of these theories reveals the intersection of economic and racial domination in South Africa, both within the country's digital economy and as an extension of the global financial ecosystem. It also demonstrates how capitalist rationale, as a pre-ontological sensibility, promotes racially skewed outcomes in the digital economy.

Castells' critique of the financial market as the most powerful network in the global economy brings the role of financial and non-financial elites to the fore. However, Castells is not a race theorist. Thus, rendering his theory inadequate to the task of analysing racial bias in investor decision-making, which this study highlights as ubiquitous in South Africa. Nevertheless, Castells' account of how financial and non-financial elites function within informational capitalism as a culturally cohesive and internationally mobile group connected via alumni and social networks, is instructive for pointing to some of the linkages that connect (white) investors from the Global North to (white) entrepreneurs from the Global South (Banet-Weiser and Castells, 2017).

Meanwhile, Bonilla-Silva's theory of racial praxis assists in assigning a racial identity to investors and entrepreneurs through its structuralist and materialist interpretation of racism, which argues that different race groups receive different rewards based on the position that they occupy in racially stratified societies (Bonilla-Silva, 2015). In this regard, racism is not attributed to supremacist ideology, but to "racial praxis" described as "racialised social practises" that develop as a social structure to preserve the advantages of a dominant racial group motivated by a particular ideology (Bonilla-Silva, 2001, p. 22). Consequently, 'racism is not (about) the ideas that individuals may have about others, but (about) the social edifice erected over racial inequality' (Bonilla-Silva, 2001, p. 22). This results in rewards accruing to the dominant racial group as resources circulate within it. From this vantage point, the racial hierarchy that manifests in the tech ecosystem is an illustration of racial praxis demonstrated by the transfer of capital between white men as members of a dominant race group in South African society who are at the apex of the economy.

Finally, Calderón's evaluation of racial inequality closes the circle by bringing the analysis back to a critique of capitalism. Her theory of whiteness as a "flat epistemology" weaves Bonilla-Silva's "racial praxis" through Marcuséan "technological rationality" to connect whiteness to the establishment in one-dimensional capitalist societies. Thus, while Bonilla-Silva's racial praxis demonstrates how racial domination functions as a practise in racially stratified societies, Calderón's work highlights "whiteness" as a concept that penetrates rationality as a thread within capitalist ideology. In this regard, her conceptualisation of the "epistemic nature of whiteness" as a flat rationality refers to whiteness as a pre-ontological way of knowing that is articulated as a commonsensical truth, which is organised in a hierarchical and unidirectional manner (Calderón, 2006, p. 75). She further defines the flat epistemology of whiteness as a capitalist sensibility within the establishment by framing it within Marcusé's theory of technological rationality as a one-directional 'mode of capitalist relations, which always (progresses) towards the reproduction of capital' (2006, p. 75). From this vantage point, the demands of capitalist reproduction flow exclusively from the white establishment, carrying with it certain requirements. Accordingly, the skewed racial outcomes in South Africa's tech ecosystem are not a behavioural issue, but a structural problem rooted in capitalist culture,

which Calderón elegantly depicts as a form of colour-blind discrimination that reproduces racial inequality. In this way, the racial hierarchy is normalised through capitalist ideology.

In the South African context, this exhibits as a racialised technological rationality, which emanates from its origins in a racially skewed society in which wealth is concentrated within the white establishment. Consequently, in the South African start-up ecosystem, the pre-ontological sensibility of neoliberal capitalism expressed as elite-driven market fundamentalism engenders a racialised technological rationality that manifests as a white hierarchy in the investor-entrepreneur dyad. The result of this racialised technological rationality is that white South Africans, especially white men, prevail as the winners in the digital economy. As the drivers of technological development, it is their innovations that dictate the future trajectory of South Africa's digital development, which, as the survey conducted by this study found, is largely aimed at extracting value from society. Consequently, this study finds a correlation between the dominance of white men in the tech ecosystem and the dominance of extractive rent seeking digital innovations. In this regard, notwithstanding the racially skewed picture that emerged from the survey of the start-ups, one respondent in this study did in fact describe start-up founders in South Africa as *"privileged white South Africans"* simply trying to turn money that they have access to *"into more money"* Gastrow (2020). This, of course, is considered perfectly normal and acceptable behaviour within a capitalist system.

Biggest Losers in the 4IR: South Africa's Black Middle Class

Continuing with the Schwabian trope of winners and losers in the 4IR, this study argues that the biggest losers in South Africa are the emerging Black middle class. This finding is based on an examination of the banks that instituted massive job cuts when the finance sector underwent major restructuring linked to digitalisation. On a global level, many of the changes instituted by banks were in response to push factors from the fintech sector. In South Africa's case, the period between 2018-2019 is associated with significant and rapidly introduced technological changes in financial services with banks automating internal functions as well as digitalising customer interfaces. Thus, rendering a number of

clerical support and client services jobs obsolete, which over this period resulted in the loss of approximately 6 000 jobs in the country's top four banks.

However, what was curious about the interviews with bank representatives is that respondents spoke about technological unemployment in abstract terms by referring to functions that were becoming automated, specifically highlighting low-level administrative functions, but refusing to respond to questions about the demographic profile of those whose jobs were most at risk or to confirm figures quoted in the media about actual job losses. Despite these guarded responses, industry reports reveal that large numbers of Black women who make up the numeric majority dominate clerical support jobs in banks (BANKSETA, 2018, BANKSETA, 2020). Concomitantly, nearly two-thirds of bank staff lack post-matric qualifications (BANKSETA, 2020). Thus, highlighting a correlation between Black women in low-skilled jobs and those with low educational attainment. Consequently, this study finds a strong correlation between race, gender and technological unemployment in the banking sector and argues that it is Black women, by virtue of the positions that they occupy, who are at the battlefront of job losses.

In this regard, the findings of this PhD study also correspond with the forecasts of an earlier study, which, based on the statistical modelling of labour market data, argues that 'low and medium-skilled white-collar' jobs in the private sector are most at risk of automation and that these jobs are occupied by 'previously disadvantaged groups' (Le Roux, 2018a, p. 11, p. 13). Also supporting the claim that white South Africans are the demographic group least at risk of technological unemployment (Le Roux, 2018a, Marwala, 2020), this PhD study finds that white men occupy jobs in the banking industry that positions them advantageously for roles in the skilled professional teams that banks are transitioning towards as they develop new staffing structures to compete with technology companies, which they are increasingly starting to emulate (Respondent A, 2019, BANKSETA, 2020). In this regard, the racial divide in the banking sector reflects the racial hierarchy in the digital economy. This comes as no surprise given that a study on the state of fintechs in South Africa found that the average fintech founder is a 31-35 year old male who studied Science, Engineering or Commerce at the University of Cape

Town and has 5-10 years' work experience in the financial services sector (Rand Merchant Bank, 2019).

As a rapidly digitalising sector, banks are a harbinger of threats to South Africa's future stability given that the industry's digital transformation is not just entrenching, but intensifying the country's historic socio-economic divide as a consequence of technological unemployment. Meanwhile, the guarded responses of banking sector respondents can be attributed to sensitivities around BEE and transformation targets, which the sector's training authority argues, are not being met (BANKSETA, 2020). In this regard, the banks have been slow to embrace transformation in any meaningful manner, as employment equity targets have historically been addressed by hiring Black women in proletarianized white-collar jobs (Oppenheimer, 1972) that are now becoming redundant. How the banking industry responds to this problem is a litmus test for corporate South Africa's response to automation and its impact on inequality.

In this regard, the banking industry's refusal to engage with the demographics of technological unemployment, which was counteracted by vague references to transformation and BEE, exposed a reluctance to recognise the role that banks have to play in finding a solution to automation. Further evidence of this attitude can be found in a report by the banking union, SASBO, which argues that the banks spurned proposals to develop a partnership to address the issue of retrenchments induced by automation (Kokela, 2019). Thus, drawing on trends in the banking sector, this study argues that the growth and consolidation of South Africa's Black middle class faces a new threat in the form of technological unemployment as employers embedded in the means-end logic of technological rationality absolve themselves of the human cost of automation.

Platform Economy Not the Solution to Technological Unemployment

Key figures in the academic and management consulting space have advanced the argument that the 4IR not only eliminates jobs, but also produces new jobs (Clemens, 2020, Marwala, 2020). In this regard, one of the new jobs to emerge in the past decade is gig work in the platform economy, which in addition to being touted as a solution to

technological unemployment, is proposed as a vehicle to develop South African workers as a nation of "micro-entrepreneurs" who will be able to build sustainable livelihoods as independent contractors in the platform economy (Kuhn and Maleki, 2015, Moyo, 2020). While this may invoke images of the Gorzian concept of "autonomous work", i.e., work that is self-directed and personally satisfying, a number of Future of Work studies instead characterise gig work as "heteronomous work", i.e., work performed under financial duress (Gorz, 1985, Granter, 2016a, Fredman et al., 2020, Schor et al., 2020). Thus, presenting a tension between what the platform economy promises and what it actually delivers, which some describe as a deception (Srnicek, 2017, Frey, 2020, Schor, 2020).

In this regard, the data gathered by this study's survey of the start-up sector demonstrates that the most common labour platforms to have emerged in South Africa's digital economy, are those that offer location specific gig work, which has been described as the most exploitable form of work in the platform economy (Standing, 2018). Not only does the literature reveal that South Africa's platform economy is unable to sustain the livelihoods of the working class (Mawii and Aneja, 2020, Webster and Masikane, 2021, MacMillan, 2022), but as the original data gathered by this PhD study reveals, it is also unable to sustain middle-class livelihoods as demonstrated by the trials of the former jewellery store employee turned Uber driver who struggled to maintain her lifestyle as a participant in the platform economy (Haupt, 2022).

At the same time, this study also notes a North-South divide in the labour market hierarchy with respect to cloud-based gig work on crowdsourcing platforms, which results in discrimination against Global South workers who are funnelled towards less-skilled and poorly paid microtasks (Beerepoot and Lambregts, 2015, Vallas, 2019). Thereby, also highlighting Taylorist micro-tasking as the dominant model of development for crowdsourcing digital platforms, which further intensifies the proletarianization of white-collar work. In this regard, gig work in the platform economy, in its current form, is unlikely to be an adequate replacement for white-collar workers, such as clerical support staff in banks that form the base of South Africa's emerging middle class who are most susceptible to technological unemployment.

Thus, the argument that the 4IR not only eliminates jobs, but also produces new jobs (Clemens, 2020, Marwala, 2020), is hugely problematic as a solution to technological unemployment due to the fact that the vast majority of jobs produced by South Africa's platform economy are location specific gig jobs, which the literature characterises as precarious work that fails to sustain the livelihoods of the working class, let alone the middle class, who are equally unlikely to find lifestyle supporting jobs on cloud work platforms.

Social Impact not Socialist Impact

This study finds that post-capitalist models lack support in South Africa's digital economy. At the heart of this problem is the neoliberal ideology that pervades the start-up ecosystem, manifesting as a lack of incubator support for the emergence of alternative models that challenge the status quo through dialectical thinking. In other words, there is no space in the start-up ecosystem for the kind of radical ideation that inspires innovations, which counteract the inevitability of Schwabian inequality through models inspired by Marcuséan liberatory technology (Bassett and Roberts, 2019) or Gorzian digital dissidence (Gorz and Turner, 1999).

Meanwhile, the kind of social impact start-up models that South Africa does produce are those that continue to reinforce the capitalist frame. This includes those that adopt technologies, which have their genesis in anti-capitalist thinking, such as blockchain technology (Nakamoto, 2008), For example, *Zlto* and the now defunct *Wala* are social impact start-ups that despite their blockchain architecture, have a developmental focus that seeks to humanise capitalism by creating opportunities for inclusion within the current dominant system. This includes a small-jobs platform for unemployed youth and an alternative currency loyalty program for people from poor communities. These start-up innovations are limited in their ability to fragment and transform capitalism from within as they merely relieve the pressure on an economic system that produces the very social pathologies, which they are attempting to address through compensatory measures that are incapable of engendering structural transformation.

Limited Awareness of Post-Capitalist Models in South Africa

This study finds that alternatives to the financial market driven model of start-up development, such as platform co-operatives, are largely unknown in South Africa except by a niche audience working in progressive spaces such as a handful of academic researchers in collaboration with workers that have exposure to the labour movement. In this regard, given the significant role played by academic researchers in support of the development of platform cooperativism, this study associates post-capitalist enterprise development with research praxis in South Africa.

At the same time, the fact that post-capitalist enterprises, such as platform co-operatives, are co-founded by academic researchers collaborating with a small group of people in the labour movement or with exposure to it, also highlights an interesting anomaly with respect to post-capitalist debates about who the agents of change are. In this regard, while support for the idea of the labour movement as the change agent has largely dissipated in post-capitalism discourse, the fact that it is almost exclusively those with links to the labour movement in South Africa, including the researchers, who are involved in post-capitalist ideation, indicates that this country is still some way behind the Global North regarding the dispersion of progressive ideas beyond universities and trade unions. In this respect, post-capitalist ideas have inspired the development of start-ups amongst much wider groups in the Global North. Examples include the 'Linux-based hacker movement for copyleft'; Wikipedia, the free online encyclopaedia produced by a community of volunteers; and Stocksy, the stock photography service established as a platform co-operative by a pair of digital dissidents (Van Tol, 2017, Pansera and Fressoli, 2021, Kang, 2023, p. 12, Stocksy, 2023).

The fact that post capitalist ideas are confined to specialist spaces in South Africa results in a lack of broader public exposure to post-capitalist ideas. The outcome is an absence of technological innovations, which promote democratic engagement through peer-to-peer and/or collective enterprise models that de-reify institutionalised capitalism as advocated by the autonomist school of thought (Gorz, 2010a, Rifkin, 2014, Mason, 2016, Varoufakis, 2021).

In this regard, as post-capitalist tendencies are an expression of the impulses that inspired the sharing economy, exploring these predispositions, however latent they may be, symbolises an important step in the redirection of technological innovation—away from the extractivist neoliberal models that currently dominate the digital economy. Failure to create the spaces to explore alternative post-capitalist solutions in the digital economy commits the vast majority of South Africans to a future where the promise of shared prosperity will remain an elusive dream.

Implications of this Study

The significance of this PhD study lies in the texture that it adds to debates on the 4IR via a multidimensional study that exposes the structural configuration of digital innovation in South Africa as well as revealing the substance of technological innovation. Viewed from a Heideggerian perspective on the metaphysics of technological innovation, this revealing exposes some fundamental truths about the nature of South African society. Drawing on Marcusé's theory of technological rationality, which builds on this Heideggerian view, this study finds an ingrained neoliberal culture in South Africa. In this regard, this study of technological innovation presents evidence that exposes South Africa as a one-dimensional capitalist society.

The principal finding of this study is that the digital economy, fuelled by the start-up sector as the source of 4IR technologies, is dominated by innovations aimed at extracting value from the South African economy. As a country with a history of extractive industries exemplified by the mining industry, the extractive model of economic development has long been part of South Africa's DNA. As such, while the innovations of the 4IR are typically characterised as disruptive in the sense that they evoke an image of progress, this is not necessarily the case in South Africa. Instead, in South Africa, the 4IR melds with an untransformed socio-economic system that was purposefully designed to concentrate wealth amongst the white population group by its erstwhile apartheid era

architects. As a result, the story of the 4IR in South Africa is not so much a story of creative disruption as it is a story of ongoing destruction.

Consequently, the story of the 4IR in South Africa is one of enduring wealth concentration and spiralling racial inequality. In this regard, despite the South African government's exaltation of a human-centred approach to innovation, its prioritisation of the WEF's model instead signals further polarisation in a nation dominated by a minority of winners amongst whom the country's wealth and opportunities currently are and have historically been concentrated. This time-worn development trajectory is proving inadequate to the task of transforming South Africa's social and economic landscape, and the findings of this study provide further evidence of its failings.

South Africa needs digital innovation that responds to the needs of its people. It does not need digital innovation that furthers the objectives of rent seeking through financial activities. However, by promoting the 4IR's market-led digital innovation model, this is precisely what South Africa has set itself up to receive in the foreseeable future—more fintech, more e-commerce, more value extraction, more labour exploitation, no social impact, more inequality.

Future Research Recommendations

The problem with South Africa being a one-dimensional capitalist society with a strong neoliberal bent is that the subtleties of market driven capitalism have maintained the apartheid era's racial status quo (Calderón, 2006, Bonilla-Silva, 2015, Marcusé, 1964). This calls attention to the need for a more robust critique of neoliberalism as an economic model in need of urgent reform to put South Africa on a pathway to socio-economic transformation that achieves shared prosperity, as an important intervention for future research. At the same time, whilst neoliberalism is the dominant ideology in South Africa, there are, as this study argues, also seismic shifts regarding people's connection to work, which is becoming increasingly tenuous as a result of new technologies. This demands a focus on bigger questions about the meaning of work given the complexity of social changes flowing from automation technologies. Thus, highlighting the need for a

revitalisation of research on the metaphysics of work and society. In this respect, there are two broad areas that emerge for future research, which are not mutually exclusive.

Post-Capitalist Policy Innovation and Post-Capitalist Enterprise Development

Firstly, a research focus on shared prosperity as an immutable policy goal geared towards challenging the dogma of neoliberalism through policy innovation, would advance efforts to address South Africa's inequality. In this regard, the discourse on post-capitalism presents viable solutions for radical ideation, which point to areas of future research that 'build the elements of (a) new system molecularly within the old' (Mason, 2016, p. 217). This policy approach is built on the Gorzian theory of non-reformist reforms, i.e., unorthodox policy reforms with the potential to fragment capitalism deep within the system (Gorz, 1967). The Gorzian approach to policy reform is ideally suited to post-capitalist innovation and experimentation as a counterweight to neoliberalism. Relatedly, there is a need for more research on post-capitalist enterprise development, which draws on the Marcuséan notion of liberation technology. Marcusé recognised the power and influence of capitalist forces in technological innovation, but argued for its reinvention under progressive social forces (Feenberg, 1991). Thus, highlighting the need for alternative economic development models.

In recent years, two Gorzian post-capitalist reforms have made an appearance, viz., the concept of a universal basic income (UBI) and the idea of a four-day week. In this regard, South Africa introduced a nominal social relief of distress (SRD) grant as a poverty relief initiative in response to the COVID-19 pandemic (South African Government News Agency, 2023). The SRD represents a scaled down version of what could expand to become a UBI. Similarly, a four-day week pilot project was undertaken in South Africa as part of a global campaign, which also emerged in response to the pandemic (Gavigan, 2023).

These initiatives are, in fact, examples of non-reformist reforms identified by Gorz as a cybernetic scholar responding to the issue of technological unemployment from a post-capitalist perspective. However, Gorz's reasoning did not feature as part of the

justification for these South African initiatives, thereby also highlighting an absence of debate on responses to technological unemployment. This is despite the fact that the topic of technological unemployment is back on the agenda following the introduction of generative AI (Fraser, 2023). One of the main reasons behind this, despite all the evidence pointing to a future of fewer employment opportunities, is the dominant view that South Africa should focus on developing skills and creating jobs as the only solution to technological unemployment (Marwala, 2020, Mdwaba, 2020). Prioritising education and skills within populations are important goals that all societies should strive towards. However, linking this to employment is an oxymoronic solution given that the future will undoubtedly be one where there are fewer jobs available as a structural outcome of automation technologies.

In this regard, the introduction of the SRD grant and the four-day week pilot project in South Africa, both present opportunities to profile post-capitalist solutions as well as to connect these initiatives to the impending structural crisis of technological unemployment. Thus, future research should expand on the SRD's narrow poverty alleviation focus by steering policy debate towards the UBI as a right that ought to be accorded to all South Africans faced with the prospect of technological unemployment as a permanent feature of life. Thus, highlighting the significance of decoupling livelihoods from work as a necessity for the future. Similarly, while the justification for the four-day week is currently focused on efficiency and productivity, for Gorz, it is more about changing the way people view themselves in relation to work (Gorz and Turner, 1999). Thus, highlighting the significance of future research being framed by philosophical questions that contribute to enhancing the debate on the meaning of work in order to better understand why cultural changes are needed to strengthen society for the future.

Related to the above, another area that requires research attention is post-capitalist enterprise development as an alternative to the market-driven innovation model that currently prevails in South Africa. Apart from one small study that explored platform cooperativism (Farouk, 2022), there are no other studies in South Africa that have explored post-capitalist enterprise development. In this regard, the idea of technology being used to free people from work, as espoused by Marcuséan liberation technology, is

largely absent from the discourse in South Africa and efforts to promote these ideas must be encouraged through studies that profile alternatives to the venture capital business model. In this regard, more research is needed on post-capitalist enterprise development. Examples of models that can be explored as an alternative to those that produce winners and losers include those that democratise ownership and management in the digital economy, such as platform co-operatives, decentralised autonomous organisations and other emerging peer-to-peer solutions with the potential to produce better social outcomes.

A Bigger Role for the State

Finally, it would be advantageous for future research to focus on a bigger role for the state in tech innovation to challenge the prevailing neoliberal dogma, which seeks to reduce the role of the state in the economy and society. Such research would be an important counterbalance to the dominance of an ideology that establishes 'markets as a superior way of coordinating complex actions' (Stalder, 2023, p. 878). Regrettably, the South African state has surrendered to the market as the driver of tech innovation without fully understanding the implications of this model, which this study highlights as a threat to positive social change. The state ought to play a bigger role in innovation—and future research can deepen our understanding of the diverse roles it could play. In this regard, the state could adopt the role of entrepreneur. For example, it would be useful to explore a role for the Council for Scientific and Industrial Research (CSIR) as a leader in digital economy innovation that responds to South Africa's needs. The state could also adopt a directive role with respect to innovation policy, and in this regard, there are international models that can be studied. For example, the Chinese model is state led with open markets (Jacques, 2022). Recent directives from Beijing to curb risk-taking and anti-competitive behaviour amongst tech entrepreneurs have not deterred investor interest (Lin et al., 2022). Another example of strong government intervention is Singapore, which directs investments to areas prioritised by the state (Wang, 2018). Both China and Singapore offer models that can be studied to draw lessons about how a state led innovation model can produce better social outcomes for South Africa.

References

4 DAY WEEK GLOBAL. 2023. 2023 South Africa Pilot Program Participants. Available: https://www.4dayweek.com/sa-2023-participants [Accessed 21 December 2023].

4 DAY WEEK GLOBAL. n.d. 4 Day Week SA Coalition. Available: https://4dayweek.co.za/sa-coalition/ [Accessed 21 December 2023].

ABROMEIT, J. 2010. Left Heideggerianism or Phenomenological Marxism? Reconsidering Herbert Marcusé's Critical Theory of Technology. *Constellations,* 17**,** 87-106.

ACEMOGLU, D. 2021. AI's Future Doesn't Have to Be Dystopian. *Boston Review* [Online]. Available: https://www.bostonreview.net/forum/ais-future-doesnt-have-to-be-dystopian/ [Accessed 17 September 2021].

ACEMOGLU, D. & RESTREPO, P. 2018. Artificial Intelligence, Automation, and Work. *In:* AGRAWAL, A., GANS, J. & GOLDFARB, A. (eds.) *The Economics of Artificial Intelligence: An Agenda.* University of Chicago Press.

ACEMOGLU, D. & RESTREPO, P. 2020. The Wrong Kind of AI? Artificial Intelligence and the Future of Labour Demand. *Cambridge Journal of Regions, Economy and Society,* 13**,** 25-35.

ACQUIER, A., DAUDIGEOS, T. & PINKSE, J. 2017. Promises and Paradoxes of the Sharing Economy: An Organizing Framework. *Technological Forecasting and Social Change,* 125**,** 1-10.

ADEGOKE, Y. 2019. The Promise of the Big Tech CEO Africa Tour Is Not Always What It Seems. *Quartz Africa* [Online]. Available: https://qz.com/africa/1763757/twitters-jack-dorsey-jack-ma-visit-nigeria-ethiopia/ [Accessed 15 December 2019].

AKBAR, A. A. 2020. Demands for a Democratic Political Economy. *Harvard Law Review,* 134**,** 29.

AKHAVEIN, J., FRAME, W. S. & WHITE, L. J. 2005. The Diffusion of Financial Innovations: An Examination of the Adoption of Small Business Credit Scoring by Large Banking Organizations. *The Journal of Business,* 78**,** 577-596.

AL-ABABNEH, M. M. 2020. Linking Ontology, Epistemology and Research Methodology. *Science & Philosophy,* 8**,** 75-91.

ALEXANDER, M. 2017. Sweep South Concludes Series-A Round with Black Coffee for 'Seven-Figure' Sum. *Venture Burn* [Online]. Available: https://ventureburn.com/2017/05/sweep-south-concludes-series-involving-top-sa-musician/ [Accessed 28 June 2019].

ALLOGGIO, S. & THOMAS, K. 2013. Resisting the Lure of Deferral: Realising the South African National Development Plan. Taylor & Francis.

AMMOUS, S. 2016. Blockchain Technology: What Is It Good For? *Available at SSRN 2832751*.

AMPUJA, M. & KOIVISTO, J. 2014a. Castells' Network Concept and Its Connections to Social, Economic and Political Network Analyses. *tripleC: Communication, Capitalism & Critique. Open Access Journal for a Global Sustainable Information Society,* 12.

AMPUJA, M. & KOIVISTO, J. 2014b. From 'Post-Industrial' to 'Network Society' and Beyond: The Political Conjunctures and Current Crisis of Information Society Theory. *tripleC:*

Communication, Capitalism & Critique. Open Access Journal for a Global Sustainable Information Society, 12**,** 447-463.

ANTTIROIKO, A.-V. 2015. Networks in Manuel Castells' Theory of the Network Society.

ANWAR, M. A. 2017. White People in South Africa Still Hold the Lion's Share of all Forms of Capital. *The Conversation* [Online]. Available: https://theconversation.com/white-people-in-south-africa-still-hold-the-lions-share-of-all-forms-of-capital-75510 [Accessed 26 September 2019].

ARCIDIACONO, D., GANDINI, A. & PAIS, I. 2018. Sharing What? The 'Sharing Economy' in the Sociological Debate. SAGE Publications Sage UK: London, England.

ASHMAN, S., FINE, B. & NEWMAN, S. 2011. The Crisis in South Africa: Neoliberalism, Financialization and Uneven and Combined Development. *Socialist Register,* 47**,** 174-195.

ASPERS, P. & CORTE, U. 2019. What is Qualitative in Qualitative Research. *Qualitative Sociology,* 42**,** 139-160.

ATHRAPPULLY, N. 2022. Klaus Schwab Wants to 'Structurally Restructure' the World Despite 'Extensive Social Tensions'. *The Epoch Times* [Online]. Available: https://www.theepochtimes.com/klaus-schwab-wants-to-structurally-restructure-the-world-despite-extensive-social-tensions_4867098.html?welcomeuser=1 [Accessed 25 November 2022].

B20 INDONESIA. 2022. *About B20* [Online]. Available: https://www.b20indonesia2022.org/about-b20 [Accessed 25 November 2022].

BADAT, S. 2020. 'The 4IR Super-highway': A Dangerously Technocratic Utopia. *Daily Maverick* [Online]. Available: https://www.dailymaverick.co.za/opinionista/2020-06-01-the-4ir-super-highway-a-dangerously-technocratic-utopia/ [Accessed 21 April 2022].

BALLIESTER, T. & ELSHEIKHI, A. 2018. The Future of Work: A Literature Review. *ILO Research Department Working Paper,* 29**,** 1-62.

BANET-WEISER, S. & CASTELLS, M. 2017. Economy is Culture. *In:* CASTELLS, M. (ed.) *Another Economy is Possible: Culture and Economy in a Time of Crisis.* Polity Press Cambridge.

BANKSETA 2018. Skills Plan 2017-2018. Johannesburg: Banking Sector Education and Training Authority (BANKSETA).

BANKSETA 2020. Skills Plan 2020-2025. Johannesburg: Banking Sector Education and Training Authority (BANKSETA).

BARTON, C. J. The Fourth Industrial Revolution: Promise or Peril? 2020 IEEE International Symposium on Technology and Society (ISTAS), 2020. IEEE, 302-309.

BASA. 2017. The Banking Association of South Africa Submission on Transformation in the Financial Sector. *Parliamentary Monitoring Group* [Online]. Available: https://www.banking.org.za/wp-content/uploads/2019/04/submission-on-transformation-in-the-financial-sector-10-03-2017.pdf [Accessed 12 December 2023].

BASA 2019. Transformation in Banking 2016-2018. Banking Association of South Africa.

BASA 2021. Integrated Report 2021. Banking Association of South Africa.

BASSETT, C. & ROBERTS, B. 2019. Automation Now and Then: Automation Fevers, Anxieties and Utopias. *New Formations,* 98**,** 9-28.

BASTANI, A. 2019. *Fully Automated Luxury Communism*, Verso Books.

BEAL, V. n.d. *Machine Learning* [Online]. Webopedia. Available: https://www.webopedia.com/TERM/M/machine-learning.html [Accessed 15 September 2019].

BEEREPOOT, N. & LAMBREGTS, B. 2015. Competition in Online Job Marketplaces: Towards a Global Labour Market for Outsourcing Services? *Global Networks,* 15**,** 236-255.

BELL, R. G., FILATOTCHEV, I. & RASHEED, A. A. 2012. The Liability of Foreignness in Capital Markets: Sources and Remedies. *Journal of International Business Studies,* 43**,** 107-122.

BELLON, T. 2020. Uber and Lyft Get Reprieve in California, Will Stay Open for Now. *Business Day* [Online]. Available: https://www.businesslive.co.za/bd/companies/2020-08-20-uber-and-lyft-get-reprieve-in-california-will-stay-open-for-now/.

BENANAV, A. 2020. *Automation and the Future of Work*, Verso.

BERNARDS, N. 2019. 'Fintech' and Financial Inclusion. *The Palgrave Handbook of Contemporary International Political Economy***,** 317-329.

BERNSTEIN, A. & RAMAN, A. 2015. The Great Decoupling: An Interview with Erik Brynjolfsson and Andrew McAfee. *Harvard Business Review***,** 66-74.

BIZCOMMUNITY. 2021. President Ramaphosa Attends Meeting on SA Startup Act. *BizCommunity* [Online]. Available: https://www.bizcommunity.com/Article/196/836/221449.html [Accessed 20 December 2023].

BIZZCOMMUNITY. 2016. BriteCap Wins SAP Pitching Competition. *Bizzcommunity* [Online]. Available: https://www.bizcommunity.com/Article/196/708/153070.html [Accessed 9 July 2023].

BIZZCOMMUNITY. 2022. SA's Centbee Raises R17m Pre-Series A Funding from Ayre Ventures. *BizzCommunity* [Online]. Available: https://www.bizcommunity.com/Article/196/839/234664.html [Accessed 4 July 2023].

BLACK BUSINESS QUARTERLY. 2019. Digitalisation and the Rising Rate of Unemployment in the Banking Sector. *BBQ* [Online]. Available: http://www.bbqonline.co.za/articles/digitalisation-and-the-rising-rate-of-unemployment-in-the-banking-sector-29202.html [Accessed 12 May 2020].

BLOCH, B. 2019. Why Corporate Innovation Investment Models are Becoming More Popular. *CIO* [Online]. Available: https://www.cio.com/article/3431859/why-corporate-innovation-investment-models-are-becoming-more-popular.html [Accessed 25 July 2023].

BLOOMABLE. n.d. *Bloomable* [Online]. Available: https://bloomable.co.za [Accessed 6 July 2023].

BLOOMENTHAL, A. 2023. E-Commerce Defined: Types, History, and Examples. *Investopedia* [Online]. Available: https://www.investopedia.com/terms/e/ecommerce.asp [Accessed 6 July 2023].

BOGNER, A., LITTIG, B. & MENZ, W. 2009. *Interviewing Experts*, Springer.

BONILLA-SILVA, E. 2001. *White Supremacy and Racism in the Post-Civil Rights Era*, Lynne Rienner Publishers.

BONILLA-SILVA, E. 2015. More than Prejudice: Restatement, Reflections, and New Directions in Critical Race Theory. *Sociology of Race and Ethnicity,* 1**,** 73-87.

BORKIN, S. 2019. Platform Co-operatives – Solving the Capital Conundrum. United Kingdom: Nesta & Cooperatives UK.

BOUCAS, D. 2020. Theory, Reality, and Possibilities for a Digital/Communicative Socialist Society. *tripleC: Communication, Capitalism & Critique. Open Access Journal for a Global Sustainable Information Society,* 18**,** 48-66.

BOURNE, T. 1979. Herbert Marcusé Grandfather of the New Left. *Change: The Magazine of Higher Learning,* 11**,** 36-64.

BOURREAU, M., CAILLAUD, B. & DE NIJS, R. 2017. The Value of Consumer Data in Online Advertising. *Review of Network Economics,* 16**,** 269-289.

BOWRING, F. 1996. Misreading Gorz. *New Left Review***,** 102-122.

BOWRING, F. 2000. *André Gorz and the Sartrean Legacy: Arguments for a Person-Centred Social Theory,* Springer.

BOWRING, F. 2005. André Gorz: Autonomy and Equity in the Post-Industrial Age. *The Sociological Review,* 53**,** 134-147.

BOWRING, F. 2008. OBITUARY-The Writer's Malady: Andre Gorz, 1923-2007. *Radical Philosophy,* 148.

BREDERODE, W. 2023. Big Job Growth in South Africa's Finance Industry. *Daily Investor* [Online]. Available: https://dailyinvestor.com/finance/10055/big-job-growth-in-south-africas-finance-industry/ [Accessed 17 June 2023].

BROWN, J. 2018. Robots could cut 3 000 Nedbank jobs. *Fin24* [Online]. Available: https://www.fin24.com/Companies/Financial-Services/robots-to-cut-3-000-jobs-at-nedbank-20180304.

BROWN, M. 2019. Technology: Hunting the Big Four. *Banking Matters: 2019 and Beyond* [Online]. Available: https://www.banking.org.za/wp-content/uploads/2019/04/Banking-Matters-Publication.pdf [Accessed 5 December 2019].

BROWN, N. 2016. Avoiding Communism: A Critique of Nick Srnicek and Alex Williams' Inventing the Future. *parrhesia,* 25**,** 155-171.

BROWNE, R. 2020. Uber Kicks Off Final Appeal against Major UK Ruling on Drivers' Employment Rights. *CNBC* [Online]. Available: https://www.cnbc.com/2020/07/21/uber-appeals-against-uk-employment-rights-ruling-in-supreme-court.html [Accessed 4 August 2020].

BRYMAN, A. 2006. Integrating Quantitative and Qualitative Research: How Is It Done? *Qualitative research,* 6**,** 97-113.

BRYNJOLFSSON, E. & MCAFEE, A. 2014. *The Second Machine Age: Work, Progress, and Prosperity in a Time of Brilliant Technologies,* New York, W.W. Norton & Company.

BRYNJOLFSSON, E. & MITCHELL, T. 2017. What Can Machine Learning Do? Workforce Implications. *Science,* 358**,** 1530-1534.

BUSINESS TECH. 2019a. Food Delivery in South Africa is Huge: The Crazy Numbers Behind Mr D Food. Available: https://businesstech.co.za/news/mobile/360068/food-delivery-in-south-africa-is-huge-the-crazy-numbers-behind-mr-d-food/ [Accessed 15 February 2023].

BUSINESS TECH. 2019b. Here's How Many Employees South Africa's Biggest Banks Have Shed. Available: https://businesstech.co.za/news/banking/361936/heres-how-many-employees-south-africas-biggest-banks-have-retrenched/ [Accessed 13 May 2020].

BUSINESS TECH. 2019c. MTN's New Mobile Money Service Launches in January. Available: https://businesstech.co.za/news/mobile/362670/mtns-mobile-money-service-launches-in-january/.

BUSINESS TECH. 2019d. Standard Bank Partners With Amazon to Accelerate Cloud Migration. Available: https://businesstech.co.za/news/banking/307298/standard-bank-partners-with-amazon-to-accelerate-cloud-migration/ [Accessed 6 December 2019].

BUTLER, E. n.d. *E Butler* [Online]. Available: https://www.e-butler.com [Accessed 6 July 2019].

CAESIUM CAPITAL. n.d. *Caesium Capital* [Online]. Available: https://caesiumcapital.com [Accessed 4 July 2023].

CALDERÓN, D. 2006. One-Dimensionality and Whiteness. *Policy Futures in Education,* 4**,** 73-82.

CALLON, M. 1987. Society in the Making: The Study of Technology as a Tool for Sociological Analysis. *The social construction of technological systems: New directions in the sociology and history of technology***,** 83-103.

CAMARATE, J. & MARITZ, C. 2019. A Marketplace without Boundaries 2.0: Digital Disruption in the South African Banking Sector. *Pice Waterhouse Cooper Report* [Online]. Available: https://www.pwc.co.za/en/assets/pdf/strategyand-digital-disruption-in-sa-banking-sector.pdf [Accessed 15 December 2019].

CAMARGO, S. 2021. Capitalism and Utopia in the Social Theory of André Gorz. *New Proposals: Journal of Marxism and Interdisciplinary Inquiry*.

CAMERON, J. 2019. Absa Job Cuts: Why Every Banker Should Be VERY Scared. *BizNews* [Online]. Available: https://www.biznews.com/sa-investing/2019/03/07/absa-job-cuts-banker [Accessed 16 May 2020].

CAMPA, R. 2017. Technological Unemployment: A Brief History of an Idea. *ISA eSymposium for Sociology,* 7**,** 1-16.

CAPE TOWN MAGAZINE. n.d. Washr Online Laundromat in Cape Town. Available: https://www.capetownmagazine.com/washr-online-laundromat [Accessed 27 August 2023].

CARLOZO, L. 2017. What is Blockchain? *Journal of Accountancy,* 224**,** 29.

CARTER, N., BRYANT-LUKOSIUS, D., DICENSO, A., BLYTHE, J. & NEVILLE, A. J. 2014. The Use of Triangulation in Qualitative Research. *Oncology Nursing Forum,* 41**,** 545-7.

CARUSO, L. 2018. Digital Innovation and the Fourth Industrial Revolution: Epochal Social Changes? *Ai & Society,* 33**,** 379-392.

CARZA. n.d. *Carza* [Online]. Available: https://carzar.co.za [Accessed 6 July 2023].

CASTELLS, M. 1996a. The Information Age: Economy, Society and Culture (3 Volumes). *Blackwell, Oxford,* 1997**,** 1998.

CASTELLS, M. 1996b. *The Network Society. The Information Age: Economy, Society and Culture,* Maiden/Oxford, Blackwell.

CASTELLS, M. 2000. Materials for an Exploratory Theory of the Network Society. *The British Journal of Sociology,* 51**,** 5-24.

CASTELLS, M. 2004a. Informationalism, Networks, and the Network Society: A Theoretical Blueprint. *The Network Society: A Cross-Cultural Perspective***,** 3-45.

CASTELLS, M. 2004b. *The Network Society A Cross-Cultural Perspective*, Edward Elgar.

CASTELLS, M. 2007. Communication, Power and Counter-Power in the Network Society. *International Journal of Communication,* 1**,** 29.

CASTELLS, M. 2010. The Rise of the Network Society. *The Information Age: Economy, Society and Culture.* 2nd ed.: Blackwell, Oxford.

CASTELLS, M. 2011. A Network Theory of Power. *International Journal of Communication,* 5**,** 15.

CASTELLS, M. 2013. *Communication Power,* Oxford, Oxford University Press.

CASTELLS, M. 2016. A Sociology of Power: My Intellectual Journey. *Annual Review of Sociology,* 42**,** 1-19.

CASTELLS, M. 2017a. *Another Economy is Possible: Culture and Economy in a Time of Crisis*, John Wiley & Sons.

CASTELLS, M. 2017b. Power and Counter Power in the Digital Society. *Making Sense of Digital Society Lecture Series hosted by Alexander von Humboldt Institute for Internet and Society (HIIG)* [Online]. Available: https://youtu.be/io3xwOBD4f0 [Accessed 6 July 2021].

CASTELLS, M. 2020. The Network Society in the Age of Pandemics. *"The Network Society Today: (Revisiting) the Information Age Trilogy" - Workshop Hosted by the Internet Interdisciplinary Institute (IN3) from 23-30 November 2020.* [Online]. Available: https://youtu.be/07KPiVpymAM [Accessed 22 September 2021].

CFO SOUTH AFRICA. 2017. Black-Owned FinTechs Score R4m Windfall. *CFO South Africa* [Online]. Available: https://cfo.co.za/articles/black-owned-fintechs-score-r4m-windfall/.

CHELLIAH, J. 2017. Will Artificial Intelligence Usurp White Collar Jobs? *Human Resource Management International Digest,* 25**,** 1-3.

CHENG, H. W. J., LAFLEUR, M. & RASHID, H. 2019. Data Economy: Radical Transformation or Dystopia? *Frontier Technology Quarterly, United Nations Department of Economic and Social Affairs*

CHOUDARY, S. P., PARKER, G. G. & VAN ALSTYNE, M. 2015. *Platform Scale: How an Emerging Business Model Helps Startups Build Large Empires with Minimum Investment,* Platform Thinking Labs.

CHRISTOPHERS, B. & FINE, B. 2020. The Value of Financialization and the Financialization of Value. *The Routledge international handbook of Financialization.* Routledge.

CITY OF CAPE TOWN 2017. 2016 Community Survey: Cape Town Trends 1996 to 2016.

CLARYSSE, B., DEL PALACIO, I. & PAUWELS, C. 2012. Investor Driven Innovation. *A Research Note for the Science Business Innovation Board AISBL,* 21.

CLEMENS, S. 2020. New Economics Thinking Forum. *The Future of Work.* Institute for New Economic Thinking (INET).

CLIFF DECKER HOFMEYR. 2018. Gillian Lumb Talks about the Gig Economy and the Employment Questions Raised in the Recent Uber SA Case. *Cliff Dekker Hofmeyr* [Online]. Available: https://www.cliffedekkerhofmeyr.com/en/news/podcasts/Gillian-Lumb-talks-about-the-gig-economy-and-the-employment-questions-raised-in-the-recent-Uber-SA-case.html [Accessed 2 December 2020].

COETZEE, J. 2014. South African Taxi Startup Zapacab Closes Up Shop and Bids Us Farewell. Available: https://ventureburn.com/2014/05/sa-taxi-startup-zapacab-closes-up-shop-bids-us-farewell/ [Accessed 6 July 2019].

COETZEE, J. 2018. Strategic Implications of Fintech on South African Retail Banks. *South African Journal of Economic and Management Sciences,* 21**,** 1-11.

COHEN, B. 2017a. *Post-Capitalist Entrepreneurship: Startups for the 99%*, Taylor & Francis.

COHEN, B. D. 2017b. Post-Capitalist Entrepreneurship: Basic Income, Blockchain Cities, and Local Currencies. Available: https://evonomics.com/post-capitalism-entrepreneurship/.

COHEN, S. M. & REEVE, C. D. C. 2021. Aristotle's Metaphysic. *In:* ZALTA, E. N. (ed.) *The Stanford Encyclopedia of Philosophy (Winter 2021 Edition).* Stanford: Stanford University.

COLEMAN, N. 2014. NDP: Doomed from the Outset. *Daily Maverick* [Online]. Available: https://www.dailymaverick.co.za/opinionista/2014-07-30-ndp-doomed-from-the-outset/ [Accessed 21 September 2023].

COLEMAN, N. 2020. Why We're Capitalizing Black. *New York Times* [Online]. Available: https://www.nytimes.com/2020/07/05/insider/capitalized-black.html [Accessed 7 December 2023].

COLLINS, S. 2016. The 'Platform Economy' Has Arrived. Here's What You Need to Know about It. Available: https://www.weforum.org/agenda/2016/07/platform-economy-boon-or-doom/ [Accessed 1 September 2019].

CONGER, K. 2020. Appeals Court Says Uber and Lyft Must Treat California Drivers as Employees. *New York Times* [Online]. Available: https://www.nytimes.com/2020/10/22/technology/uber-lyft-california.html [Accessed 28 February 2021].

CONSULTANCY.EU. 2019. Global FinTech Investment More Than Doubled to $112 Billion. Available: https://www.consultancy.eu/news/2390/global-fintech-investment-more-than-doubled-to-112-billion [Accessed 20 July 2019].

CONVERSIO. n.d. *Conversio* [Online]. Available: https://conversio.com [Accessed 9 Jul 2023].

COOPER, D. 2021. Why Does the Davos World Economic Forum Proclaim the Second Phase of a Post-1970's Third Industrial Revolution as the '4IR'? *In:* NGWANE, T. & TSHOAEDI, M. (eds.) *The Fourth Industrial Revolution: A Sociological Critique.* Johannesburg: Jacana.

COUNTS, A. & MALONEY, T. 2023. Twitter Now Worth Just One-Third of What Elon Musk Paid for It. *Bloomberg* [Online]. Available: https://time.com/6283658/twitter-worth-third-musk-price-fidelity/ [Accessed 25 July 2023].

CRESWELL, J. 2013. *What is Mixed Methods Research?* [Online]. YouTube: John Creswell. Available: https://youtu.be/1OaNiTlpyX8 [Accessed 8 June 2023 2023].

CRESWELL, J. W. & POTH, C. N. 2016. *Qualitative Inquiry and Research Design: Choosing among Five Approaches,* Sage publications.

CRUDDAS, J. & PITTS, F. H. 2020. The Politics of Postcapitalism: Labour and our Digital Futures. *The Political Quarterly,* 91**,** 275-286.

CRUNCHBASE. n.d.-a. *Jumpin Rides* [Online]. Available: https://www.crunchbase.com/organization/jump-in-rides [Accessed 6 July 2019].

CRUNCHBASE. n.d.-b. *Lorien Gamaroff (CEO BankyMoon)* [Online]. Available: https://www.crunchbase.com/person/lorien-gamaroff [Accessed 6 July 2023].

CRUNCHBASE. n.d.-c. Nichestream. Available: https://www.crunchbase.com/organization/nichestreem [Accessed 6 July 2023].

CRUNCHBASE. n.d.-d. *Picadoo* [Online]. Available: https://www.crunchbase.com/organization/picadoo [Accessed 6 July 2019].

CRUNCHBASE. n.d.-e. *TaskMarket* [Online]. Available: https://www.crunchbase.com/organization/taskmarket [Accessed 6 July 2019].

CUESTA, C., RUESTA, M., TUESTA, D. & URBIOLA, P. 2015. The Digital Transformation of the Banking Industry. *BBVA Research (available at https://www. bbvaresearch. com/wp-content/uploads/2015/08/EN_Observatorio_Banca_Digital_vf3. pdf)*.

CUMMING, D. & BINTI JOHAN, S. A. 2008. Preplanned Exit Strategies in Venture Capital. *European Economic Review,* 52**,** 1209-1241.

CUNNINGHAM, S. 2018. World Economic Forum and the Fourth Industrial Revolution in South Africa. *Pretoria: Trade and Industrial Policies South Africa*.

CUTOLO, D. & KENNEY, M. 2019. Platform-Dependent Entrepreneurs: Power Asymmetries, Risks, and Strategies in the Platform Economy. *Risks, and Strategies in the Platform Economy (April 15, 2019)*.

DAIKELER, J., BOŠNJAK, M. & LOZAR MANFREDA, K. 2020. Web Versus Other Survey Modes: An Updated and Extended Meta-Analysis Comparing Response Rates. *Journal of Survey Statistics and Methodology,* 8**,** 513-539.

DATAPROPHET. n.d. *Dataprophet* [Online]. Available: https://dataprophet.com [Accessed 6 July 2023].

DAVIES, H., GOODLEY, S., LAWRENCE, F., LEWIS, P. & O'CARROLL, L. 2022. Uber Broke Laws, Duped Police and Secretly Lobbied Governments, Leak Reveals. *The Guardian* [Online]. Available: https://www.theguardian.com/news/2022/jul/10/uber-files-leak-reveals-global-lobbying-campaign [Accessed 20 February 2022].

DAVIES, R. 2012. Afrikaner Capital Elites, Neo-Liberalism and Economic Transformation in Post-Apartheid South Africa. *African Studies,* 71**,** 391-407.

DAVIS, A. Y. 2014. Marcusés Legacies. *In:* KELLNER, D. (ed.) *Herbert Marcusé.* Routledge.

DE FILIPPI, P., MANNAN, M. & REIJERS, W. 2020. Blockchain as a Confidence Machine: The Problem of Trust & Challenges of Governance. *Technology in Society,* 62**,** 101284.

DE GREEF, K. 2019a. Immigrant Food Couriers Risk Death on SA's Roads. *IOL* [Online]. Available: https://www.iol.co.za/news/south-africa/western-cape/immigrant-food-couriers-risk-death-on-sas-roads-28550788 [Accessed 20 February 2023].

DE GREEF, K. 2019b. One More Way to Die: Delivering Food in Cape Town's Gig Economy. *New York Times* [Online]. Available: https://www.nytimes.com/2019/08/24/world/africa/south-africa-delivery-deaths.html [Accessed 26 Oct 2020].

DECHESARE, B. 2019. Uber Valuation: The Most Overhyped Company Ever? *Mergers and Inquisitions* [Online]. Available: https://mergersandinquisitions.com/uber-valuation/ [Accessed 25 July 2023].

DHAR, V. 2013. Data Science and Prediction. *Communications of the ACM,* 56**,** 64-73.

DI PIERRO, M. 2017. What is the blockchain? *Computing in Science & Engineering,* 19**,** 92-95.

DICKSON, B. 2018. What is the AI Winter? *TechTalks* [Online]. Available: https://bdtechtalks.com/2018/11/12/artificial-intelligence-winter-history/.

DIEM25 TV. 2020. Yanis Varoufakis on Post-Capitalism. *DiEM25 TV* [Online]. Available: https://youtu.be/PFH_D6q62xM.

DIGITAL COLLECTIVE AFRICA. 2021. South Africa Start-up Act: Position Paper Update - September 2021. Available: https://www.startupact.co.za/_files/ugd/2757ac_3a524309c4d24d17984f3a046fed89d6.pdf [Accessed 26 August 2023].

DONNELLY, L. 2019. Reserve Bank Labels Six SA Banks as Systemically Important. *Business Day Online* [Online]. Available: https://www.businesslive.co.za/bd/economy/2019-11-28-reserve-bank-labels-six-sa-banks-as-systemically-important/ [Accessed 5 December 2019].

DÖRINGER, S. 2021. 'The Problem-Centred Expert Interview'. Combining Qualitative Interviewing Approaches For Investigating Implicit Expert Knowledge. *International Journal of Social Research Methodology,* 24**,** 265-278.

DRAHOKOUPIL, J. & PIASNA, A. 2017. Work in the Platform Economy: Beyond Lower Transaction Costs. *Intereconomics,* 52**,** 335-340.

DREYFUS, H. L. 1990. *Being-in-the-World: A Commentary on Heidegger's Being in Time, Division I*, Mit Press.

DRUCKER, P. 1993. *Post-capitalist Society*, Buttterworth-Heinemann.

DRUMMER, D., FEUERRIEGEL, S. & NEUMANN, D. 2017. Crossing the Next Frontier: The Role of ICT in Driving the Financialization of Credit. *Journal of Information Technology,* 32**,** 218-233.

DUSEK, V. 2006. *Philosophy of Technology: An Introduction*, Blackwell Malden, MA.

DWOLATZKY, B. & HARRIS, M. 2021. Huge Gap Between SA's 4IR Strategy and What Commission Recommends. Available: https://www.wits.ac.za/news/latest-news/opinion/2021/2021-01/huge-gap-between-sas-4ir-strategy-and-what-commission-recommends.html [Accessed 26 August 2023].

E SQUARED. 2021. The Amazi-Zlto Colab. Available: https://www.esquared.org.za/the-amazi-zlto-colab/ [Accessed 4 July 2023].

EKAYA. n.d. *Ekaya* [Online]. Available: https://www.ekaya.com [Accessed 6 July 2023].

ELLUL, J., WILKINSON, J. & MERTON, R. K. 1964. *The Technological Society*, Vintage books New York.

EMPIRE STATE. n.d. *Empire State* [Online]. Available: https://www.empirestate.co.za/landing/web-design [Accessed 6 July 2023].

ENCA. 2021. Drivers take on Uber battle. Available: https://youtu.be/XzI9KgTn7ko.

ENGLER, M. & ENGLER, P. 2021. André Gorz's Non-Reformist Reforms Show How We Can Transform the World Today. *Jacobin Magazine* [Online]. Available: https://www.jacobinmag.com/2021/07/andre-gorz-non-reformist-reforms-revolution-political-theory.

EPSTEIN, G. 2021. Financialisation: There's Something Happening Here. *Global Political Economy.* Routledge.

ERIKSSON, K. 2005. On the Ontology of Networks. *Communication and Critical/Cultural Studies,* 2**,** 305-323.

FAIRWORK 2020. Fairwork South Africa Ratings 2020: Labour Standards in the Gig Economy. Cape Town, South Africa; Oxford, UK; Manchester, UK.

FAIRWORK 2023. Fairwork South Africa Ratings 2023. Cape Town, South Africa; Oxford, UK; Manchester, UK.

FAROOHAR, R. 2016. Why Robert Gordon Is the New Thomas Piketty. Available: https://time.com/4456826/robert-gordon-american-growth/ [Accessed 13 July 2022].

FAROUK, F. 2020. Alternative Models for the Digital Economy: Social Impact Tech Start-ups and Platform Co-operatives. *The RIA Podcast* [Online]. Available: https://podcasts.apple.com/za/podcast/the-ria-podcast/id1639327571?i=1000575758179 [Accessed 16 December 2023].

FAROUK, F. 2022. In Search of Platform Cooperatives in South Africa (Working Paper). *Research ICT Africa* [Online]. Available: https://researchictafrica.net/wp/wp-content/uploads/2022/05/Working-Paper-Platform-Co-ops-South-Africa-Fazila-Farouk-2022.pdf [Accessed 28 December 2022].

FARR, A. 2021. Herbert Marcusé. *In:* ZALTA, E. N. (ed.) *Stanford Encyclopedia of Philosophy (Summer 2021 Edition).* Stanford, California: Stanford University.

FEENBERG, A. 1991. *Critical Theory of Technology*, Oxford University Press New York.

FEENBERG, A. 2009. What is Philosophy of Technology? *International Handbook of Research and Development in Technology Education.* Brill.

FEENBERG, A. 2010. Marxism and the Critique of Social Rationality: From Surplus Value to the Politics of Technology. *Cambridge Journal of Economics,* 34**,** 37-49.

FEENBERG, A. 2013. Marcusé's Phenomenology: Reading Chapter Six of One-Dimensional Man. *Constellations,* 20**,** 604-614.

FEENBERG, A. 2015. Critical Theory of Technology and STS. *ISIS Summit Vienna 2015: The Information Society at the Crossroads.* Vienna: MDPI, Basel, Switzerland.

FEENBERG, A. 2016. The Philosophy of Praxis: Marx, Lukács and the Frankfurt School. *In:* LUDOVISI, S. G. (ed.) *Critical Theory and the Challenge of Praxis: Beyond Reification.* London: Routledge.

FEENBERG, A. 2017a. A Critical Theory of Technology. *In:* FELT, U., FOUCHÉ, R., MILLER, C. A. & SMITH-DOERR, L. (eds.) *Handbook of Science and Technology Studies.* MIT Press.

FEENBERG, A. 2017b. A Critical Theory of Technology and STS. *Thesis Eleven,* 138**,** 3-12.

FILGUEIRAS, V. A. & CAVALCANTE, S. M. 2020. What Has Changed: A New Farewell to the Working Class? *Revista Brasileira de Ciências Sociais,* 35.

FINCHECK. n.d. What Does It Cost? *Fincheck* [Online]. Available: https://help.fincheck.co.za/knowledge-base/what-does-it-cost/ [Accessed 27 August 2023].

FINE, B. 2012. Financialization and Social Policy. *The Global Crisis and Transformative Social Change.* Springer.

FISHER, G. 2012. *Identity and Resource Mobilization in New Ventures: A Model of Venture Identification.*

FLEMING, P. 2017. The Human Capital Hoax: Work, Debt and Insecurity in the Era of Uberization. *Organization Studies,* 38**,** 691-709.

FLUSS. n.d. *Fluss* [Online]. Available: https://fluss.io [Accessed 6 July 2023].

FORD, M. 2015. *Rise of the Robots: Technology and the Threat of a Jobless Future*, Basic Books.

FOUREL, C. & GOLLAIN, F. 2013. André Gorz, Thinker of Imagination. *La Vie des Idées,* 3.

FRASE, P. 2016. *Four Futures: Life After Capitalism,* Verso books.

FRASER, L. 2023. This is What Keeps South Africa's CEOs Up at Night. *Business Tech* [Online]. Available: https://businesstech.co.za/news/technology/729095/this-is-what-keeps-south-africas-ceos-up-at-night/ [Accessed 21 December 2023].

FREDMAN, S., DU TOIT, D., GRAHAM, M., HOWSON, K., HEEKS, R., VAN BELLE, J.-P., MUNGAI, P. & OSIKI, A. 2020. Thinking Out of the Box: Fair Work for Platform Workers. *King's Law Journal,* 31**,** 236-249.

FREY, C. 2020. Good Work - Now and in the Future. *Bridges to the Future* [Online]. Available: https://youtu.be/hZg3nqVIeeY?t=1089 [Accessed 11 June 2020].

FREY, C. B. & OSBORNE, M. A. 2013. The Future of Employment: How Susceptible Are Jobs to Computerisation? *Technological Forecasting and Social Change,* 114**,** 254-280.

FRIEDERICI, N., WAHOME, M. & GRAHAM, M. 2020. *Digital Entrepreneurship in Africa: How a Continent is Escaping Silicon Valley's Long Shadow,* The MIT Press.

FUND, S. S. n.d. *SA SME Fund,* [Online]. Available: https://sasmefund.co.za [Accessed 20 December 2023].

FUNDERS CLUB. n.d. *What are Tech Startups?* [Online]. Available: https://fundersclub.com/learn/tech-startups/overview-of-tech-startups/what-are-tech-startups/ [Accessed 3 September 2019].

FUNDINGHUB. n.d. *How the Funding Process Works* [Online]. Available: https://www.fundinghub.co.za/how-it-works#how-it-works [Accessed 3 July 2023].

GARDINER, M. E. 2017. Critique of Accelerationism. *Theory, Culture & Society,* 34**,** 29-52.

GAVIGAN, H. 2023. Africa's First 4 Day Week Trial a Remarkable Success. *4 Day Week Global* [Online]. Available: https://www.4dayweek.com/press-releases-posts/africas-first-4-day-week-trial [Accessed 21 December 2023].

GERMAN FEDERAL LABOUR COURT. 2020. Arbeitnehmereigenschaft von "Crowdworkern". Available: https://juris.bundesarbeitsgericht.de/cgi-bin/rechtsprechung/document.py?Gericht=bag&Art=pm&Datum=2020&nr=24710&pos=1&anz=44&titel=Arbeitnehmereigenschaft_von_%84Crowdworkern%93 [Accessed 20 December 2020].

GIRIDHARADAS, A. 2015. Want a Steady Income? There's an App for That. *New York Times* [Online]. Available: https://www.nytimes.com/2015/05/03/magazine/want-a-steady-income-theres-an-app-for-that.html.

GIRIDHARADAS, A. 2019. *Winners Take All: The Elite Charade of Changing the World*, Vintage.

GOLEMAN, D. 2013. Rich People Just Care Less. Available: https://archive.nytimes.com/opinionator.blogs.nytimes.com/2013/10/05/rich-people-just-care-less/?_php=true&_type=blogs&_r=1 [Accessed 24 August 2023].

GOLLAIN, F. 2009. André Gorz: A Marxist Existentialist. History and Its Subject. *Revue du MAUSS,* 34**,** 349-367.

GOLLAIN, F. O. 2018. Questioning the Centrality of Work with André Gorz. *Green European Journal*.

GORDON, P. 2021. Left Accelerationism, Transhumanism and the Dialectic: Three Manifestos. *New Proposals: Journal of Marxism and Interdisciplinary Inquiry,* 12.

GORDON, R. J. 2012. Is US Economic Growth Over? Faltering Innovation Confronts the Six Headwinds. National Bureau of Economic Research.

GORZ, A. 1967. *Strategy for Labor,* Boston, Beacon Press.

GORZ, A. 1968. Reform and Revolution. *Socialist Register,* 5.

GORZ, A. 1982. *Farewell to the Working Class: An Essay on Post-Industrial Socialism*, Pluto Press.

GORZ, A. 1985. *Paths to Paradise: On the Liberation from Work*, Pluto Press.

GORZ, A. 1989. *Critique of Economic Reason*, Verso Trade.

GORZ, A. 2003. L'immatériel. *Connaissance, Valeur et Capital*.

GORZ, A. 2010a. The Exit from Capitalism has Already Begun. *Cultural Politics,* 6**,** 5-14.

GORZ, A. 2010b. *The Immaterial: Knowledge, Value and Capital*, Seagull Books.

GORZ, A. 2013. Beyond the Wage-Based Society. *In:* WIDERQUIST, K. & WISPELAERE, J. D. (eds.) *Basic Income: An Anthology of Research.* United Kingdom: Wiley Blackwell.

GORZ, A. & TURNER, C. 1999. *Reclaiming Work: Beyond the Wage-Based Society*, Polity Press Cambridge.

GRAEBER, D. 2013. On the Phenomenon of Bullshit Jobs: A Work Rant. *Strike Magazine,* 3**,** 1-5.

GRAHAM, M., HJORTH, I. & LEHDONVIRTA, V. 2017a. Digital Labour and Development: Impacts of Global Digital Labour Platforms and the Gig Economy on Worker Livelihoods. *Transfer: European Review of Labour and Research,* 23**,** 135-162.

GRAHAM, M., LEHDONVIRTA, V., WOOD, A., BARNARD, H., HJORTH, I. & D SIMON, P. 2017b. The Risks and Rewards of Online Gig Work at the Global Margins. Oxford Internet Institute.

GRAMSCI, A. 1971. The Modern Prince. *Selections from the prison notebooks***,** 123-205.

GRANADILLA. n.d. *Granadilla* [Online]. online. Available: https://granadillaworld.co.za/ [Accessed 4 July 2023].

GRANTER, E. 2016a. André Gorz: Postindustrial Marxism and the End of Work. *Critical Social Theory and the End of Work.* Routledge.

GRANTER, E. 2016b. Marcusé: Needs and Potentialities in the Age of Automation. *Critical Social Theory and the End of Work.* Routledge.

GRANTER, E. 2020. The End of Work Revisited. *Futures of Work.* February 2020 ed. United Kingdom: Bristol University Press.

GRANTER, E. 2021. Critical Theory and the Post-work Imaginary. *In:* VAUJANY, F.-X. D., AROLES, J. & DALE, K. (eds.) *Experiencing the New World of Work.* Cambridge: Cambridge University Press.

GRININ, L., KOROTAYEV, A. & TAUSCH, A. 2016. Kondratieff Waves and Technological Revolutions. *Economic Cycles, Crises, and the Global Periphery.* Springer.

GUPTA, V. 2015. Blockchains, Databases, Reification: Are Bottom Up Standards Possible? *YouTube* [Online]. Available: https://www.youtube.com/live/AbacROAa4xY?feature=share [Accessed 30 June 2023].

GUPTA, V. 2017. European Parliament Blockchain Presentation May 2017. *YouTube* [Online]. Available: https://youtu.be/fCYT9KWoldI.

HAMILTON, A. M. 2020. A Genealogy of Critical Race and Digital Studies: Past, Present, and Future. *Sociology of Race and Ethnicity,* 6**,** 292-301.

HARRIS, N., GARCIA, J. Z. & FORD, L. 2023. André Gorz and Contemporary Frankfurt School Critical Theory: Alienation, Eco-Socialism and Post-Productivism. *Journal of Classical Sociology,* 23**,** 229-241.

HARRIS, T. G. 1993. The Post-Capitalist Executive: An Interview with Peter F. Drucker. *Harvard Business Review* [Online]. Available: https://hbr.org/1993/05/the-post-capitalist-executive-an-interview-with-peter-f-drucker.

HARTE, M. 2015. Digital Transformation in Banking - USI Events. 13 July 2015. YouTube. Available: https://www.youtube.com/watch?v=d6mqxcevZj0 [Accessed 6 December 2019].

HARVEY, D. 1989. *The Condition of Postmodernity: an Enquiry into the Origins of Cultural Change Oxford: Blackwell,* Blackwell, Oxford.

HASCHER, M. 2016. Physical Banking in a Digital World: The Digital Revolution and the Impact on Consumers and Banks. *Journal of Digital Banking,* 1**,** 258-265.

HAWKSWORTH, J., BERRIMAN, R. & GOEL, S. 2018. Will Robots Really Steal our Jobs? An International Analysis of the Potential Long Term Impact of Automation. *PricewaterhouseCoopers,* http://pwc.co.uk/economics.

HEATON, L. & PROULX, S. 2015. Paradoxical Empowerment: Immaterial Labor Translated in a Web of Affective Connections. *The Information Society,* 31**,** 28-35.

HEIDEGGER, M. 1954. The Question Concerning Technology. *Technology and values: Essential readings,* 99**,** 113.

HERIAN, R. 2018. Taking Blockchain Seriously. *Law and Critique,* 29**,** 163-171.

HLATSWAYO, M. 2021. Botched Technological Revolutions and the South African Proletariat. *In:* NGWANE, T. & TSHOAEDI, M. (eds.) *The Fourth Industrial Revolution: A Sociological Critique.* Johannesburg: Jacana Media.

HOCHBERG, Y. V., LJUNGQVIST, A. & LU, Y. 2007. Whom You Know Matters: Venture Capital Networks and Investment Performance. *The Journal of Finance,* 62**,** 251-301.

HOWITT, K. 2018. Value Creators: Why We Love Software Businesses. Available: https://www.youtube.com/watch?v=RszPP_3Qivs [Accessed 20 October 2019].

HUCKLE, S. & WHITE, M. 2016. Socialism and the Blockchain. *Future Internet,* 8**,** 49.

HUGHES, N. & LONIE, S. 2007. M-PESA: Mobile Money for the "Unbanked" Turning Cellphones into 24-Hour Tellers in Kenya. *Innovations: technology, governance, globalization,* 2**,** 63-81.

HUGHES, T. P. 2001. History of Technology. *International Encyclopedia of the Social & Behavioral Sciences***,** 6852-6857.

HUNTER, R., JOHNSON, C. & SMIT, H. 2019. How are African Digital Platforms Shaping the Economic Development Conversation? *Insight2Impact* [Online]. Available from: https://i2ifacility.org/insights/blog/how-are-african-digital-platforms-shaping-the-economic-development-conversation?entity=blog&offset=6 [Accessed 15 December 2020 2020].

HYMAN, R. 1983. Andre Gorz and His Disappearing Proletariat. *Socialist register,* 20.

ILLING, S. 2023. Conservative Socialism? *The Gray Area* [Online]. Available: Apple Podcasts [Accessed 30 August 2023].

ILO 2017. Strengthening Social Protection for the Future of Work. *2nd Meeting of the G20 Employment Working Group.* Hamburg: International Labour Organisation.

ILO 2019. ILO Centenary Declaration for the Future of Work, 2019 Geneva: International Labour Organisation.

ILO. 2023. How are Trade Unions Adapting to Changes in the World of Work? *ILO News* [Online]. Available: https://www.ilo.org/actrav/media-center/news/WCMS_883756/lang--en/index.htm [Accessed 25 November 2023].

ILO. n.d. *Global Commission on the Future of Work* [Online]. International Labour Organisation. Available: https://www.ilo.org/global/topics/future-of-work/WCMS_569528/lang--en/index.htm [Accessed 20 December 2023].

IN3 EDITORIAL TEAM. 2021. Looking Back at Castells' Trilogy, The Information Age. Available: https://in3.blogs.uoc.edu/looking-back-at-castells-trilogy-the-information-age/ [Accessed 22 September 2021].

IOANNOU, S. 2022. Book Review: Yanis Varoufakis, Another Now: Dispatches from an Alternative Present (The Bodley Head, London, UK 2020). *Review of Keynesian Economics,* 10**,** 440-442.

ISPANI. n.d. *Ispani* [Online]. Available: https://www.ispanigroup.co.za [Accessed 9 July 2023].

JACKSON, M. C. 2022. Alexander Bogdanov, Stafford Beer and Intimations of a Post-Capitalist Future. *Systems Research and Behavioral Science*.

JACKSON, T. 2015. SA Fitness App FitKey Raises Funding from Angel Investor Justin Stanford. *Disrupt Africa* [Online]. Available: https://disrupt-africa.com/2015/09/21/sa-fitness-app-fitkey-raises-funding-from-angel-investor-justin-stanford/.

JACKSON, T. 2016. SA Microjobbing Startup M4JAM to Resurface with New Owners. *Disrupt Africa* [Online]. Available: https://disrupt-africa.com/2016/05/19/sa-microjobbing-startup-m4jam-to-resurface-with-new-owners/ [Accessed 10 July 2023].

JACKSON, T. 2019a. SA Insurtech Startup Nobuntu Raises Funding from Crossfin. *Disrupt Africa* [Online]. [Accessed 4 July 2023].

JACKSON, T. 2019b. SA Startup Fincheck Acquires Local Competitor FundingHub. *Disrupt Africa* [Online]. Available: https://disrupt-africa.com/2019/08/27/sa-startup-fincheck-acquires-local-competitor-fundinghub/ [Accessed 4 July 2023].

JACQUES, M. 2022. *Understanding China on the Global Political Stage* [Online]. United `kingdom. Available: https://youtu.be/yqNoZRK0F2w?si=4qM7jDFzGmvOLO3V [Accessed 15 December 2023].

JAIN, A. K., MAO, J. & MOHIUDDIN, K. M. 1996. Artificial Neural Networks: A Tutorial. *Computer,* 29**,** 31-44.

JASURE. n.d. *Jasure* [Online]. Available: https://www.jasure.com [Accessed 4 July 2024].

JONES, T. L., BAXTER, M. A. & KHANDUJA, V. 2013. A Quick Guide to Survey Research. *Ann R Coll Surg Engl,* 95**,** 5-7.

JUDGE, K. 2018. Investor-Driven Financial Innovation. *Harv. Bus. L. Rev.,* 8**,** 291.

JUSTIE, B. 2020. Inhuman Power: Artificial Intelligence and the Future of Capitalism, Digital Barricades: Interventions in Digital Culture and Politics. *Information, Communication & Society,* 23**,** 151-154.

KAINE, S., LOGUE, D. & JOSSERAND, E. 2016. The 'Uberisation'of Work Is Driving People to Co-operatives. *The Conversation,* 28.

KANDUA. n.d. *Kandua* [Online]. Available: https://kandua.com/pro/tawandadiza [Accessed 6 July 2019].

KANG, J. 2023. Toward a Critical Social Theory of AI: Knowledge, Information, and Intelligence in the Later Works of André Gorz. *Journal of Classical Sociology***,** 1468795X231153825.

KAYE, E. n.d. *Bozza Media* [Online]. Available: https://www.emmakaye.com/bozza [Accessed 9 July 2023].

KEDROSKY, P. & STANGLER, D. 2011. Financialization and Its Entrepreneurial Consequences. *Ewing Marion Kauffman Foundation Research Paper.*

KENNEY, M. & ZYSMAN, J. 2016. The Rise of the Platform Economy. *Issues in science and technology,* 32**,** 61.

KERR, T. 2022. Uber Technologies Has Strong Growth, but No Profits. *Yahoo Finance* [Online]. Available: https://finance.yahoo.com/news/uber-technologies-strong-growth-no-195747169.html [Accessed 27 February 2023].

KERR, W. & NANDA, R. 2009. Financing Constraints and Entrepreneurship. National Bureau of Economic Research.

KETTLER, D. 1982. A Note on the Aesthetic Dimension in Marcusé's Social Theory. *Political Theory,* 10**,** 267-275.

KEWELL, B., ADAMS, R. & PARRY, G. 2017. Blockchain for Good? *Strategic Change,* 26**,** 429-437.

KEYNES, J. M. 1931. Essays in Persuasion: Economic Possibilities for Our Grandchildren. 1 ed. UK: Palgrave Macmillan.

KHAYRALLAH, A., RADIA, N., HICKEY, J., SINGH, J. & XU, V. 2015. Technology & Banking. *Applied Innovation Review,* 23.

KHUMALO, K. 2018. Big 4 Banks are Prepared for Newcomers. *Business Report* [Online]. Available: https://www.iol.co.za/business-report/economy/big-4-banks-are-prepared-for-newcomers-18374824 [Accessed 5 December 2019].

KING, B. 2010. *Bank 2.0: How Customer Behaviour and Technology Will Change the Future of Financial Services,* Marshall Cavendish International Asia Pte Ltd.

KING, B. 2018. *Bank 4.0: Banking Everywhere, Never at a Bank,* John Wiley & Sons.

KLINE, R. R. 2001. Technological Determinism. *In:* SMELSER, N. J. & BALTES, P. B. (eds.) *International Encyclopedia of the Social & Behavioral Sciences.* Oxford: Pergamon.

KÖHLER, J. 2012. A Comparison of the Neo-Schumpeterian Theory of Kondratiev Waves and the Multi-Level Perspective on Transitions. *Environmental Innovation and Societal Transitions,* 3**,** 1-15.

KOKELA, J. 2019. Why SASBO Is Challenging the Banks on 4IR Issues. *SASBO News* [Online], 41. Available: https://www.sasbo.org.za/wp-content/uploads/2020/04/SASBO-News-v41n4-Proof-27-Nov.pdf [Accessed 20 June 2020].

KORNBERGER, M., PFLUEGER, D. & MOURITSEN, J. 2017. Evaluative iInfrastructures: Accounting for Platform Organization. *Accounting, Organizations and Society,* 60**,** 79-95.

KUHN, K. & MALEKI, A. A Workforce of Micro-Entrepreneurs: Online Labor Platforms in the Sharing Economy. Academy of Management Proceedings, 2015. Academy of Management Briarcliff Manor, NY 10510, 15009.

KUHN, T. S. 1970. *The Structure of Scientific Revolutions*, Chicago University of Chicago Press.

LABOUR COURT OF SOUTH AFRICA. 2018. Judgement in the Matter of Uber South Africa Technology Services PTY LTD and National Union of Public Service and Allied Workers Union (NUPSAW). Available: http://www.saflii.org/za/cases/ZALCCT/2018/1.html.

LAM, L. & TRIANDAFYLLIDOU, A. 2021. Migrants, Platform Work and Resilience. *World Bank Blogs* [Online]. Available: https://blogs.worldbank.org/peoplemove/migrants-platform-work-and-resilience [Accessed 20 February 2023].

LANCHESTER, J. 2015. The Robots Are Coming. *London Review of Books,* 37**,** 3-8.

LANGLEY, P. & LEYSHON, A. 2017. Platform Capitalism: The Intermediation and Capitalisation of Digital Economic Circulation. *Finance and Society,* 3**,** 11-31.

LAPPETITO, C. 2019. The Diffusion of Financial Innovations: An Examination of the Adoption of Small Business Credit Scoring by Large Banking Organizations. *Forbes Magazine* [Online]. Available: https://www.forbes.com/sites/forbesfinancecouncil/2019/10/22/the-digital-divide-to-stay-competitive-banks-must-embrace-new-technology/#5a1f0a3179d4 [Accessed 28 November 2019].

LATOUR, B. 1990. Technology is Society Made Durable. *The Sociological Review,* 38**,** 103-131.

LE ROUX, D. B. 2018a. Automation and Employment: The Case of South Africa. *African Journal of Science, Technology, Innovation and Development,* 10**,** 507-517.

LE ROUX, D. B. 2018b. Many South African Jobs Could Soon be Automated, and the Country Isn't Prepared. *The Conversation Africa* [Online]. Available: https://theconversation.com/many-south-african-jobs-could-soon-be-automated-and-the-country-isnt-prepared-99689 [Accessed 11 May 2020].

LEAPLY. n.d. *Leaply* [Online]. Available: https://about.leap.ly [Accessed 9 July 2023].

LEE, J. & LEE, K. 2021. Is the Fourth Industrial Revolution a Continuation of the Third Industrial Revolution or Something New Under the Sun? Analyzing Technological Regimes Using US Patent Data. *Industrial and Corporate Change,* 30**,** 137-159.

LEE, M., YUN, J., PYKA, A., WON, D., KODAMA, F., SCHIUMA, G., PARK, H., JEON, J., PARK, K. & JUNG, K. 2018. How to Respond to the Fourth Industrial Revolution, or the Second Information Technology Revolution? Dynamic New Combinations Between Technology, Market, and Society Through Open Innovation. *Journal of Open Innovation: Technology, Market and Complexity,* 4**,** 21.

LEONARDI, E. & BENEGIAMO, M. 2021. André Gorz's Labour-Based Political Ecology and Its Legacy for the Twenty-First Century. *In:* RÄTHZEL, N., STEVIS, D. & UZZELL, D. (eds.) *The Palgrave Handbook of Environmental Labour Studies.* Cham: Springer International Publishing.

LEVINE, M. E. & FORRENCE, J. L. 1990. Regulatory Capture, Public Interest, and the Public Agenda: Toward a Synthesis. *JL Econ & Org.,* 6**,** 167.

LEVY, A. 2000. Andre Gorz: An Inspiring Mind. *Canadian Dimension* [Online]. Available: https://www.thefreelibrary.com/Andre+Gorz%3a+An+Inspiring+Mind.-a066011884 [Accessed 4 February 2022].

LEWIS, H., DWYER, P., HODKINSON, S. & WAITE, L. 2015. Hyper-Precarious Lives: Migrants, Work and Forced Labour in the Global North. *Progress in Human Geography,* 39**,** 580-600.

LIBRYO. n.d. *Libryo* [Online]. Available: https://libryo.com [Accessed 9 July 2023].

LIFEQ. n.d. *LifeQ* [Online]. Available: https://www.lifeq.com [Accessed 9 July 2023].

LIN, K. 2019. Role of Data Science in Artificial Intelligence. *Medium* [Online]. Available: https://towardsdatascience.com/role-of-data-science-in-artificial-intelligence-950efedd2579 [Accessed 9 September 2019].

LIN, L., YANG, J. & ZHAI, K. 2022. China's Startups Are Awash With Money as Beijing Shi!s Focus to 'Hard Tech'. *Wall Street Journal* [Online]. Available: https://www.wsj.com/articles/chinas-startups-attract-record-funding-despite-tech-clampdown-11642000017 [Accessed 30 July 2022].

LINUMLABS. n.d. *LinumLabs* [Online]. Available: https://www.linumlabs.com [Accessed 6 July 2023].

LIPTON, A., SHRIER, D. & PENTLAND, A. 2016. Digital Banking Manifesto: The End of Banks?

LITTLE, A. 2007. Andre Gorz: Iconoclastic Philosopher and Critic. *Indpendent* [Online]. Available: https://www.independent.co.uk/news/obituaries/andre-gorz-396662.html [Accessed 19 January 2022].

LITTLE, J. 2020. Ten Years On, Why Are There Still So Few Women in Tech? *The Guardian* [Online]. Available: https://www.theguardian.com/careers/2020/jan/02/ten-years-on-why-are-there-still-so-few-women-in-tech [Accessed 9 June 2020].

LUKÁCS, G. 1972. *History and Class Consciousness: Studies in Marxist Dialectics*, MIT Press.

LULALEND. n.d. *LulaLend,* [Online]. Available: https://www.lulalend.co.za [Accessed 4 July 2023].

LUNIKA, M. 2017. Wahi Helps Users Find Physical Storage Space. *ITWeb* [Online]. Available: https://www.itweb.co.za/content/xo1Jr5qxgGMKdWLb [Accessed 6 July 2023].

MACMILLAN, D. 2022. Uber Promised South Africans Better Lives but Knew Drivers Risked Debt and Danger. *Washington Post* [Online]. Available: https://www.washingtonpost.com/business/2022/07/11/uber-driver-south-africa-attacks/ [Accessed 20 February 2022].

MAGGETTI, M., GILARDI, F. & RADAELLI, C. 2013. Designing Research in the Social Sciences. London: SAGE Publications Ltd.

MAHA, A. & MORRIS, R. 2018a. Evaluation and Network Analysis of the Cape Town-Stellenbosch Tech Sector. *Endeavour Insight.*

MAHA, A. & MORRIS, R. 2018b. Evaluation and Network Analysis of the Johannesburg Tech Sector. Endeavour Insight, Tshimologong (Wits University) & JP Morgan.

MAHARAJ, R. 2021. Long-Run Global Perspectives on Evolution, Revolution and Innovation in South Africa's Development. *In:* NGWANE, T. & TSHOAEDI, M. (eds.) *The Fourth Industrial Revolution: A Sociological Critique.* Johannesburg: Jacana Media.

MAKINA, D. 2019. The Potential of FinTech in Enabling Financial Inclusion. *Extending Financial Inclusion in Africa.* Elsevier.

MALINGA, S. 2017. Tapsnapp Expands to Swaziland, Botswana. *IT Web* [Online]. Available: https://www.itweb.co.za/content/DVgZeyvJkwW7djX9 [Accessed 6 July 2019].

MALINGA, S. 2020. Cell C's Spaza Pilot Project to Create 230K Jobs. *ITWeb* [Online]. Available: https://www.itweb.co.za/content/P3gQ2qGx2o3vnRD1 [Accessed 4 July 2023].

MALINGA, S. 2022. Fintech Sector Takes Largest Cut of Africa's Start-up Funding. *IT Web* [Online]. Available: https://www.itweb.co.za/content/kLgB1MezzAQq59N4 [Accessed 2 July 2023].

MAPADIMENG, M. S. 2021. The Fourth Industrial Revolution: A Theoretical Critique of the Discourse. *In:* NGWANE, T. & TSHOADEI, M. (eds.) *The Fourth Industrial Revolution: A Sociological Critique.* Johannesburg: Jacana Media.

MAPFRE ECONOMICS 2020. Financial Inclusion in Insurance. Madrid: MaPFRE Economics,.

MARCUSÉ, H. 1941. Some Social Implications of Modern Technology. *Political Sociology and Critique of Politics,* IX**,** 138-162.

MARCUSÉ, H. 1964. *One-Dimensional Man: Studies in the Ideology of Advanced Industrial Society,* Boston, Beacon.

MARCUSÉ, H. & MAGEE, B. 2022. The Frankfurt School - Herbert Marcusé & Bryan Magee (1978). *Philosophy Overdose YouTube Channel* [Online]. Available: https://youtu.be/U23Ho0m_Sv0?si=mh6ZE-eETS1yC0Jb [Accessed 12 December 2022].

MARIVATE, V., AGHOGHOVWIA, P., ISMAIL, Y., MAHOMED-ASMAIL, F. & STEENHUISEN, S.-L. 2021. The Fourth Industrial Revolution-What Does It Mean to Our Future Faculty? *South African Journal of Science,* 117**,** 1-3.

MARKHAM, L. 2018. The Immigrants Fueling the Gig Economy. *The Atlantic* [Online]. Available: https://www.theatlantic.com/technology/archive/2018/06/the-immigrants-fueling-the-gig-economy/561107/ [Accessed 11 November 2020].

MARURI, K. 2021. California Court Declines to Take Up Case Against Prop 22. *Government Technology* [Online]. Available: https://www.govtech.com/policy/California-Court-Declines-to-Take-Up-Case-Against-Prop-22.html [Accessed 28 February 2021].

MARWALA, T. 2019. Artificial Intelligence and the Changing Face of Banking. *Daily Maverick* [Online]. Available: https://www.dailymaverick.co.za/opinionista/2019-12-01-artificial-intelligence-and-the-changing-face-of-banking/ [Accessed 5 December 2019].

MASON, P. 2016. *Postcapitalism: A Guide to our Future*, Macmillan.

MASUKU, A. 2017. Investor Bias: The Problem with Venture Capitalists. *IOL Business Report* [Online]. Available: https://www.iol.co.za/business-report/investor-bias-the-problem-with-venture-capitalists-10287143 [Accessed 14 October 2019].

MATHE, T. 2019. Swings and Roundabouts for Jobs in Banks. *Mail & Guardian* [Online]. Available: https://mg.co.za/article/2019-10-11-00-swings-and-roundabouts-for-jobs-in-banks/ [Accessed 12 May 2020].

MATHUROS, F. 2016. The Fourth Industrial Revolution Will Be Driven by Renewable Energy. Davos-Klosters, Switzerland: World Economic Forum.

MAWII, Z. & ANEJA, U. 2020. Case Study 3: SweepSouth – Platform-Based Domestic Work. *Gig Work On Digital Platforms.* Tandem Research.

MAYRING, P. 2014. Qualitative Content Analysis: Theoretical Foundation, Basic Procedures and Software Solution.

MAZIBUKO-MAKENA, Z. & KRAEMER-MBULA, E. 2021. *Leap 4.0 : African Perspectives on the Fourth Industrial Revolution,* Johannesburg, Mapungubwe Institute for Strategic Reflection MISTRA.

MAZZUCATO, M. 2011. The Entrepreneurial State. *Soundings,* 49**,** 131-142.

MCCOMBES, S. 2023. Sampling Methods | Types, Techniques & Examples. *Scribbr* [Online]. Available: https://www.scribbr.com/methodology/sampling-methods/ [Accessed 27 December 2023].

MCKANE, J. 2019. All the Standard Bank Branches Closing in South Africa. Available: https://mybroadband.co.za/news/banking/308601-all-the-standard-bank-branches-closing-in-south-africa.html [Accessed 20 October 2019].

MCMILLAN COTTOM, T. 2020. Where Platform Capitalism and Racial Capitalism Meet: The Sociology of Race and Racism in the Digital Society. *Sociology of Race and Ethnicity,* 6**,** 441-449.

MEDIUM. 2019. The Inflection Point of Artificial Intelligence Technology Is Coming, How Will It Develop in the Future? *Medium* [Online]. Available: https://medium.com/@hytlee1230/the-inflection-point-of-artificial-intelligence-technology-is-coming-how-will-it-develop-in-the-a7cbb1f6d90c [Accessed 31 July 2021].

MENON, A. 2018. After 20+ Years in Banking I Moved to Blockchain. Available: https://medium.com/tallyx/after-20-years-in-banking-i-moved-to-blockchain-2b2fb5f49137 [Accessed 29 November 2019].

MERCHANT, B. 2020. Uber and Lyft's Business Model May Be Dead. Good. *Medium* [Online]. Available: https://onezero.medium.com/uber-and-lyfts-business-model-may-be-dead-good-53940dcbac34.

MICHIE, S. & NELSON, D. 2006. Barriers Women Face in Information Technology Careers: Self-efficacy, Passion and gGnder Biases. *Women In Management Review,* 21**,** 10-27.

MILLER, L. J. 2019. *Genderblindness in American Society: The Rhetoric of a System of Social Control of Women,* Rowman & Littlefield.

MITRA, A. 2010. Creating a Presence on Social Networks via Narbs. *Global Media Journal,* 9**,** 1-18.

MITRA, A. & SCHWARTZ, R. L. 2001. From Cyber Space to Cybernetic Space: Rethinking the Relationship between Real and Virtual Spaces. *Journal of Computer-Mediated Communication,* 7.

MOHAMED, S. 2016. Financialization of the South African Economy. *Development,* 59**,** 137-142.

MOKOFE, W. M. 2022. Achieving Decent Work for Digital Platform Workers in South Africa. *Obiter,* 43**,** 349-365.

MOLABE, K. 2020. South Africa's Biggest Bank Is Preparing for a Permanent Shift in the Way of Work. *Business Tech* [Online]. Available: https://businesstech.co.za/news/banking/444415/south-africas-biggest-bank-is-preparing-for-a-permanent-shift-in-the-way-of-work/ [Accessed 8 January 2020].

MOLL, I. 2021a. 4IR the Ideology. *Working paper presented at University of Johannesburg seminar: The Myth, and the Ideology, of the Fourth Industrial Revolution.* Johannesburg.

MOLL, I. 2021b. The Myth of the Fourth Industrial Revolution. *Theoria,* 68**,** 1-38.

MOYO, A. 2020. SA Urged to Promote Gig Economy as Unemployment Takes Toll. *IT Web* [Online]. Available: https://www.itweb.co.za/content/lwrKxq3JykLMmg1o.

MPALA, D. 2017. Makro Acquisition of SA Startup WumDrop Will Shrink Delivery Time to Three Hours. Available: https://ventureburn.com/2017/11/makro-acquires-courier-service-wumdrop-shrinks-delivery-times-3-hours/ [Accessed 20 Octobr 2019].

MPALA, D. 2018. Debate Rages Over Whether VC Investors Biased Towards Expat-founded Startups. *Ventureburn* [Online]. Available: https://ventureburn.com/2018/08/investor-bias-expat-founded-startups/ [Accessed 14 October 2019].

MTHIMUNYE, V. 2015. Start-up With A Fortune 500 Vision. *LinkedIn* [Online]. Available: https://www.linkedin.com/pulse/start-up-fortune-500-vision-vusi-mbokane/ [Accessed 7 July 2023].

MTONGANA, L. 2019. Venture Capital and Early Stage Investing. *Gibs News* [Online]. Available: https://www.gibs.co.za/news-events/news/Pages/Venture-Capital-and-Early-Stage-Investing-.aspx [Accessed 7 October 2019].

MUSONDA, I., GUMBO, T. & OKORO, C. 2019. An Assessment of Tansformation Strategies in South Africa: A Multi-Case Study of the Accounting, Financial Services, Fovernment, and Construction Sectors. *Acta Structilia,* 26**,** 71-106.

MYBROADBAND. 2020. MTN launches Mobile Money in South Africa. Available: https://businesstech.co.za/news/telecommunications/369420/mtn-launches-mobile-money-in-south-africa/ [Accessed 23 January 2021].

MZEKANDABA, S. 2015. Crowdfunding to Aid #FeesMustFall Campaign. *ITWeb* [Online]. Available: https://www.itweb.co.za/content/ALPwQ57lWbDvNgkj [Accessed 3 July 2023].

MZIMBA, W. 2017. Platform Economy of the Future is the Pathway that Will Drive Growth and Jobs across Africa. *Tech Smart* [Online]. Available: http://www.techsmart.co.za/business/Platform-economy-of-the-future-is-the-pathway-that-will-drive-growth-and-jobs-across-Africa [Accessed 25 September 2020].

NAKAMOTO, S. 2008. Bitcoin: A Peer-to-Peer Electronic Cash System.

NEWS24WIRE. 2016. SA Start-up Entrepreneurs Lack Technical Skills. *Business Tech* [Online]. Available: https://businesstech.co.za/news/internet/127501/sa-start-up-entrepreneurs-lack-technical-skills/ [Accessed 27 August 2023].

NGWANE, T. & TSHOAEDI, M. 2021. *The Fourth Industrial Revolution: A Sociological Critique,* Johannesburg, Jacana Media.

NGWENYA, M. 2023. FinTech and Financial Inclusion for the Unbanked and Underbanked in Africa. *Engineering News* [Online]. Available: https://www.engineeringnews.co.za/article/fintech-and-financial-inclusion-for-the-unbanked-and-underbanked-in-africa-2023-03-22 [Accessed 3 July 2023].

NOBLE, S. U. & ROBERTS, S. T. 2019. *6 Technological Elites, the Meritocracy, and Postracial Myths in Silicon Valley,* Duke University Press.

NORRIS, C. 2020. Uber is Still Overvalued. *Medium* [Online]. Available: https://medium.com/datadriveninvestor/uber-is-still-overvalued-b3645abbd217 [Accessed 6 October 2020].

NURVALA, J.-P. 2015. 'Uberisation' is the Future of the Digitalised Labour Market. *European View,* 14**,** 231-239.

O'BRIEN, S. A. 2020. Prop 22 Passes in California, Exempting Uber and Lyft from Classifying Drivers as Employees. *CNN Business* [Online]. Available: https://edition.cnn.com/2020/11/04/tech/california-proposition-22/index.html [Accessed 28 February 2021].

O'REILLY, T. 2021. The Master Algorithm. *Economics and Beyond* [Online]. Available: https://www.ineteconomics.org/perspectives/podcasts/the-master-algorithm [Accessed 23 March 2021].

OFFERZEN. n.d. *Offerzen* [Online]. Available: https://www.offerzen.com [Accessed 9 July 2023].

OLAITAN, O. O., ISSAH, M. & WAYI, N. 2021. A Framework to Test South Africa's Readiness for the Fourth Industrial Revolution. *South African Journal of Information Management,* 23**,** e1-e10.

OLSEN, O. E. & ENGEN, O. A. 2007. Technological Change as a Trade-Off between Social Construction and Technological Paradigms. *Technology in Society,* 29**,** 456-468.

OMARJEE, L. 2019. 1 200 Jobs Affected as Standard Bank Closes 91 Branches. *Fin24* [Online]. Available: https://www.fin24.com/Companies/Financial-Services/1-200-jobs-affected-as-standard-bank-closes-91-branches-20190314 [Accessed 13 August 2019].

OPPENHEIMER, M. 1972. The Proletarianization of the Professional. *The Sociological Review,* 20**,** 213-227.

ORTIZ, D. & GREENE, J. 2007. Research Design: Qualitative, Quantitative, and Mixed Methods Approaches. *Qualitative Research Journal,* 6**,** 205+.

PAGEMAN. n.d. *Pageman* [Online]. Available: https://pageman.com/cloud-based-digtial-signage/ [Accessed 6 July 2023].

PALANDRANI, P. 2019. FinTech Trends: M&A and Mobile Payments Driving Recent Growth. *Global X* [Online]. Available: https://www.globalxetfs.com/fintech-trends-ma-and-mobile-payments-driving-recent-growth/ [Accessed 25 October 2019].

PANSERA, M. & FRESSOLI, M. 2021. Innovation Without Growth: Frameworks for Understanding Technological Change in a Post-Growth Era. *Organization,* 28**,** 380-404.

PAPADIMITROPOULOS, E. 2021. Platform Capitalism, Platform Cooperativism, and the Commons. *Rethinking Marxism,* 33**,** 246-262.

PC4IR 2020. Summary Report and Recommendatoins of the Presidential Commission on the Fourth Industrial Revolution (Government Gazette Number 43834). Pretoria: Department of Communications and Digital Technologies.

PEARLSTEIN, S. 2014. Review: 'The Second Machine Age,' by Erik Brynjolfsson and Andrew McAfee. *The Washington Post* [Online]. Available: https://www.washingtonpost.com/opinions/review-the-second-machine-age-by-erik-brynjolfsson-and-andrew-mcafee/2014/01/17/ace0611a-718c-11e3-8b3f-b1666705ca3b_story.html [Accessed 30 November 2019].

PEREZ, C. 2004. Finance and Technical Change: A Neo-Schumpeterian Perspective. Working Paper, 2004, 14: 1-16.

PEREZ, C. 2007. Great Surges of Development and Alternative Forms of Globalization. *Working Papers in Tecnology Governance and Economic Dynamics,* 15.

PEREZ, C. 2010. Technological Revolutions and Techno-economic Paradigms. *Cambridge Journal of Economics,* 34**,** 185–202.

PEREZ, C. 2022. *Webinar: Carlota Perez on How Governments have Brought Golden Ages in Previous Revolutions* [Online]. Available: https://youtu.be/uFwWkDHuYYQ [Accessed 5 July 2022].

PEREZ, C. & LEACH, T. M. 2021. Technological Revolutions: Which Ones, How Many and Why Does It Matter: A Neo-Schumpeterian View. *Beyond 4.0.* London, UK: UCL Institute for Innovation and Public Purpose (IIPP).

PERRIGO, B. 2023. Exclusive: OpenAI Used Kenyan Workers on Less Than $2 Per Hour to Make ChatGPT Less Toxic. *Time Magazine* [Online]. Available: https://time.com/6247678/openai-chatgpt-kenya-workers/ [Accessed 15 February 2023].

PESOLE, A., BRANCATI, M., FERNÁNDEZ-MACÍAS, E., BIAGI, F. & GONZÁLEZ VÁZQUEZ, I. 2018. Platform Workers in Europe. *Luxembourg: Publications Office of the European Union*.

PETERS, M. A. 2019. Beyond Technological Unemployment: The Future of Work. *Educational Philosophy and Theory***,** 1-7.

PETICCA-HARRIS, A., DEGAMA, N. & RAVISHANKAR, M. 2020. Postcapitalist Precarious Work and Those in the 'Drivers' Seat: Exploring the Motivations and Lived Experiences of Uber Drivers in Canada. *Organization,* 27**,** 36-59.

PETIT, N. & TEECE, D. J. 2021. Innovating Big Tech Firms and Competition Policy: Favoring Dynamic over Static Competition. *Industrial and Corporate Change***,** 1-31.

PICUP. n.d. *Picup* [Online]. Available: https://picup.co.za [Accessed 6 July 2019].

PIROGAN, M. & KATZENBACH, C. 2017. Revisiting Castells' Network Society. Available: https://www.hiig.de/en/revisiting-castells-network-society/ [Accessed 08 December 2017].

PITCHBOOK. n.d. *Fitkey* [Online]. Available: https://pitchbook.com/profiles/company/121580-83#overview [Accessed 9 July 2023].

PLATFORM COOPERATIVISM CONSORTIUM. 2020. Darcy Du Toit – Social Law Project, University of Western Cape. Available: https://platform.coop/stories/darcy-du-toit-social-law-project-university-of-western-cape/ [Accessed 28 February 2023].

POLLMAN, E. & BARRY, J. M. 2017. Regulatory Entrepreneurship. *SOUTHERN CALIFORNIA LAW REVIEW,* 90**,** 383-448.

POPESCU, G. H., PETRESCU, I. E. & SABIE, O. M. 2018. Algorithmic Labor in the Platform Economy: Digital Infrastructures, Job Quality, and Workplace Surveillance. *Economics, Management and Financial Markets,* 13**,** 74-79.

PRINSLOO, F. & ROOPNARAIN, R. 2019. Still a Balancing Act: South Africa - Major Banks Analysis. *Price Waterhouse Cooper Report* [Online]. Available: https://www.pwc.co.za/en/assets/pdf/major-banks-analysis-nov-2019.pdf [Accessed 15 December 2019].

PROLIFIC IDEA. n.d. *Prolific Idea* [Online]. Available: https://prolificidea.com [Accessed 6 July 2023].

PULVER, S. 2016. Contemporary Sociological Theory: Micro, Macro and Integrative. *The National Socio-Environmental Synthesis Centre YouTube Channel* [Online]. Available: https://youtu.be/U4nPkPvaK7E [Accessed 12 Augut 2021].

QIU, J. L. & CASTELLS, M. 2008. Interview with Manuel Castells. 4 PARK SQUARE, MILTON PARK: ROUTLEDGE JOURNALS, TAYLOR & FRANCIS LTD.

RAND MERCHANT BANK 2019. The SA Fintech in Motion Report. Rand Merchant Bank.

RAND MERCHANT INVESTMENTS. 2015. *Alphacode* [Online]. Available: https://www.alphacode.club [Accessed 6 December 2019].

RANTANEN, T. 2005. The Message Is the Medium: An Interview with Manuel Castells. *Global Media and Communication,* 1**,** 135-147.

REALTY, Y. n.d. *You Realty* [Online]. Available: https://www.yourealty.co.za [Accessed 9 July 2023].

REUTERS. 2013. Twitter IPO Frenzy Boosts Stock. *Business Tech* [Online]. Available: https://businesstech.co.za/news/internet/49131/twitter-ipo-frenzy-boosts-stock/ [Accessed 25 July 2023].

REUTERS. 2019. German Court Bans Uber's Ride-Hailing Services in Germany. Available: https://www.reuters.com/article/us-uber-court/german-court-bans-ubers-ride-hailing-services-in-germany-idUSKBN1YN171 [Accessed 11 September 2020].

REYNOLDS, J. & RENAUDIE, P.-J. 2022. Jean-Paul Sartre. *In:* ZALTA, E. N. (ed.) *The Stanford Encyclopedia of Philosophy (Summer 2022 Edition).* Stanford University.

RIFKIN, J. 2011. *The Third Industrial Revolution: How Lateral Power is Transforming Energy, the Economy, and the World,* New York, Palgrave Macmillan.

RIFKIN, J. 2012. The Third Industrial Revolution: How the Internet, Green Electricity, and 3-D Printing are Ushering in a Sustainable Era of Distributed Capitalism. Available:

https://www.worldfinancialreview.com/the-third-industrial-revolution-how-the-internet-green-electricity-and-3-d-printing-are-ushering-in-a-sustainable-era-of-distributed-capitalism/ [Accessed 1 September 2019].

RIFKIN, J. 2014. *The Zero Marginal Cost Society: The Internet of Things, the Collaborative Commons, and the Eclipse of Capitalism*, St. Martin's Press.

RIFKIN, J. 2016. The 2016 World Economic Forum Misfires With Its Fourth Industrial Revolution Theme. *Huffington Post* [Online]. Available: https://www.huffpost.com/entry/the-2016-world-economic-f_b_8975326 [Accessed 18 July 2022].

ROBERTS, J. 1999. Theory, Technology and Cultural Power an Interview with Manuel Castells. *Angelaki,* 4**,** 33-39.

ROONEY, K. 2019. Jack Dorsey's Planned Move to Africa Divides Square and Twitter Investors. *CNBC Markets* [Online]. Available: https://www.cnbc.com/2019/12/02/jack-dorseys-move-to-africa-raises-questions-for-investors.html [Accessed 16 December 2019].

ROSAMOND, B. 2016. Review of Inventing the Future: Postcapitalism and a World Without Work by Nick Srnicek and Alex Williams. *New Zealand Sociology,* 31**,** 134.

ROSEN, R. J. 2015. A Charming Parenthetical. *The Atlantic* [Online]. Available: https://www.theatlantic.com/business/archive/2015/09/karl-marx-technological-unemployment/626735/ [Accessed 27 July 2022].

ROSIC, A. 2016. What is Blockchain Technology? Available: https://blockgeeks.com/guides/what-is-blockchain-technology/ [Accessed 9 September 2019].

ROTH, C. & MULVANEY, E. 2020. Uber Uses Usual Stall Strategy as Court Rulings Don't Go Its Way. *Business Day* [Online]. Available: https://www.businesslive.co.za/bd/companies/telecoms-and-technology/2020-08-13-uber-uses-usual-stall-strategy-as-court-rulings-dont-go-its-way/.

RUFFOLO, J. 2019. *Technology Is Eating the World* [Online]. CBRE Forward. Available: https://cbreforward.com/technology-is-eating-the-world/ [Accessed 7 October 2019].

RUS, D. 2015. The Robots Are Coming. *Foreign Aff.,* 94**,** 2.

SAHAY, R., VON ALLMEN, U. E., LAHRECHE, A., KHERA, P., OGAWA, S., BAZARBASH, M. & BEATON, K. 2020. *The Promise of Fintech: Financial Inclusion in the Post COVID-19 Era*, International Monetary Fund.

SALISBURY, P. R. 2019. Ways of Being and Ways of Knowing: Heidegger's The Question Concerning Technology and Knowledge Organization. *NASKO,* 7**,** 7-15.

SALTER, L. 2016. Review of Inventing the Future: Postcapitalism and a World Without Work. *Counterfutures,* 2**,** 218-228.

SANDOVAL, M. 2020. Entrepreneurial Activism? Platform Cooperativism between Subversion and Co-Optation. *Critical Sociology,* 46**,** 801-817.

SAPIENZA, H. J. & DE CLERCQ, D. 2000. Venture Capitalist-Entrepreneur Relationships in Technology-based Ventures. *Enterprise and Innovation Management Studies,* 1**,** 57-71.

SAS. n.d. *Machine Learning: What It Is and Why It Matters* [Online]. SAS. Available: https://www.sas.com/en_za/insights/analytics/machine-learning.html [Accessed 15 September 2019 2019].

SAYERS, J. G. 2014. Book Review: Manuel Castells, Communication Power. *Work, Employment and Society,* 28**,** 142-144.

SCHARFF, R. C. & DUSEK, V. 2013. *Philosophy of Technology: The Technological Condition: An Anthology*, John Wiley & Sons.

SCHOLZ, T. 2014. Platform Cooperativism vs. the Sharing Economy. *Big Data & Civic Engagement,* 47.

SCHOR, J. 2020. *After the Gig: How the Sharing Economy Got Hijacked and How to Win It Back*, Univ of California Press.

SCHOR, J. B., ATTWOOD-CHARLES, W., CANSOY, M., LADEGAARD, I. & WENGRONOWITZ, R. 2020. Dependence and Precarity in the Platform Economy. *Theory and Society,* 49**,** 833-861.

SCHWAB, K. 2016a. *The Fourth Industrial Revolution*, Geneva, Switzerland, World Economic Forum.

SCHWAB, K. 2016b. The Fourth Industrial Revolution: What It Means, How to Respond. Available: https://www.weforum.org/agenda/2016/01/the-fourth-industrial-revolution-what-it-means-and-how-to-respond/ [Accessed 4 May 2022].

SCHWAB, K. 2017. *The Fourth Industrial Revolution*, New York, Crown Publishing.

SCOTT, R. 2018. Humanity is Dead, Long Live Humanity!: From Posthumanism to Postcapitalism via Hegel. *eSharp Journal,* July 2018**,** 78-87.

SEEDSTARS. n.d. *CommuScore* [Online]. online: Seedstars. Available: https://www.seedstarsworld.com/startup/42860/ [Accessed 3 July 2023].

SEGEV, L. n.d. What Every Tech Start-up Business Should Know with Vinny Lingham's Invaluable Advice. *The Techie Guy* [Online]. Available: https://thetechieguy.com/what-every-tech-start-up-businesses-should-know-with-vinny-lingham-invaluable-advice/ [Accessed 10 July 2023].

SELELO, M. E. & KHWELA, M. 2022. Analysis of the Business Inequalities Stimulated by the Fourth Industrial Revolution Between Corporates and Small and Micro Enterprises in South Africa. *Technium Soc. Sci. J.,* 29**,** 497.

SHAPIRO, S. P. 2005. Agency theory. *Annu. Rev. Sociol.,* 31**,** 263-284.

SHAPSHAK, T. 2019. South Africa Prepares For 4IR and "More Entrepreneurial" Govt. *Forbes Magazine* [Online]. Available: https://www.forbes.com/sites/tobyshapshak/2019/07/12/south-africa-prepares-for-4ir-and-more-entrepreneurial-govt/#35a9f6ee38cd [Accessed 13 October 2020].

SHAVIRO, S. 2015. *No Speed Limit: Three Essays on Accelerationism*, University of Minnesota Press.

SHEEHAN, K. B. 2001. E-mail Survey Response Rates: A Review. *Journal of Computer-Mediated Communication,* 6**,** JCMC621.

SIRMAKEZIS, S. 2017. The Paradigm of Digital Transformation in the Banking Sector. Available: https://www.youtube.com/watch?v=YLkVJe5mfT8 [Accessed 6 December 2019].

SITAS, A. 2008. Obituary: Andre Gorz (1923-2007). *Transformation: Critical Perspectives on Southern Africa,* 65**,** 1-3.

SMITH, M. R. & MARX, L. 1994. *Does Technology Drive History?: The Dilemma of Technological Determinism*, Mit Press.

SOCIETY FOR HUMAN RESOURCE MANAGMENT. n.d. Assistant Branch Manager. Available: https://www.shrm.org/resourcesandtools/tools-and-samples/job-descriptions/pages/assistant-branch-manager.aspx [Accessed 15 December 2023].

SOOBRAMONEY, M. 2023. Viva Sasbo, Viva! *SASBO News* [Online], 44. Available: https://sasbo.org.za/wp-content/uploads/2023/10/Sasbo_Sep_Oct.pdf [Accessed 20 December 2023].

SORTD. n.d. *Sortd* [Online]. Available: https://www.sortd.com [Accessed 6 July 2023].

SOUNDSREAL. n.d. *SoundsReal* [Online]. Available: https://soundsreal.co.za/2023/03/30/article/ [Accessed 6 July 2023].

SOUTH AFRICAN GOVERNMENT NEWS AGENCY. 2023. COVID-19 Social Grant Extended Until 2025. *South African Goernment News Agency* [Online]. Available: https://www.sanews.gov.za/south-africa/covid-19-social-grant-extended-until-2025 [Accessed 28 December 2023].

SPATIALEDGE. n.d. *Spatialedge* [Online]. Available: https://spatialedge.co.za [Accessed 6 July 2023].

SRNICEK, N. 2017. *Platform Capitalism*, John Wiley & Sons.

SRNICEK, N. & WILLIAMS, A. 2015. *Inventing the Future: Postcapitalism and a World without Work*, Verso Books.

STAHL, T. 2018. Georg [György] Lukács. *In:* ZALTA, E. N. (ed.) *The Stanford Encyclopedia of Philosophy (Spring 2018 Edition).*

STALDER, F. 2006. *Manuel Castells: The Theory of the Network Society*, Polity.

STALDER, F. 2023. Breakdown 2.0? Systemic Blockages in Late-Stage Statism and Late-Stage Liberal Capitalism. *American Behavioral Scientist,* 67**,** 872-884.

STANDING, G. 2016. Rentier Capitalism: Taskers in the Precariat. *Oxford University Digital Transformations of Work Conference.* Oxford: Green Templeton College.

STANDING, G. 2018. Taskers in the Precariat: Confronting an Emerging Dystopia. *In:* PAUS, E. (ed.) *Confronting Dystopia: The New Technological Revolution and the Future of Work.* Ithaca, NY, and London: ILR Press.

STARTUP GRIND 2019a. Fireside Chat with Janine Basel of Akro Capital. Startup Networking Event Hosted by Startup Grind in Cape Town on 7 August 2019. Cape Town.

STARTUP GRIND 2019b. Investor Readiness and Pitching Workshop with Sandras Phiri. Workshop 17, Cape Town: Startup Grind.

STATISTA. 2023. Number of Fintech Startups in South Africa as of 2021, by Sub-Sector. *Statista* [Online]. Available: https://www.statista.com/statistics/1324467/fintech-startups-in-south-africa-by-sub-sector/ [Accessed 25 July 2023].

STEDMAN, R. C., CONNELLY, N. A., HEBERLEIN, T. A., DECKER, D. J. & ALLRED, S. B. 2019. The End of the (Research) World as We Know It? Understanding and Coping

with Declining Response Rates to Mail Surveys. *Society & Natural Resources,* 32**,** 1139-1154.

STEVENSON, N. 2022. Herbert Marcusé as a Critical Intellectual: The New Left and Alternative Socialist Futures. *Rethinking Marxism,* 34**,** 81-98.

STEWART, A., YAWORSKY, K. & LAMONT, P. 2018. Demystifying Digital Lending. Accion.

STOCKSY. 2023. What is a Platform Cooperative? *Stocksy* [Online]. Available: https://support.stocksy.com/hc/en-us/articles/201824023-What-is-a-platform-cooperative- [Accessed 19 December 2023].

STOKES, D. E. 2011. *Pasteur's Quadrant: Basic Science and Technological Innovation*, Brookings Institution Press.

STORER, A. 2011. France's 35 Hour Work Week and the Political Economy of Andre Gorz. *Berkeley Undergraduate Journal,* 24.

STREECK, W. 2016. The Post-Capitalist Interregnum: The Old System is Dying, but a New Social Order Cannot Yet Be Born. *Juncture,* 23**,** 68-77.

STUART, T. E. & SORENSON, O. 2007. Strategic Networks and Entrepreneurial Ventures. *Strategic Entrepreneurship Journal,* 1**,** 211-227.

SUDONUM. n.d. *Sudonum* [Online]. Available: https://www.sudonum.com [Accessed 7 July 2023].

SUTHERLAND, E. 2020. The Fourth Industrial Revolution–The Case of South Africa. *Politikon,* 47**,** 233-252.

SWEEPSOUTH. 2020. Pay and Working Conditions for Domestic Workers in South Africa. Available: https://blogdotsweepsouthdotcom.files.wordpress.com/2020/09/report-on-pay-working-conditions-for-domestic-work-in-sa-covid-19-edition-2020.pdf [Accessed 22 December 2020].

SWEEPSOUTH. n.d. *SweepSouth* [Online]. Available: https://sweepsouth.com [Accessed 6 July 2017].

TERREBLANCHE, S. 2018. A Wealth Tax for South Africa. SCIS Working Paper No 1.

THE STUDENT HUB. n.d. *The Student Hub* [Online]. Available: https://www.thestudenthub.co.za [Accessed 9 July 2023].

THIEL, P. 2014. Competition Is for Losers. *Wall Street Journal* [Online]. Available: https://www.wsj.com/articles/peter-thiel-competition-is-for-losers-1410535536 [Accessed 11 August 2020].

THISISME. n.d. *ThisIsMe* [Online]. Available: https://www.thisisme.com/#Homepage [Accessed 9 July 2023].

THOMAS, S. 2016. M4JAM's Mystery Buyer Goes Public. Available: https://ventureburn.com/2016/06/m4jams-mystery-buyer-goes-public/ [Accessed 20 October 2019].

THOMPSON, P. 2013. The Frankfurt school, Part 4: Herbert Marcusé. *The Guradian* [Online]. Available: https://www.theguardian.com/commentisfree/2013/apr/15/frankfurt-school-herbert-marcuse [Accessed 16 September 2021].

THOMSON, I. 2000. From the Question Concerning Technology to the Quest for a Democratic Technology: Heidegger, Marcusé, Feenberg. *Inquiry,* 43**,** 203-215.

TIMM, S. 2019a. Fintech Accounts for Over a Third of SA Tech Startup Investments in 2019 So Far. *Venture Burn* [Online]. Available: https://ventureburn.com/2019/07/fintech-over-a-third-of-sa-startup-investments-2019-so-far/ [Accessed 25 July 2019].

TIMM, S. 2019b. Will These Startups Still Have an Uncle, Parent in Ramaphosa's Cabinet? *Venture Burn* [Online]. Available: https://ventureburn.com/2019/05/sa-startups-with-uncle-parent-in-ramaphosas-cabinet/ [Accessed 28 June 2019].

TRAINER, D. 2022. Uber: Falling Knife You Don't Want To Catch. *Forbes* [Online]. Available: https://www.forbes.com/sites/greatspeculations/2022/02/14/uber-falling-knife-you-dont-want-to-catch/?sh=7dd738ca145e [Accessed 25 July 2023].

TURBAN, E., OUTLAND, J., KING, D., LEE, J. K., LIANG, T.-P. & TURBAN, D. C. 2017. *Electronic Commerce 2018: A Managerial and Social Networks Perspective*, Springer.

TURGEMAN, A. 2018. Demystifying Digital Identity: What It Is, What It Isn't And What It Can Be. *Forbers Magazine* [Online]. Available: https://www.forbes.com/sites/forbestechcouncil/2018/11/15/demystifying-digital-identity-what-it-is-what-it-isnt-and-what-it-can-be/#3e1960e92af1 [Accessed 17 February 2020].

TURK, V. 2017. Tim O'Reilly Says the Economy Is Running on the Wrong Algorithm. *Wired Magazine* [Online]. Available: https://www.wired.co.uk/article/tim-oreilly-wtf-whats-the-future-economy-wrong-algorithm [Accessed 13 August 2021].

TURNER, C. 2007. André Gorz: French Philosopher Who Pioneered Ideas of Political Ecology. *The Guradian* [Online]. Available: https://www.theguardian.com/news/2007/nov/07/guardianobituaries.obituaries.

UNGER, R. M. 2009. *The Left Alternative*, Verso.

UTHINI. n.d. *Uthini* [Online]. Available: https://uthini.tech [Accessed 9 July 2023].

VALLAS, S. P. Platform Capitalism: What's at Stake for Workers? New Labor Forum, 2019. SAGE Publications Sage CA: Los Angeles, CA, 48-59.

VAN AUDENHOVE, L. 2007. Expert Interviews and Interview Techniques for Policy Analysis. *Vrije University, Brussel Retrieved May,* 5**,** 2009.

VAN DER MADE, G. 2016. From Banks to Microlenders, Fincheck Wants to Help You Find the Best Loans. *Venture Burn* [Online]. Available: https://ventureburn.com/2016/01/from-banks-to-microlenders-fincheck-wants-to-help-you-find-the-best-loans/ [Accessed 4 July 2023].

VAN DOORN, N., FERRARI, F. & GRAHAM, M. 2020. Migration and Migrant Labour in the Gig Economy: An Intervention. *Work, Employment and Society,* 37.

VAN KRIEKEN, R. 2016. Castells and the Network Society. *University of Sydney YouTube Channel* [Online]. Available: https://youtu.be/tLF5J8Y5zyg [Accessed 22 September 2021].

VAN PARIJS, P. 2010. Political Ecology: From Autonomous Sphere to Basic Income. *Basic Income Studies,* 4.

VAN TOL, A. 2017. Why Stocksy United's CEO is a Rebel With a Cause. *Douglas Magazine* [Online]. Available: https://www.douglasmagazine.com/stocksy-uniteds-ceo-rebel-cause/ [Accessed 19 Decmber 2019].

VAN TRIER, W. 2021. From ‘Second Cheque Strategy’ to ‘Basic Income’: Why Did André Gorz Change His Mind? *In:* SLOMAN, P., ZAMORA VARGAS, D. & RAMOS PINTO, P. (eds.) *Universal Basic Income in Historical Perspective.* Cham: Springer International Publishing.

VANCOUVER INSTITUTE OF SOCIAL RESEARCH. 2014. Lukács’s Theory of Reification and Contemporary Social Movements: Andrew Feenberg at VISR. Available: https://youtu.be/DlIe5CHdeEo [Accessed 12 September 2022].

VARMA, A. 2018. The Relationship between IoT, Big Data, and Cloud Computing. Available: https://www.whizlabs.com/blog/relationship-between-iot-big-data-cloud-computing/ [Accessed 1 September 2019].

VAROUFAKIS, Y. 2021. *Another Now: Dispatches from an Alternative Present,* Brooklyn, NY, Melville House Publishing.

VAULT. n.d. Select the Vault Investor Modules Best Suited to Your Requirements. *VAULT* [Online]. Available: https://thevault.exchange/about-us/the-modules/ [Accessed 27 August 2023].

VENTER, B. 2019. Sasbo Had a Busy Year. *SASBO News* [Online], 41. Available: https://www.sasbo.org.za/wp-content/uploads/2020/04/SASBO-News-v41n4-Proof-27-Nov.pdf [Accessed 20 June 2020].

VENTURE BURN. 2018. SA Startup Wala Wins $100k Zambezi Prize for Innovation in Financial Inclusion. Available: https://ventureburn.com/2018/09/wala-zambezi-prize/ [Accessed 16 July 2023].

VENTUREBURN. 2019. Why I Closed Down Blockchain Startup – Wala Founder. *Venture Burn* [Online]. Available: https://ventureburn.com/2019/07/why-i-closed-down-blockchain-startup-wala-founder/ [Accessed 19 August 2019].

VERDEGEM, P. 2022. Dismantling AI Capitalism: The Commons as an Alternative to the Power Concentration of Big Tech. *AI & society***,** 1-11.

VERVER, M. & KONING, J. 2018. Toward a Kinship Perspective on Entrepreneurship. *Entrepreneurship Theory and Practice,* 42**,** 631-666.

VILLARONGA, E. F., KIESEBERG, P. & LI, T. 2018. Humans Forget, Machines Remember: Artificial Intelligence and the Right to be Forgotten. *Computer Law & Security Review,* 34**,** 304-313.

VISHWANATH, K. 2020. How Uber and Airbnb Created a Parasite Economy. *Medium* [Online]. Available: https://marker.medium.com/uber-and-airbnb-are-parasites-but-they-dont-have-to-be-36909355ac3b [Accessed 6 October 2020].

VIŠIĆ, M. 2019. Renaissance of Herbert Marcusé : A Study on Present Interest in Marcusé’s Interdisciplinary Critical Theory. *Interdisciplinary Description of Complex Systems: INDECS,* 17**,** 659-683.

VPRO DOCUMENTARY. 2020. Anand Giridharadas on 'Winners Take All' and the Charade of Elite Philanthropy *YouTube* [Online]. Available: https://youtu.be/qcHlNKLQBIM [Accessed 3 July 2023].

VRASTI, W. 2017. 6 Things André Gorz Can Teach Us About Building a Post-Work Society. Available: https://novaramedia.com/2017/08/08/6-things-andre-gorz-can-teach-us-about-building-a-post-work-society/ [Accessed 22 November 2021].

VRASTI, W. 2021. Struggling with Precarity: From 'More Jobs' to Post-work Politics. *In:* VIJ, R., KAZI, T. & WYNNE-HUGHES, E. (eds.) *Precarity and International Relations.* Cham: Springer International Publishing.

WALL STREET JOURNAL. 2020. Why BigTech is Getting into Finance. Available: https://on.wsj.com/2R4LVlr [Accessed 30 January 2020].

WALLERSTEIN, I. 1974. The Rise and Future Demise of the World Capitalist System: Concepts for Comparative Analysis. *Comparative Studies in Society and History,* 16**,** 387-415.

WALSH, M. 2008. Key Thinkers from Critical Theory to Post-Marxism. *Contemporary Political Theory,* 7**,** 349-351.

WANG, J. 2018. Innovation and government intervention: A comparison of Singapore and Hong Kong. *Research Policy,* 47**,** 399-412.

WANG, J. X. 2016. AI in a Post-Capitalist World. *Thinking about Thinking* [Online]. Available from: http://www.janexwang.com/blog/2016/1/10/ai-in-the-postcapitalistic-world [Accessed 15 December 2022].

WEBSTER, E. 2020. The Uberisation of Work: The Challenge of Regulating Platform Capitalism. A Commentary. *International Review of Applied Economics***,** 1-10.

WEBSTER, E. & MASIKANE, F. 2021. I Just Want to Survive: A Comparative Study of Food Courier Riders in Three African Cities. *Southern Centre for Inequality Studies, Univerity of the Witwatersrand* [Online]. Available: https://www.wits.ac.za/media/wits-university/faculties-and-schools/commerce-law-and-management/research-entities/scis/documents/I_just_want_to_survive.pdf [Accessed 28 Decmber 2022].

WEBSTER, F. 2006. *Theories of the Information Society,* London and New York, Routledge.

WEF. n.d. *Fourth Industrial Revolution* [Online]. World Economic Forum. Available: https://www.weforum.org/focus/fourth-industrial-revolution [Accessed 14 April 2022].

WESSELS, V. & HENDERSON, R. 2019. Standard Bank Gets More Bang for Buck From Staff After Jobs Cuts. *Fin24* [Online]. Available: https://www.fin24.com/Companies/standard-bank-gets-more-bang-for-buck-from-staff-after-jobs-cuts-20190810 [Accessed 13 May 2020].

WHEREISMYTRANSPORT. n.d. *WhereIsMyTransport* [Online]. Available: https://www.whereismytransport.com [Accessed 6 July 2023].

WHITFIELD, B. 2019. Standard Bank's Branch Closures: The Most Radical Single Action by a SA Bank in Decades. Available: https://www.businessinsider.co.za/bruce-whitfield-on-standard-bank-2019-3 [Accessed 5 December 2019].

WHITFIELD, S. 2014. Refusing Marcusé: 50 Years After One-Dimensional Man. Available: https://www.dissentmagazine.org/article/refusing-marcuse-fifty-years-after-one-dimensional-man [Accessed 21 September 2022].

WILLIAMS, A. & SRNICEK, N. 2014. # ACCELERATE MANIFESTO for an Accelerationist Politics. *Rhuthmos*.

WILSON, A. 2019. Ties and Trainers: Banking on Fintech Collaboration and Partnership. Available: https://www.pwc.co.za/en/publications/ties-and-trainers.html [Accessed 15 December 2019].

WINTER, R. 2017. Resistance as a Way out of One-Dimensionality. The Contribution of Herbert Marcuse to a Critical Analysis of the Present. *In:* BUTLER, M., MECHERIL, P. &

BRENNINGMEYER, L. (eds.) *Resistance: Subjects, Representations, Contexts.* transcript-Verlag Bielefeld.

WOOD, A. J. 2020. *Despotism on Demand: How Power Operates in the Flexible Workplace*, Cornell University Press.

WORLD BANK 2019. World Development Report 2019: The Changing Nature of Work. World Bank.

WORLD BANK GROUP 2016. *World Development Report 2016: Digital Dividends*, World Bank Publications.

WORLD POPULATION REVIEW. 2023. *Cape Town Population 2023* [Online]. Available: https://worldpopulationreview.com/world-cities/cape-town-population# [Accessed 13 July 2023].

WUMDROP. n.d. *Wumdrop* [Online]. Available: https://za.wumdrop.com [Accessed 6 July 2019].

WYATT, S. 2008. Technological Determinism is Dead; Long Live Technological Determinism. *The Handbook of Science and Technology Studies,* 3**,** 165-180.

YATES, M. & HASMATH, R. 2017. When a Joke is More than a Joke: Humor as a Form of Networked Practice in the Chinese Cyber Public Sphere. *The Journal of Chinese Sociology,* 4**,** 1-14.

YELLOWSA. n.d. *African Coin Exchange* [Online]. Available: https://www.yellosa.co.za/company/969367/african-coin-exchange [Accessed 4 July 2023].

YUEDILIGENCE. n.d. *Yuediligence* [Online]. Available: https://yuediligence.com [Accessed 9 July 2023].

ZIADY, H. 2019. Technology Firms Have Financial Services Sector in Sights. *Business Day*, 28 October 2019, p.7.

ZLTO. n.d. *Zlto* [Online]. Available: https://www.zlto.co [Accessed 4 July 2023].

ZUCKERMAN, N. 2015. Heidegger and the Essence of Dasein. *The Southern Journal of Philosophy,* 53**,** 493-516.

Appendix A: 120 Tech Start-ups Launched in CT and JHB between 2013-2018

Name	Sector
1. Kaching Parking	Fintech Payment
2. Wax'd	Fintech Payment
3. FiX	Fintech Payment
4. Allxs Media	Fintech Payment
5. PlaidPlay	Fintech Payment
6. Walletdoc	Fintech Payment
7. Flickpay	Fintech Payment
8. Ikhokha	Fintech Payment
9. Karri	Fintech Payment
10. Payment24	Fintech Payment
11. I-Pay, rebranded to Ozow	Fintech Payment
12. FundingHub	Fintech Credit and Loan
13. FinCheck	Fintech Credit and Loan
14. AirAdvance	Fintech Credit and Loan
15. EduFunder	Fintech Credit and Loan
16. Commuscore	Fintech Credit and Loan
17. Lulalend	Fintech Credit and Loans
18. Sasa Finance	Fintech Credit and Loan

19. Jumo World	Fintech Credit and Loan
20. Granadilla	Insurtech
21. Jasure	Insurtech
22. FO-SHO	Insurtech
23. Nobuntu	Insurtech
24. Riovic	Insurtech
25. Cybertar	Insurtech
26. Click2sure	Insurtech
27. Hepstar	Insurtech
28. Wala	Fintech Blockchain
29. zlto	Fintech Blockchain
30. African Coin Exchange	Fintech Blockchain
31. Centbee	Fintech Blockchain
32. Caesium Capital	Fintech Blockchain
33. ProsperiProp	Fintech Investments
34. VAULT	Fintech Investments
35. Bsavi	Fintech FinMan
36. Yethu	Fintech FinMan
37. Zar X	Fintech Trading
38. Algo Trading	Fintech Trading
39. Bettr Finance	Fintech Mobile Banking

40. Sikhona Foreign Exchange	Fintech Remittances
41. Envisionit E-Escrow	Fintech Escrow
42. Printulu	E-Commerce
43. Diga Digital Intelligence	E-Commerce
44. You Realty	E-Commerce
45. E butler	E-Commerce
46. Picadoo	E-Commerce
47. Tapsnapp	E-Commerce
48. Kandua	E-Commerce
49. Task Market	E-Commerce
50. Carzar	E-Commerce
51. Bloomable	E-Commerce
52. Nichestreem	E-Commerce
53. SongRoller	E-Commerce
54. M4Jam	E-Commerce
55. Tuyu	E-Commerce
56. Shopping Feeder	E-Commerce
57. WAHI	E-Commerce
58. Ekhaya	E-Commerce
59. AppyEverAfter	E-Commerce
60. The Happiness Network	E-Commerce

61. SnapnSave	E-Commerce
62. Jumpin Rides	E-Commerce
63. Zapacab	E-Commerce
64. Picup	E-Commerce
65. Eventerprise	E-Commerce
66. Wumdrop	E-Commerce
67. Domestly	E-Commerce
68. SweepSouth	E-Commerce
69. Washr	E-Commerce
70. Ikasi Property Group	E-Commerce
71. Recast.fm	E-Commerce/Data Science
72. Banky Moon	Software Development
73. SortD	Software Development
74. Deja vu Blue	Software Development
75. Empire State Software Development	Software Development
76. Fluss	Software Development
77. Ikwook	Software Development
78. Prolific Idea	Software Development
79. BuiSoft	Software Development
80. Sponty	Software Development/Data
81. Spatial Edge	Software Development/Data

82. Numberboost	Software Development/Data
83. Data prophet	Software Development/Data
84. Whereismtransport	Software Development
85. Linum Labs	Software Development
86. Sudonum	Software Development
87. Expression Source	Software Development
88. SoundsReal	Software Development
89. Cloud One/Pageman	Software Development
90. Notafy	Communication
91. You, Baby and I	Communication
92. Microtising	Communication
93. Ace Notes	Communications
94. Ispani	Communications
95. DoxTeam	Communications
96. Frontcrew	Communications
97. Conversio	Communications
98. 8bit	Communications
99. juggl	Communications
100. The Digital Academy	Edtech
101. Clock Education	Edtech
102. Britecap	Edtech

103.	Uthini	Edtech
104.	Skillup Tutors	Edtech
105.	The Student Hub	Edtech
106.	Rekindle Learning	Edtech
107.	Hubble Studios	Edtech
108.	ZA Freelancer	Recruitment
109.	Giraffe	Recruitment
110.	Uprise	Recruitment
111.	Bozza	Recruitment
112.	Springleap	Recruitment
113.	Leaply	Recruitment
114.	Offferzen	Recruitment
115.	Thisisme	Legal Tech
116.	Yuedilgence	Legal Tech
117.	Libryo	Legal Tech
118.	LifeQ	Health Tech
119.	signapps	Health Tech
120.	Fitkey	Fittech

Appendix B: Interview Respondents

Start-Up Sector

1. Prof. Tshilidzi Marwala, Deputy Chair of The Presidential Commission on the Fourth Industrial Revolution in South Africa. Telephonic interview on 3 February 2020.
2. Prof. Mthunzi Mdwaba, Vice Chair of the International Labour Organisation (ILO)/Ex-Officio Member of Global Future of Work Commission at the ILO/Chair of the Productivity Board of South Africa. Interviewed on 23 January 2020 in Cape Town.
3. Dr. Michael Gastrow, Commissioner on The Presidential Commission on the Fourth Industrial Revolution in South Africa. Interviewed on 20 March 2020 via Skype.
4. Dr. Nicolas Friederici, Humboldt Institute for Internet & Society. Interviewed on 22 October 2020 via Skype.

Banking Sector

5. Paul O'Flaherty, Chief Executive of Engineering Services at ABSA Bank Head Office. Telephonic interview on 13 December 2019.
6. Gwenaël Trotel, Head of Payments, Digitisation and Open Banking at Standard Bank Head Office. Telephonic interview on 23 July 2020.
7. Dr. Abba Omar, Head of Strategy and Communications at the Banking Association of South Africa (BASA). Telephonic interview on 22 July 2020.
8. Kumaran Selvarajalu, Business Development Manager, Banking Association of South Africa (BASA). Telephonic interview on 2 July 2019.
9. Anonymous Male Manager in Technology Division of a Big Four Bank in South Africa (Respondent A). Telephonic interview on 1 July 2019.
10. Anonymous Female Manager in Technology Division of a Big Four Bank in South Africa (Respondent B). Telephonic interview on 29 October 2019.
11. Martin Jansen, Executive Director, Workers' World Media Productions. Interviewed on 7 July 2022 via Zoom.

Platform Economy

12. Dr. Rüdiger Helm, Lawyer and research affiliate of the Southern Africa Labour and Development Research Unit (SADLRU) at the University of Cape Town. Interviewed on 24 August 2020 via Zoom.
13. Prof. Darcy du Toit, Emeritus Professor and Former Dean of Law at the University of the Western Cape University. Telephonic interview on 20 July 2020.
14. Fairuz Mullagee, Co-ordinator of Social Law Project and Co-Founder of Domestic Workers' Platform Co-operative at the University of the Western Cape. Interviewed on 26 July 2019 in Cape Town.
15. Faiza Haupt, Founding Member of the Platform Co-operative, Trip Rider SA. Interviewed on 7 September 2022 in Cape Town.

Appendix C: Checklist of Questions

Start-up Sector

Systematic data gathering on the tech start-up sector was guided by the following questions:

- What kind of business activity is this tech start-up involved in?
- What economic sector is this start-up working in?
- Who is/are the founder/s of the start-up?
- What is the South African racial classification of the founder/s?
- What is the gender of the founder/s?
- What is the country of origin of the founder/s?
- Is the start-up supported by venture capital funds or angel investors?
- What is the gender and racial profile of investors?

Banking Sector

Semi-structured interviews with representatives from the banking industry were guided by the following questions:

- What new technologies have been introduced to the banks?
- When were these technologies introduced?
- Do fintechs represent an existential threat to banks?
- How many jobs were lost during peak digitalisation in the banking industry?
- What is the demographic profile of the people that have lost their jobs?
- What future employment prospects exist for those in the banking sector that have lost their jobs to automation?

Platform Economy

Interviews with respondents in the platform economy study were unstructured.