AN ENTERPRISE SUSTAINABILITY FRAMEWORK FOR HARNESSING SUSTAINABLE ENTREPRENEURSHIP IN THE 4TH INDUSTRIAL REVOLUTION.

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ABSTRACT

This study explores the confluence between the Fourth Industrial Revolution (4IR) and Sustainable Entrepreneurship, with a geographical emphasis on the eThekwini region of KwaZulu-Natal, South Africa. The 4IR, typified by the swift evolution of digital technology, artificial intelligence, big data, and automation, ushers in noteworthy opportunities and substantial challenges for Small, Medium, and Micro Enterprises (SMMEs) aiming for sustainability.

Positioning this study within an interpretive research paradigm and adopting a phenomenological research approach has facilitated a deep-seated understanding of the lived experiences of SMMEs amid the 4IR. This methodology was vital as the transformational influence of the 4IR requires a holistic understanding that captures the subjective experiences and perceptions of those most directly involved.

The choice of the target population, specifically owners and managers of SMMEs, was driven by the understanding that these individuals are the key decision-makers, directly shaping the strategic direction and responses to the challenges and opportunities presented by the 4IR. Their insights, borne out of their lived experiences, bring authenticity and depth to the research.

The research involved semi-structured interviews with twelve individuals, yielding rich qualitative data. Number twelve reached theoretical saturation, where no new themes or insights emerged from the data. This aligns with the qualitative research paradigm, which values depth and detail over breadth and quantity.

The data was meticulously analysed using NVivo software, recognised for its ability to manage, sort, and classify voluminous qualitative data. Following this, a robust thematic analysis was performed, which facilitated the identification, research, and interpretation of key themes within the data.

The findings of this study present a complex picture. While the 4IR offers considerable opportunities for sustainable entrepreneurship, such as improved efficiency, innovation potential, and expanded market access, it also presents daunting

challenges. These include the complexity of advanced technologies, the financial burden of technology adoption, and risks related to cybersecurity. The research also highlights a range of influential factors affecting the sustainability of SMMEs in the 4IR era, including technological literacy, accessibility to financial resources, the regulatory landscape, and the availability of institutional support.

This research significantly contributes to the academic field by bridging the discourse of 4IR and sustainable entrepreneurship. It further enriches practical knowledge by proposing an innovative enterprise sustainability framework for SMMEs. This framework, grounded in theoretical and empirical insights, offers a comprehensive roadmap for SMMEs to harness sustainable entrepreneurship in the context of the 4IR. It emphasises technological integration, strategic sustainability practices, a supportive policy environment, and continual learning and adaptation.

Beyond its academic contributions, the research offers valuable insights for stakeholders, including policymakers, business support institutions, and SMMEs. These insights can guide the formulation and implementation of strategies and policies that promote sustainable entrepreneurship in the era of the 4IR. While the study focuses on the eThekwini region, its findings and the proposed framework have broader implications, resonating with other areas and countries grappling with the complex dynamics of 4IR and sustainable entrepreneurship.

DECLARATION

I, Ismail Sheik, declare that this thesis is the result of my investigation and research and that this has not been submitted in part or whole for any degree or any other degree to any other university.

	1 May 2024
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I. Sheik	Date

DEDICATION

With sincere admiration and love, I dedicate this to my late grandparents, who left an everlasting legacy that has shaped my life and aspirations.

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First and foremost, I express my deepest gratitude to the Almighty for gracing me with the grit and tenacity to bring this thesis to fruition.

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LIST OF ACRONYMS

4IR	Fourth Industrial Revolution
AI	Artificial intelligence
AM	Additive Manufacturing
AR	Augmented Reality
CBDR	Common but differentiated responsibilities
CSR	Corporate social responsibility
ESG	Ecological, social, and governance
GDPR	General Data Protection Regulation
GPAI	Global Partnership on Artificial Intelligence
GRI	Global Reporting Initiative
IO	Industrial organisation
IoT	Internet of Things
IPR	Intellectual property rights
ML	Machine Learning
NGOs	Non-governmental organisations
NSBC	National Small Business Chamber
PPPS	Public-private partnerships
SAGIC	South African Green Industries Council
SANSE	South African Network for Sustainable Entrepreneurship
SDGs	Sustainable Development Goals
SMEs	Small and medium-sized enterprises
SMMEs	Small and medium-sized enterprises
SRI	Socially responsible investment
TBL	Triple bottom line
TIA	Technology Innovation Agency
VR	Virtual Reality
WEF	World Economic Forum

CHAPTER ONE

INTRODUCTION

1.1 INTRODUCTION

The Fourth Industrial Revolution has emerged as a transformative force, characterised by the rapid convergence of various digital, physical, and biological technologies, resulting in significant changes to economies and societies worldwide (Schwab, 2016). While the 4IR presents new opportunities for businesses and communities, it also poses numerous challenges, particularly for small and medium-sized enterprises that form the backbone of most economies (OECD, 2019).

Sustainable entrepreneurship has gained attention as a means to address environmental, social, and economic challenges in the context of the 4IR. Sustainable entrepreneurship refers to identifying, evaluating, and exploiting opportunities that contribute to sustainable development, combining the principles of entrepreneurship, social responsibility, and environmental stewardship (Cohen & Winn, 2007; Schaltegger & Wagner, 2011). SMMEs, in particular, can play a crucial role in promoting sustainable development through innovative business models and practices that align with the 4IR (Acs et al., 2018).

This study explores the factors that lead to entrepreneurs' successful identification and utilisation of local resources, ideas, and skills to stimulate enterprise sustainability in the context of the 4IR. The research focuses on SMMEs in the eThekwini area of KwaZulu-Natal, South Africa. It seeks to examine the challenges entrepreneurs face and the impact of governmental support on their survival. By developing an enterprise sustainability framework for SMMEs, this study enhances their development and performance growth in a turbulent digital environment.

1.2 BACKGROUND OF THE STUDY

1.2.1 The Fourth Industrial Revolution: Evolution and Impact

The 4IR is a term coined by Klaus Schwab, founder and executive chairman of the World Economic Forum (WEF), to describe the ongoing global transformation driven

by the convergence of digital, biological, and physical technologies (Schwab, 2016). This phenomenon is reshaping industries, economies, and societies at an unprecedented pace and scale, bringing about new opportunities and challenges for sustainable entrepreneurship and SMMEs.

1.2.1.1 Digital Transformation

The 4IR is characterised by the rapid advancement and adoption of digital technologies, such as artificial intelligence (AI), the Internet of Things (IoT), robotics, and big data analytics (Bughin et al., 2017). These technologies transform businesses' operations, communicate, and deliver customer value, increasing efficiency, flexibility, and customisation (Brynjolfsson & McAfee, 2014). As a result, digital transformation has become a crucial aspect of sustainable entrepreneurship, with SMMEs needing to adapt their business models and strategies to remain competitive in the digital age (Nambisan, 2017).

1.2.1.2 Global Economic Shifts

The 4IR is also driving significant shifts in the global economic landscape, with emerging markets increasingly participating in producing and consuming innovative products and services (Baldwin, 2016), which has led to the rise of new economic powerhouses, such as China and India, and the reshaping of global value chains, with implications for SMMEs and sustainable entrepreneurship (Banga & Willem te Velde, 2018). For instance, SMMEs in developing countries now face opportunities and challenges in accessing global markets, acquiring advanced technologies, and integrating into global innovation networks (Kummitha, 2019).

1.2.2 Sustainable Entrepreneurship: A Holistic Approach

Sustainable entrepreneurship is a multidimensional concept that integrates economic, social, and environmental considerations into the entrepreneurial process (Cohen & Winn, 2007). It seeks to create long-term value for multiple stakeholders by addressing societal needs and challenges through innovative and responsible business practices (Schaltegger & Wagner, 2011). As the 4IR unfolds, sustainable entrepreneurship has gained increasing importance as a means of

harnessing the potential of technological innovations for inclusive and sustainable development (George et al., 2016).

1.2.2.1 Social, Economic, and Environmental Sustainability

In the context of the 4IR, sustainable entrepreneurship involves pursuing social, economic, and environmental sustainability objectives. Social sustainability focuses on promoting equitable access to opportunities, resources, and benefits and fostering social cohesion and inclusion (Bocken et al., 2014). Economic sustainability entails the generation of wealth, employment, and income, as well as efficiently allocating and using resources to ensure long-term competitiveness and viability (Parrish, 2010).

Environmental sustainability emphasises the conservation of natural resources, the reduction of ecological footprints, and the mitigation of climate change and other environmental impacts (Stubbs & Cocklin, 2008). Sustainable entrepreneurs in the 4IR must balance these three dimensions in their business models and strategies to create shared value and contribute to the United Nations Sustainable Development Goals (SDGs) (Santos et al., 2015).

1.2.2.2 Drivers and Barriers

Drivers and barriers influence the development and success of sustainable entrepreneurship in the context of the 4IR. Understanding these factors is essential for SMMEs to navigate the opportunities and challenges presented by the 4IR effectively.

1.2.2.2.1 Drivers

Several vital drivers promote sustainable entrepreneurship in the 4IR:

a) Technological advancements: The rapid development of digital technologies, such as AI, IoT, and big data analytics, provides opportunities for sustainable entrepreneurs to create innovative products and services, improve operational efficiency, and reduce environmental impact (Nidumolu et al., 2009).

b) Market demand: Increasing awareness of social and environmental issues, combined with changing consumer preferences, is driving demand for sustainable products and services (Lubin & Esty, 2010). This trend creates opportunities for sustainable entrepreneurs to differentiate themselves in the market and capture value from responsible consumption (Schaltegger et al., 2016).
c) Regulatory frameworks: Governments worldwide implement policies and regulations that encourage or require sustainable practices, such as carbon pricing, renewable energy targets, and circular economy initiatives (York et al., 2010). This regulatory environment can stimulate sustainable entrepreneurship by creating market opportunities and levelling the playing field for responsible businesses (Wagner & Lutz, 2018).
d) Access to finance: The growing interest in impact investing and sustainable finance has increased the availability of capital for sustainable entrepreneurs (Brest & Born, 2013). This financial support can help SMMEs overcome the initial barriers to entry and scale their sustainable business models (Mazzucato & Semieniuk, 2018).

1.2.2.2.2 Barriers

Despite these drivers, several barriers can hinder the development and success of sustainable entrepreneurship in the 4IR:

a) Resource constraints: SMMEs often face limited financial, human, and technological resources, constraining their ability to invest in sustainable technologies and practices (Acs et al., 2013). This challenge exacerbates the capital-intensive nature of some 4IR technologies and the need for specialised skills to utilise them (Soto-Acosta et al., 2017) effectively.
b) Market barriers: Sustainable entrepreneurs may face difficulties in accessing markets, building customer trust, and competing with established players that have greater brand recognition and economies of scale (Dean & McMullen, 2007). Additionally, the absence of clear standards and certifications for

sustainable products and services can create confusion and uncertainty for businesses and consumers (Parguel et al., 2011).

c) Regulatory barriers: In some cases, existing regulations and policies can act as barriers to sustainable entrepreneurship, either by favouring incumbents or by not providing sufficient incentives for the adoption of sustainable practices (Kivimaa & Kern, 2016) which can limit the potential of sustainable entrepreneurs to scale their impact and contribute to the SDGs (Loorbach et al., 2017).
d) Cultural and mindset barriers: Finally, cultural norms and entrenched attitudes can hinder sustainable entrepreneurship, as they may not prioritise or value sustainability objectives (Spence et al., 2011), which can result in a lack of support from stakeholders, such as employees, suppliers, and investors, and limit the potential of sustainable entrepreneurs to drive transformative change (Wüstenhagen & Menichetti, 2012).

By understanding and addressing these drivers and barriers, sustainable entrepreneurs and SMMEs can better navigate the challenges and opportunities of the Fourth Industrial Revolution requires a holistic approach that integrates social, economic, and environmental sustainability into business models and strategies and the development of innovative solutions that leverage the potential of digital technologies.

1.2.3 Strategies for Sustainable Entrepreneurship in the 4IR

To thrive in the context of the Fourth Industrial Revolution, sustainable entrepreneurs and SMMEs must adopt strategies that enable them to seize opportunities and overcome barriers. Some of these strategies include:

1.2.3.1 Embracing Digital Technologies

Sustainable entrepreneurs should actively explore digital technologies to enhance their operations, products, and services, including investing in AI, IoT, and big data analytics to improve efficiency, reduce environmental impact, and create innovative solutions that address societal needs (Bocken et al., 2019). Additionally, sustainable

entrepreneurs should consider partnering with technology providers, participating in innovation networks, or joining accelerator programmes to access cutting-edge technologies and knowledge (Nambisan et al., 2019).

1.2.3.2 Developing Sustainable Business Models

Sustainable entrepreneurs must design business models that integrate social, economic, and environmental objectives, creating shared value for multiple stakeholders (Boons & Lüdeke-Freund, 2013) to involve identifying innovative revenue streams, partnerships, and value propositions that address societal needs and challenges while ensuring long-term competitiveness and viability (Schaltegger et al., 2016). Sustainable business models include circular economy approaches, product-as-a-service models, and social enterprises that combine commercial activities with social impact (Bocken et al., 2014).

1.2.3.3 Building a Sustainable Supply Chain

Sustainable entrepreneurs should create transparent and responsible supply chains that minimise negative social and environmental impacts (Seuring & Müller, 2008), including working closely with suppliers to ensure fair labour practices, responsible sourcing of materials, and environmentally friendly production processes (Pagell & Wu, 2009). By implementing sustainable procurement practices and collaborating with suppliers, sustainable entrepreneurs can improve their brand reputation, reduce risks, and drive innovation (Foerstl et al., 2015).

1.2.3.4 Fostering a Culture of Sustainability

Promoting a culture of sustainability within the organisation is crucial for sustainable entrepreneurship in the 4IR (Bansal, 2003) by integrating sustainability principles into the company's mission, values, and decision-making processes and encouraging employee engagement and participation in sustainability initiatives (Mirvis et al., 2010). By fostering a culture of sustainability, sustainable entrepreneurs can improve employee motivation and retention, enhance stakeholder relationships, and drive continuous improvement in sustainability performance (Dumitru et al., 2015).

1.2.3.5 Engaging with Stakeholders

Successful sustainable entrepreneurs proactively engage with diverse stakeholders, including customers, suppliers, investors, regulators, and communities (Freeman et al., 2010) through regular communication, transparency, and active listening to understand and respond to stakeholder needs and concerns (Ayuso et al., 2006). By building trust and fostering collaborative relationships, sustainable entrepreneurs can access valuable resources, knowledge, and support and identify new opportunities for innovation and value creation (Dentchev et al., 2018).

1.2.3.6 Leveraging Policy and Regulatory Frameworks

Sustainable entrepreneurs should stay informed about relevant policy and regulatory frameworks that impact their Industry and business practices (Wagner & Lutz, 2018). By understanding and proactively addressing these frameworks, sustainable entrepreneurs can identify opportunities for competitive advantage, reduce regulatory risks, and contribute to developing supportive policy environments (Kivimaa & Kern, 2016). However, this may involve participating in Industry associations, engaging in policy dialogues, or collaborating with other stakeholders to advocate for sustainable policies and regulations (Reid & Toffel, 2009).

1.3 RESEARCH PROBLEM

The Fourth Industrial Revolution has emerged as a significant force driving global economic transformation, affecting various aspects of society and challenging traditional business models. Its rapid advancements in digital technologies, such as AI, robotics, and the IoT, can potentially disrupt industries and create new opportunities for innovation and growth (Schwab, 2016). The 4IR presents opportunities and challenges for small and medium-sized enterprises, essential drivers of economic growth and job creation (Fatoki, 2019).

However, SMMEs are crucial drivers of innovation, job creation, and economic development, making them vital actors in the 4IR (Acs & Audretsch, 1990; Ayyagari, Beck, & Demirguc-Kunt, 2007). However, SMMEs in developing countries, such as

South Africa, face numerous challenges in adopting and harnessing sustainable entrepreneurship practices within the 4IR context. These challenges include a lack of access to advanced technologies, limited financial resources, and inadequate support from governmental institutions (Fatoki, 2018; Rogerson, 2008).

Sustainable entrepreneurship plays a crucial role in leveraging the opportunities presented by the 4IR to create economic, social, and environmental value (Kuckertz & Wagner, 2010; Shepherd & Patzelt, 2011). However, the current knowledge on the interplay between sustainable entrepreneurship and the 4IR, particularly in the context of SMMEs in developing countries like South Africa, remains limited (George, McGahan, & Prabhu, 2012; Ndlovu & Luthuli, 2019).

The eThekwini region in KwaZulu-Natal, South Africa, provides an ideal setting to explore the factors that influence sustainable entrepreneurship in the 4IR due to its diverse economic landscape and numerous SMMEs operating in different sectors (Rogerson & Sithole, 2001; Zulu et al., 2016). Despite the potential of these SMMEs to contribute to sustainable development, many face significant challenges in harnessing the opportunities presented by the 4IR (Ndlovu & Luthuli, 2019; Neneh, 2019). Furthermore, the role of government support in facilitating sustainable entrepreneurship in the 4IR remains underexplored (Piperopoulos, Wu, & Wang, 2018).

While some studies have explored the relationship between sustainable entrepreneurship and the 4IR, there is limited research focusing on the specific challenges and opportunities faced by SMMEs in the eThekwini region of KwaZulu-Natal, South Africa. This knowledge gap hinders the development of effective strategies and policies that could support SMMEs in harnessing sustainable entrepreneurship for the 4IR.

1.4 RESEARCH AIMS

This research aims to address the knowledge gap by exploring the factors that lead entrepreneurs to successfully identify and utilise local resources, ideas, and skills in the eThekwini region of KwaZulu-Natal to stimulate enterprise sustainability in the 4IR.

It also seeks to examine the challenges entrepreneurs face and the impact of governmental support on their survival in this rapidly changing landscape. By investigating these issues, the study aims to contribute to developing an enterprise sustainability framework that can guide SMMEs towards enhancing their development and performance growth in a turbulent digital environment.

1.5 RESEARCH OBJECTIVES

The objectives of this research are:

- To identify the internal and external environmental factors influencing sustainable entrepreneurship in the 4IR.
- To evaluate the current state of Industry 4.0 practices in SMMEs within the eThekwini region (KwaZulu-Natal).
- To investigate the factors contributing to sustainable entrepreneurship's failure in the 4IR.
- To assess the current state of sustainable entrepreneurship (SMMEs) in the eThekwini region (KZN).
- To examine how supportive are governmental institutions in KwaZulu-Natal towards sustainable entrepreneurship.
- To provide recommendations for SMMEs' towards stimulating their performance and growth in the turbulent digital environments of KwaZulu-Natal.

1.6 RESEARCH QUESTIONS

- What are the internal and external factors influencing sustainable entrepreneurship in the 4IR?
- What is the current state of Industry 4.0 practices in SMMEs within the eThekwini region (KwaZulu-Natal)?
- What factors contribute to the failure of sustainable entrepreneurship in the 4IR?
- What is the current state of sustainable entrepreneurship (SMMEs) in the eThekwini region (KZN)?

- How supportive are governmental institutions in KwaZulu-Natal towards sustainable entrepreneurship?
- What recommendations can be provided for SMMEs to stimulate performance and growth in the turbulent digital environments of KwaZulu-Natal?

1.7 SIGNIFICANCE OF THE STUDY

This study holds significant value for stakeholders in sustainable entrepreneurship, Industry 4.0, and the eThekwini region's economic development. The research findings contribute to the existing knowledge base and provide valuable insights to guide policy and decision-making processes. The significance of this study is as follows:

- The research will contribute to the literature on sustainable entrepreneurship and Industry 4.0, specifically in the context of SMMEs in the eThekwini region of KwaZulu-Natal, which is crucial for understanding the dynamics of sustainable entrepreneurship in the rapidly evolving digital environment.
- By examining the internal and external environmental factors that influence sustainable entrepreneurship in the 4th industrial revolution, the study will provide a comprehensive understanding of the factors contributing to the success or failure of SMMEs in this context. This knowledge will be helpful for entrepreneurs, policymakers, and other stakeholders to address potential challenges and capitalise on opportunities.
- The study will evaluate the current state of Industry 4.0 practices in the eThekwini region's SMMEs. This information will be valuable for benchmarking purposes and identifying areas for improvement, ultimately contributing to the growth and competitiveness of these businesses.
- By investigating the factors contributing to the failure of sustainable entrepreneurship in the 4IR, the study will enable stakeholders to address these issues proactively and mitigate risks associated with business failure.
- Assessing the current state of sustainable entrepreneurship in the eThekwini region will provide valuable insights into the overall health and potential of

the region's SMME sector, which is essential for economic development and job creation initiatives.

- By examining the support provided by governmental institutions in KwaZulu-Natal, the study will help identify gaps and areas for improvement in government policies and programmes, ultimately contributing to a more conducive environment for sustainable entrepreneurship.
- The recommendations provided by the study will be instrumental in guiding SMMEs' strategies, actions, and initiatives to stimulate performance and growth in the digital environment of KwaZulu-Natal, enhancing their competitiveness and contributing to the region's socio-economic development.

1.8 SCOPE AND LIMITATIONS OF THE STUDY

The scope of this study is primarily focused on sustainable entrepreneurship in the context of the 4IR, with a specific emphasis on SMMEs operating within the eThekwini region in KwaZulu-Natal, South Africa. As such, the study will consider the internal and external environmental factors affecting these businesses, the current state of Industry 4.0 practices, and the support offered by governmental institutions.

However, there are some limitations to the study that should be acknowledged:

- The research findings may not be generalisable to all SMMEs outside of the eThekwini region or other regions in South Africa, as the study's context is specific to KwaZulu-Natal.
- The rapidly evolving nature of the 4IR revolution may make some research findings outdated or less relevant over time.
- The study could limit the availability and quality of data on sustainable entrepreneurship and Industry 4.0 practices in the eThekwini region. Access to SMMEs and their willingness to participate in the study may also impact the data collected.
- Despite these limitations, the study aims to provide valuable insights and contribute to understanding sustainable entrepreneurship in the context of

Industry 4.0, ultimately benefiting SMMEs, policymakers, and other stakeholders involved in fostering the growth and development of the eThekwini region's SMME sector.

1.9 OVERVIEW OF THE THESIS STRUCTURE

This thesis is structured as follows:

Chapter one: introduces the study, including background, research problem, aims, objectives, and questions.

Chapter two: presents a comprehensive literature review covering the 4IR, sustainable entrepreneurship, and SMMEs.

Chapter three: introduces the theoretical framework, combining relevant theories to develop an integrated framework that underpins the study.

Chapter four: details the research methodology, including research design, sampling, data collection, and analysis techniques.

Chapter five: presents the data analysis and findings, discussing the themes emerging from the data and their relation to the theoretical framework.

Chapter six: discusses the findings in the context of the research objectives and questions, elaborating on the factors influencing sustainable entrepreneurship in the 4IR.

Chapter seven: concludes the thesis by providing recommendations and policy implications for SMMEs, government, and stakeholders and identifying limitations and future research directions.

1.10 CONCLUSION

The rapidly evolving landscape of the 4IR has significant implications for sustainable entrepreneurship and small and medium-sized enterprises. The main aim of this study is to explore factors that lead to entrepreneurs' successful identification and utilisation of local resources, ideas, and skills to stimulate economic growth and development in the 4IR. By examining the challenges entrepreneurs face and the

impact of governmental support, the research will contribute to developing an enterprise sustainability framework for SMMEs, enhancing their development and performance growth in the turbulent digital environment.

As the thesis structure outlines, this study will draw upon various theoretical perspectives and empirical evidence to address the research objectives and questions. By integrating these perspectives into a cohesive framework, the research aims to comprehensively understand the dynamics of sustainable entrepreneurship in the 4IR and inform policy recommendations for SMMEs, government, and stakeholders.

CHAPTER TWO

LITERATURE REVIEW

2.1 INTRODUCTION

The 4IR has significantly impacted the global economy, with transformative technologies and innovations shaping how businesses and societies operate. As the world continues to grapple with these rapid changes, there is a growing need for sustainable entrepreneurship that can harness the potential of the 4IR to address social, economic, and environmental challenges. In this context, developing an enterprise sustainability framework becomes crucial for SMMEs to adapt and thrive in the digital era. This chapter provides an extensive literature review on the 4IR, sustainable entrepreneurship, SMMEs, and their interconnectedness in the context of the eThekwini area of KwaZulu-Natal, South Africa.

The 4IR has brought forth an unprecedented era of technological advancements, pushing the boundaries of human-machine interaction and transforming business models and ecosystems (Pandza & Wilkins, 2019). As such, organisations must understand and adapt to the changing landscape to remain competitive and address sustainability challenges (Nyberg et al., 2019). In particular, SMMEs play a crucial role in economic growth and development. Their ability to leverage the opportunities presented by the 4IR can contribute significantly to SDGs and the overall well-being of societies (Ndemo & Weiss, 2017).

2.2 THE FOURTH INDUSTRIAL REVOLUTION

2.2.1 Defining the Fourth Industrial Revolution

The Fourth Industrial Revolution characterises the fusion of the physical, digital, and biological worlds, enabled by advanced technologies transforming industries and societies (Schwab, 2016). Building on the previous industrial revolutions, the 4IR is marked by the blurring of boundaries between humans and machines and the rapid pace at which disruptive technologies are adopted (Bughin et al., 2018). The 4IR is not only about technological advancements but also encompasses how these

technologies are adopted, integrated, and utilised by organisations, individuals, and societies (Marr, 2018). As such, the 4IR has far-reaching implications for various aspects of human life, from economic growth and employment to social well-being and environmental sustainability (Lasi et al., 2014).

2.2.2 Key Technologies and Innovations

2.2.2.1 Artificial Intelligence and Machine Learning

AI and Machine Learning (ML) are at the core of the 4IR, driving innovation and enabling new business models (Kaplan & Haenlein, 2019). AI is the development of computer systems capable of performing tasks that usually require human intelligence, such as visual perception, speech recognition, decision-making, and natural language understanding (Russell & Norvig, 2016). ML, a subset of AI, refers to the ability of computers to learn from data without explicit programming (Mitchell, 1997). These technologies can potentially revolutionise various industries, from manufacturing and logistics to healthcare and finance (Brynjolfsson & McAfee, 2017).

AI and ML are integrated into various aspects of business operations, from customer service and marketing to supply chain management and decision-making (Lee & See, 2017). Adopting AI and ML can lead to improved efficiency, cost reduction, and enhanced customer experiences while opening up new avenues for innovation and value creation (Davenport & Ronanki, 2018). However, the widespread adoption of AI and ML raises concerns regarding job displacement, ethical considerations, and data privacy (Arntz et al., 2016; Bostrom & Yudkowsky, 2014). As such, it is essential for businesses and policymakers to carefully consider the implications of these technologies and develop strategies to harness their potential while mitigating potential risks (Brynjolfsson & Kahin, 2019).

2.2.2.2 Internet of Things

The IoT is another critical component of the 4IR, connecting billions of devices, sensors, and systems across various industries and sectors (Gubbi et al., 2013). IoT enables real-time data collection, analysis, and communication, allowing

businesses and organisations to optimise operations, make informed decisions, and develop innovative solutions (Whitmore et al., 2015). The growing interconnectivity of devices and systems has led to the emergence of smart cities, where IoT technologies are used to enhance urban planning, transportation, energy management, and environmental monitoring (Bibri & Krogstie, 2017).

IoT has the potential to create new opportunities for businesses and societies, improving efficiency, reducing costs, and enabling more sustainable practices (Atzori et al., 2010). However, the widespread adoption of IoT also presents challenges related to data security, privacy, and infrastructure requirements (Roman et al., 2013). Addressing these challenges requires a collaborative effort among stakeholders, including businesses, governments, and civil society, to develop effective policies, standards, and practices that ensure IoT technologies' responsible and sustainable development (Al-Fuqaha et al., 2015).

2.2.2.3 Big Data Analytics

Big Data Analytics is another critical aspect of the 4IR, enabling organisations to harness the vast amounts of data generated by digital technologies to drive innovation and decision-making (Provost & Fawcett, 2013). Big Data Analytics uses advanced computational techniques and tools to process and analyse diverse, complex, and large datasets, uncovering valuable insights and patterns that can inform business strategy and operations (Hashem et al., 2015). The growing availability of data and advancements in storage and processing technologies have made big data analytics an essential component of modern business management and decision-making (Cukier & Mayer-Schoenberger, 2013).

Adopting big data analytics can give businesses a competitive advantage, enabling them to understand customer preferences better, optimise supply chains, and identify new market opportunities (McAfee & Brynjolfsson, 2012). Additionally, big data analytics has the potential to contribute to SDGs by informing policy decisions, improving healthcare and education systems, and promoting environmental stewardship (Assunção et al., 2015). However, the widespread use of big data analytics also raises concerns about data privacy, security, and ethical

considerations, necessitating the development of appropriate governance mechanisms and regulatory frameworks (Kshetri, 2014).

2.2.2.4 Robotics and Automation

Robotics and automation play a central role in the 4IR, driving significant advancements in robotic process automation, autonomous systems, and collaborative robots (cobots) (Ljungblad et al., 2017). Integrating robotics and automation technologies in various industries can increase productivity, reduce costs, and improve safety and quality in sectors such as manufacturing, logistics, and agriculture (Bahrin et al., 2016).

The adoption of robotics and automation technologies has been facilitated by AI, ML, and IoT advancements, which enable the development of sophisticated systems capable of performing complex tasks with minimal human intervention (Zhang & Qin, 2018). However, the widespread use of robotics and automation technologies also raises concerns about job displacement, skills development, and the ethical implications of human-robot interactions (Ford, 2015). Addressing these challenges requires a multi-stakeholder approach involving businesses, governments, and educational institutions, focusing on workforce reskilling, lifelong learning, and developing ethical guidelines and policies (Chui et al., 2018).

2.2.2.5 Additive Manufacturing (3D Printing)

Additive Manufacturing (AM), also known as 3D printing, is a process that creates three-dimensional objects by adding material layer by layer, following a digital model (Gibson et al., 2015). AM has the potential to revolutionise manufacturing and supply chain processes by enabling the production of complex and customised products, reducing waste, and decreasing the need for inventory and transportation (Wohlers & Caffrey, 2015). Furthermore, AM can promote sustainability by using environmentally friendly materials, reducing energy consumption, and fostering localised production (Ford & Despeisse, 2016). The adoption of AM has implications for various industries, including aerospace, automotive, healthcare, and construction (Huang et al., 2013).

AM has gained significant attention recently due to its potential to transform traditional manufacturing processes and supply chains (Gebler et al., 2014). By enabling on-demand production and reducing the need for large-scale factories and warehouses, AM can contribute to decentralising production systems and democratising design and manufacturing capabilities (Rayna & Striukova, 2016). The adoption of AM technologies can also support the development of circular economy models, as it allows for the efficient use of resources and the possibility of recycling materials (Despeisse et al., 2017).

Despite its potential benefits, the widespread adoption of AM also presents challenges related to intellectual property protection, quality assurance, and environmental impacts (Kietzmann et al., 2015). Addressing these challenges requires the development of appropriate regulatory frameworks and Industry standards, as well as ongoing research and development efforts to improve the performance, efficiency, and sustainability of AM technologies (Weller et al., 2015).

2.2.2.6 Blockchain Technology

Blockchain technology is a decentralised and distributed ledger system that securely records transactions across a network of computers without the need for a central authority (Tapscott & Tapscott, 2016). By enabling trust, transparency, and immutability, blockchain technology can potentially disrupt various sectors, such as finance, supply chain management, and governance (Mougayar, 2016). The use of blockchain technology can promote sustainability by enhancing traceability and accountability, reducing fraud and corruption, and fostering the development of decentralised and energy-efficient systems (Kewell et al., 2017).

Blockchain technology has garnered considerable interest due to its potential to enable secure, transparent, and efficient transactions in various sectors, such as finance, healthcare, and energy (Swan, 2015). By eliminating the need for intermediaries, blockchain technology can streamline processes, reduce transaction costs, and enhance collaboration among different stakeholders (Tapscott & Tapscott, 2017). Moreover, blockchain technology can support the development of

decentralised applications and platforms, empowering individuals and communities by giving them greater control over their data and digital assets (Merkle, 2017).

However, the widespread adoption of blockchain technology also presents challenges related to scalability, interoperability, and energy consumption (Casino et al., 2019). Addressing these challenges requires ongoing research and development efforts and collaboration among Industry players, academia, and policymakers to develop effective governance mechanisms and standards that ensure the responsible and sustainable development of blockchain technologies (Zohar, 2015).

2.2.2.7 Virtual and Augmented Reality

Virtual Reality (VR) and Augmented Reality (AR) are immersive technologies that have gained significant attention in recent years due to their potential to transform various industries and aspects of daily life (Milgram & Kishino, 1994). VR involves the creation of a wholly digital environment that users can interact with, while AR overlays digital information onto the user's view of the physical world (Azuma, 1997). These technologies have various applications, including entertainment, education, healthcare, and industrial training (Carmigniani et al., 2011).

VR and AR technologies can enhance user experiences, improve productivity, and foster innovation in various sectors (Gavish et al., 2015). However, the widespread use of these technologies also presents challenges related to technological limitations, user acceptance, and ethical considerations, such as privacy and data security (Makuch et al., 2018). Addressing these challenges requires collaboration among stakeholders to develop robust technical standards, user-friendly interfaces, and appropriate regulatory frameworks that ensure the responsible and sustainable development of VR and AR technologies (Kipper & Rampolla, 2012).

2.2.2.8 Biotechnology and Genomics

Biotechnology and genomics are rapidly advancing fields that have the potential to revolutionise healthcare, agriculture, and environmental management in the context of the 4IR (Ledford, 2015). Biotechnology uses living organisms or their components

to develop new products, processes, or technologies. At the same time, genomics focuses on studying an organism's genetic information and function (Goyal et al., 2018).

The convergence of biotechnology and genomics with other 4IR technologies, such as AI and big data analytics, has led to the development of novel applications, such as personalised medicine, gene editing, and synthetic biology (Khalil & Collins, 2010). These advancements can significantly improve human health, increase agricultural productivity, and address environmental challenges (Gupta et al., 2020). However, the rapid pace of innovation in biotechnology and genomics also raises ethical, legal, and social concerns, such as the potential for unintended consequences, the equitable distribution of benefits, and the protection of individual privacy (Jasanoff et al., 2015). Addressing these challenges requires the development of comprehensive regulatory frameworks, public engagement, and responsible research practices to ensure the safe and ethical development and deployment of biotechnology and genomics technologies (Roco et al., 2013).

2.2.3 Future Trends and Projections

The 4IR is expected to continue evolving at an accelerated pace, driven by the convergence of various technologies and innovations (Schwab, 2016). As we move forward into the future, new trends and projections will further shape the landscape of the 4IR.

One such trend is the growth of edge computing, which brings data processing closer to the source of data generation, improving efficiency and reducing latency (Shi et al., 2016). This shift towards edge computing allows for real-time processing and decision-making, enabling organisations to become more agile and responsive (Mao et al., 2020). Another significant trend is the development of quantum computing, which has the potential to revolutionise computational capabilities and enable the solution of complex problems (Preskill, 2018). Quantum computing can provide unprecedented processing power, which can have a transformative impact on industries such as pharmaceuticals, finance, and logistics (Arute et al., 2019). The advancement of human-machine interfaces, such as brain-computer interfaces

and AR, is another trend that can enhance human capabilities and transform how people interact with technology (Reardon, 2016). For example, brain-computer interfaces can direct communication between the human brain and a computer, enabling people to control devices or access information using only their thoughts (Wolpaw et al., 2020). Similarly, AR can overlay digital information onto the physical world, allowing for more immersive and interactive experiences (Azuma et al., 2020).

The rise of digital twins, virtual replicas of physical assets, systems, or processes, is another emerging trend in the 4IR (Glaessgen & Stargel, 2012). Digital twins can enable organisations to optimise their operations, predict maintenance needs, and improve overall efficiency by providing a real-time, data-driven view of their assets and processes (Negri et al., 2017). This technology has applications in various industries, including manufacturing, transportation, and urban planning (Tao et al., 2019).

The increasing importance of data and analytics in the 4IR also drives the development of advanced data management and processing technologies, such as federated learning (Konečný et al., 2016). Federated learning allows for decentralised ML, where data remains on local devices, and only the model updates are shared, addressing privacy concerns and reducing data transmission costs (Yang et al., 2019). This approach has potential applications in healthcare, finance, and telecommunications (Li et al., 2020).

The growth of 5G technology is another significant trend that will further enable the 4IR by providing faster and more reliable connectivity (Agiwal et al., 2016). With its increased bandwidth and lower latency, 5G can support the widespread deployment of IoT devices, autonomous vehicles, and other advanced technologies (Boccardi et al., 2014).

Moreover, the development of decentralised technologies, such as blockchain, can provide secure and transparent data storage and exchange methods, fostering trust and collaboration among various stakeholders in the 4IR (Swan, 2015). Blockchain

technology can be applied in areas such as supply chain management, digital identity, and financial services (Zheng et al., 2018).

Sustainability and environmental considerations are also becoming increasingly important in the context of the 4IR, with the development of green technologies and the integration of ecological, social, and governance (ESG) criteria into business and investment decisions (Adams et al., 2020). The 4IR can contribute to achieving the United Nations SDGs by leveraging technologies such as AI, IoT, and renewable energy to address global challenges, including climate change, poverty, and inequality (Matarazzo et al., 2020).

As the 4IR progresses, it is crucial for countries and organisations to continuously monitor and adapt to these emerging trends and developments to remain competitive and capitalise on the potential benefits of the 4IR (Daugherty & Wilson, 2018) requires a concerted effort from policymakers, businesses, and individuals to develop and implement strategies that embrace the 4IR's opportunities while addressing its challenges (Schwab & Davis, 2018).

2.2.4 Global Perspectives on the 4IR

The impact of the 4IR is not limited to specific regions or countries but encompasses the global landscape (Makridakis, 2017). While developed countries, such as the United States, Germany, and Japan, have been at the forefront of adopting and implementing 4IR technologies (Manyika et al., 2019), emerging economies, such as China, India, and Brazil, are also actively investing in and embracing the opportunities and challenges presented by the 4IR (UNCTAD, 2018). The 4IR can reshape global economic dynamics, as countries that successfully harness its potential can leapfrog in terms of development and competitiveness (Baldwin, 2016).

As the 4IR continues to unfold, international cooperation and collaboration become increasingly essential to ensure that countries can maximise the benefits of this technological revolution while mitigating its potential negative consequences (Schwab & Samans, 2018). Global governance institutions, such as the United Nations, World Bank, and WEF, have been actively engaging with the 4IR,

promoting policy dialogue, capacity-building initiatives, and research on the implications of advanced technologies for sustainable development (WEF, 2020; UN, 2019; World Bank, 2018).

Furthermore, the 4IR has spurred new forms of international cooperation, such as the Global Partnership on Artificial Intelligence (GPAI), which aims to guide the responsible development and use of AI in line with human rights, inclusion, diversity, innovation, and economic growth (OECD, 2020).

The global diffusion of 4IR technologies also raises concerns regarding the digital divide between countries with varying access levels to technology, infrastructure, and resources (Hilbert, 2021). Efforts to bridge this divide and promote more inclusive growth in the context of the 4IR include international development assistance, technology transfer, and capacity-building programmes (Sachs et al., 2020). Additionally, cross-border collaboration in research and innovation can foster the development of new technologies and business models better suited to the needs of different regions and socio-economic contexts (Lee & Lim, 2018).

2.2.5 South African Perspectives on the 4IR

2.2.5.1 South Africa’s readiness for the 4IR

As an emerging economy, South Africa faces opportunities and challenges in the 4IR (Rasool & Botha, 2019). The country's readiness for the 4IR is influenced by factors such as access to advanced technologies, investment in research and development, workforce skills, and infrastructure (Msimang, 2019). While South Africa has made progress in telecommunications and the adoption of digital technologies, challenges remain regarding internet penetration, digital literacy, and the availability of relevant skills (Gastrow & Turok, 2020). Strengthening the country's readiness for the 4IR requires a coordinated effort from the government, the private sector, and civil society to address these challenges and capitalise on the opportunities presented by the 4IR (Marwala & Bhebhe, 2018).

Several factors can indicate a country's readiness for the 4IR, including the quality of education, the level of innovation, digital infrastructure, and regulatory

frameworks (Goldin & Kutarna, 2020). In this regard, South Africa has shown mixed results, with strengths in some areas, such as its growing innovation ecosystem, but weaknesses in others, such as its education system and skill development (World Bank, 2021). To enhance its readiness for the 4IR, South Africa needs to develop a comprehensive strategy that addresses the various dimensions of this transformation, ranging from technological adoption to social and environmental sustainability (Chetty et al., 2019).

2.2.5.2 Government initiatives for 4IR

The South African government has recognised the importance of the 4IR and has launched various initiatives to support the country's transition to a digital economy (Department of Communications and Digital Technologies, 2020). These initiatives include the development of a national 4IR strategy, which aims to accelerate the adoption of advanced technologies, promote innovation, and enhance skills development (South African Government, 2019). Additionally, the government has established the Presidential Commission on the 4IR, which advices on policy, strategy, and implementation related to the 4IR (Presidency of the Republic of South Africa, 2019). Moreover, the government has invested in digital infrastructure, such as broadband networks, to improve internet access and connectivity (National Planning Commission, 2020). To further support the 4IR, the South African government has also initiated various sector-specific strategies and programmes, such as the Advanced Manufacturing Strategy, the Agricultural Policy Action Plan, and the National Health Insurance Plan, designed to leverage advanced technologies in key industries and promote inclusive growth (DST, 2020; DAFF, 2020; NDoH, 2020). Furthermore, the government has been encouraging public-private partnerships and international collaboration to foster innovation and technology transfer, as evidenced by initiatives like the South Africa-UK Newton Fund and the South Africa-EU Strategic Partnership (DIRCO, 2018).

2.2.5.5 Challenges and opportunities for South Africa in the 4IR

The 4IR presents both challenges and opportunities for South Africa. Key challenges include upgrading infrastructure, developing relevant skills, and fostering

an enabling policy environment for innovation and entrepreneurship (Mpofu et al., 2020). Additionally, there is a need to address issues such as the digital divide, cybersecurity, and data privacy, which are critical for ensuring trust and resilience in the digital economy (Naidoo & Gaspari, 2020).

On the other hand, the 4IR presents opportunities for South Africa to leapfrog in terms of development by harnessing the potential of advanced technologies to drive economic growth, create jobs, and improve the quality of life for its citizens (Chingonikaya & Taderera, 2019). Some sectors that could benefit from the 4IR include manufacturing, agriculture, healthcare, and education, which can leverage AI, IoT, and big data analytics to enhance productivity, efficiency, and sustainability (Monyei et al., 2020).

Moreover, the 4IR offers the possibility of fostering innovation ecosystems and promoting entrepreneurship in South Africa by supporting the development of technology start-ups and small and medium-sized enterprises (SMEs) (Kew et al., 2021), which can be achieved through targeted policies, funding mechanisms, and business support services facilitating entrepreneurs' and innovators' access to resources, knowledge, and networks (Qobo & Nyawo, 2021). The growth of technology clusters and innovation hubs in South Africa, such as the Cape Innovation and Technology Initiative and the Tshimologong Digital Innovation Precinct, also provide opportunities for collaboration and knowledge exchange among various stakeholders in the 4IR ecosystem (Bhorat et al., 2021). In global value chains, the 4IR can help South African companies integrate into regional and international markets by enhancing their competitiveness through technology adoption and process improvements (Das & Singh, 2021) and can also contribute to economic diversification as new industries and services emerge as a result of technological advancements (UNCTAD, 2020).

However, realising the full potential of the 4IR in South Africa also requires addressing broader socio-economic challenges, such as poverty, inequality, and unemployment, which the disruptive nature of advanced technologies may exacerbate (Naudé et al., 2021) calls for a comprehensive and inclusive approach

to the 4IR that prioritises social objectives and ensures that the benefits of technological progress are accessible to all segments of society (Twala et al., 2021).

2.2.6 Implications for Businesses and Society

2.2.6.1 Workforce and Skill Requirements

The 4IR has significant implications for businesses and society's workforce and skill requirements. As advanced technologies are adopted, there will be an increased demand for skilled workers with expertise in AI, ML, IoT, and data analytics (Bessen, 2019). At the same time, the 4IR is expected to displace jobs in specific sectors, such as routine manual labour and repetitive administrative tasks, as these can be automated (Frey & Osborne, 2017).

Consequently, there is a growing need to invest in reskilling and upskilling initiatives to ensure that the workforce prepares for the changing labour market demands (World Economic Forum, 2018), which includes fostering lifelong learning, promoting interdisciplinary education, and developing training programmes in partnership with Industry and educational institutions (Brynjolfsson et al., 2019). Additionally, soft skills such as creativity, problem-solving, communication, and collaboration will become increasingly important as the nature of work shifts towards more complex, non-routine tasks that require human adaptability and ingenuity (Deming, 2017).

To effectively address the workforce and skill requirements of the 4IR, it is essential to consider the unique needs of different demographic groups, including women, youth, and marginalised populations (Kabeer, 2020), as this may involve promoting gender equality in STEM fields, investing in youth development programmes, and implementing targeted interventions to support vulnerable groups in accessing quality education and training opportunities (Chetty et al., 2020).

Moreover, the role of governments and public policy in shaping the future workforce cannot be overstated (Agrawal et al., 2019) as policymakers must design and implement initiatives that facilitate skill development, promote labour market flexibility, and create enable environments for innovation and entrepreneurship

(Lund et al., 2018). International cooperation and collaboration are crucial for sharing best practices, resources, and knowledge in workforce development and skill enhancement (Sung, 2021).

2.2.6.2 Business Models and Strategies

The 4IR transforms traditional business models and strategies as organisations leverage advanced technologies to enhance efficiency, improve customer experience, and create new revenue streams (Bughin et al., 2017), including the emergence of platform-based business models that facilitate the exchange of goods and services between users (Parker et al., 2016), and data-driven strategies that enable organisations to make informed decisions based on real-time insights (Sivarajah et al., 2017).

Moreover, the 4IR has spurred the development of new business models focused on the sharing economy, which allows individuals and organisations to share underutilised assets and resources more effectively (Sundararajan, 2016). Examples include ride-sharing platforms like Uber and accommodation services like Airbnb, which have disrupted traditional industries and reshaped consumer behaviour (Cohen & Sundararajan, 2015). In addition, the increasing importance of sustainability and environmental concerns has led to the rise of circular economy models. Businesses aim to minimise waste and maximise resource efficiency by designing products and services that can be reused, repaired, or recycled (Lacy & Rutqvist, 2016).

As the competitive landscape evolves, businesses must also adapt their strategies to capitalise on the opportunities presented by the 4IR can include investing in digital transformation initiatives, such as the adoption of cloud computing, robotics, and advanced analytics, to streamline operations and gain a competitive edge (Westerman et al., 2014). Furthermore, organisations should explore opportunities for collaboration and co-creation with stakeholders across their value chains, including suppliers, customers, and even competitors, to drive innovation and create shared value (Porter & Kramer, 2011).

Another strategic consideration for businesses in the 4IR is developing and retaining the right talent to navigate the rapidly changing technological landscape posits Schwartz et al. (2017), which may involve upskilling existing employees, attracting and retaining individuals with specialised skills, such as data scientists and AI experts, and fostering a culture of lifelong learning and adaptability (Fuller & Raman, 2020).

2.2.6.3 Ethical and Social Considerations

The 4IR raises several ethical and social considerations that businesses and society must confront. These include privacy and data security concerns, as advanced technologies such as AI, IoT, and big data analytics rely heavily on collecting, storing, and processing large amounts of personal information (Mittelstadt et al., 2016). Organisations must be transparent about their data practices and implement robust security measures to protect user privacy and prevent data breaches (Cavoukian, 2010).

Another critical ethical consideration is the potential for bias and discrimination in AI systems, which can have significant consequences for individuals and society (O'Neil, 2016). To mitigate these risks, organisations must invest in developing fair and transparent algorithms, incorporating diverse perspectives in designing and developing AI systems and fostering a culture of ethical AI use (Cath et al., 2018).

Additionally, the 4IR raises questions about the future of work and the potential for increased inequality, as advanced technologies may disproportionately benefit specific segments of the population while displacing others (Brynjolfsson & McAfee, 2014). To address this challenge, businesses, governments, and other stakeholders must collaborate to develop inclusive policies and initiatives that ensure the benefits of the 4IR are equitably shared and that vulnerable populations are not left behind (Atkinson, 2015).

Furthermore, the 4IR highlights the need for responsible innovation and the development of technologies that align with societal values and ethical principles, such as accountability, transparency, and fairness (Stahl et al., 2017). Companies should proactively address ethical concerns by integrating ethical considerations

into their decision-making processes and fostering a culture of responsibility (Dignum, 2018), which may involve establishing ethical guidelines and codes of conduct and creating multi-disciplinary teams to assess the ethical implications of new technologies and business practices (Dunstan et al., 2020). Another area of concern is the environmental impact of the 4IR, as the increasing reliance on digital technologies may contribute to resource depletion, e-waste, and carbon emissions (Berkhout, 2018). Companies and governments should prioritise sustainable technologies and practices, such as energy-efficient data centres, renewable energy sources, and circular economy principles, to minimise the ecological footprint of the 4IR (Korhonen et al., 2018) and to address environmental challenges, advanced technologies such as climate change, biodiversity loss, and pollution can be harnessed through innovative solutions like AI-powered conservation efforts, smart grids, and precision agriculture (Vinuesa et al., 2020).

The 4IR also highlights the importance of digital literacy and the need to equip individuals with the necessary skills to navigate the digital landscape and participate effectively in the digital economy (Van Laar et al., 2017), including technical skills, such as programming and data analysis, and soft skills, like critical thinking, creativity, and collaboration, which are essential for adapting to the rapidly changing world of work (Bughin et al., 2018). Governments, educational institutions, and the private sector should work together to develop and implement comprehensive digital literacy programmes targeting young people, adults, and disadvantaged populations, to ensure everyone can benefit from the 4IR (Hilbert, 2017).

As the adoption of 4IR technologies becomes more widespread, the potential for misuse and unintended consequences also increases, making it crucial to establish effective governance mechanisms and regulatory frameworks (Floridi & Cowls, 2019). Policymakers must balance promoting innovation and protecting the public interest by developing flexible and adaptive regulations to keep pace with technological advancements (Yeung, 2017), which may involve exploring novel regulatory approaches, such as co-regulation, anticipatory regulation, and outcome-based regulation, which emphasise collaboration between the public and private sectors and focus on achieving desired societal outcomes rather than prescribing

specific technological solutions (Marchant & Wallach, 2015). Finally, the 4IR prompts re-evaluating the societal values and norms underpinning our understanding of progress, well-being, and development (Bessant, 2019). As the boundaries between humans, machines, and the environment become increasingly blurred, it is essential to engage in a collective dialogue about the kind of future we want to create and the role that advanced technologies should play in shaping our societies (Bostrom & Yudkowsky, 2014) requiring the active involvement of diverse stakeholders, including citizens, civil society organisations, researchers, policymakers, and the private sector, in the process of co-creating a shared vision for a more just, equitable, and sustainable world in the context of the 4IR (Ihde, 2019).

2.2.7 Opportunities and Challenges for SMMEs

2.2.7.1 Access to Advanced Technologies

For SMMEs, the 4IR presents both opportunities and challenges. On the one hand, advanced technologies can enable SMMEs to improve their productivity, enhance competitiveness, and access new markets (OECD, 2018). For example, AI and ML can help SMMEs optimise their operations and make better decisions based on data-driven insights (Bughin et al., 2017), while IoT and big data analytics can facilitate the development of new products and services tailored to specific customer needs (Porter & Heppelmann, 2014).

On the other hand, adopting advanced technologies can be challenging for SMMEs due to factors such as limited financial resources, lack of technical expertise, and concerns about the return on investment (Mollick, 2014). To overcome these barriers, SMMEs may need to collaborate with external partners, such as technology providers, research institutions, and other businesses, to access the necessary resources and expertise (Spithoven et al., 2013). Additionally, governments and other stakeholders can play a crucial role in supporting SMMEs in their digital transformation journey by providing funding, training, and other forms of assistance (OECD, 2017).

2.2.7.2 Market Opportunities and Competitive Advantage

The 4IR allows SMMEs to create new market niches and gain a competitive advantage by leveraging advanced technologies to develop innovative products, services, and business models (Bharadwaj et al., 2013). For example, SMMEs can use AM to produce customised and complex products on-demand, reducing the need for inventory and enabling faster response times to customer needs (Wohlers & Caffrey, 2015). Similarly, blockchain technology can help SMMEs enhance the transparency and traceability of their supply chains, which can be a valuable differentiator in industries where customers demand increased sustainability and ethical practices (Kshetri, 2018).

However, to capitalise on these market opportunities, SMMEs must be agile and adaptive, as the competitive landscape in the 4IR is marked by rapid change and uncertainty (Nambisan et al., 2017). Which may involve adopting a culture of experimentation and continuous learning and fostering a solid internal capacity for innovation and change management (Teece, 2014).

2.2.7.3 Regulatory and Policy Environment

The regulatory and policy environment is another critical factor influencing SMMEs' ability to harness the potential of the 4IR. As advanced technologies evolve, they raise new legal, ethical, and social challenges that governments and regulatory bodies must address to ensure these innovations' responsible development and deployment (Mayer-Schönberger & Cukier, 2013). For example, data protection, privacy, and intellectual property rights regulations have direct implications for SMMEs that rely on AI, IoT, and big data analytics (European Commission, 2018).

In this context, governments need to develop and implement policies that balance promoting innovation and addressing the potential risks and unintended consequences of advanced technologies (Köhler et al., 2019) by updating existing regulatory frameworks, creating new standards and guidelines, encouraging dialogue and collaboration among stakeholders, including SMMEs, to ensure that the policy environment supports the growth and sustainability of businesses in the 4IR (Bessant & Tidd, 2018).

Moreover, the regulatory environment should promote access to digital infrastructure, such as high-speed internet and cloud computing services, to enable SMMEs to capitalise on the opportunities offered by the 4IR (Gupta et al., 2019). Governments can play a significant role in facilitating the development of affordable and reliable digital infrastructure, particularly in underserved areas, through public investment, public-private partnerships, and regulatory incentives (Ndemo & Weiss, 2017) to help level the playing field for SMMEs, allowing them to compete more effectively in the digital economy and reducing the digital divide between large and small businesses (OECD, 2019).

Furthermore, the regulatory environment should encourage SMMEs to adopt 4IR technologies by providing financial and non-financial support, such as tax incentives, grants, loans, and technical assistance (Mazzucato & Penna, 2016). Governments and development agencies can establish targeted programmes and initiatives to help SMMEs access funding, knowledge, and expertise required to innovate and adopt advanced technologies and build their capacity to navigate the complex regulatory landscape of the 4IR (Acs et al., 2018). Additionally, the policy environment should promote collaboration and networking among SMMEs, larger firms, research institutions, and other stakeholders to facilitate knowledge sharing, technology transfer, and the development of innovative solutions that can drive sustainable growth and competitiveness (Chesbrough, 2003).

Governments and regulatory bodies should recognise the importance of education and skills development in enabling SMMEs to thrive in the 4IR (Bessen, 2019) by including policies and programmes that support lifelong learning, reskilling, and upskilling, as well as the integration of digital skills and entrepreneurial education in formal and non-formal education settings (Vuori et al., 2019). By investing in developing a skilled and adaptable workforce, governments can help ensure that SMMEs have access to the human capital they need to successfully navigate the challenges and opportunities presented by the 4IR (Autor, 2015).

The international dimension of the regulatory and policy environment should also be considered as global trends and agreements can shape the opportunities and

constraints faced by SMMEs in the context of the 4IR (Schwab, 2016). For instance, international trade agreements, standards, and protocols can influence the access of SMMEs to foreign markets, technologies, and resources, as well as their ability to compete on a global scale (Gold et al., 2020). Therefore, governments should engage in international cooperation and dialogue to ensure that the global regulatory and policy landscape is conducive to the growth and sustainability of SMMEs in the era of the 4IR (Lundvall et al., 2018).

Furthermore, governments and regulatory bodies should consider the potential impact of 4IR technologies on social and environmental sustainability when developing policies and regulations (Rasche & Waddock, 2014), including addressing issues such as digital exclusion, labour displacement, and the ecological footprint of digital technologies, as well as promoting the development and diffusion of sustainable innovations that can contribute to the achievement of the United Nations SDGs (Geissdoerfer et al., 2017). By integrating sustainability considerations into the regulatory and policy environment, governments can help ensure that the 4IR leads to inclusive and sustainable development outcomes for SMMEs and society (George et al., 2016).

In summary, the regulatory and policy environment plays a crucial role in shaping the ability of SMMEs to harness the potential of the 4IR and contribute to sustainable development. Governments and regulatory bodies must adopt a proactive and forward-looking approach by updating existing frameworks, developing new policies, guidelines and maintaining dialogue and collaboration among diverse stakeholders to ensure that the regulatory environment is supportive of innovation, sustainability, and inclusiveness in the era of the 4IR (Brown et al., 2018).

2.3 SUSTAINABLE ENTREPRENEURSHIP

2.3.1 The Concept of Sustainable Entrepreneurship

Sustainable entrepreneurship refers to identifying, evaluating, and exploiting opportunities to create economic, social, and environmental value by developing innovative products, services, and business models (Schaltegger & Wagner, 2011). This concept has emerged in response to the growing recognition of the

interdependence between economic development, social well-being, and environmental preservation, as well as the need for businesses to take responsibility for their impacts on society and the planet (Bocken et al., 2014).

Sustainable entrepreneurship represents a paradigm shift from traditional profit-oriented entrepreneurship, emphasising the need for businesses to consider the triple bottom line (TBL) of people, planet, and profit in their decision-making and operations (Elkington, 1997). This approach aims to balance the pursuit of financial returns with the creation of social and environmental value, thus fostering more responsible and inclusive forms of economic growth (Parrish, 2010). Sustainable entrepreneurship seeks to address global challenges, such as climate change, resource scarcity, and social inequality, by promoting innovation and the diffusion of sustainable practices across industries and sectors (Cohen & Winn, 2007). This approach benefits society and the environment and creates new market opportunities and competitive advantages for businesses that embrace sustainability as a core aspect of their strategy (Hockerts & Wüstenhagen, 2010).

2.3.2 Dimensions of Sustainable Entrepreneurship

2.3.2.1 Economic Sustainability

Economic sustainability refers to the ability of a business to generate sufficient financial returns and maintain long-term profitability while contributing to broader economic development and well-being (Dyllick & Hockerts, 2002). Sustainable entrepreneurship emphasises the need for businesses to pursue economic sustainability by creating value for a wide range of stakeholders, including customers, employees, suppliers, and local communities, and by adopting innovative business models that support resource efficiency, circularity, and fair distribution of wealth (Stubbs & Cocklin, 2008). These models may involve, for instance, the development of sharing economy platforms, the implementation of closed-loop production systems, or the adoption of inclusive financing mechanisms that enable greater access to capital and resources for disadvantaged groups (Bocken et al., 2016).

2.3.2.2 Social Sustainability

Social sustainability focuses on the social dimensions of sustainable entrepreneurship, encompassing aspects such as social equity, inclusiveness, and human well-being (Colantonio, 2009), it involves addressing the social impacts of business activities, promoting fair labour practices, and fostering social cohesion and community development (Dillard et al., 2010). Sustainable entrepreneurs are expected to engage with various stakeholders, including marginalised and vulnerable groups, to ensure their businesses contribute to social progress and do not exacerbate existing inequalities (Murillo & Lozano, 2006). Additionally, sustainable entrepreneurship may involve the development of products, services, or business models that directly address social issues, such as poverty, education, health, and access to essential services (Seelos & Mair, 2005). For example, social enterprises and impact-driven businesses have emerged as key players in sustainable entrepreneurship, combining commercial activities with a vital social mission and delivering positive social outcomes (Matarazzo et al., 2020). These organisations often prioritise stakeholder value over shareholder value, focusing on creating shared value for all participants in the value chain (Porter & Kramer, 2011).

To foster social sustainability, sustainable entrepreneurs can also adopt collaborative and participatory approaches, such as co-creation, open innovation, and multi-stakeholder partnerships (Bocken et al., 2016). By involving diverse actors in the innovation process, sustainable entrepreneurs can leverage different stakeholders' knowledge, resources, and expertise to develop more inclusive and socially responsible solutions (Perey & Benn, 2015). Furthermore, sustainable entrepreneurship can contribute to social sustainability by supporting the development of local economies, creating jobs, and enhancing human capital through capacity building and skills development (Schwartz et al., 2012).

2.3.2.2.1 Social Innovation and Entrepreneurship

Social innovation refers to developing and implementing new ideas, practices, or models that address social needs and challenges (Mulgan et al., 2007). Sustainable entrepreneurs can drive social innovation by exploring novel ways to tackle pressing

social issues, such as inequality, social exclusion, and human rights abuses (Nicholls & Murdock, 2012). Social entrepreneurship, a subset of sustainable entrepreneurship, focuses on creating and scaling social innovations that generate social and economic value (Mair & Marti, 2006). Social entrepreneurs often adopt hybrid organisational forms, combining elements of for-profit and non-profit structures to pursue their mission (Battilana & Lee, 2014).

2.3.2.3 Environmental Sustainability

Environmental sustainability is a critical aspect of sustainable entrepreneurship, focusing on the ecological impacts of business activities and the need to preserve natural resources for future generations (Gladwin et al., 1995); it involves adopting practices that minimise negative environmental impacts, such as reducing waste, emissions, and resource consumption and promoting renewable energy and materials (Hart & Milstein, 2003). Sustainable entrepreneurs can contribute to environmental sustainability by developing innovative products, services, or business models that help mitigate or adapt to environmental challenges, such as climate change, biodiversity loss, and resource depletion (Schaltegger & Wagner, 2011).

2.3.2.3.1 Eco-Innovation and Entrepreneurship

Eco-innovation refers to developing and adopting new technologies, products, services, and business models that reduce environmental impacts and enhance resource efficiency (Kemp & Pearson, 2008). Sustainable entrepreneurs can drive eco-innovation by identifying and exploiting market opportunities from transitioning to a low-carbon, resource-efficient, and circular economy (Rennings, 2000). Eco-entrepreneurship, a subset of sustainable entrepreneurship, focuses on creating and scaling eco-innovations that generate both environmental and economic value (Schaper, 2002). Eco-entrepreneurs often collaborate with various stakeholders, such as researchers, policymakers, and civil society organisations, to develop and disseminate environmentally friendly solutions (Boons et al., 2013).

2.3.3 Role in the Fourth Industrial Revolution

The 4IR can potentially transform the landscape of sustainable entrepreneurship. It encompasses a range of advanced technologies harnessed to address pressing social, economic, and environmental challenges (Schwab, 2016). These technological advancements can facilitate the development of innovative solutions, promote new business models, and create opportunities for sustainable growth and development.

2.3.3.1 Technological Innovations for Sustainability

The 4IR brings forth a variety of technological innovations that can be leveraged for sustainable entrepreneurship, ranging from AI and ML to the IoT and big data analytics (Marr, 2018). These technologies have the potential to significantly enhance resource efficiency and reduce waste in various industries, such as manufacturing, agriculture, and transportation (Gupta et al., 2021).

For instance, AI and ML can optimise production processes, predict equipment failures, and minimise energy consumption in manufacturing facilities (Wuest et al., 2016). IoT and big data analytics can monitor and manage natural resources, such as water and forests, by collecting real-time data on environmental conditions and supporting informed decision-making (Al-Turjman, 2020). Additionally, integrating renewable energy technologies, like solar and wind power, can facilitate the transition towards cleaner, more sustainable energy sources and reduce businesses' carbon footprint (Jacobson et al., 2017).

2.3.3.2 New Business Models and Approaches

The 4IR also fosters the emergence of innovative business models and approaches that can support sustainable entrepreneurship. These models, such as the sharing economy and the circular economy, encourage more efficient use of resources, waste reduction, and adopting environmentally friendly practices (Ghisellini et al., 2016).

The sharing economy, fuelled by advancements in digital technologies and the growth of online platforms, promotes access to goods and services instead of

ownership (Frenken & Schor, 2017). By facilitating the sharing of resources, such as cars, homes, and tools, the sharing economy can help reduce waste, lower resource consumption, and support sustainable development (Heinrichs, 2013).

The circular economy model, on the other hand, emphasises the importance of closed-loop production systems that minimise waste and extend the lifespan of products and materials through recycling, remanufacturing, and reuse (Geissdoerfer et al., 2017). By implementing circular economy principles, businesses can reduce their environmental impact, create new revenue streams, and foster long-term resilience (Korhonen et al., 2018). Leveraging advanced technologies, such as AM, blockchain, and AI, businesses can develop innovative solutions that align with these sustainable models and contribute to transforming industries and societies (Tukker, 2015). For example, AM (3D printing) can support the circular economy by enabling the production of complex, customised components with minimal material waste and reduced transportation emissions (Gebler et al., 2014).

2.3.4 Factors Influencing Sustainable Entrepreneurship

2.3.4.1 Market Demand and Consumer Preferences

Market demand and consumer preferences play a critical role in driving sustainable entrepreneurship, as businesses must respond to the growing interest in sustainability among consumers, investors, and other stakeholders (Kotler et al., 2010). As awareness of social and environmental issues increases, businesses that demonstrate a commitment to sustainability can benefit from enhanced brand reputation, customer loyalty, and market share (Hartmann & Apaolaza-Ibáñez, 2012). Moreover, the demand for sustainable products and services can create new market opportunities and encourage innovation in sustainable business practices (Porter & Kramer, 2011).

In recent years, the rise of socially responsible investment (SRI) has further underscored the importance of market demand and consumer preferences in sustainable entrepreneurship (Lourenço et al., 2018). Investors are increasingly seeking businesses that align with their values, leading to the integration of ESG criteria into investment decision-making processes (Busch et al., 2016). This shift

has incentivised companies to adopt more sustainable practices, as strong ESG performance can translate into improved access to capital and lower cost of capital (Clark et al., 2015).

Furthermore, the increasing importance of corporate social responsibility (CSR) in the business landscape has prompted companies to understand better and address the expectations of their stakeholders (Carroll & Shabana, 2010). By engaging in CSR initiatives and communicating their sustainability efforts, companies can strengthen their relationships with stakeholders, such as customers, employees, and communities, and enhance their long-term success and competitiveness (Dahlsrud, 2008).

2.3.4.2 Access to Resources and Capabilities

The ability of businesses to pursue sustainable entrepreneurship depends on their access to resources and capabilities, such as financial capital, human capital, and technological know-how (York & Venkataraman, 2010). Businesses need to invest in research and development, employee training, and the adoption of advanced technologies to support the integration of sustainability into their operations and strategy (Schaltegger & Wagner, 2011). Collaboration and partnerships with other businesses, research institutions, and public organisations can help companies to access the necessary resources and expertise to develop and implement sustainable solutions (Pitelis & Teece, 2010).

One of the key challenges facing sustainable entrepreneurs is the mobilisation of financial resources to support their ventures, as traditional funding sources may be risk-averse or have a limited understanding of the value proposition of sustainable businesses (Schaltegger et al., 2016). Innovative financing mechanisms, such as crowdfunding, impact investing, and green bonds, have emerged to address this gap and provide much-needed capital for sustainable ventures (Mollick, 2014; Brest & Born, 2013; Flammer, 2018).

In addition to financial resources, access to knowledge and expertise is crucial for sustainable entrepreneurs to develop and scale their innovations (Sarasvathy, 2001), which may involve tapping into networks of experts, mentors, and peers who

can provide guidance, feedback, and support throughout the entrepreneurial journey (Nambisan, 2017). Furthermore, businesses can leverage open innovation strategies, such as crowdsourcing, collaboration platforms, and technology transfer, to acquire and share knowledge and accelerate the development of sustainable solutions (Chesbrough & Bogers, 2014).

2.3.4.3 Policy and Regulatory Environment

The policy and regulatory environment can significantly influence sustainable entrepreneurship by creating incentives or disincentives for businesses to adopt sustainable practices (Delmas & Toffel, 2008). Government policies, such as regulations on emissions, waste, and resource use, can drive businesses to improve their environmental performance and invest in more sustainable technologies (Aragón-Correa & Rubio-López, 2007). Additionally, governments can support sustainable entrepreneurship through financial incentives, such as grants, tax credits, subsidies, and non-financial support, such as technical assistance, information sharing, and capacity-building programmes (Dorfman et al., 2016).

International agreements and frameworks, such as the Paris Agreement on climate change and the United Nations SDGs, have also shaped the policy landscape for sustainable entrepreneurship by setting global targets and guidelines for sustainable development (United Nations, 2015; Rogelj et al., 2016). These initiatives have prompted national governments to implement policies and measures to promote sustainability and address global challenges, thereby influencing the opportunities and constraints faced by sustainable entrepreneurs (Levin et al., 2012). Furthermore, the role of non-governmental organisations (NGOs) and civil society in shaping the policy and regulatory environment for sustainable entrepreneurship should not be missed (Waddock, 2008). By advocating for more stringent regulations, raising public awareness, and holding businesses accountable for their social and environmental impacts, NGOs and civil society can pressure companies to adopt sustainable practices and contribute to positive change (Doh & Guay, 2006).

2.3.4.4 Cultural and Societal Factors

Cultural and societal factors also shape the landscape for sustainable entrepreneurship, as they can influence the values, beliefs, and norms that guide business behaviour (Hofstede et al., 2010). In societies where sustainability is a substantial cultural value, businesses may be more likely to adopt sustainable practices and prioritise the well-being of stakeholders over short-term profits (Spence et al., 2011). Conversely, sustainable entrepreneurship may face more significant challenges and resistance in societies where the focus is primarily on economic growth and material prosperity (Egri & Ralston, 2004).

Education and awareness-raising efforts can be pivotal in shaping cultural and societal attitudes towards sustainable entrepreneurship (Lindner & Ströbele, 2018). By increasing the general public's understanding of the importance of sustainability and the potential benefits of sustainable business practices, educational initiatives can help create a more supportive environment for sustainable entrepreneurs to thrive (Fadeeva & Mochizuki, 2010).

Moreover, the role of the media in shaping public discourse on sustainability and influencing the cultural context for sustainable entrepreneurship should not be underestimated (Gibson et al., 2013). By reporting on sustainability issues, highlighting the achievements of sustainable entrepreneurs, and exposing unsustainable business practices, the media can help shape societal norms and values related to sustainability and encourage businesses to align their strategies and operations with SDGs (Gomes et al., 2017).

Finally, in promoting sustainable entrepreneurship, the influence of industry associations and professional organisations should be considered. These bodies can establish Industry standards, codes of conduct, and best practice guidelines that encourage sustainable practices among their members (Gunningham et al., 2004). By fostering a culture of sustainability within their respective sectors, Industry associations and professional organisations can help drive the adoption of sustainable business practices and contribute to the wider diffusion of sustainable entrepreneurship (Bansal & Roth, 2000).

2.3.5 Sustainable Entrepreneurship from a South African Perspective

2.3.5.1 The State of Sustainable Entrepreneurship in South Africa

Sustainable entrepreneurship in South Africa has garnered increasing attention in recent years as the country faces social, economic, and environmental challenges, such as high unemployment, income inequality, and ecological degradation (Nhamo & Nhamo, 2016). South African businesses and entrepreneurs recognise the need to integrate sustainability principles into their operations and strategies, and some are developing innovative solutions that address local and global sustainability issues (Urban & Kujinga, 2017). However, the overall progress in sustainable entrepreneurship remains uneven, with many businesses focusing primarily on short-term economic gains rather than long-term sustainability (Musango et al., 2018).

To foster sustainable entrepreneurship, the South African government has introduced policies and initiatives aimed at supporting the development and growth of sustainable enterprises, such as the National Development Plan (NDP) 2030, which emphasises the importance of sustainable development and green industries for the country's future economic growth (South African Government, 2012). Additionally, various organisations and networks, such as the South African Green Industries Council (SAGIC) and the South African Network for Sustainable Entrepreneurship (SANSE), have emerged to promote knowledge sharing, capacity building, and collaboration among sustainable entrepreneurs and stakeholders (Kuada & Buatsi, 2021).

2.3.5.2 The eThekwini Region of KwaZulu-Natal’s Contribution to Sustainable Entrepreneurship

The eThekwini region of KwaZulu-Natal has shown a growing commitment to sustainable entrepreneurship, driven by the need to address local social, economic, and environmental challenges and contribute to the achievement of the United Nations SDGs (eThekwini Municipality, 2017). Several initiatives have been implemented to support sustainable entrepreneurship, including establishing the eThekwini Environmental Sustainability Cluster, which aims to promote

collaboration, knowledge sharing, and innovation among businesses, government, and civil society organisations in the region (eThekwini Municipality, 2018).

Furthermore, local universities and research institutions in the eThekwini region have played a pivotal role in fostering sustainable entrepreneurship by providing education and training programmes focused on sustainability and conducting research that supports the development and diffusion of sustainable innovations and practices (Baker et al., 2021). The region has also witnessed the growth of various support structures, such as business incubators and accelerators, which offer mentoring, networking, and funding opportunities for sustainable entrepreneurs (Chimucheka & Mandipaka, 2020).

Additionally, the eThekwini region has seen the emergence of sustainable enterprises in various sectors, such as renewable energy, waste management, and sustainable agriculture, contributing to the region's economic development, job creation, and environmental preservation (Hamann et al., 2018). These enterprises demonstrate the viability of sustainable business models in the South African context and serve as inspiring examples for other entrepreneurs and businesses seeking to embrace sustainability and contribute to the country's sustainable development agenda (Nkosi et al., 2021).

2.4 SMALL, MICRO AND MEDIUM-SIZED ENTERPRISES

2.4.1 The Importance of SMMEs in Economic Growth and Development

Small, micro and medium-sized enterprises play a crucial role in economic growth and development, contributing significantly to job creation, innovation, and social cohesion (OECD, 2017). In many countries, including South Africa, SMMEs account for many businesses and employment opportunities (Rogerson, 2008). The development and growth of SMMEs can foster excellent income distribution, economic diversification, and resilience, particularly in the context of the 4IR and its associated challenges and opportunities (Ayyagari et al., 2011).

Moreover, SMMEs often serve as critical change agents within local economies, driving innovation and entrepreneurial activity by identifying new market

opportunities, creating novel products and services, and introducing more efficient production methods (Audretsch & Keilbach, 2004). They can also contribute to regional development and the revitalisation of economically disadvantaged areas. They are often more rooted in local communities and are more committed to addressing local needs and challenges (North & Smallbone, 2000).

2.4.2 SMMEs and the Fourth Industrial Revolution

2.4.2.1 Adoption and Integration of 4IR Technologies

The 4IR presents opportunities and challenges for SMMEs, navigating the rapidly changing technological landscape and striving to remain competitive in the global market (Lindsay et al., 2018). While some SMMEs have successfully adopted and integrated 4IR technologies into their operations, others face barriers such as limited access to finance, lack of technological expertise, and challenges related to workforce adaptation and skill development (Dombrowski & Wagner, 2014). SMMES must understand the potential benefits and risks associated with 4IR technologies and develop strategies for their effective adoption and integration (Schwab, 2016).

To facilitate the successful adoption of 4IR technologies, SMMEs can leverage networks, partnerships, and collaborations with larger firms, research institutions, and government agencies to access resources, knowledge, and expertise that may not be readily available within their organisations (Radas & Božić, 2009). Furthermore, targeted policies and support programmes, such as financial incentives, infrastructure development, and capacity-building initiatives, can help overcome some of the barriers faced by SMMEs and promote a more inclusive and sustainable transition to the 4IR (Gebauer et al., 2017).

2.4.2.2 Skill Development and Workforce Transformation

The 4IR has significant implications for the workforce and skill requirements of SMMEs, as new technologies and innovations demand a higher level of digital and technical proficiency, adaptability, and creativity (Bessen, 2019). SMMEs must invest in skill development and workforce transformation to ensure their employees

have the competencies to effectively utilise and manage 4IR technologies (Ganco et al., 2019), which may involve retraining existing employees, attracting new talent with specialised skills, or collaborating with educational institutions and training providers to develop Industry-relevant curricula and training programmes (Autor, 2015).

Moreover, fostering a continuous learning and development culture is essential for SMMEs to adapt to the rapidly changing technological landscape and maintain a competitive edge (Cedefop, 2020) by implementing tailored training programmes, employee mentoring and coaching, and promoting a growth mindset among employees (Gallup, 2019). By investing in their human capital development, SMMEs can enhance their capacity for innovation, productivity, and resilience in the face of 4IR challenges (De Grip et al., 2016).

In addition to technical skills, the 4IR emphasises the importance of soft skills, such as critical thinking, problem-solving, communication, and collaboration (World Economic Forum, 2018). These skills are crucial for employees to effectively navigate the complexities of the 4IR and contribute to developing and implementing innovative solutions within their organisations (Arntz et al., 2016). SMMEs should strive to nurture these soft skills through targeted training initiatives, team-building activities, and opportunities for employees to engage in interdisciplinary projects and collaborations (Borghans et al., 2014).

2.4.3 Challenges and Success Factors for SMMEs

2.4.3.1 Financial Constraints and Access to Capital

Access to finance is a critical challenge for many SMMEs, particularly those in the early stages of development or those seeking to invest in innovative technologies and processes (Fatoki, 2014). Limited access to capital can hinder the growth and competitiveness of SMMEs and their ability to adapt and integrate 4IR technologies (Marrano et al., 2018). Solutions to address this challenge may include government initiatives to provide funding and financial support, partnerships with financial institutions and alternative financing mechanisms, such as crowdfunding or venture capital (Mudavanhu et al., 2015).

To overcome financial constraints, SMMEs can also explore opportunities for collaboration and partnership with larger enterprises, Industry associations, or research institutions, which can provide access to resources, expertise, and networks that support innovation and growth (Lee et al., 2018). By leveraging such partnerships, SMMEs can mitigate the risks and costs associated with adopting 4IR technologies and benefit from knowledge transfer, technology transfer, and shared resources (Rosenbusch et al., 2011).

In addition to external funding sources, SMMEs can improve their financial sustainability by optimising their internal resource management and adopting more efficient business practices (Ayyagari et al., 2011) by implementing cost-saving measures, such as reducing waste, streamlining processes, investing in energy-efficient technologies, and adopting innovative business models and revenue streams that enhance profitability and resilience (Carroll & Buchholtz, 2014).

2.4.3.2 Market Access and Competitiveness

Market access and competitiveness are crucial factors for the success of SMMEs in the context of the 4IR (Schwab, 2016). SMMEs must adapt to rapidly changing market conditions and customer preferences while navigating increased competition from local and global players (Christensen et al., 2018), which may involve developing and implementing innovative marketing strategies, leveraging digital technologies to reach a broader customer base, and differentiating themselves through unique value propositions and sustainable practices (Porter & Kramer, 2011).

To enhance their competitiveness, SMMEs should also focus on continuous innovation, product and service development, and process improvement (Terziovski, 2010) through investment in research and development, collaboration with research institutions, and the establishment of innovation ecosystems that facilitate knowledge sharing and technology transfer (Chesbrough, 2003). Moreover, SMMEs should monitor emerging trends and technologies to stay ahead of the curve and capitalise on new opportunities in the market (Dahlman et al., 2018).

2.4.3.3 Human Resource Management and Skill Development

Effective human resource management and skill development are essential for the success and sustainability of SMMEs, particularly in the context of the 4IR (Bessant & Tidd, 2018). SMMEs must attract, retain, and develop skilled employees who effectively manage and utilise new technologies and innovations (Durst & Poutanen, 2013), which may involve offering competitive compensation and benefits packages, creating a positive organisational culture, and providing opportunities for continuous learning and development (Schwab, 2016).

Furthermore, SMMEs should invest in training and upskilling their workforce to equip them with the necessary skills to adapt to the changing nature of work and technological advancements (Autor, 2015) through partnerships with educational institutions, Industry associations, and government programmes that offer targeted skill development initiatives and by encouraging lifelong learning and fostering a culture of innovation and adaptability within the organisation (Cedefop, 2018).

2.4.3.4 Government Support and Regulatory Environment

The government plays a crucial role in fostering a conducive environment for the development and growth of SMMEs through policies, regulations, and support programmes (Gumede, 2017). An enabling regulatory environment can facilitate access to finance, reduce bureaucratic barriers, and promote innovation and entrepreneurship (Hallward-Driemeier & Pritchett, 2015). Additionally, government support through grants, tax incentives, and advisory services can help SMMEs overcome challenges and seize opportunities presented by the 4IR (Mthanti & Ojah, 2017).

Governments can also promote sustainable entrepreneurship by incorporating sustainability goals and principles into their policies and regulations (Koirala et al., 2016), which may include setting targets for renewable energy generation, waste reduction, and emissions reduction and developing standards and certifications for sustainable products and services (Waas et al., 2011). Furthermore, governments can stimulate cross-sector collaboration by fostering partnerships between SMMEs,

larger corporations, research institutions, and NGOs to drive innovation and the diffusion of sustainable practices (Meuleman & Punjabi, 2018).

Another critical aspect of government support is the provision of education and training programmes for entrepreneurs to develop the necessary skills and knowledge to succeed in the 4IR (Acs et al., 2018). These programmes may cover digital literacy, advanced technologies, sustainable business practices, and market analysis, helping entrepreneurs adapt and thrive in the rapidly changing business landscape (Bacigalupo et al., 2016).

2.5 Challenges and Factors Influencing Sustainable Entrepreneurship in the 4IR

2.5.1 Economic Challenges

Sustainable entrepreneurs face various economic challenges in the 4IR, such as securing financing, managing costs associated with adopting new technologies, and maintaining competitiveness in the market (Kuratko et al., 2020). Additionally, economic uncertainties and fluctuations in global markets may impact the ability of sustainable entrepreneurs to attract investments and achieve long-term growth (Horbach & Rennings, 2013). To overcome these challenges, sustainable entrepreneurs must develop robust financial strategies and explore alternative funding sources, such as impact investing or green bonds (Bocken et al., 2014).

Moreover, sustainable entrepreneurs must contend with balancing the TBL, as prioritising social and environmental objectives may sometimes conflict with short-term financial goals (Fisher et al., 2019), which requires the development of innovative business models that can integrate sustainability considerations while generating adequate financial returns (Osterwalder et al., 2015). Furthermore, sustainable entrepreneurs must navigate the complexities of global supply chains and adapt to shifting consumer preferences, regulatory frameworks, and Industry standards, which may necessitate significant investments in research and development, workforce training, and infrastructure upgrades (Stevenson & Brown, 2018).

2.5.2 Technological Challenges

Adopting and integrating 4IR technologies can be challenging for sustainable entrepreneurs, particularly those operating in resource-constrained settings (Carrillo-Hermosilla et al., 2010). The rapid pace of technological advancements can create knowledge gaps, and the high costs of acquiring and maintaining new technologies may pose significant barriers to entry (Täuscher & Abdelkafi, 2018). Sustainable entrepreneurs must continuously update their technological skills and explore collaborations with technology providers, research institutions, and other stakeholders to address these challenges (Amit & Zott, 2012).

Furthermore, the complexity and interdependence of 4IR technologies can make it difficult for sustainable entrepreneurs to identify the most appropriate solutions for their specific needs and contexts (Nambisan et al., 2019). To overcome this challenge, entrepreneurs should engage in the process of continuous learning and experimentation, leveraging open innovation strategies and multi-stakeholder partnerships to access new ideas, resources, and expertise (Chesbrough & Bogers, 2014). They should also consider developing in-house capabilities and nurturing a culture of innovation that encourages the exploration and adoption of novel technologies and practices (Schwab, 2017).

Additionally, sustainable entrepreneurs may face regulatory and policy challenges associated with adopting 4IR technologies, as existing legal frameworks and standards may not adequately address the unique risks and opportunities presented by these innovations (Winickoff & Pfotenhauer, 2018). To navigate this complex landscape, entrepreneurs should actively engage with policymakers and regulators, promoting and developing enabling policies and regulations that support the growth and diffusion of sustainable technologies and business models (Geels et al., 2016).

2.5.3 Social and Environmental Challenges

Sustainable entrepreneurs must address social and environmental challenges related to the 4IR, such as workforce displacement due to automation, privacy and security concerns, and the environmental impact of technological innovations (Ghisetti et al., 2016). These challenges require sustainable entrepreneurs to

engage with various stakeholders, including employees, customers, and policymakers, to develop solutions that are socially and environmentally responsible (York et al., 2016), which may involve implementing fair labour practices, investing in employee reskilling and upskilling, adopting circular economy principles, and ensuring transparency and accountability throughout the supply chain (Stubbs & Cocklin, 2008).

Moreover, addressing the potential ethical implications of 4IR technologies is critical for sustainable entrepreneurs. Issues like algorithmic bias, surveillance, and digital exclusion can exacerbate social inequalities and undermine trust in technology-driven solutions (Whittlestone et al., 2019). Entrepreneurs should adopt a responsible innovation approach, incorporating ethical considerations into the design, development, and deployment of their products, services, and business models (Stilgoe et al., 2013), which may include establishing ethical guidelines, engaging in stakeholder consultations, and conducting impact assessments to identify and mitigate potential risks and unintended consequences (Brey, 2012).

Another challenge sustainable entrepreneurs face in the context of the 4IR is the need to balance the short-term demands of the market with the long-term goals of sustainability (Markard & Truffer, 2008), which requires entrepreneurs to develop a strategic mindset that embraces the tensions and trade-offs between profitability and sustainability, fostering resilience and adaptability in the face of uncertainty and change (Lozano et al., 2018).

2.5.4 Legal and Regulatory Challenges

Legal and regulatory challenges, such as complex and evolving regulatory frameworks, intellectual property rights, and data protection laws, can impact sustainable entrepreneurs' adoption and implementation of 4IR technologies (Köhler et al., 2019). Sustainable entrepreneurs must stay informed about relevant regulations and collaborate with legal experts to ensure compliance and minimise potential risks (Yun et al., 2018).

One significant legal challenge is navigating the differences in regulations across various jurisdictions, especially for international businesses (Bauer et al., 2020). The

diversity in national laws governing environmental protection, labour standards, and taxation can create additional complexities and compliance burdens for sustainable entrepreneurs (Pauwelyn, 2021). To address these challenges, entrepreneurs should monitor regulatory developments in their target markets, engage in dialogue with regulators, and seek professional advice to adapt their strategies accordingly (Newlands et al., 2021).

Another issue facing sustainable entrepreneurs is the potential for legal disputes and liability arising from implementing 4IR technologies, such as AI, IoT, and robotics (Calo, 2016). These technologies can raise questions about accountability, especially in cases where they cause harm or make autonomous decisions with unintended consequences (Pagallo, 2017). Entrepreneurs should assess the legal implications of their innovations and implement measures to minimise potential liabilities, such as incorporating risk management strategies, maintaining transparency, and ensuring the ethical use of these technologies (Marchant et al., 2020).

Intellectual property rights (IPR) protection is also a critical challenge for sustainable entrepreneurs. The rapid pace of innovation in the 4IR can lead to disputes over patents, copyrights, and trade secrets (Lemley, 2018). Entrepreneurs should develop robust IPR strategies to protect their innovations and avoid infringement issues, which may involve securing patents, registering trademarks, and maintaining confidentiality agreements (Kritikos, 2019). Furthermore, they should consider licensing agreements and collaborative arrangements with other stakeholders to share knowledge and promote the diffusion of sustainable technologies (De Beer et al., 2019).

Data protection and privacy are legal challenges for sustainable entrepreneurs, particularly given the increasing reliance on big data and analytics in the 4IR (Dufft, 2020). Businesses must navigate the complex landscape of data protection laws, such as the European Union's General Data Protection Regulation (GDPR) and similar regulations in different jurisdictions (Zarsky, 2019). To ensure compliance and trust with stakeholders, entrepreneurs should implement data protection

policies, establish unique data collection and usage protocols, and invest in robust cybersecurity measures to safeguard sensitive information (Wachter et al., 2021).

2.6 SUSTAINABLE ENTREPRENEURSHIP STRATEGIES AND SUPPORT

2.6.1 Governmental Support and Policies

Government support and policies play a crucial role in fostering sustainable entrepreneurship, particularly in the context of the 4IR (Nambisan et al., 2019). Governments can provide incentives, such as tax breaks and grants, for sustainable entrepreneurs who adopt 4IR technologies and implement environmentally friendly practices (Ozorhon & Oral, 2017). Additionally, governments can invest in research and development, infrastructure, and education to support the growth and development of sustainable entrepreneurship (Acs et al., 2021).

Moreover, governments can establish regulatory frameworks encouraging businesses to prioritise sustainability and ethical practices (Wiek & Kay, 2015), which may include implementing policies that promote transparency, accountability, and the integration of ESG factors in business decision-making (Ioannou & Serafeim, 2017). Furthermore, governments can promote public-private partnerships and multi-stakeholder collaborations to drive the diffusion of sustainable practices and innovations across industries and sectors (Bocken et al., 2019).

2.6.2 Local Stakeholders and Networking

Collaboration with local stakeholders and networking can support sustainable entrepreneurs in overcoming the challenges associated with the 4IR (Cohen & Muñoz, 2015). By engaging with local communities, Industry associations, and other entrepreneurs, sustainable entrepreneurs can share knowledge, resources, and best practices and develop strategic partnerships that enhance their competitiveness and resilience (Korsgaard et al., 2016).

In addition, sustainable entrepreneurs can benefit from participating in local and regional innovation ecosystems, which can provide access to cutting-edge technologies, research, and expertise (Spigel, 2017). These ecosystems often

involve collaborations between universities, research institutions, government agencies, and Industry partners, fostering a supportive environment for developing and commercialising sustainable innovations (Etzkowitz & Leydesdorff, 2000). Networking within these ecosystems can help entrepreneurs identify new opportunities, build relationships with key stakeholders, and access resources such as funding, mentorship, and talent (Mason & Brown, 2014).

2.6.3 Capacity Building and Skills Development

Capacity building and skills development are essential for sustainable entrepreneurs to successfully navigate the 4IR (Karataş-Ozkan & Chell, 2015), which may involve investing in employee training and development, collaborating with educational institutions to develop relevant curricula, and participating in Industry conferences and workshops to stay informed about the latest technological advancements and market trends (Treiblmaier, 2018).

Moreover, fostering a culture of continuous learning and innovation within organisations can help sustainable entrepreneurs cultivate the necessary competencies to adapt to the rapidly changing landscape of the 4IR (Senge, 2010), which includes developing digital literacy, critical thinking, problem-solving, and creativity skills, as well as promoting collaboration and cross-functional teamwork to facilitate the integration of diverse perspectives and expertise (Nylén & Holmström, 2015). Additionally, partnering with other organisations, such as start-ups, research institutions, and NGOs, can enable sustainable entrepreneurs to access new knowledge, resources, and networks, thus enhancing their capacity to drive sustainable innovation and transformation (Ritala et al., 2015).

2.6.4 Global Best Practices and Lessons Learned

Examining global best practices and lessons learned can provide valuable insights for sustainable entrepreneurs operating in the 4IR (Shepherd & Patzelt, 2011). By learning from other entrepreneurs' and organisations' successes and failures, sustainable entrepreneurs can identify effective strategies and approaches to overcome challenges, adopt innovative technologies, and achieve long-term sustainability (Pacheco et al., 2014).

Benchmarking against Industry leaders and adopting best practices in areas such as corporate governance, stakeholder engagement, and sustainability reporting can also help sustainable entrepreneurs enhance their performance and credibility (Eccles et al., 2012). For instance, analysing case studies of successful sustainable businesses, such as Patagonia, Interface, and Unilever, can offer insights into the key drivers of their success, such as strong leadership, clear vision and values, and the ability to innovate and scale sustainable solutions (Stubbs, 2017).

Furthermore, participating in global sustainability networks and initiatives, such as the United Nations Global Compact, the World Business Council for Sustainable Development, and the Ellen MacArthur Foundation, can provide sustainable entrepreneurs with access to a wealth of resources, tools, and expertise, as well as opportunities for collaboration and learning from peers (Bennett et al., 2018). By staying abreast of emerging trends, best practices, and policy developments, sustainable entrepreneurs can proactively anticipate and respond to the evolving demands and expectations of the 4IR, thereby enhancing their resilience and competitiveness in the long run (Amit & Zott, 2012).

2.7 GOVERNMENTAL SUPPORT AND POLICIES FOR SMMES FROM A SOUTH AFRICAN CONTEXT

2.7.1 The Role of Government in Supporting SMMEs

The South African government plays a critical role in fostering the growth and development of SMMEs by providing support through various initiatives, programmes, and policies. These efforts enhance the competitiveness of SMMEs, promoting inclusive economic growth and addressing the socio-economic challenges, such as unemployment and poverty, that the country faces (Nieuwenhuizen & Groenewald, 2020).

2.7.1.1 Regulatory Environment and Policy Framework

The South African government plays a crucial role in supporting SMMEs by developing and implementing a conducive regulatory environment and policy framework (Rogerson, 2008) which includes policies promoting SMME growth,

reducing bureaucratic red tape, and creating a favourable business climate that encourages innovation and entrepreneurship (Fatoki, 2014). These policies must be designed to address the unique challenges and opportunities presented by the 4IR and should consider the needs of sustainable entrepreneurs (Lindsay et al., 2018).

One of the key policy frameworks for SMME development in South Africa is the National Small Business Act, which outlines the government's commitment to promoting entrepreneurship and the growth of SMMEs (Department of Trade and Industry, 1996). This Act has been revised and updated over the years to reflect the changing needs of the SMME sector, including the National Small Business Amendment Act in 2004, which sought to improve access to finance and reduce the regulatory burden on SMMEs (Chimucheka & Mandipaka, 2015).

In addition to the legislative framework, the South African government has introduced various support initiatives and programmes to assist SMMEs. For instance, the Small Enterprise Development Agency (SEDA) provides non-financial support services to SMMEs, such as business training, mentorship, and market access assistance (SEDA, 2021). Furthermore, the Industrial Development Corporation (IDC) offers financing solutions to SMMEs, including loans, equity investments, and guarantees, to promote industrial development and entrepreneurship (IDC, 2021).

Recognising the potential of sustainable entrepreneurship in addressing the challenges of the 4IR, the South African government has also implemented policies and initiatives targeting the promotion of sustainability in SMMEs. One such initiative is the Green Economy Accord, which seeks to create green jobs and foster a low-carbon, resource-efficient, and socially inclusive economy (Department of Economic Development, 2011). Additionally, the Department of Trade, Industry, and Competition (DTIC) has introduced the Green Industries Action Plan, which aims to support the development of green industries, including sustainable SMMEs, through targeted interventions and incentives (DTIC, 2011).

The Department of Industry and Trade must continuously engage with stakeholders, including SMMEs, Industry associations, and research institutions, to identify

emerging challenges and opportunities in the context of the 4IR (Rogerson, 2019), which may involve conducting regular policy reviews, monitoring the implementation and impact of existing policies, and developing new approaches and strategies that support SMMEs in their transition to sustainable business practices (Herrington & Kew, 2017).

In addition, the local government should consider establishing public-private partnerships and cross-sectoral collaborations to support SMMEs in adopting new technologies, accessing global markets, and implementing sustainable business models (Chimucheka & Mandipaka, 2015). This could include creating innovation hubs, accelerators, and incubators that foster knowledge sharing, networking, and capacity building among SMMEs and providing targeted financial incentives and support for sustainable entrepreneurs (Naidoo, 2020).

Finally, the South African government should prioritise capacity building and skills development in sustainable entrepreneurship by incorporating sustainability education and training into entrepreneurship development programmes and curricula at various levels (Botha et al., 2019). This will help equip entrepreneurs with the knowledge and skills needed to navigate the complexities of the 4IR and contribute to the long-term success and resilience of the SMME sector in South Africa (Tengeh & Choto, 2020).

2.7.1.2 Funding and Financial Assistance

Financial support from the South African government is vital in enabling SMMEs to access capital for starting and growing their businesses and adopting and integrating 4IR technologies (Mudavanhu et al., 2015). This can include grants, low-interest loans, and tax incentives targeted at specific sectors or types of enterprises, such as those focused on sustainability or innovation (Chimucheka, 2013). The government can partner with financial institutions, venture capitalists, and other funding providers to create more accessible and diverse financing options for SMMEs (Mthanti & Ojah, 2017).

Additionally, the South African government can establish public-private partnerships (PPPs) to facilitate access to funding for SMMEs, by leveraging private sector

resources and expertise (Naudé et al., 2021). These partnerships can help bridge the financing gap for SMMEs that face challenges obtaining funding from traditional sources, such as banks, due to their limited credit history or lack of collateral (Kraemer-Eis & Lang, 2014). Furthermore, the government can support the development of alternative financing mechanisms, such as crowdfunding and peer-to-peer lending, which can provide additional funding options for entrepreneurs and small businesses (Bruton et al., 2015).

2.7.1.3 Business Development Services and Capacity Building

The South African government offers various business development services and capacity-building initiatives to support SMMEs. These services include training programmes, mentorship, and technical assistance to help entrepreneurs develop business skills, access new markets, and adopt 4IR technologies (Ligthelm, 2017). Government agencies, such as SEDA and the IDC, play a critical role in providing these services and fostering an enabling environment for SMMEs (Rogerson, 2013).

Additionally, PPPs are instrumental in delivering capacity-building initiatives for South African SMMEs. For example, the National Small Business Chamber (NSBC) works alongside government agencies to offer tailored support services, such as networking events, seminars, and online resources, to help entrepreneurs overcome challenges and capitalise on opportunities (Rankhumise, 2017). Furthermore, organisations like the Technology Innovation Agency (TIA) provide funding, infrastructure, and technical support to stimulate innovation and enhance the competitiveness of SMMEs in technology-driven sectors (Chimucheka, 2015).

The South African government also recognizes the importance of fostering an inclusive entrepreneurial ecosystem that supports historically disadvantaged groups, such as women, youth, and people with disabilities. As a result, targeted initiatives, like the Isivande Women's Fund and the Youth Enterprise Development Strategy, have been introduced to provide specialised support services, access to finance, and mentorship opportunities to these groups (Makgato, 2018). This focus on inclusivity helps ensure that the benefits of entrepreneurship and 4IR

technologies are accessible to all South Africans and contribute to a more equitable society (Fatoki, 2017).

To enhance the effectiveness of business development services and capacity-building initiatives, the South African government has introduced monitoring and evaluation mechanisms to assess the impact of these interventions on SMMEs. These mechanisms allow policymakers to identify gaps in the existing support infrastructure, learn from best practices, and continuously improve the design and delivery of services to meet entrepreneurs' needs better (Molefe et al., 2016). Moreover, fostering a culture of knowledge sharing and collaboration among government agencies, private sector stakeholders, and academic institutions can further strengthen the capacity-building ecosystem for SMMEs (Mthanti & Ojah, 2017).

Despite the numerous business development services and capacity-building initiatives available in South Africa, there remain challenges in terms of accessibility, coordination, and effectiveness. For instance, many SMMEs may not be aware of the support services on offer or may face barriers in accessing them, such as bureaucratic red tape or complex application processes (Chinyamurindi, 2018). Additionally, coordination and collaboration between government agencies and private sector stakeholders could be improved to ensure a more coherent and streamlined approach to SMME support (Herrington et al., 2019).

Lastly, addressing the digital divide issue is crucial and ensuring that SMMEs in rural and underserved areas can benefit from capacity-building initiatives and 4IR technologies. This may involve investing in digital infrastructure, such as broadband connectivity and mobile networks, and tailoring support services to rural entrepreneurs' unique needs and challenges (Nzimakwe & Reddy, 2021).

2.7.2 Evaluation of Local Government Support Programmes in KwaZulu-Natal

2.7.2.1 Effectiveness and Impact on SMME Performance

Local government support programmes in KwaZulu-Natal have shown varying effectiveness in supporting SMMEs. Some programmes, such as the KwaZulu-Natal

Business Support Programme, have positively impacted SMME performance, including improved access to finance, increased productivity, and job creation (Rogerson, 2016). However, there is still room for improvement regarding programme reach, targeting, and coordination among various stakeholders (Nzimakwe, 2014).

Other programmes, such as the KwaZulu-Natal SMME Incubator Programme, have also shown potential in nurturing early-stage entrepreneurs and providing them with resources, mentorship, and market access (Perks & Moolla, 2018). However, these programmes often face challenges related to scalability, sustainability, and the ability to cater to diverse sectors and target groups (Qondi et al., 2020). Moreover, the impact of these support programmes on the overall competitiveness and long-term survival of SMMEs remains an area of ongoing research and debate (Bhorat et al., 2019).

2.7.2.2 Challenges and Opportunities for Improvement

Local government support programmes in KwaZulu-Natal face limited resources, such as inadequate monitoring and evaluation mechanisms, and insufficient public and private sector collaboration (Fatoki, 2014). To improve the effectiveness of these programmes, it is essential to address these challenges by enhancing resource allocation, implementing robust monitoring and evaluation systems, and fostering partnerships with the private sector and other stakeholders (Chimucheka, 2014). Additionally, local governments can focus on supporting sustainable entrepreneurship and 4IR integration to ensure SMMEs are better equipped to navigate the rapidly changing business landscape (Nzimakwe & Mpehle, 2012).

Moreover, it is crucial to enhance the capacity of local government institutions and staff to design, implement, and manage support programmes tailored to the unique needs of SMMEs in the region (Neneh, 2020). This may involve investing in capacity-building initiatives, knowledge-sharing platforms, and international partnerships to learn from global best practices and adapt them to the local context (Odendaal & Tewari, 2019). Furthermore, promoting evidence-based policy-making and adopting a more holistic and integrated approach to SMME support is vital,

considering the interdependencies between economic, social, and environmental dimensions of sustainable entrepreneurship (Lekhanya, 2015).

Another opportunity for improvement lies in the customisation of support programmes to cater to the specific needs of different industries and stages of business development (Mthanti & Ojah, 2017). This could involve the development of specialised incubators, accelerators, and training programmes tailored to the unique challenges and opportunities faced by SMMEs operating in various sectors, such as agriculture, manufacturing, and the digital economy (Qondi et al., 2020).

Furthermore, enhancing the accessibility and inclusiveness of support programmes is crucial in promoting the participation of underrepresented groups, such as women, youth, and rural entrepreneurs, in the SMME sector (Nzimande & Dhliwayo, 2019). This may involve implementing targeted outreach strategies, affirmative action measures, and capacity-building initiatives aimed at addressing the barriers faced by these groups in accessing finance, markets, and other resources (Mthanti & Ojah, 2017).

2.8 CONCLUSION

The Fourth Industrial Revolution presents opportunities and challenges for sustainable entrepreneurship and SMMEs in South Africa, particularly in the eThekwini region of KwaZulu-Natal. To successfully navigate the 4IR and contribute to sustainable development, entrepreneurs and SMMEs must adopt innovative technologies, develop new skills, and engage with various stakeholders. Through policies, incentives, and business development services, government support is crucial in fostering an enabling environment for sustainable entrepreneurship and SMME growth.

While significant progress in supporting sustainable entrepreneurship and SMMEs in South Africa has been made, there is still room for improvement. By learning from global best practices and addressing the challenges associated with the 4IR, sustainable entrepreneurs and SMMEs in South Africa can drive economic growth, social inclusion, and environmental sustainability, ultimately contributing to the realisation of the United Nations SDGs. To achieve this vision, concerted efforts

from all stakeholders, including entrepreneurs, government agencies, private sector actors, and civil society, will be necessary to build a more resilient, inclusive, and sustainable future for South Africa and the broader global community.

CHAPTER THREE

THEORETICAL FRAMEWORK

3.1 INTRODUCTION

This chapter presents a theoretical framework for understanding sustainable entrepreneurship in the context of the Fourth Industrial Revolution. The chapter discusses various theories and concepts relevant to sustainable entrepreneurship, including the Sustainable Development Theory, the Resource-Based View (RBV) Theory, Innovation Systems Theory, the TBL, and Institutional Theory. Additionally, the chapter proposes an integrated framework for analysing sustainable entrepreneurship, drawing on these theories and concepts.

3.2 SUSTAINABLE DEVELOPMENT THEORY

3.2.1 Historical Development

Sustainable development emerged in the 1980s due to increasing global concerns about the environment, social inequality, and economic growth (Brundtland, 1987). The Brundtland Report, published in 1987 by the World Commission on Environment and Development, defined sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (Brundtland, 1987, p. 43). Since then, the concept has evolved and has been adopted by governments, businesses, and civil society organisations worldwide.

The Sustainable Development Theory focuses on three interconnected dimensions: economic, social, and environmental (Pearce et al., 1990). It emphasises the need for a holistic approach to development, addressing the various interdependencies between these dimensions and promoting the integration of economic growth, social equity, and environmental protection (Kates et al., 2005). The concept of sustainable development has been instrumental in shaping international policy frameworks, such as the United Nations (UN) SDGs, which set out a comprehensive agenda for global development until 2030 (United Nations, 2015).

3.2.2 Core Principles and Concepts

Several fundamental principles and concepts underpin the Sustainable Development Theory, such as intergenerational equity, intragenerational equity, the precautionary principle, and the polluter pays principle (Solow, 1991; Haughton, 1999). Intergenerational equity refers to the notion that current generations should not compromise the well-being of future generations by depleting natural resources or causing irreversible environmental damage (Rawls, 1971). Intragenerational equity emphasises the need for fair distribution of resources and opportunities within the current generation, addressing social justice and equity (Daly, 1996).

The precautionary principal advocates for a cautious approach to decision-making when there is uncertainty about the potential impacts of specific actions on the environment or human health (Raffensperger & Tickner, 1999). The polluter pays principle asserts that those responsible for causing pollution or environmental degradation should bear the costs of remediation and prevention (Pearce, 1991).

In addition to these core principles, sustainable development encompasses other elements, such as the principle of common but differentiated responsibilities (CBDR) and the idea of integrating environmental, social, and economic goals (Agarwal & Narain, 1991; Leiserowitz et al., 2006). The CBDR principle recognizes that different countries and actors have varying levels of responsibility for addressing global challenges based on their historical contributions, capacities, and resources (Rajamani, 2006). Integrating environmental, social, and economic goals involves recognizing the interdependencies among these dimensions and seeking solutions that promote synergies and minimise trade-offs (Sachs, 2015).

3.2.3 Application to Sustainable Entrepreneurship

Sustainable entrepreneurship incorporates the principles of sustainable development by creating innovative business models and practices that contribute to economic growth, social equity, and environmental protection (Schaltegger & Wagner, 2011). Sustainable entrepreneurs seek to address societal and ecological challenges by creating new products, services, and business models contributing to a more sustainable economy (Cohen & Winn, 2007). Sustainable entrepreneurs can

foster long-term business viability by adopting sustainable development principles and contributing to achieving the UN SDGs (Amit & Zott, 2012).

In sustainable entrepreneurship, the main principles of sustainable development can be promoted in various ways. For example, intergenerational equity may manifest in businesses that prioritise long-term value creation and invest in research and development to ensure their products and services remain viable and relevant in the future (Hart & Milstein, 2003). Equity integration can be implemented by supporting fair labour practices, inclusive growth, and the economic empowerment of marginalised communities (Murillo & Lozano, 2006).

The precautionary principle can guide sustainable entrepreneurs in adopting eco-friendly technologies and practices, even without complete scientific certainty about their potential benefits (O'Riordan & Cameron, 1994). Meanwhile, the polluter pays principle can inform sustainable business models that internalise environmental costs and incentivise resource efficiency and waste reduction (Porter & van der Linde, 1995). The focus of CBDR encourages sustainable entrepreneurs to consider the diverse contexts in which they operate and tailor their strategies to address the unique needs and capacities of various stakeholders (Hall et al., 2012).

Integrating environmental, social, and economic goals in sustainable entrepreneurship involves balancing competing priorities and finding innovative solutions that generate value across multiple dimensions (Stubbs & Cocklin, 2008), which may entail developing products and services that cater to underserved markets, implementing resource-efficient production processes, or fostering collaborative partnerships with other businesses, governments, and civil society organisations to scale sustainable innovations (Seelos & Mair, 2005; Schaltegger et al., 2016).

By applying the principles and concepts of Sustainable Development Theory, sustainable entrepreneurs can better navigate the complex and interconnected challenges facing the global economy, society, and environment. Moreover, their efforts can contribute to the broader transformation towards a more sustainable and

inclusive future, in line with the objectives of the UN SDGs (Bocken et al., 2014; United Nations, 2015).

3.3 RESOURCE-BASED VIEW (RBV) THEORY

3.3.1 Historical Development

The RBV is a strategic management theory that emerged in the 1980s as a response to the limitations of the traditional industrial organisation (IO) approach, which focused on external factors such as market structure and competitive forces (Wernerfelt, 1984). RBV focuses on a firm's internal resources and capabilities, arguing that these can provide a sustainable competitive advantage (Barney, 1991).

The development of the RBV theory can be traced back to the seminal work of Edith Penrose, who, in her book "The Theory of the Growth of the Firm" (1959), emphasised the role of a firm's unique resources and managerial capabilities in shaping its growth trajectory. RBV gained widespread acceptance in the 1990s, with influential publications by Jay Barney, Birger Wernerfelt, and others (Barney, 1986; Wernerfelt, 1984). Over time, the theory has evolved to incorporate various concepts such as dynamic capabilities (Teece et al., 1997) and the knowledge-based view (Grant, 1996), which emphasise the role of a firm's ability to learn, adapt, and innovate in maintaining a competitive advantage.

3.3.2 Key Principles and Concepts

The core tenet of the RBV theory is that a firm's resources and capabilities are the primary drivers of its competitive advantage and performance (Barney, 1991). Resources can be tangible (e.g., financial assets, physical assets) or intangible (e.g., human capital, organisational culture, brand reputation). At the same time, capabilities refer to the firm's ability to deploy and combine resources effectively to achieve its objectives (Grant, 1991). According to RBV, a competitive advantage can be sustained if a firm possesses resources and capabilities that are valuable, rare, inimitable, and non-substitutable (VRIN) (Barney, 1991).

Valuable resources and capabilities contribute to the firm's ability to exploit opportunities or neutralise threats in the market (Barney, 1991). Rare resources and

capabilities are those that few competitors possess, making them sources of differentiation (Wernerfelt, 1984). Inimitable resources and capabilities are complex for competitors to replicate due to unique historical conditions, causal ambiguity, or social complexity (Barney, 1986). Non-substitutable resources and capabilities have no strategic equivalents, meaning that competitors cannot easily replace them with other resources or capabilities to achieve similar outcomes (Barney, 1991).

3.3.3 Application to Sustainable Entrepreneurship

The RBV theory has significant implications for sustainable entrepreneurship, as it highlights the importance of leveraging a firm's unique resources and capabilities to create and maintain a competitive advantage in the context of sustainability (Hart, 1995). Sustainable entrepreneurs can identify and develop VRIN resources and abilities related to sustainability, such as eco-innovations, green supply chain management, stakeholder engagement, and sustainable business models (Hart & Dowell, 2011).

By focusing on developing and deploying sustainability-related resources and capabilities, sustainable entrepreneurs can differentiate themselves from competitors and create new market opportunities (Schaltegger & Wagner, 2011). For example, firms that excel in sustainability-driven innovation may gain a first-mover advantage, enabling them to establish market leadership and set Industry standards (Porter & van der Linde, 1995). Similarly, firms with solid capabilities in stakeholder engagement can build trust and credibility with customers, investors, and regulators, further enhancing their competitive position (Freeman et al., 2010).

Furthermore, the RBV theory suggests that sustainable entrepreneurship requires the identification and development of sustainability-related resources and capabilities and their effective integration and alignment with the firm's overall strategy (Hart, 1995), which may involve creating a culture of sustainability within the organisation, promoting cross-functional collaboration, and fostering continuous learning and improvement in sustainability practices (Shrivastava, 1995; Linnenluecke & Griffiths, 2010).

Sustainable entrepreneurship can also benefit from dynamic capabilities, which refer to a firm's ability to sense, seize, and reconfigure resources and capabilities in response to changing market conditions and emerging opportunities (Teece et al., 1997). By developing dynamic capabilities related to sustainability, sustainable entrepreneurs can better adapt to the evolving sustainability landscape, anticipate future trends and challenges, and seize new market opportunities (Hart & Dowell, 2011). Moreover, the knowledge-based view of the firm, an extension of the RBV theory, highlights the importance of knowledge as a critical resource for sustainable entrepreneurship (Grant, 1996).

3.4 INNOVATION SYSTEMS THEORY

3.4.1 Historical Development

Innovation Systems Theory emerged in the 1990s as a response to traditional innovation theories' limitations, which focused on individual actors and linear innovation models (Lundvall, 1992). The concept of innovation systems emphasises the interconnectedness of various actors and institutions involved in the innovation process and recognizes the importance of feedback loops, knowledge flows, and learning (Edquist, 1997).

The origins of Innovation Systems Theory can be traced back to the work of scholars like Christopher Freeman, Bengt-Åke Lundvall, and Richard Nelson, who introduced the concepts of national innovation systems, regional innovation systems, and sectoral innovation systems, respectively (Freeman, 1987; Lundvall, 1992; Nelson, 1993). These scholars argued that innovation processes are shaped by the institutional contexts and relationships between actors within a particular system, which can be national, regional, or sector specific. Over time, the theory has been refined further and expanded to include other innovation systems, such as technological and global ones (Carlsson & Stankiewicz, 1991; Archibugi & Iammarino, 2002).

3.4.2 Key Principles and Concepts

At the core of Innovation Systems Theory is the idea that innovation is a systemic, interactive, and dynamic process driven by the interplay of various actors and institutions within a specific context (Lundvall, 1992; Edquist, 1997).

Actors in an innovation system can include firms, universities, research institutes, government agencies, and NGOs, among others (Freeman, 1987). Institutions, in this context, refer to the formal and informal rules, norms, and practices that shape the interactions and behaviour of actors within the system (North, 1990). Critical elements of an innovation system include knowledge generation and diffusion, learning processes, networks and linkages, and the institutional framework that supports innovation (Edquist, 2005).

Knowledge generation and diffusion involve creating, disseminating, and applying new knowledge within the system (Lundvall, 1992). Learning processes refer to the acquisition and development of new skills, competencies, and capabilities by actors within the system and the adaptation and improvement of existing ones (Nelson & Winter, 1982). Networks and linkages encompass the relationships and collaborations between actors, facilitating knowledge flows, resource sharing, and joint problem-solving (Powell et al., 1996). The institutional framework consists of the policies, regulations, standards, and cultural norms that influence the innovation process and shape the incentives and constraints actors face in the system (Edquist & Johnson, 1997).

3.4.3 Application to Sustainable Entrepreneurship

Innovation Systems Theory has important implications for sustainable entrepreneurship, highlighting the critical role of collaboration, learning, and institutional support in fostering sustainable innovations (Kemp et al., 1998). Sustainable entrepreneurs can leverage their innovation systems' knowledge, resources, and networks to develop and diffuse new products, services, and business models that contribute to sustainability (Cohen & Winn, 2007).

By engaging with diverse stakeholders, such as customers, suppliers, competitors, research institutions, and policymakers, sustainable entrepreneurs can access valuable insights, expertise, and resources to help them identify and exploit sustainability-related opportunities (Hall et al., 2010). Furthermore, sustainable entrepreneurs can contribute to their innovation systems' overall development and performance by sharing their knowledge and experiences, participating in collaborative initiatives, and advocating for supportive policies and regulations (York & Venkataraman, 2010).

Understanding the dynamics and structures of their innovation systems can also help sustainable entrepreneurs identify and address potential barriers to adopting and diffusion of sustainable innovations, such as technological lock-in, path dependencies, and institutional inertia (Unruh, 2000; Geels, 2002). By actively engaging in efforts to shape their innovation systems, sustainable entrepreneurs can help create more favourable conditions for the emergence and growth of sustainable enterprises and markets (Schaltegger & Wagner, 2011).

Moreover, the innovation systems perspective highlights the importance of continuous learning and adaptation in sustainable entrepreneurship (Lundvall, 1992; Loorbach & Wijsman, 2013). Sustainable entrepreneurs need to constantly monitor and assess the performance of their products, services, and business models, as well as the broader trends and developments in their innovation systems, to identify areas for improvement and potential sources of competitive advantage (Nidumolu et al., 2009). This emphasis on learning and adaptation can help sustainable entrepreneurs navigate the complexities and uncertainties associated with sustainability challenges and stay ahead of the curve in an ever-changing competitive landscape (Schneider & Spieth, 2013; Bocken et al., 2019).

Furthermore, recent research has highlighted the role of sustainable entrepreneurship in fostering systemic transformations towards more sustainable pathways (Geels et al., 2018; Markard et al., 2021). By developing and promoting disruptive innovations that challenge incumbent technologies, business models, and practices, sustainable entrepreneurs can contribute to reconfiguring existing

innovation systems and creating new ones that better align with sustainability goals (Köhler et al., 2019; Geels, 2020).

In this context, sustainable entrepreneurs can act as change agents by leveraging their position within the innovation system to influence the behaviour and strategies of other actors, such as incumbent firms, policymakers, and consumers, and facilitate the adoption and diffusion of sustainable innovations (Battilana et al., 2012; Hockerts & Wüstenhagen, 2020). This may involve building coalitions and alliances with like-minded actors, participating in standard-setting and policy-making processes, and engaging in public discourse and advocacy efforts to promote sustainability-oriented values and norms (Wittmayer & Schäpke, 2014; Fichter & Clausen, 2020).

Overall, Innovation Systems Theory provides a valuable framework for understanding and analysing the role of sustainable entrepreneurship in driving systemic change and fostering the transition towards a more sustainable economy (Kemp et al., 1998; Loorbach et al., 2021). By adopting a systems perspective and actively engaging with the various actors and institutions within their innovation systems, sustainable entrepreneurs can maximise their impact and contribute to achieving long-term sustainability goals (Ritala et al., 2020; Pérez-López et al., 2021). This includes identifying and capitalising on emerging trends and opportunities and adapting to changing market dynamics and regulatory environments (Gasbarro et al., 2017; Pacheco et al., 2021). It is essential for sustainable entrepreneurs to develop robust networks and foster collaboration within their innovation systems to create synergies and unlock the full potential of sustainable innovations (Santos et al., 2019; Wijaya et al., 2021). By connecting with diverse stakeholders, such as investors, academics, and policymakers, sustainable entrepreneurs can access crucial resources and knowledge that facilitate their innovations' development, commercialisation, and scaling (Mazzucato & Penna, 2016; Stubbs et al., 2021).

Additionally, sustainable entrepreneurs must be aware of the potential pitfalls and challenges associated with the systemic nature of sustainability transitions, such as

the risk of unintended consequences and trade-offs (Korhonen et al., 2018; Geels, 2021). By adopting a holistic and systemic perspective on sustainable entrepreneurship, researchers, practitioners, and policymakers can better anticipate and address these challenges and work together to create the enabling conditions necessary for the widespread diffusion and adoption of sustainable innovations (Caniëls et al., 2019; Karatas-Ozkan et al., 2021).

In conclusion, Innovation Systems Theory offers a valuable lens through which to examine the role of sustainable entrepreneurship in driving systemic change and fostering the transition towards a more sustainable economy. By understanding the dynamics and structures of their innovation systems, sustainable entrepreneurs can better navigate the complexities and uncertainties associated with sustainability challenges, build robust networks, and contribute to sustainable development (Hockerts & Wüstenhagen, 2010; Foote et al., 2021).

3.5 TRIPLE BOTTOM LINE THEORY

3.5.1 Historical Development

The TBL concept was introduced by John Elkington in 1994 as a way to expand the traditional financial accounting framework to include social and environmental dimensions (Elkington, 1994). The TBL framework encourages businesses to measure and report their economic value and social and ecological performance (Elkington, 1998). Since its introduction, organisations worldwide have widely adopted the TBL concept. It has influenced the development of various sustainability reporting standards, such as the Global Reporting Initiative (GRI) and the Sustainability Accounting Standards Board (SASB) (Adams, 2017; Gibson et al., 2019).

The TBL framework has evolved over time, with an increasing focus on integrating the three dimensions and developing more comprehensive and consistent reporting methodologies and metrics (Milne & Gray, 2013; Michelon et al., 2018). This evolution has been driven by various factors, including the growing recognition of the importance of sustainability for business success, the need for improved

transparency and accountability, and the influence of regulatory and voluntary initiatives (Stubbs, 2017; de Lange et al., 2021).

3.5.2 Core Principles

The TBL has three interconnected dimensions: economic, social, and environmental performance (Elkington, 1994). Economic performance refers to the financial health and profitability of an organisation. In contrast, social performance encompasses the impacts of an organisation's activities on its stakeholders, including employees, customers, suppliers, and local communities (Slaper & Hall, 2011). The environmental performance addresses the ecological impacts of an organisation's operations, such as resource use, waste generation, and emissions (Elkington, 1998). The TBL framework emphasises that organisations should balance and integrate these three dimensions to achieve long-term sustainability and success (Norman & MacDonald, 2004; Hall, 2011).

3.5.3 Application to Sustainable Entrepreneurship

The TBL provides a comprehensive framework for sustainable entrepreneurs to assess and communicate their sustainability performance (Stubbs & Cocklin, 2008; Schaltegger et al., 2021). By adopting the TBL approach, sustainable entrepreneurs can ensure that their business models and practices generate economic and social and environmental value (Schaltegger & Wagner, 2011). For instance, sustainable entrepreneurs can invest in eco-efficient technologies, engage in fair labour practices, and support community development initiatives (Parrish, 2010; Bocken & Short, 2016).

By doing so, sustainable entrepreneurs can positively impact society and the environment while enhancing their competitiveness and long-term business viability (Cohen & Winn, 2007; Hockerts & Wüstenhagen, 2010). The TBL framework also helps sustainable entrepreneurs identify potential synergies and trade-offs between the three dimensions, enabling them to make more informed and balanced decisions (Szekely & Knirsch, 2005; Schaltegger & Burritt, 2018). Moreover, adopting the TBL approach can facilitate stakeholder engagement and dialogue, as it encourages businesses to be transparent about their sustainability performance

and to address their stakeholders' diverse needs and expectations (Adams et al., 2016; Gibson et al., 2019).

The TBL framework has increasingly integrated with other sustainability-related concepts and tools, such as the circular economy, life cycle assessment, and the UN SDGs (Geissdoerfer et al., 2017; Clancy et al., 2020). This integration highlights the growing recognition of the interdependence between various aspects of sustainability and the need for a more holistic and systemic approach to sustainable entrepreneurship (Korhonen et al., 2018; Foss & Saebi, 2019).

Furthermore, the TBL framework has inspired the development of various assessment tools and methodologies to help sustainable entrepreneurs measure and manage their sustainability performance more effectively (Stubbs, 2017; Henriques, 2020). For example, the GRI and SASB standards provide guidelines for sustainability reporting, while the B Corporation certification offers a comprehensive assessment framework for businesses that seek to create positive social and environmental impact (Honeyman, 2014; Adams, 2017).

It is important to note that while the TBL framework provides a useful starting point for sustainable entrepreneurs, it is not without limitations and challenges. Critics argue that the TBL framework can oversimplify complex sustainability issues, leading to potential trade-offs and conflicts between the three dimensions (Norman & MacDonald, 2004; Milne & Gray, 2013). Additionally, there is a lack of consensus on the appropriate metrics and indicators for measuring social and environmental performance, making it difficult for sustainable entrepreneurs to accurately assess their impact (Bansal, 2005; Gibson et al., 2019).

To address these limitations, researchers and practitioners have proposed various refinements and extensions to the TBL framework, such as integrating stakeholder theory, developing more context-specific indicators, and incorporating dynamic capabilities and systems thinking perspectives (Mitchell et al., 2015; Waas et al., 2018; Elg et al., 2020). These advances suggest that the TBL framework is continually evolving, and its relevance to sustainable entrepreneurship is likely to

grow as our understanding of sustainability challenges and opportunities deepens (Hahn et al., 2018; Montiel & Delgado-Ceballos, 2020).

In summary, the TBL framework has significantly influenced the field of sustainable entrepreneurship by providing a comprehensive and integrative approach to assessing and managing sustainability performance. While the TBL framework has limitations and challenges, its ongoing refinement and integration with other sustainability concepts and tools suggest that it will continue to play a vital role in guiding sustainable entrepreneurs in pursuing economic, social, and environmental value creation.

3.6 INSTITUTIONAL THEORY

3.6.1 Historical Development

Institutional Theory originated in sociology in the early 20th century, with the works of scholars such as Max Weber and Talcott Parsons, and later gained prominence in organisational studies and strategic management in the 1970s and 1980s (Scott, 2008). The theory focuses on the role of institutions, defined as the formal and informal rules, norms, and practices that shape the behaviour of individuals and organisations within a given context (North, 1990; Scott, 2008). Institutional Theory posits that organisations are influenced by and embedded within a complex web of institutional pressures and expectations, which can shape their strategies, structures, and actions (DiMaggio & Powell, 1983; Meyer & Rowan, 1977).

3.6.2 Core Principles

Institutional Theory distinguishes between three main types of institutional pressures: regulative, normative, and cognitive (Scott, 2008). Regulative tensions stem from ceremonial laws, regulations, and policies enforced through coercive mechanisms such as fines, sanctions, and legal action (Scott, 2008). Normative pressures derive from societal norms, values, and expectations, transmitted through professional associations, social networks, and cultural practices (Scott, 2008). Mental tensions arise from shared beliefs, mental models, and taken-for-granted assumptions reinforced through socialisation, imitation, and learning (Scott, 2008).

Organisations face pressures to conform to these institutional expectations, as conformity can increase legitimacy, resources, and survival chances (Di Maggio & Powell, 1983; Meyer & Rowan, 1977). However, organisations may also face conflicting institutional pressures or opportunities for strategic nonconformity, leading to variation and change in organisational behaviour (Oliver, 1991; Pache & Santos, 2010). Institutional Theory, therefore, provides a framework for understanding the complex interplay between organisations and their institutional environments and the potential for organisational innovation, adaptation, and transformation (Scott, 2008; Greenwood et al., 2011).

3.6.3 Application to Sustainable Entrepreneurship

Institutional Theory offers valuable insights into sustainable entrepreneurship by highlighting the role of institutions in shaping the opportunities, constraints, and incentives for sustainable business practices (York et al., 2016; Wijen & Ansari, 2007). Sustainable entrepreneurs operate within a complex institutional environment, characterised by diverse and sometimes conflicting pressures related to sustainability, innovation, and competitiveness (Hall et al., 2010; Dacin et al., 2011).

For instance, sustainable entrepreneurs may face regulatory pressures to adopt more environmentally friendly technologies or socially responsible practices while confronting normative forces from customers, investors, and peers to demonstrate their commitment to sustainability (Battilana et al., 2015; Aguilera-Caracuel et al., 2020). At the same time, sustainable entrepreneurs may need to navigate cognitive pressures arising from dominant Industry paradigms, mental models, and taken-for-granted assumptions that may either support or hinder the adoption of sustainable innovations (Hargrave & Van de Ven, 2006; Geels, 2014).

By drawing on Institutional Theory, sustainable entrepreneurs can develop a more intricate understanding of the institutional landscape in which they operate and identify potential levers for change and opportunities for creating value (York et al., 2016; Tracey et al., 2011). For example, sustainable entrepreneurs can engage in institutional entrepreneurship, which involves actively shaping and transforming the

institutional environment to create more favourable conditions for sustainable innovation and value creation (Battilana et al., 2009; Lawrence & Suddaby, 2006). This may involve challenging existing norms, building new alliances, and mobilising resources to advocate for policy reforms, Industry standards, or cultural shifts that support the diffusion and adoption of sustainable practices (Wijen & Ansari, 2007; Garud et al., 2007).

Moreover, Institutional Theory can help sustainable entrepreneurs identify potential sources of competitive advantage and differentiation within their institutional context (Rivera-Santos et al., 2012; Lenox & Eesley, 2009). For instance, sustainable entrepreneurs can leverage their unique institutional knowledge, networks, and capabilities to identify untapped market niches, develop innovative business models, and create new forms of value that address societal and environmental challenges (York & Venkataraman, 2010; Parrish, 2010). By doing so, sustainable entrepreneurs can contribute to the broader institutional change and transformation process towards more sustainable economic, social, and environmental outcomes (De Clercq & Voronov, 2009; Linnenluecke & Griffiths, 2010).

Furthermore, Institutional Theory highlights the importance of institutional legitimacy in the success of sustainable entrepreneurship ventures (Suchman, 1995; Zimmerman & Zeitz, 2002). Legitimacy refers to the extent to which an organisation's actions and practices are perceived as desirable, proper, and appropriate within its institutional environment (Aldrich & Fiol, 1994; Bitektine, 2011). Sustainable entrepreneurs need to acquire and maintain legitimacy to attract resources, customers, and other stakeholders and navigate the complex and sometimes conflicting institutional pressures they face (DiMaggio & Powell, 1983; Delmas & Toffel, 2008).

To achieve legitimacy, sustainable entrepreneurs can adopt various strategies, such as conforming to existing norms and standards, differentiating themselves through innovative practices or products, or actively shaping and influencing the institutional environment to create new models and expectations (Deephouse & Suchman, 2008; De Clercq & Voronov, 2009). By doing so, sustainable entrepreneurs can

build credibility, trust, and support from various stakeholders, ultimately enhancing their competitiveness and long-term viability (Hahn et al., 2016; Lounsbury & Glynn, 2001).

In summary, Institutional Theory provides a rich and multifaceted perspective on sustainable entrepreneurship, shedding light on the complex interplay between sustainable entrepreneurs and their institutional environments. By understanding and leveraging the institutional context, sustainable entrepreneurs can identify opportunities for innovation, value creation, and positive impact while navigating the diverse and sometimes conflicting pressures and expectations they face.

3.7 SYNTHESISING THEORIES INTO AN INTEGRATED FRAMEWORK

3.7.1 Rationale for Integration

The various theories discussed in this chapter offer valuable insights into different aspects of sustainable entrepreneurship. However, a comprehensive understanding of sustainable entrepreneurship in the context of the Fourth Industrial Revolution requires an integrated approach that draws on the strengths of each theory while acknowledging their interdependencies and potential synergies (George et al., 2016; Schaltegger & Wagner, 2011). An integrated framework can provide a more holistic understanding of the factors, processes, and mechanisms that influence sustainable entrepreneurship and help guide future research and practice in this field (Aguinis & Glavas, 2019; Parrish, 2010).

3.7.2 Proposed Integrated Framework

The proposed framework integrates the key concepts and principles from Sustainable Development Theory, RBV Theory, Innovation Systems Theory, TBL, and Institutional Theory to provide a comprehensive and coherent approach to understanding sustainable entrepreneurship in the Fourth Industrial Revolution. The framework is built on the following components:

Sustainable Development Goals (SDGs): The framework recognises aligning entrepreneurial activities with the UN Sustainable Development Goals to ensure

long-term sustainability and contribute to global development priorities (Amit & Zott, 2012; Sachs, 2015).

Resources and Capabilities: Drawing on the RBV, the framework emphasises the importance of leveraging a firm's unique resources and capabilities to create sustainable value and competitive advantage (Hart & Dowell, 2011; Hitt et al., 2016). It also highlights the role of dynamic capabilities in adapting and evolving to meet changing market demands and emerging sustainability challenges (Teece, 2007).

Innovation Systems: The framework incorporates the Innovation Systems Theory, highlighting the role of various actors and institutions in supporting the development and diffusion of sustainable innovations (Kanda & Kivimaa, 2020; Edquist & Johnson, 2021). It acknowledges the importance of collaboration, networks, and knowledge sharing in fostering innovation and driving sustainable entrepreneurship (Bergek et al., 2008).

Triple Bottom Line Performance: The framework adopts the TBL approach, emphasising the need for organisations to balance and integrate economic, social, and environmental performance to achieve long-term sustainability and success (Norman & MacDonald, 2004; Slaper & Hall, 2011). It also highlights the role of integrated reporting and performance measurement in driving transparency and accountability in sustainable entrepreneurship (Adams, 2017; Eccles & Serafeim, 2013).

Institutional Environment: The framework incorporates Institutional Theory, recognising the influence of regulative, normative, and cultural-cognitive forces on sustainable entrepreneurship and the potential for institutional entrepreneurship to shape more favourable conditions for sustainable business practices (Battilana et al., 2017; DiMaggio & Powell, 1983). It also underscores the importance of engaging with stakeholders, including policymakers, investors, and consumers, to drive systemic change and advance sustainable entrepreneurship (Yunus et al., 2010).

By integrating these components, the proposed integrated framework offers a comprehensive and coherent approach to understanding and promoting sustainable entrepreneurship in the context of the Fourth Industrial Revolution. This framework

can guide future research, policy, and practice in sustainable entrepreneurship, helping to identify and address the complex challenges and opportunities that arise in an increasingly digitalised and interconnected global economy (Schwab, 2016; George et al., 2016).

The framework also recognises the need for a systemic perspective on sustainable entrepreneurship, acknowledging that individual firms are embedded in complex networks of relationships and interdependencies with other actors and institutions (Freeman, 1984; Austin et al., 2006). As a result, sustainable entrepreneurship requires a multi-level approach that considers not only the micro-level actions of individual entrepreneurs and firms but also the meso-level dynamics of industries and markets and the macro-level context of societal norms, values, and policies (Spencer et al., 2011; Sarasvathy & Venkataraman, 2011).

Moreover, the framework emphasises the importance of continuous learning, adaptation, and innovation in rapidly changing technologies, market conditions, and societal expectations (Dacin et al., 2010; Teece, 2007). In the context of the Fourth Industrial Revolution, sustainable entrepreneurs must be agile and resilient, embracing digital technologies, such as AI, robotics, and the IoT, to create new business models, products, and services that promote sustainability while also ensuring economic viability and competitiveness (Brynjolfsson & McAfee, 2014; Nidumolu et al., 2009).

It also highlights the critical role of leadership and organisational culture in driving sustainable entrepreneurship (Schein, 2010; Linnenluecke, 2017). Sustainable entrepreneurs must cultivate a culture of sustainability within their organisations, embedding sustainability values and principles into their strategies, structures, and decision-making processes (Egri & Herman, 2000; Marcus & Fremeth, 2009). In doing so, they can foster a shared commitment to sustainability among their employees, stakeholders, and partners and encourage the development of innovative and collaborative approaches to addressing environmental, social, and economic challenges (Hart, 1995; Waddock & McIntosh, 2011).

Furthermore, the it underscores the significance of stakeholder engagement and collaboration in achieving sustainable entrepreneurship (Freeman, 1984; Mitchell et al., 1997). By actively involving a diverse range of stakeholders, including customers, suppliers, regulators, investors, and civil society organisations, sustainable entrepreneurs can identify emerging sustainability challenges, co-create innovative solutions, and build a broad base of support for their initiatives (Hart & Sharma, 2004; Bocken et al., 2014). This framework can also serve as a foundation for future empirical research, providing scholars with a comprehensive lens to investigate sustainable entrepreneurship's antecedents, dynamics, and outcomes in various contexts and settings. Additionally, the framework can inform the development of practical tools, guidelines, and policies to support sustainable entrepreneurs, helping them navigate the challenges and opportunities that arise in the Fourth Industrial Revolution. Policymakers and business leaders can use the framework to design and implement strategies that foster a more sustainable and inclusive economy, promoting the diffusion of sustainable innovations, the responsible use of resources, and the equitable distribution of benefits and opportunities.

The framework also highlights the importance of continuous learning and adaptation for sustainable entrepreneurs in the context of the Fourth Industrial Revolution (Senge, 1990; Weick & Quinn, 1999). As new technologies, business models, and societal expectations emerge, sustainable entrepreneurs must continually reassess and refine their strategies, practices, and performance metrics to stay ahead of the curve and respond effectively to the evolving sustainability landscape (DeSimone & Popoff, 2000; Hargadon, 2003).

Finally, it underscores the role of education and capacity building in fostering sustainable entrepreneurship (Korhonen & Seager, 2008; Wiek et al., 2011). Educating entrepreneurs with the knowledge, skills, and competencies needed to develop and implement sustainable business models and practices, educational institutions, and training programmes can be critical in catalysing the transition to a more sustainable and inclusive global economy.

3.8 CONCLUSION

This chapter has presented a theoretical framework for understanding sustainable entrepreneurship in the context of the Fourth Industrial Revolution by integrating key concepts and principles from Sustainable Development Theory, RBV Theory, Innovation Systems Theory, TBL, and Institutional Theory. The proposed integrated framework offers a comprehensive and coherent approach to understanding the factors, processes, and mechanisms that influence sustainable entrepreneurship, providing a valuable foundation for future research, policy, and practice in this field.

CHAPTER FOUR

RESEARCH METHODOLOGY

4.1 INTRODUCTION

This chapter outlines the research methodology employed in this study, which focuses on an enterprise sustainability framework for harnessing sustainable entrepreneurship in the 4th Industrial Revolution. The chapter begins with an explanation of the research paradigm, including a discussion of the interpretivism philosophy and the rationale for adopting it. Subsequently, the research design is discussed, highlighting the qualitative research approach and its rationale. The research strategy is then presented, focusing on the phenomenological research approach and its rationale. The population and sampling section provides information on the population of the study, sample size, and sampling strategy. The data collection and analysis section covers the procedures, techniques, and tools used in the study. Trustworthiness and validity are then discussed, followed by the ethical considerations observed during the study. The chapter concludes with a summary of the research methodology and its significance to the study.

4.2 RESEARCH PARADIGM

A research paradigm is a set of shared beliefs, values, and practices that guide the way researchers view the world and conduct their research (Denzin & Lincoln, 2018). Several research paradigms in social science include positivism, interpretivism, critical theory, and pragmatism. Each paradigm has unique ontological, epistemological, and methodological assumptions that inform research design, data collection, and data analysis techniques (Creswell & Poth, 2018). This study adopted an interpretivism paradigm, which is discussed in more detail below.

4.2.1 Interpretivism Philosophy

Interpretivism is a research paradigm that emphasises the importance of understanding individuals' subjective experiences and interpretations in their social context (Bryman, 2016). This paradigm is grounded in the belief that reality is

socially constructed and can only be understood through the meanings and interpretations individuals attach to their experiences (Crotty, 1998). Interpretivists argue that human behaviour is complex, context-dependent, and influenced by individual beliefs, values, and social norms, making it essential to study people in their natural settings (Geertz, 1973).

Interpretive researchers employ qualitative methods to explore participants' lived experiences, perceptions, and interpretations, focusing on their emic (insider) perspectives (Schwandt, 2015). They use various data collection techniques such as in-depth interviews, observations, and document analysis to capture rich, contextualised data that reflects the complexity of the social world (Denzin & Lincoln, 2018). Interpretive research aims to generate a holistic, context-specific insights and contribute to a deeper understanding of social phenomena (Bryman, 2016).

4.2.2 Rationale for Adopting Interpretivism

The rationale for adopting an interpretivism paradigm in this study was based on the nature of the research questions, which sought to explore the factors influencing sustainable entrepreneurship in the 4th Industrial Revolution, the challenges faced by entrepreneurs, and the impact of governmental support. These questions required an in-depth understanding of the subjective experiences, perceptions, and interpretations of entrepreneurs and other stakeholders in their social and economic context (Littlewood & Holt, 2018). Interpretivism provided a suitable framework for exploring these complex, context-dependent issues and generating insights that can inform the development of an enterprise sustainability framework for SMMEs in the digital age.

Furthermore, interpretivism is well-suited to studying organisations and their people, as it acknowledges the importance of individual beliefs, values, and social norms in shaping organisational behaviour and decision-making (Leung, 2015). By adopting an interpretive approach, the researcher explored the unique experiences and perspectives of SMME owners and managers in the eThekwini region of KwaZulu-Natal, shedding light on the challenges and opportunities they faced in adapting to the 4th Industrial Revolution. This approach also enabled the researcher to examine

the role of governmental institutions in supporting sustainable entrepreneurship and fostering an enabling environment for SMMEs in the digital age.

4.3 RESEARCH DESIGN

A research design is a plan that guides the researcher in collecting, analysing, and interpreting data (Creswell & Poth, 2018). It provides a framework for addressing the research questions and achieving the study's objectives. This study employed a phenomenological research design, discussed in more detail below.

4.3.1 Qualitative Research Design: Phenomenological Research

Phenomenology is a qualitative research design that seeks to describe the lived experiences of individuals concerning a particular phenomenon (Creswell & Poth, 2018). It is rooted in the philosophical tradition of phenomenology, which emphasises the importance of understanding human experiences from the perspective of those who live them (Moustakas, 1994). Phenomenological researchers aim to explore a phenomenon's essence or underlying structure by examining the commonalities and variations in the experiences of different individuals (Smith, Flowers, & Larkin, 2009).

Phenomenological research involves the collection of detailed, first-person accounts of participants' experiences, usually through in-depth interviews, and systematically analysing these accounts to identify patterns, themes, and structures that capture the essence of the phenomenon under investigation (Creswell & Poth, 2018). This approach is particularly well-suited to the study of complex, multifaceted issues that require a deep understanding of individuals' lived experiences and perspectives in their social and cultural context (Moustakas, 1994).

4.3.2 Rationale for Adopting a Phenomenological Design

The rationale for adopting a phenomenological research design in this study is based on the research questions and objectives, which focused on understanding the factors influencing sustainable entrepreneurship in the 4th Industrial Revolution, the challenges faced by entrepreneurs, and the impact of governmental support from the perspective of those who experienced them. A phenomenological approach

allowed the researcher to delve into the lived experiences of SMME owners and managers in the eThekwini region of KwaZulu-Natal, capturing rich, contextualised data that reflect the unique challenges and opportunities they faced in adapting to the digital age (Smith et al., 2009).

Furthermore, a phenomenological design was well-suited to the study of complex, context-dependent issues, such as sustainable entrepreneurship in the 4th Industrial Revolution, where a more superficial, decontextualised analysis may not have adequately captured the intricacies and variations in the experiences and perspectives of participants (Creswell & Poth, 2018). By exploring the commonalities and differences in the lived experiences of entrepreneurs and other stakeholders, this study generated insights that informed the development of an enterprise sustainability framework for SMMEs in the digital age.

4.4 RESEARCH STRATEGY

The research strategy in this study refers to the overall plan and approach for addressing the research questions and achieving the objectives outlined. According to Creswell & Poth (2018), a research strategy sets the course for the inquiry and guides the choices involved in the process from the outset to the conclusion of the study.

4.4.1 QUALITATIVE RESEARCH APPROACH

Qualitative research is an approach that seeks to understand the meanings and interpretations people attach to their experiences, behaviours, and social interactions (Denzin & Lincoln, 2018). It is characterised by its focus on exploring human experiences, using inductive reasoning, and generating context-specific insights (Creswell & Poth, 2018). Qualitative researchers use various data collection techniques, such as interviews, observations, and document analysis, to gather rich, descriptive data that captures the complexity and intricacies of social phenomena (Bryman, 2016).

Qualitative research is particularly well-suited to studying complex, multifaceted issues that require an in-depth understanding of individual experiences,

perceptions, and interpretations (Miles, Huberman, & Saldaña, 2014). It provides a flexible and adaptable framework for exploring the factors influencing sustainable entrepreneurship in the 4th Industrial Revolution, the challenges entrepreneurs faced, and the impact of governmental support, among other issues addressed in this study.

4.4.2 Rationale for Adopting a Qualitative Approach

The rationale for adopting a qualitative research approach in this study is based on the research questions and objectives, which necessitate an in-depth exploration of the experiences, perceptions, and interpretations of entrepreneurs and other stakeholders in the eThekwini region KwaZulu-Natal. A qualitative approach enabled the researcher to delve into the complexities and intricacies of sustainable entrepreneurship in the context of the 4th Industrial Revolution, capturing rich, contextualised data that reflect the unique challenges and opportunities SMMEs face in this rapidly changing environment (Littlewood & Holt, 2018).

Additionally, a qualitative approach allowed for data collection and analysis flexibility, enabling the researcher to probe deeper into the issues under investigation and adapt the study design as new insights emerge (Creswell & Poth, 2018).

This flexibility was significant in studying dynamic, context-dependent phenomena, such as sustainable entrepreneurship in the digital age, where a more rigid, pre-determined research design may not have adequately captured the intricacies and variations in the experiences and perspectives of participants (Miles et al., 2014).

4.5 POPULATION AND SAMPLING

The research methodology's population and sampling section outlines the study's target population, the sample size, and the sampling strategy employed to select participants.

4.5.1 Population of the Study

Understanding the 'population' in a research context is not merely a statistical necessity but also a methodological imperative. The chosen population delineates the boundary conditions for the generalisation of research findings (Bryman, 2016; Creswell, 2014). In this study, the focus was on SMMEs operating in the eThekwini region of KwaZulu-Natal, South Africa. This population has been carefully chosen based on several factors:

Diverse Range of Industries: The SMMEs in eThekwini encompass a wide array of industries including manufacturing, retail, services, and technology. The heterogeneity of these sectors provides a fertile ground for understanding how different industries are navigating the complexities of sustainability in the wake of technological advancements (Jones et al., 2016; Porter & Kramer, 2011). This diversity is significant for capturing the intricacies in sustainable practices across various business contexts (Miles & Huberman, 1994).

Significance to Local Economy: Termed as the 'backbone' of local economies, SMMEs in eThekwini contribute not just to economic capital but also to social capital by stimulating community development and social mobility (eThekwini Municipality, 2020; Putnam, 2000). Their role in local economic development makes them a critical unit of analysis (North & Smallbone, 2000).

Relevance to the Fourth Industrial Revolution: The Fourth Industrial Revolution is more than a technological wave; it is a complex interplay of technological, social, and organizational paradigms (Schwab, 2017). SMMEs are not just passive recipients of these changes but active participants in shaping and redefining the new industrial landscape (Prahalad & Hamel, 1990). Their role in adopting new technologies places them at the nexus of technological transformation and sustainability (Nidumolu, Prahalad, & Rangaswami, 2009).

Employment Generation: In the developing world, and particularly in regions like eThekwini, SMMEs are often the most significant employers, sometimes providing jobs to marginalized sections of society (Bhorat et al., 2017; Rogerson, 2008). This socio-economic aspect adds another layer of importance to the study of these enterprises (Banerjee & Duflo, 2007).

Potential for Scaling: While the study is rooted in a specific geographical context, the insights gleaned have broader applicability. Comparative research shows that regional ecosystems often share common characteristics, and thus, findings can be generalized to similar settings (Flick, 2018; Yin, 2014).

The target population was further narrowed down to include only the top-level management or owners of SMMEs within the eThekwini region. This focus is based on the leadership theory which posits that organizational leaders play a crucial role in shaping strategy and culture, particularly with respect to sustainability (Kotter, 1990; Chell et al., 2016). Leaders are not just decision-makers but are also visionaries who steer the company towards sustainable practices (Bass, 1999). Their perspectives, therefore, offer invaluable insights into the strategic intricacies of sustainable entrepreneurship (Amit & Zott, 2001).

By concentrating on this specific population, the study elicited intricate, context-rich data which contributed to both theory and practice in the fields of business administration, sustainable development, and management sciences.

4.5.2 Sample Size

Determining the sample size in qualitative research is a intricate process that diverges significantly from the straightforward statistical calculations often seen in quantitative studies. The concept of 'theoretical saturation' serves as a guiding principle, wherein the collection of new data ceases when it no longer offers fresh insights or themes (Hox & Boeije, 2005; Strauss & Corbin, 1998). This is in line with the epistemological stance of interpretivism, which values depth over breadth in understanding social phenomena (Denzin & Lincoln, 2005).

The literature offers varying recommendations on the appropriate sample size for qualitative studies. Saunders et al. (2015) suggest a range of between 5 and 25 participants for semi-structured interviews. Phenomenological research, which seeks to understand lived experiences, may require even fewer participants, often ranging from 1 to 10 (Leavy, 2017; Moustakas, 1994). On the other hand, ethnographic studies that aim for a comprehensive understanding of a culture or sub-culture may necessitate larger samples (Geertz, 1973).

For this study, a sample size of 12 participants was chosen. This number was determined through a phased approach:

First phase: An initial study with 3 participants was conducted to test the research instrument, attached under appendix F, to assess the depth and richness of the data (Teijlingen & Hundley, 2001).

Iterative Sampling: Following phase one, nine more interviews were conducted. After each interview, the data were analysed to assess if new themes were emerging (Miles, Huberman, & Saldaña, 2014).

Theoretical Saturation: The process stopped at 12 participants, as it was determined that theoretical saturation had been achieved. No new themes were emerging, and the existing data provided a rich and comprehensive understanding of the research questions (Guest, Bunce, & Johnson, 2006; Guest et al., 2020).

Resource Considerations: Qualitative research is often resource-intensive, requiring a significant investment of time for data collection, transcription, and analysis. The sample size was deemed manageable within the constraints of the study's timeline and budget (Maxwell, 2012).

This sample size allowed for a comprehensive, transcendent data collection and analysis without overwhelming the research process, thus aligning with the methodological recommendations of Guest et al. (2020).

4.5.3 Sampling Strategy

The choice of sampling strategy in qualitative research is critical for ensuring that the data collected are both relevant and rich, serving to answer the research questions with depth and profoundness (Creswell & Poth, 2018; Marshall & Rossman, 2016). For this study, a non-probability purposive sampling strategy was employed, chosen for its unique suitability to the study's objectives and the nature of the research questions (Palinkas et al., 2015; Teddlie & Yu, 2007).

Purposive Sampling: The crux of purposive sampling lies in the deliberate selection of participants based on specific characteristics or qualities that are

pertinent to the study (Neuman, 2011). This is not a 'shortcut' but a rigorous methodological choice that allows for the gathering of in-depth, contextualized data (Patton, 2002).

Expert Sampling: Within the umbrella of purposive sampling, the study employed 'expert sampling,' where participants were selected for their specialised knowledge or experience on the topic under investigation (Marshall & Rossman, 2016; Bogner, Littig, & Menz, 2009). Given the study's focus on sustainable entrepreneurship and the Fourth Industrial Revolution, the participants were primarily top-level managers or owners of SMMEs.

Credibility and Transferability: The quality of a qualitative study is often evaluated based on its credibility and transferability, rather than the quantitative measures of reliability and validity (Lincoln & Guba, 1985). Purposive expert sampling helps in enhancing the credibility of the study by ensuring that the data come from informed, experienced sources. It also aids in the transferability of the findings to other similar contexts (Shenton, 2004).

Context Sensitivity: The purposive sampling approach allowed for the inclusion of participants who could offer rich, context-sensitive insights, thus aligning with the study's interpretivist paradigm which values the understanding of phenomena within their particular contexts (Schwandt, 2000).

Ethical Considerations: In line with the ethical guidelines, only those who consented to participate were included, and all participants were treated with respect and dignity, ensuring the ethical integrity of the sampling process (Denzin & Lincoln, 2005; Guillemin & Gillam, 2004).

Data Saturation in Sampling: The iterative process of data collection and analysis allowed for continual assessment of data saturation, ensuring that the sampling process was flexible and adaptive (Saunders et al., 2018).

By employing this carefully considered sampling strategy, the study was able to generate rich, context-specific insights into the lived experiences, perceptions, and interpretations of the participants. These insights contribute substantively to the

development of an enterprise sustainability framework tailored to the unique challenges and opportunities faced by SMMEs in the digital age (Vanclay et al., 2013; Stead & Stead, 2014).

4.6 DATA COLLECTION AND ANALYSIS

This section describes the data collection procedures employed in this study, including in-depth semi-structured interviews, virtual observation and field notes, document analysis, and the data analysis techniques used, such as thematic analysis and NVivo software.

4.6.1 Data Collection Procedures

Data collection in qualitative research involves systematically gathering information from various sources to address the research questions and achieve the study's objectives (Creswell & Poth, 2018). In this study, the following data collection procedures were employed:

4.6.1.1 In-depth Semi-structured Interviews

Semi-structured interviews are a widely used data collection method in qualitative research, which allows the researcher to engage in a flexible, open-ended conversation with participants while ensuring that specific topics and questions are addressed (Creswell & Poth, 2018). This study conducted in-depth semi-structured interviews with 12 participants, including SMME owners, Managing Directors, CFOs, and CEOs in the eThekwini region of KwaZulu-Natal, South Africa.

The interviews followed a pre-determined interview guide (appendix F), which consisted of open-ended questions designed to elicit participants' experiences, perceptions, and opinions about sustainable entrepreneurship in the 4th Industrial Revolution, the challenges they face, and the support they receive from governmental institutions, among other issues (Creswell & Poth, 2018). The interviews were recorded with the participant's permission and transcribed verbatim for subsequent analysis.

4.6.1.2 Virtual Observation and Notes

Virtual observation is a data collection method that systematically observes online interactions, activities, and environments to gain insights into the experiences, behaviours, and social dynamics of individuals and groups (Hine, 2015). The researcher conducted virtual observations of SMMEs' online presence, such as their websites, social media profiles, and digital platforms, to gather information about their adoption and use of Industry 4.0 technologies, their engagement with sustainable entrepreneurship practices, and their interactions with stakeholders, including customers, suppliers, and governmental institutions.

Notes were taken during the virtual observations to document the researcher's observations, impressions, and reflections, which complemented and triangulated the data obtained from the semi-structured interviews and document analysis (Creswell & Poth, 2018).

4.6.1.3 Document Analysis

Document analysis is a qualitative data collection method that systematically examines written or visual materials, such as reports, policy documents, and media articles, to gain insights into the phenomenon under investigation (Bowen, 2009). Member checking was conducted by sharing the interview transcripts, preliminary themes, and interpretations with the participants, who were invited to provide their feedback and suggest any necessary corrections or clarifications. This process helped ensure that the findings accurately reflected the participants' experiences, perceptions, and opinions and addressed any potential misunderstandings or misinterpretations (Creswell & Poth, 2018).

Reflexivity refers to the researcher's ongoing critical reflection on their role, assumptions, and biases in the research process, which can help enhance the study's credibility and transparency (Creswell & Poth, 2018). The researcher engaged in reflexivity by maintaining a research journal, where they documented their reflections on the data collection, analysis, and interpretation processes, as well as their personal experiences, reactions, and insights. This reflexivity allowed the researcher to become more aware of their potential influence on the findings and take measures to minimise potential biases or preconceptions.

4.6.2 Data Collection Analysis

Data analysis techniques refer to the methods and procedures used to examine, interpret, and make sense of the data collected in a research study (Creswell & Poth, 2017). In this study, the following data analysis techniques were employed:

4.6.2.1 Thematic Analysis

Thematic analysis was used to analyse the interview transcripts, field notes, and documents collected in the study. This involved identifying, coding, and interpreting patterns and themes that emerged from the data concerning the research questions and objectives (Braun & Clarke, 2006).

The six phases outlined by Braun and Clarke (2006) guided the thematic analysis process. These include familiarisation with the data, generating initial codes, searching for themes, reviewing themes, defining and naming themes, and producing the final report.

4.6.2.2 Use of NVivo Software

NVivo software was utilised to assist with the data analysis process. NVivo is a qualitative data analysis software program that facilitates the organisation, coding, and analysis of textual data, such as interview transcripts, notes, and documents (Bazeley & Jackson, 2013). NVivo software allowed the researcher to efficiently manage and analyse the large amount of qualitative data collected in the study while enhancing the rigour and transparency of the data analysis process (Creswell & Poth, 2017).

4.7 TRUSTWORTHINESS AND VALIDITY

4.7.1 Strategies Used to Ensure Trustworthiness

Trustworthiness refers to the credibility, dependability, confirmability, and transferability of the findings in a research study (Lincoln & Guba, 1985). Several strategies were employed to ensure the trustworthiness of the research:

4.7.1.1 Triangulation

Triangulation involves using multiple data sources, methods, or perspectives to enhance the credibility and comprehensiveness of the research findings (Denzin, 1978). Triangulation was achieved through in-depth semi-structured interviews, virtual observation, document analysis, and the incorporation of diverse participants from different industries and sectors.

4.7.1.2 Member checking

Member checking involves allowing participants to review and provide feedback on the researcher's interpretations of their data (Creswell & Poth, 2017). Participants were allowed to check and verify the accuracy of their interview transcripts and the preliminary findings derived from the data analysis process.

4.7.1.3 Reflexivity

Reflexivity involves the researcher's critical reflection on their role, assumptions, and potential biases in the research process (Creswell & Poth, 2017). The researcher maintained a reflexive journal throughout the research process to document their reflections, insights, and decisions, which helped to enhance the transparency and confirmability of the research findings.

4.7.2 Validity Assessment

Validity in qualitative research refers to the extent to which the findings accurately represent the phenomenon under investigation and can be generalised to other contexts or populations (Creswell & Poth, 2018). The validity of the findings was assessed through thick description, transferability, peer debriefing, and external audit.

4.7.2.1 Thick description

This involves the provision of detailed and contextually rich descriptions of the participants, settings, and events, which can help the readers to understand the phenomenon better and assess the applicability of the findings to their contexts (Creswell & Poth, 2018). The researcher provided thick descriptions of the participants, their SMMEs, the eThekwini region of KwaZulu-Natal, and the broader

context of sustainable entrepreneurship in the 4th Industrial Revolution, allowing the readers to gain a deeper understanding of the phenomenon and evaluate the validity of the findings.

4.7.2.2 Transferability

This refers to how the findings can be applied or adapted to other contexts or populations based on the similarities and differences between the original study and the target context or population (Lincoln & Guba, 1985). The researcher provided detailed descriptions of the research methodology, participants, and context, as well as the limitations and delimitations of the study, which can help future researchers to assess the transferability of the findings to their studies or contexts.

4.7.2.3 Peer debriefing

This involves consultation with colleagues or experts who can provide an external perspective on the research process, findings, and interpretations, which can help enhance the study's validity and credibility (Creswell & Poth, 2018). The researcher engaged in peer debriefing by sharing the research design, data collection procedures, and preliminary findings with their academic supervisor and fellow researchers, who provided feedback, suggestions, and critiques that contributed to refining and validating the findings.

4.7.2.4 External audit

An external audit involves an independent review of the research process, data, and findings by a knowledgeable, impartial individual or group (Creswell & Poth, 2017). An external audit was conducted by a qualified statistician who was not involved in the study, which helped to confirm the rigour and trustworthiness of the research findings.

4.8 ETHICAL CONSIDERATIONS

Ethical considerations are crucial in any research study to protect the participant's rights, dignity, and well-being and the integrity and credibility of the research process

and findings (Creswell & Poth, 2018). In this study, the following ethical considerations were addressed:

4.8.1 Informed Consent

Informed consent is a fundamental ethical principle that requires the researcher to obtain the participants' voluntary and informed agreement to participate in the study based on a clear and comprehensive understanding of the research purpose, procedures, risks, and benefits (Creswell & Poth, 2018). Informed consent was obtained from all participants by providing them with a written consent form explaining the study's objectives, methods, confidentiality and anonymity measures, potential risks and benefits, and their rights to withdraw from the study without any negative consequences. The participants were given adequate time to read and consider the consent form, ask any questions, and make an informed decision about their participation. The signed consent forms were collected and stored to maintain a record of the participants' informed consent.

4.8.2 Confidentiality and Anonymity

Confidentiality and anonymity are essential ethical principles that protect the participants' privacy, identity, and sensitive information. They ensure that their data is not disclosed to unauthorised individuals or linked to their identities (Creswell & Poth, 2018). Confidentiality and anonymity were ensured by using pseudonyms for the participants, removing any identifiable information from the interview transcripts and other data sources, securely storing the data in password-protected files and devices, and limiting access to the data to the researcher and authorised individuals only. Moreover, the findings and interpretations were presented that did not reveal the participants' identities or compromise their confidentiality.

4.8.3 Ethical Approval Process

Before commencing the data collection, the researcher sought and obtained ethical approval from the Institutional Research Ethics Committee (IREC), which is responsible for reviewing and approving the ethical aspects of research involving human participants. The ethical approval process involved submitting a detailed

approved research proposal, consent forms, and other relevant documents, which the IREC carefully reviewed to ensure the study's compliance with the applicable ethical standards and guidelines. Upon receiving the IREC's approval, the researcher proceeded with the data collection, adhering to the approved ethical procedures and requirements throughout the research process.

4.9 CONCLUSION

This chapter comprehensively describes the research methodology employed in this study, including the research paradigm, design, strategy, population and sampling, data collection and analysis, trustworthiness and validity, and ethical considerations. By adopting an interpretive paradigm, qualitative research approach, and phenomenological research strategy, the study aimed to explore the factors, challenges, and government support for sustainable entrepreneurship in the 4th Industrial Revolution, as experienced by the owners and top-level management of SMMEs in the eThekwini region of KwaZulu-Natal, South Africa. The use of in-depth semi-structured interviews, virtual observation and field notes, and document analysis allowed the researcher to obtain rich and diverse data from the participants, which were subsequently analysed using thematic analysis and NVivo software. The trustworthiness and validity of the findings were ensured through various strategies, such as triangulation, member checking, reflexivity, thick description, transferability, and peer debriefing. At the same time, the ethical considerations were addressed through informed consent, confidentiality and anonymity, and the ethical approval process. The next chapter presents the data analysis and findings of the study, which are derived from the analysis of the collected data and guided by the research objectives and questions.

CHAPTER FIVE

DATA ANALYSIS, PRESENTATION, AND INTERPRETATION OF FINDINGS

5.1 INTRODUCTION

This chapter presents the study's findings, which were derived from the analysis of the collected data, including in-depth semi-structured interviews, virtual observations, and document analysis. The chapter begins with an overview of data collection and participants, followed by the thematic analysis results, which are organised into several themes, such as the Fourth Industrial Revolution, challenges and factors, sustainable entrepreneurship dynamics, and sustainable entrepreneurship strategies and support. The findings are then integrated with the theoretical framework, discussing their connections and implications concerning the Sustainable Development Theory, RBV, Innovation Systems Theory, TBL, and Institutional Theory. Finally, the chapter concludes with a summary of the main findings and their contributions to understanding sustainable entrepreneurship in the context of the 4th Industrial Revolution.

5.2 DEFINITIONS OF QUALITATIVE TECHNIQUES USED

This section presents a detailed explanation of the qualitative techniques used in this study for data analysis. The primary methods are Word Clouds, Tree Maps, Cluster Analysis, Hierarchy Charts, and Word Trees. These techniques were used to interpret, analyse, and visualise the collected data, facilitating an in-depth understanding of the research findings. These methods are particularly effective for dealing with large volumes of unstructured data, allowing for identifying patterns, themes, and connections that might not be immediately apparent (NVivo Online, 2022).

Each technique is distinct in its approach to data representation and offers unique insights into the data. Word Clouds and Tree Maps highlight the frequency of words

and themes, respectively. Cluster Analysis groups related items into clusters, revealing common themes or topics. Hierarchy Charts showcase the relationships in a hierarchical structure, while Word Trees visualise the contextual paths of words.

The subsequent sections define, discuss, and visually represent each technique. The accompanying images illustrate what each definition means and how these techniques are employed in the context of qualitative data analysis of this study.

Understanding these techniques is vital for interpreting the results of this study. They form the basis for extracting meaning from the data and provide a structured way to navigate the complexities of qualitative research. Each image below offers a snapshot of the respective techniques in action, serving as a practical guide to understanding their application and impact on the data analysis process.

5.2.1 Word Cloud

A word cloud is a qualitative visualisation tool that represents text data in which the size of each word indicates its frequency or importance. Significant textual data points can be highlighted using this method (Kucher & Kerren, 2015). Typically, the larger the word in the visual, the more frequently it is mentioned in the source of the text. Word clouds are instrumental in identifying and representing key themes or concepts in the data.

Figure 5.2.1: Word cloud of the entire study (Researcher, 2023)

5.2.2 Tree Map

Tree Maps are a form of visual representation that helps express hierarchical data compactly and space-efficiently. The space in the tree map is divided into rectangles, which are then subdivided into smaller rectangles representing sub-categories (Shneiderman & Plaisant, 2010). The size of each rectangle corresponds to the quantity of the data it means, intuitively providing a quick overview of the structure and amount of the data.

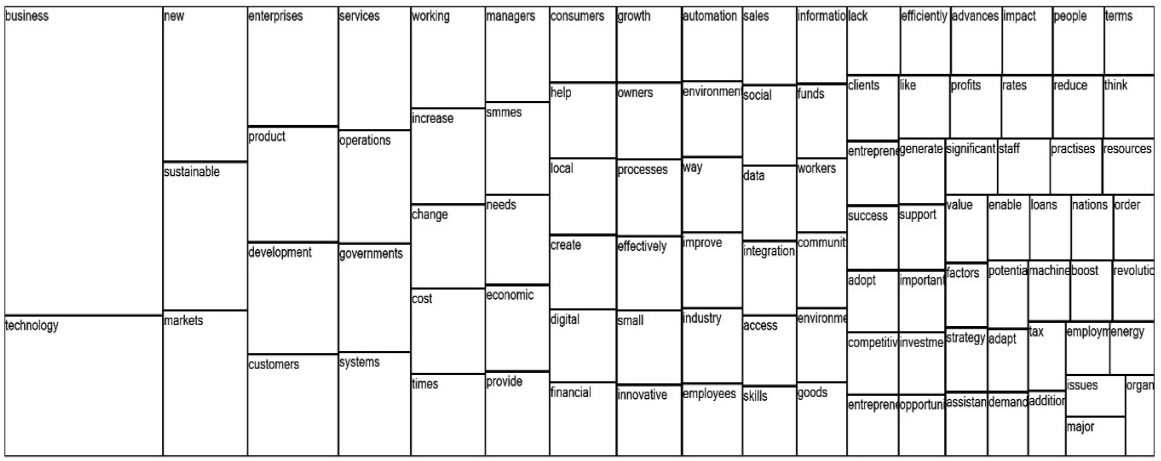

Figure 5.2.2: Tree map of the entire study (Researcher, 2023)

5.2.3 Cluster Analysis

Cluster analysis is a statistical technique to classify or group similar items into clusters. A cluster is a collection of data objects that are similar to each other and different from objects in other clusters (Everitt et al., 2011). In qualitative data analysis, cluster analysis can help identify common themes or topics in the data.

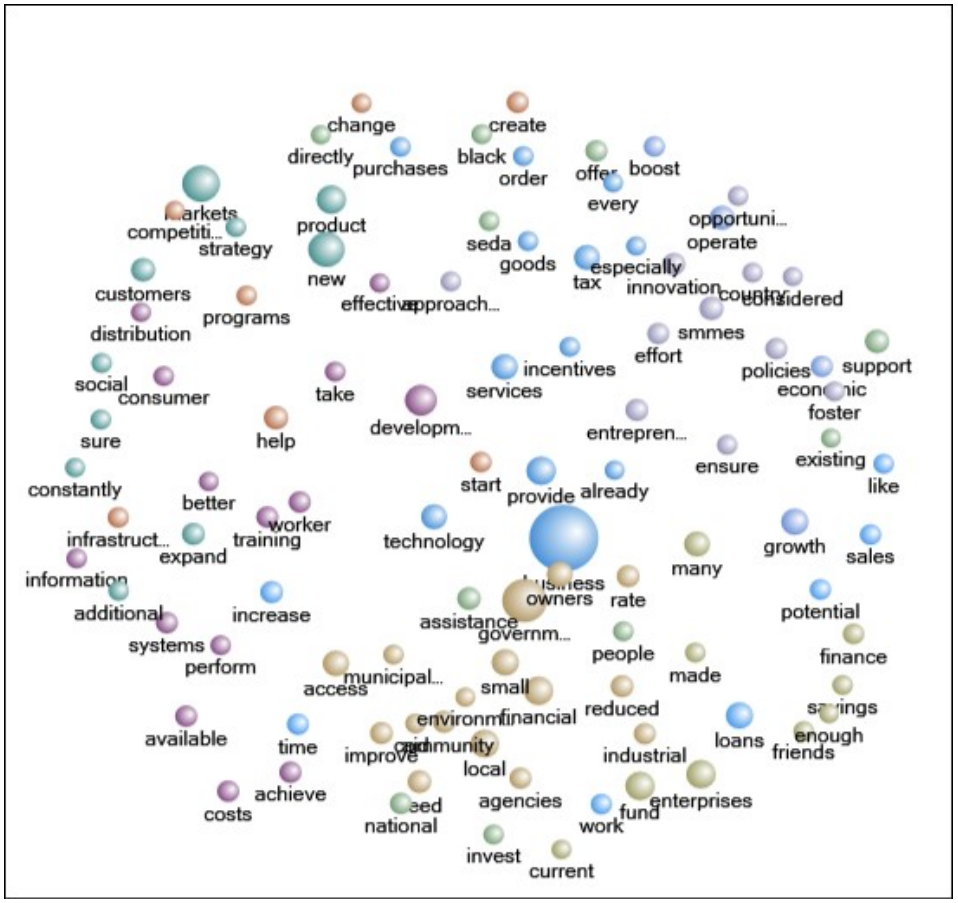

Figure 5.2.3: Cluster analysis of the entire study (Researcher, 2023)

5.2.4 Hierarchy Chart

Hierarchy charts, also known as organisational charts or tree diagrams, show relationships in a hierarchical structure. It is a diagram used to represent data elements regarding their rank and the relationship between them (Holtzblatt & Beyer, 2016). In qualitative data analysis, a hierarchy chart can help illustrate the relationships between different themes or categories.

Figure 5.2.4: Hierarchy chart of the entire study (Researcher, 2023)

5.2.5 Word Trees

Word trees are graphical representations of the contextual paths of words. They allow for exploring how specific key terms and their context occur in a text corpus (Wattenberg & Viégas, 2008). They help identify the frequency of words and how they are connected to other comments, thereby revealing the context of their usage.

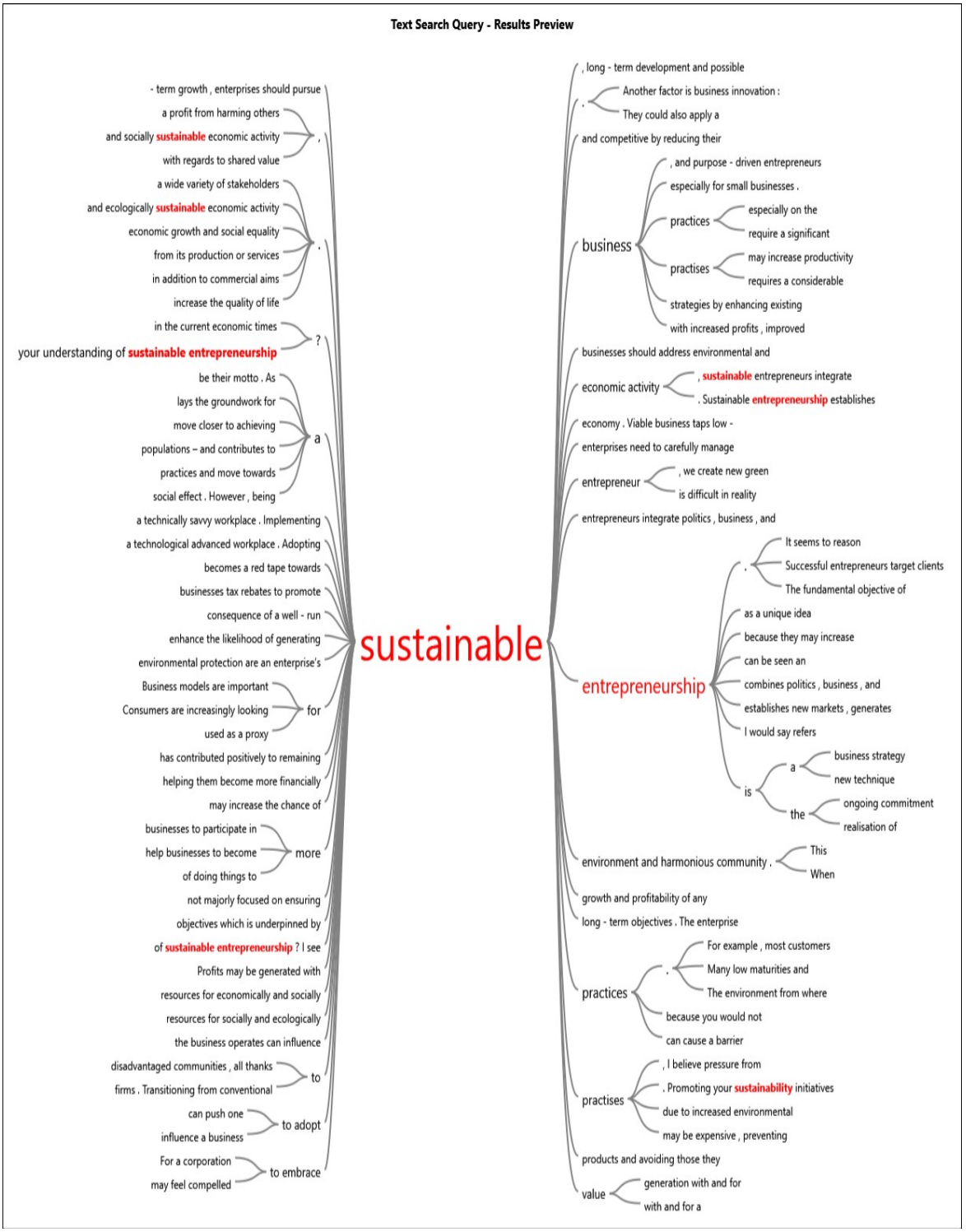

Figure 5.2.5: Word trees of the entire study (Researcher, 2023)

5.3 STUDY DEMOGRAPHICS

The demographic profile of the study participants, which was discussed in 4.51 and 4.5.2, provides vital information in terms of age, gender, race, educational background, and years of experience in owning or working in an enterprise.

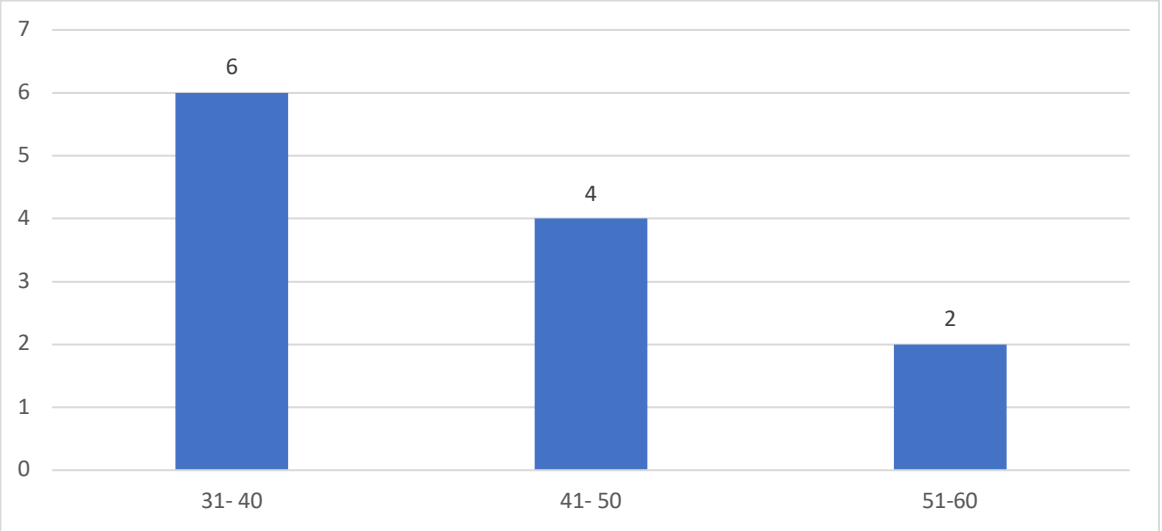

Figure 5.3.1: Age

The age distribution of the respondents, with the majority being above the age of 30, suggests a mature and experienced group of SMME owners. This aligns with previous research that suggests that older entrepreneurs are likely to have more excellent Industry knowledge and networks, which can contribute to business success (Block, Fisch & van Praag, 2017).

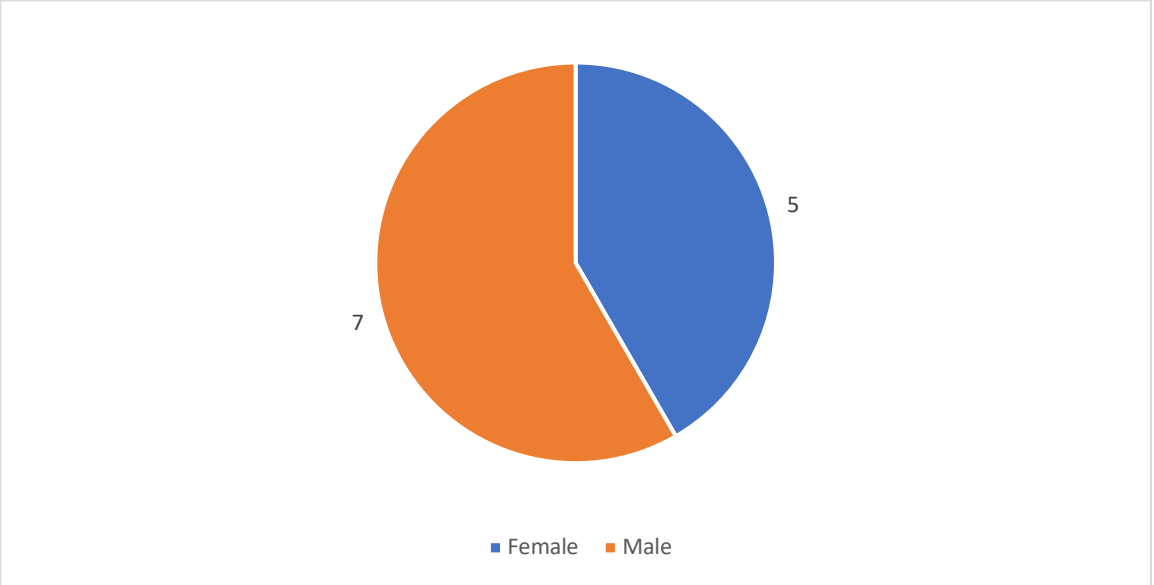

Figure 5.2.2: Gender

The gender representation, while majority male, shows a substantial number of female entrepreneurs. This finding indicates a positive trend of growing female entrepreneurship, which has been recognised as a significant contributor to economic development and women's empowerment (Brush, de Bruin & Welter, 2009).

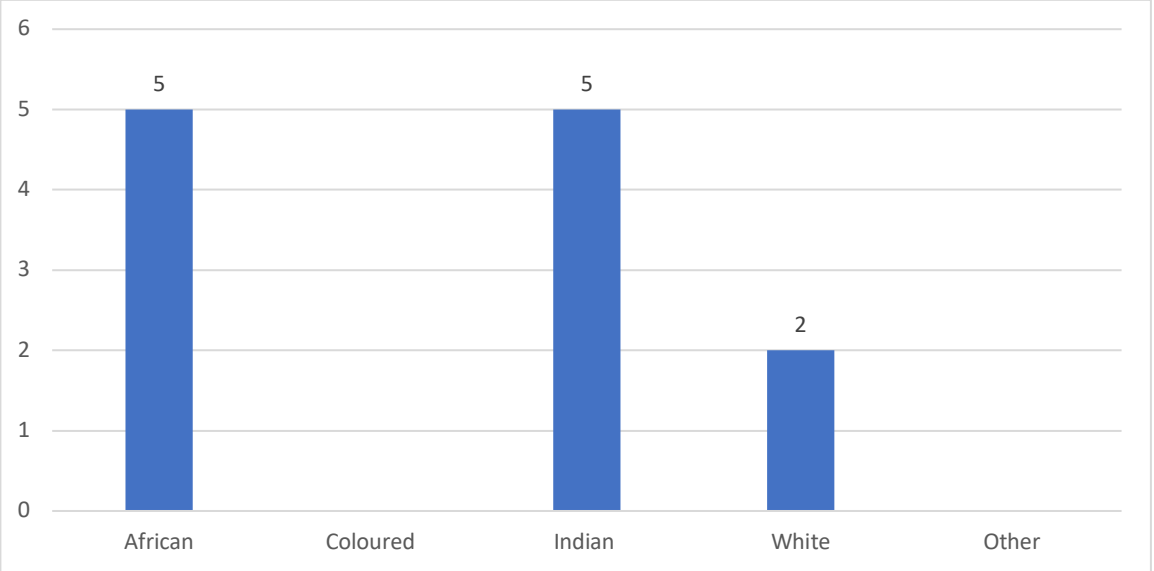

Figure 5.2.3: Race

The racial distribution of the respondents, with a majority being African and Indian, reflects the demographic landscape of KwaZulu-Natal and suggests that entrepreneurship is being embraced across different racial groups. This aligns with the South African government's initiatives to promote inclusivity and diversity in entrepreneurship (Urban & Kujinga, 2017).

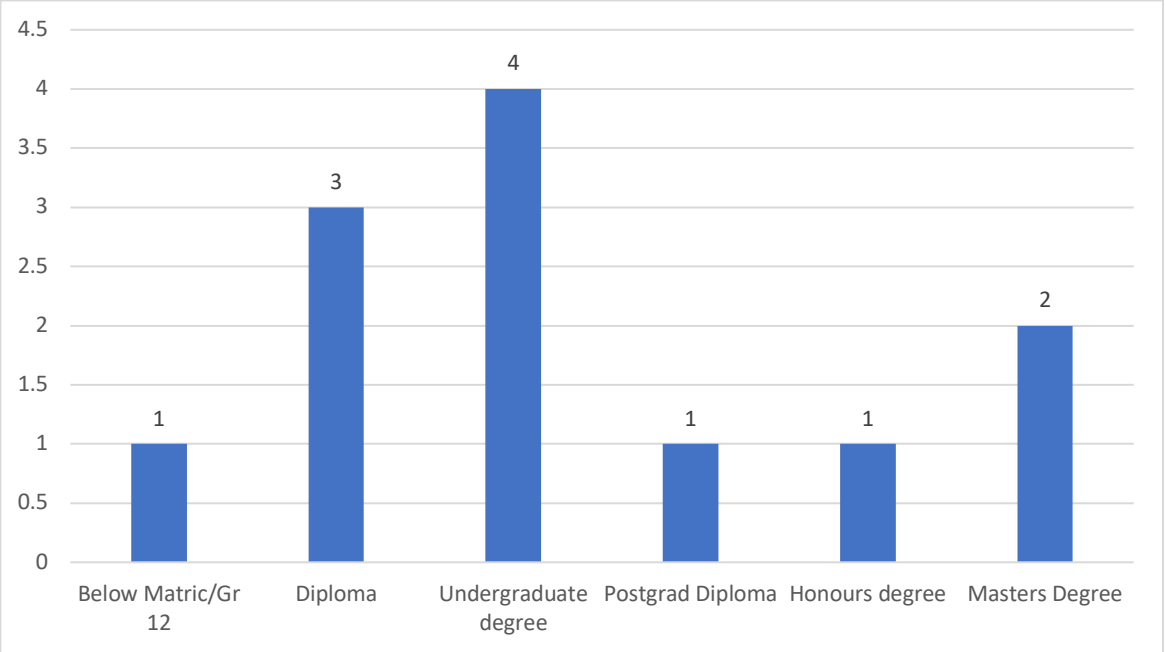

Figure 5.2.4: Highest Level of Education

The high level of education among respondents, with most having degrees and postgraduate qualifications, is noteworthy. This might indicate a trend of highly educated individuals turning to entrepreneurship, possibly due to the increasing recognition of entrepreneurship as a viable career path or the challenging job market for academics and professionals (Roberts, Lall, & Dunworth, 2016). It also suggests that these entrepreneurs will likely understand the subject matter strongly.

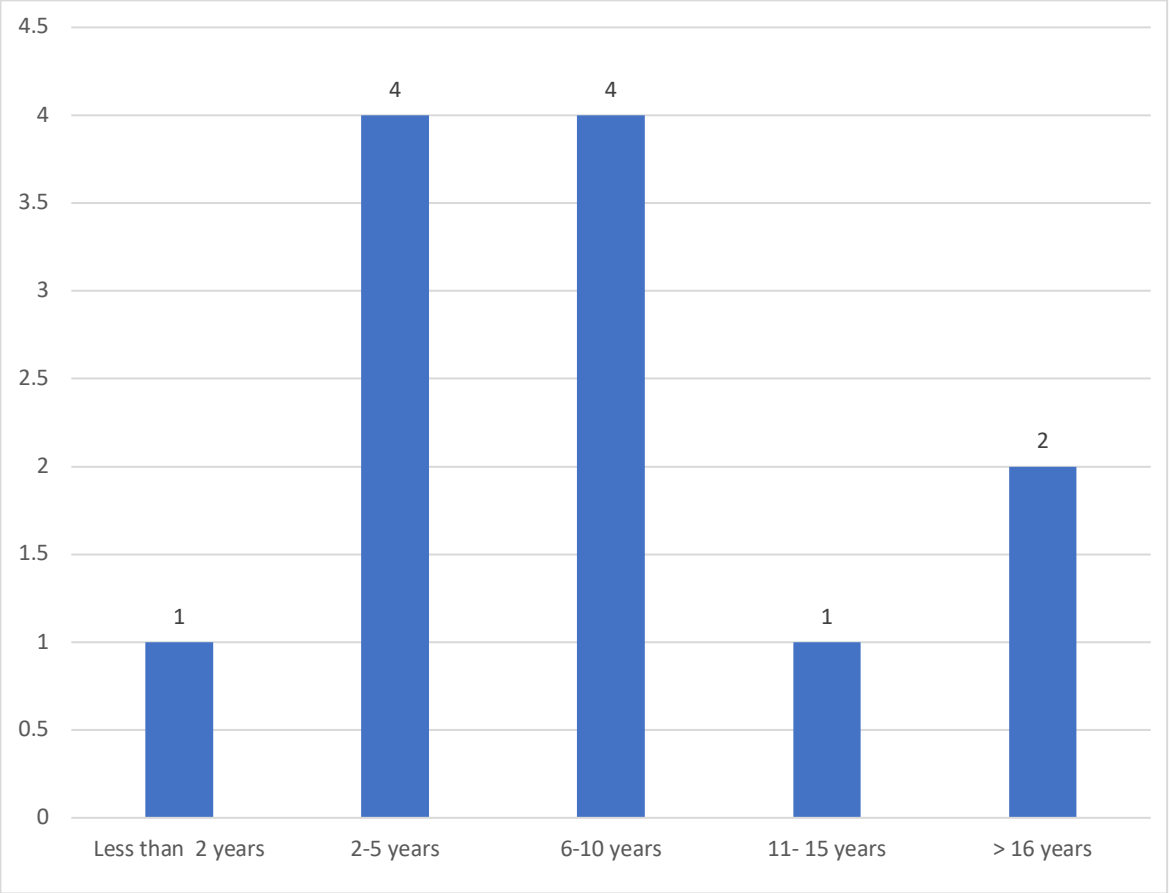

Figure: 5.2.5: Duration Working At / Owning This Enterprise

Most respondents have over six years of experience in their enterprises. This suggests a high level of knowledge among participants, which can significantly contribute to the resilience and sustainability of their enterprises (Ucbasaran, Westhead, & Wright, 2009). The longevity of these businesses also indicates their ability to navigate the challenges inherent in entrepreneurship, which could provide valuable insights for this study.

5.4 THEME ONE: FOURTH INDUSTRIAL REVOLUTION

The central theme emerging from the interviews is the Fourth Industrial Revolution and its implications for business, as depicted in the word cloud below. This theme was primarily characterised by the understanding, practices, sustainability factors, and technology integration surrounding 4IR.

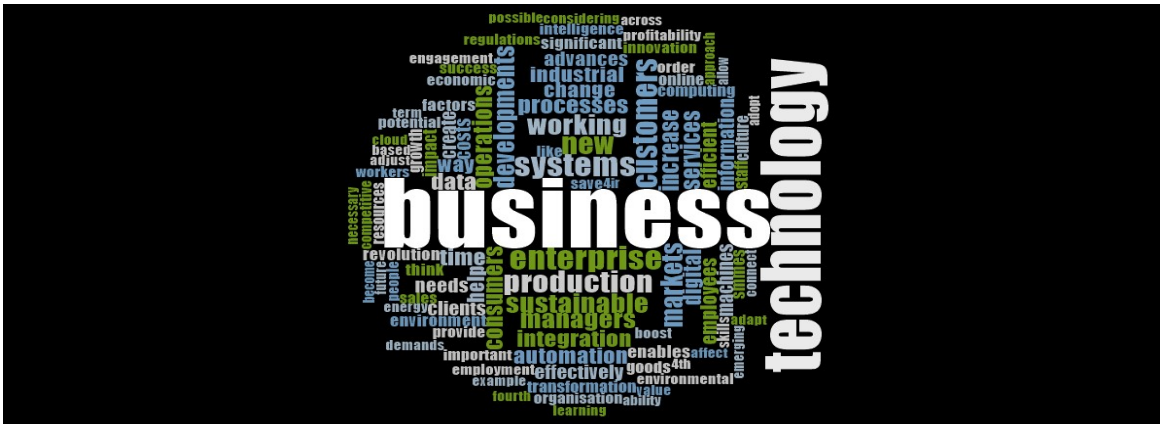

Figure 5.4: Fourth Industrial Revolution Theme (Researcher, 2023)

5.4.1 Subtheme: Understanding of the 4th Industrial Revolution in Business.

Three key facets were discussed within this subtheme: Integration and Advancement, Integrating Biological and Technological, and Collective Advancement.

5.4.1.1 Integration and Advancement

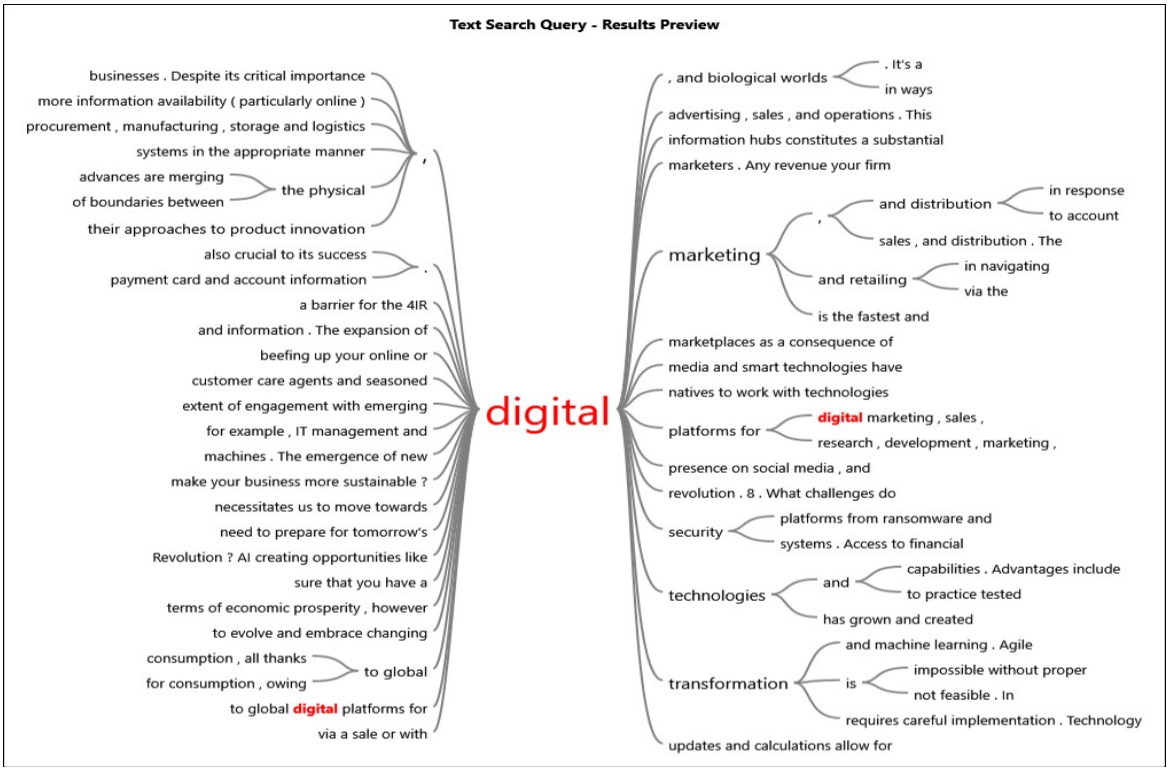

Figure 5.4.1.1: Digital transformation word tree (Researcher, 2023)

The word tree above provides insights into the various aspects and implications of the digital transformation brought about by integration and advanced technologies. This section highlights the transformative power of advanced technologies, the need for businesses to adapt and innovate, and the opportunities for gaining a competitive edge in the digital landscape.

5.4.1.1.1 Advanced Technologies in Business

The integration and advancement of 4IR were predominantly seen as the convergence and application of advanced technologies like AI, IoT, Quantum computing, Big Data, and blockchain. These technologies were considered transformative for business operations and the traditional business landscape. This perspective is encapsulated by the respondents' assertions below.

Respondent 1:

The Fourth Industrial Revolution describes the blurring of boundaries between the physical, digital, and biological worlds. It's a fusion of advances in artificial intelligence, robotics, the Internet of Things, 3D printing, genetic engineering, quantum computing, and other technologies.

Respondent 11:

I believe it's technological systems integration combined with corporate IT systems.

Respondent 3:

The 4th Industrial Revolution is characterised by the fusion of numerous cutting-edge technologies, such as artificial intelligence, robots, the Internet of Things and many more in the business environment.

Respondent 4:

Reference 1 -

It combines technological advancements in artificial intelligence, automation, the Internet of Things, 3D printing, bioengineering, and quantum computing.

Reference 2 -

The keywords Big Data, IoT, Blockchain Technology, and Machine Learning, among others, all relate to the 4th Industrial Revolution. From the termination of these lockdowns, businesses are under more pressure than ever to accept, adapt, and absorb these technological developments.

Respondent 6:

Reference 1 -

It is a technological transformation that drives evolution away from the traditional way of living and working,

Reference 2 -

particularly SMMEs, to effectively align and automate their systems and processes.

Respondent 8:

For businesses to function more effectively, they are using technologies such as cloud computing, data analytics, remote work, and more advanced technology.

Respondent 9:

Reference 1 -

Combining several different information technology systems in business is referred to as technological systems integration.

Reference 2 -

Without the integration of technologies and systems in the appropriate manner, digital transformation is not feasible. In addition, you will need to integrate your business's physical and virtual system components throughout this procedure.

These viewpoints are consistent with Schwab's (2016) conceptualisation of 4IR as a transformative phase driven by technological innovations.

5.4.1.1.2 Integrating biological and technological

This integration involves a blended approach of humans and technology towards the focal point of business. The following respondents support this perspective.

Respondent 11:

Your business's general operation is also crucial to its success. Digital transformation is impossible without proper technology and system integration. During this phase, you must cautiously combine your business's physical and virtual systems.

Respondent 12:

The 4IR involves merging economic, technical, and biological contexts, combining AI, automation, IoT etc.

Respondent 2:

It is a new chapter in human development, enabled by extraordinary technological advances. These advances merge the physical, digital, and biological worlds, creating both huge promises and potential peril.

Respondent 4:

I think the 4th Industrial Revolution relates to blending the economic, technological, and biological environments.

These viewpoints are consistent with the research conducted by Marr (2018) and Lasi et al. (2014), which highlight the integration of biological and technological components as a fundamental aspect of the 4IR. The blending of humans and technology and the convergence of various contexts is crucial for successfully implementing the 4IR and transforming business operations.

5.4.1.1.3 Collective advancement

The collective advancement within the 4IR highlights the importance of a collaborative approach among all stakeholders involved in business operations. This approach extends beyond the changes in business operations themselves and encompasses a broader perspective. This is echoed by the respondent below.

Respondent 2:

The 4IR is about more than just technology-driven change; it is an opportunity to help everyone, including leaders, policymakers and people from all income groups and nations, to harness converging technologies to create an inclusive, human-centred future.

The inclusive and human-centred future envisioned by respondent 2 resonates with the idea put forth by Kaplan and Haenlein (2019), who emphasise the significance of collective action and collaboration in the context of the 4IR. They argue that the 4IR is not solely about technology-driven change but also about the collective advancement of society.

5.4.1.2 Transformation and Innovation

Transformation and innovation were key aspects brought about by 4IR.

5.4.1.2.1 Reconceptualization

It was about reconceptualising how business is done, utilising new methods and approaches to products and services, and creating more value for customers. Less human involvement was foreseen due to technology.

Respondent 10:

The smart technologies of the fourth industrial revolution enable SMMEs to accomplish the same tasks in new ways, produce new goods and services with less human involvement, and be alerted when the last human touch is necessary.

Respondent 2:

This revolution's speed, breadth and depth are forcing us to rethink how countries develop and how organisations create value.

5.4.1.2.2 Radical transformation

One respondent felt that the 4IR brought a radical transformation due to the influx of new technologies that bring about inevitable change to the business world.

Respondent 1:

It's the collective force behind many products and services quickly becoming indispensable to modern life. As a result of this perfect storm of technologies, the Fourth Industrial Revolution is paving the way for transformative changes in how we live and radically changing almost every business sector.

5.4.1.2.3 Strategy and Agility

Automation needed to be done in line with business strategy and promote business agility.

Respondent 6:

Particularly SMMEs, to effectively align and automate their systems and processes with their business strategic goals in a manner that is more agile.

5.4.1.2.4 Innovation

Innovation was, by default, a vital aspect of the 4 IR related to innovations, product and service offerings, and customer engagement.

Respondent 6:

Product creation and innovation, consumer expectations and engagement, and the structure and function of enterprises are all affected by the extent of engagement with emerging digital technologies and capabilities.

5.4.1.2 Competitiveness

Competitiveness was seen as a derivative of the 4IR through technology.

5.4.1.2.1 Leverage technologies

The 4IR presented opportunities for businesses to leverage technology towards their products and services. It also allowed technology to revise and revamp processes and cut costs. This would increase revenue and competitiveness.

Respondent 10:

The emerging technologies I'll discuss in more detail can invigorate R&D, the work on the business floor, contacts with customers and suppliers, and the creation of whole new approaches to conducting business.

Respondent 12:

This includes more significant technology costs, operational costs, and maintenance. This may be a chance for small businesses to reorganise expenses and shift resources, boosting their likelihood of success by investing in IoT, blockchain technology, and machine learning.

Respondent 7:

4IR is the ability to leverage the various technologies to drive business growth and development and create efficiencies within your business,

5.4.1.2.2 Competitive advantage

Technological leveraging would inevitably lead to a new competitive advantage and break geographical barriers regarding the offerings due to online benefits.

Respondent 10:

Reference 1 -

The ability to adapt quickly to new conditions and ride the wave of change will be the differentiator and source of competitive advantage for businesses transitioning from an SMME to a 4IR enterprise model.

Reference 2 -

To revitalise the SMME segment of our economy, South Africa has the chance to embrace these technologies quickly and surge beyond its global rivals.

5.4.2 Subtheme: Current 4th Industrial Revolution (technology) practices for businesses

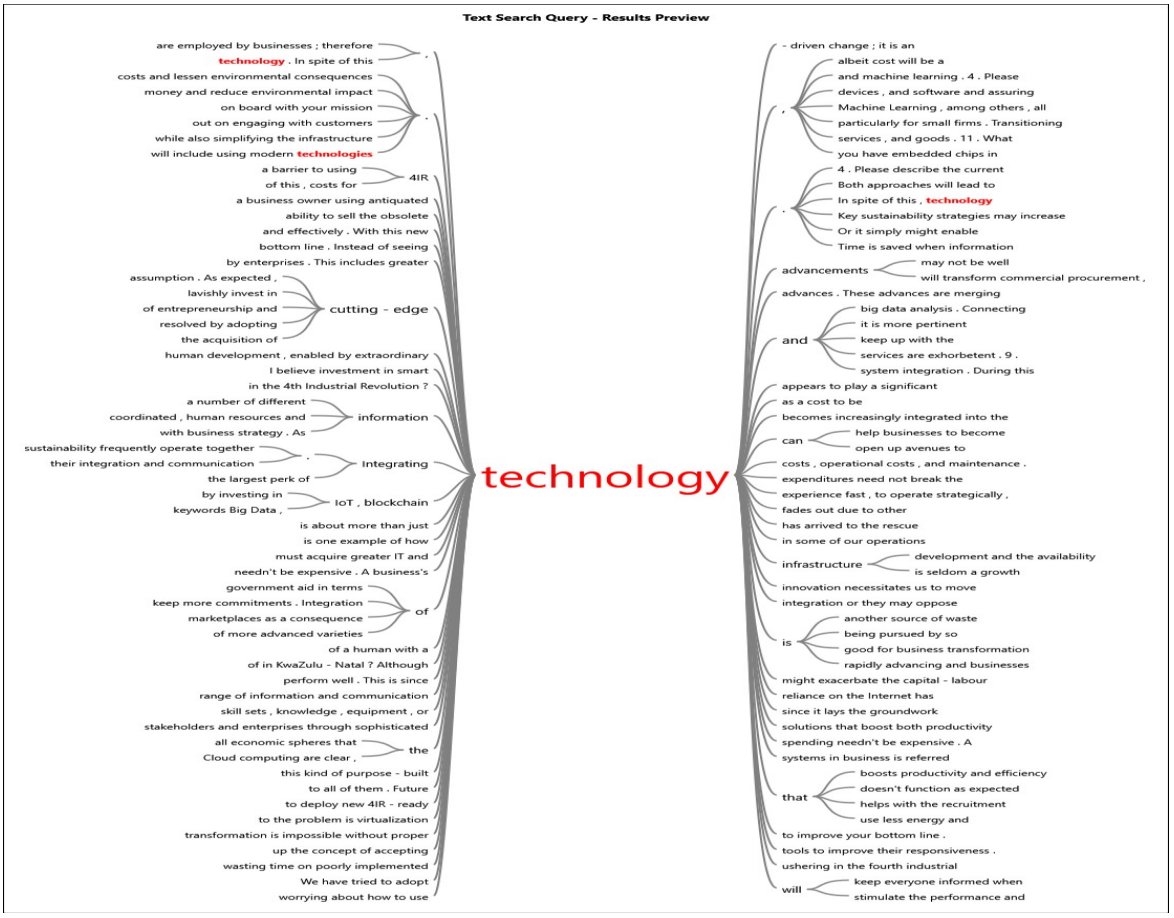

Figure 5.4.2: Technology practices for business word chart (researcher, 2023)

As depicted in the word tree above, this subtheme examined the current 4IR technology practices at the business and concerning other SMMEs. It was informed by the following.

5.4.2.1 Online and Automation

It was evident that transitioning to the online world by increasing automation was a key component of 4IR technology practices.

5.4.2.1.1 Automation

Automating manual operations and processes could reduce waiting time, labour costs, and errors. This could, in turn, improve profitability and sustainability. Furthermore, online marketing could improve customer reach and base.

Respondent 1:

This has helped to automate various processes resulting in significantly lower manufacturing lead times, reduced wastage/errors and saved costs to different businesses, thereby ensuring sustainability in the long term.

Respondent 12:

SMMEs must acquire greater IT and technology experience fast, operate strategically, and stay ahead of digitally savvy new competitors eroding into market share by working remotely and reducing office space or workplace expenditures.

Respondent 4:

The emergence of new digital marketplaces as a consequence of technology innovation necessitates us to move towards digital marketing and retailing in navigating new investor relations terrain and managing its potential pitfalls.

5.4.2.1.2 Online operations

Online systems can make operations faster and more flexible, ensuring operational excellence.

Respondent 6:

When properly combined and coordinated, human resources and information technology can open avenues to operational excellence previously out of reach for SMMEs. The onus is on the business owners to make the collaboration fruitful.

Respondent 7:

At present, we have taken our business to the online space, which was necessary during the time of COVID-19 and lockdowns. We have identified that the time to order and delivery is faster, based on the online systems we implemented. Customers can order online based on a catalogue we uploaded instead of customers calling into the store and waiting for a price.

5.4.2.1.3 Cloud

Cloud computing brings new avenues for safe and large volumes of storage. This means that complete information and data can be stored at minimal to zero cost, and there is also no need for physically expensive storage spaces.

Respondent 2:

Cloud computing means storing and processing data on other people's computers in a data centre via a network that allows businesses to store massive amounts of data and process it in nearly real-time.

Respondent 6:

Reference 1 -

Cloud computing enables this by providing efficient alternates to traditional data storage methods, facilitating improved teamwork, and decreasing the need for expensive infrastructure upgrades.

Reference 2 -

One such system is Cloud PBX, which is operated in the cloud and enables remote workers to communicate with one another and with the main office using the same phone network. Another rising mobility trend is Bring Your Own Device (BYOD), which allows businesses to save money on expensive hardware while allowing employees to work more efficiently on their preferred devices.

5.4.2.1.4 Apps

Apps were a norm in the 4IR and current times. Such APPs helped to reach out and connect more to customers. It also made online transactions easier and quicker. SMMEs needed to explore this.

Respondent 6:

Reference 1 -

Apps are a great way to boost productivity and organisation or make your life as an entrepreneur less hectic since it is common for small business owners to feel like they are juggling everything at once. There is a wealth of useful business APPs, but if you want to get your new business off the ground, you should pay attention to these.

Reference 2 -

An APP like Google Data Studio is perfect for tech-enabled advertising. It's a Google-based reporting tool lets you build robust dashboards from various Google data in record time. I also really like PandaDoc, a document automation tool that helps with sales proposals, legal agreements, analytics, and customer relationship management integrations.

Reference 3 -

Zapier is another option that works great for enterprises of all sizes. It's a tool for automating APPs that helps users connect the ones they use on the web so they can devote their time and energy to the tasks that matter most.

5.4.2.1.5 Edge

Relating to apps, EDGE technologies allowed for the minimising of devices and equipment, whereby many processes could be done using handheld mobile devices. This meant that even customers could be involved in processes and operations related to the business.

Respondent 2:

Reference 1 -

Edge computing refers to the processing of data on devices such as smartphones.

Reference 2 -

Implementing this has proved incredibly beneficial to businesses by reducing the overhead costs to maintain and operate individual systems, software and data. Rather than send every piece of information collected by cameras, scanners, handheld terminals, or sensors to the cloud to be processed, edge devices carry out most of the processing themselves at the source of the data, thereby ensuring efficiency in the operations.

5.4.2.2 Reposition and review

It was time for business to review their operations and reposition themselves. This can be achieved through the following.

5.4.2.2.1 Workforce

While it was feared that the 4IR could reduce the workforce, it could be an opportunity to develop the workforce's skills accordingly. Staff could be equipped with technical skills to learn and operate 4IR technology, thus improving efficiency and productivity. Recruitment of staff can be done in accordance with technology competence as well.

Respondent 5:

There is an increase in layoffs. Some businesses have been informing workers of future releases as they cannot afford to upskill their staff as their previous skills have become redundant. Other viable enterprises provide opportunities for their staff to acquire new skills or retrain. Thus, enhancing job security via skill development and change management efficiency.

Businesses are trying to seize the opportunity to safeguard against skills shortage, joblessness, and income disparity, and develop an empowered, innovative workforce that is multi-skilled, dedicated to continuous learning, and keen to embrace the opportunity provided by the Fourth Industrial Revolution rather than fighting against it. However, this is not possible without the support of policymakers and local government subsidies and incentives.

Respondent 6:

Reference 1 -

Although technology appears to play a significant role in the success of SMMEs, the true backbone of a successful business is often its workforce, which possesses the tenacity and creative capacity to work smart and still compete with larger, considerably better corporates despite technological limitations.

Reference 2 -

The first step is to build a solid foundation with people who are on board with your mission. Technology that intelligently helps with recruitment is a massive boon to enterprises. Many lack the resources to compete with larger companies, which can afford lavish recruitment strategies and generous bonus structures. SMMEs can screen more potential employees and eliminate those who lack the necessary skills thanks to the Internet and various recruitment technologies.

Reference 3 -

When compared to larger companies, SMMEs excel in the area of employment and offer flexibility. More and more people are opting to work remotely, and businesses that are agile and confident in using new technologies are reaping the benefits. Even if they can't match the salary offers of their competitors, employees are increasingly interested in working for businesses that allow them to manage their work and personal lives better.

5.4.2.2.2 See technology as an investment

Technology must be seen as an investment and not only as an expense but as a method to increase efficiency, attract customers, and reduce manual labour and time. In this way, the investment will outweigh the costs.

Respondent 11:

Reference 1 -

Technology spending needn't be expensive. A business's technology infrastructure is seldom a growth area, and it's standard in the Industry. If sales are down, you don't need a CRM or an online store; instead, tackle the fundamental problems before considering technological means.

Reference 2 -

Rather than an expenditure to entice customers or a patch for faltering services, see new tech as an opportunity. It's meant to help you operate smoothly.

Respondent 9:

Instead of seeing technology as a cost to be incurred to attract consumers or a stopgap measure for failing systems, think of it as an investment. Its purpose is to facilitate your work; therefore, think carefully about the requirements of your business.

5.4.2.2.3 Decision-making

The 4IR technology can bring about data-driven decision-making which can be more accurate.

Respondent 1:

By relying on the ability of machines to learn and act intelligently; meaning they can make decisions, carry out tasks and even predict future outcomes based on what they learn from the data.

Respondent 10:

Big data analysis is an example of smart technology that can potentially transform the SMME sector in South Africa.

5.4.2.2.4 Review of issues

The 4IR must also be seen as an opportunity to review existing business issues so they can be first fixed/remedied rather than only relying on technology.

Respondent 9:

Despite this, technology expenditures need not break the bank. In most cases, a business area for development is not its technological infrastructure, and it's a standard procedure in the corporate world. If sales are down, for instance, it doesn't mean you need a customer relationship management system or a revamped website; instead, you should focus on fixing the fundamental issues before worrying about how to use technology to improve your bottom line.

5.4.2.3 Products and Services

This subcategory focuses on practices related to products and services in the 4IR.

5.4.2.3.1 Customer and stakeholder connection

The 4IR brings added customer and stakeholder connections. This was through various 4IR technologies and apps which could make such a connection possible. This can thereby enhance marketing, engagements and customer and stakeholder interest holistically. It can lead to mass customisation and collaborative consumption.

Respondent 10:

Reference 1 -

The future development of products, services, and processes that connect departments and different businesses through advanced computing.

Reference 2 -

Establishing connections with clients and providers paves the way for developing novel and profitable modes of collaboration and engagement, such as mass customisation and collaborative consumption.

Respondent 11:

Customers are perturbed because they expect simplicity and ease of access from the enterprises they frequent. Business owners employing outdated technologies lose out on engaging with customers.

Respondent 12:

Connecting with customers and suppliers enables unique and lucrative cooperation and engagement, such as mass customisation and purchasing goods and services.

Respondent 9:

Customers are also becoming more frustrated since they, like other consumers, have certain expectations of the businesses they patronise, including the convenience and ease of access to such establishments. You're missing out on a chance to engage with consumers if you're a business owner using antiquated technology.

5.4.2.3.2 Future products

Engaging more with customers can inform the development of new products suited to their needs.

Respondent 12:

Smart technologies can potentially alter the SMME sector in South Africa via the future creation of goods and services, as well as procedures that link stakeholders and enterprises through sophisticated technology and big data analysis.

5.4.2.3.3 Marketing

Social media technologies became a solid and interactive marketing avenue.

Respondent 3:

The only technologies we use in our business associated with the 4th Industrial Revolution are social media like WhatsApp, Twitter, Instagram and Facebook, which we use for marketing because it is cheap and easy to manage.

5.4.2.4 Emerging and underestimated

Many respondents felt that it was still emerging and underestimated by SMME owners.

5.4.2.4.1 Emerging

SMMEs were still getting accustomed to the complex technologies because they were previously not exposed to such.

Respondent 1:

SMMEs are warming to using Artificial intelligence and machine learning in the production and supply chain processes.

Respondent 8:

The points mentioned above are common in smaller businesses that may not have previously been able to or needed to adopt newer technological practices.

5.4.2.4.2 Underestimated

It was also underestimated as some still needed to see the value-based aspect of 4IR approaches and technologies.

Respondent 4:

While many start-up businesses and entrepreneurs see the importance of sustainability from a personal perspective, they may worry that their fledgling business lacks the resources to embrace the concept fully. They fail to see that in

today's fast-paced start-up world, sustainability is the single most crucial factor in determining a company's eventual success.

5.4.3 Subtheme: Factors that Influence the Sustainability of the Business in the 4th Industrial Revolution

This subtheme examined internal and external factors that influenced the sustainability of the business in the 4th Industrial Revolution.

5.4.3.1 Internal factors

There were many internal factors at play when it came to 4IR. Each is classified and unpacked below.

5.4.3.1.1 Organisational

Various organisational factors played a role in the following ways:

a) Leadership

It was all about leadership and their ability to see value in 4IR and provide oversight for adoption and implementation. It was their role to get staff buy-in accordingly. Hence it needed to start at the top. They also needed to be focused on customer needs. Leadership competency was also critical, as well as their ability to adapt to change.

Respondent 10:

On the other hand, the most significant component is the behaviour and attitude of the entrepreneur and his or her staff toward providing appropriate customer care to the business customers.

Respondent 2:

In the business, the leadership/management team serves an oversight function and helps with a long-term strategy incorporating more technological uses within the

organisation. Some members also take on a more hands-on approach. They'll help find candidates and make introductions, promoting good leadership culture.

Respondent 3:

Employees and managers have a significant influence on new practices and changes brought by the organisation. They must buy into the idea; otherwise, they may resist adopting the organisation's practices.

Respondent 5:

There needs to be a high level of management competency.

Respondent 6:

Effective leadership that is adaptive to change.

Respondent 9:

Many business executives experience anxiety from attempting to keep up with the rapid pace of technological change.

b) Vision and strategy

Relating to the above, it was important for leadership to create a vision to inform a strategy for 4IR.

Respondent 12:

Businesses should aim for long-term growth, which requires a plan and vision.

Respondent 4:

In recent years, businesses have been preoccupied with 'growth hacking,' but driving expansion in this manner is likely to inflict more damage than benefit. Instead of focusing on short-term growth, enterprises should pursue sustainable, long-term development and possible growth. This form of expansion demands the proper mix of components, strategy, and vision.

c) Culture

The culture of the business needs to change and be aligned towards 4IR. To change the culture, the company needed to focus on the needs of customers, society and the environment to win their support and confidence.

Respondent 1:

Regarding business culture, it is the cultural way people in our enterprise behave and handle certain situations. Having a strong positive culture has helped us grow our business more quickly. Our culture of flexibility and ability to adapt to various emerging trends and technologies has contributed positively to remaining sustainable.

Respondent 4:

In an organisational culture setting, social standing and personal decisions impact what and where individuals buy. Enterprises should consider societal concerns, events, and movements while producing a product/service for the market.

A feminist organisation that supports women's causes and movements would gain their confidence and allegiance. When targeting a specific market segment, consider its preferences and recent impacts. Such variables might boost your enterprise and please clients.

Respondent 9:

As a concept, organisational culture is nebulous yet universally understood. It includes and transcends your core beliefs. Consider how employees in your business respond to and deal with various scenarios. For instance, if a company does nothing when employees engage in insider trading, that practice will become widespread. There will be a shift toward accepting and celebrating this in your enterprise, yet it is ethically and legally wrong.

5.4.3.1.2 Financial

Financial factors were always critical as they determined SMME's economic trajectory. The factors included:

a) Access and availability

There had to be ample financial resources and access to such resources.

Respondent 5:

Access to financial resources via credit or financial institutions and subsidies from local government or tax incentives.

Respondent 7:

Availability of cash flow, access to financial resources, and assistance in applying for financial aid through subsidies and grants.

b) Financial management

Apart from having finances, financial management skills were necessary, and economic mismanagement could lead to significant losses.

Respondent 5:

Enterprises need to budget for business management training or short courses like management development programmes for their staff to be upskilled continuously of the ever evolving 4IR to ensure that the business is keeping up with modern-day trends that will influence its sustainability in a positive light.

c) Cost reduction

Cost reduction strategies such as reducing manual time and labour and increasing automation could lead to minimal wastage and more productivity.

Respondent 3:

Reference 1 -

I think it would be cost reduction and efficiency because when systems are automated, they reduce labour costs and wastage of material so that you can do more digitally and effectively.

Reference 2 -

With this new technology, you have embedded chips in the manufacturing line that warn you of any machine failure or when the machine is due for service. As a result of automation, workers no longer need to devote time to routine jobs and can instead hone their abilities to think critically and creatively.

d) Geographical footprint

The geographical footprint was significant regarding financial and profit management to expand to new regions and promote growth.

Respondent 4:

The geographical footprint is connected towards how our cash flow, profits, and investments are managed to penetrate new regions, resulting in growth.

5.4.3.1.3 Skills and Resources

Skills and resources are critical internal factors.

a) Skills and Labour

The labour force will still be part of the 4IR, but their skills must change considerably. Due to the 4IR being technology-driven, staff must adapt to change.

Respondent 10:

A lack of technical and managerial skills,

Respondent 12:

And happy/healthy workforce.

Respondent 2:

Many SMME owners or managers least realise that employees are the business. They're the place ideas come from, the ones who execute plans and handle emergencies as they happen. To make the most of this intrinsic factor, we ensure the business is a great place to work, constantly upskill our team to be in tune with the developing technologies, and have well-developed hiring processes based on HR metrics and analytics.

Respondent 5:

Reference 1 -

personnel that possess skills of the 4IR, for example, IT management and digital security systems.

Reference 2 -

And the most important of all is to improve your enterprise's technological capabilities. Replacing human labour with automated systems does not necessarily cause job losses. You can upskill your workforce to handle and maintain these machines and computerised systems and beef up your online or digital security platforms from ransomware and viruses.

Respondent 6:

Employees,

Respondent 7:

Practical labour management approaches.

Respondent 9:

Reference 1 -

On the other hand, the method itself is not easy to execute and requires the assistance of an experienced and trained IT management professional. If you hire

a professional, they can guarantee that all of your subsystems work together correctly without causing any disruption to your business operations. In addition, it is essential for your business's success to keep its overall functionality.

Reference 2 -

Business operations will be significantly altered if the availability of qualified workers is restricted, either due to your region's small size or the rising demand for your particular target market.

Getting highly qualified people may require paying far more than the going rate. On the other hand, if there is an abundance of employees, hiring skilful employees will be relatively easy.

b) Resources

Similarly, equipment, facilities, materials and other technology resources were needed to embrace the 4IR.

Respondent 10:

High costs and a scarcity of raw materials, insufficient transport and communication facilities,

Respondent 6:

Resources,

Respondent 7:

We are introducing and adjusting to the organisation's existing technological resources and dependencies.

Respondent 9:

It's no secret that machinery is among any business's most essential and costly assets. Some companies, especially those involved in construction, cannot function

without it. They may lease most of their equipment because it's expensive to purchase or finance. Our equipment needs are almost nothing compared to those of comparable institutions, and we need to bring our laptops, and we'll be ready to go. How you handle the necessary machinery may significantly affect your profitability and output.

5.4.3.1.3 Adaptability and Innovation

Businesses need to have the ability to adapt and innovate.

a) Innovation and creativity

Companies needed to be more creative in their thinking and approach. This is because innovation was crucial within the 4IR. Hence, businesses must stimulate their people to think creatively to promote innovation.

Respondent 1:

Another factor is business innovation: continuously remaining alert to the latest developments and adapting our business model to suit them has allowed our enterprise to retain its competitive advantage.

Respondent 11:

Automation frees up employees' time to focus on critical and creative thinking. Creative thinking of employees and management influences new business practices and advancements. They must back up the concept of accepting technology integration, or they may oppose embracing the firm's approaches and be obsolete.

b) Agility and transforming

Apart from creativity, businesses needed to become more agile to adapt to the changes brought by 4IR to the business world, or they would get left behind.

Respondent 6:

Reference 1 -

Adaptive to change, agile

Reference 2 -

Technological processes and systems are transformed to meet the new way of working.

5.4.3.1.4 Relationships

Apart from technology and innovation, relationships with customers and staff were pertinent.

a) Customer relations

Customers will always remain despite any industrial revolution. However, their needs may change, and this needs to be met by businesses. Therefore, ensuring ongoing customer relationships are strengthened through engagements and feedback can allow firms to determine customer needs and change their product and service offerings accordingly.

Respondent 12:

To achieve growth and profitability, SMMEs should focus on client problem-solving, feedback, and good service. Consumption, confidence, and value will thereby increase.

Respondent 4:

Alongside expansion is the value you provide to your clients or consumer. Displaying this value from the beginning of the relationship enables you to guarantee future loyalty and increases your funnel via referrals. A complicated gear wheel attached to growth includes many facets of fostering new and current partnerships and creating value.

Respondent 5:

The consumer market is wary of the social environment and commercial actions' effects on the environment. Some consumers support businesses like these that support environmentally friendly methods and goods. The deliberate selection of environmentally friendly, recyclable, and organic goods has presented several possibilities and difficulties for enterprises. An enterprise's sustainable long-term objectives are increased income, client retention, and environmental protection.

Respondent 7:

Ensuring customers' needs are met while targeting new markets and audiences and having reliable suppliers that deliver promptly and timeously.

Respondent 9:

An example of a favourable internal factor is having a marketing staff equipped to develop, measure, and fine-tune advertising efforts to increase the business's client base.

b) Staff relations

Similarly, staff should be seen as assets, and it is essential to promote staff relationships to build staff morale and capacity to embrace the 4IR.

Respondent 7:

They are establishing meaningful relationships with staff members rather than considering them as just statistics is essential.

5.4.3.1.5 Customer focus

Relating to customer needs, a strong focus on customers should be exercised**.**

a) Client-centricity

The client must become the centre of the business to become sustainable. Therefore clients should be met and client queries resolved to promote their satisfaction and prevent them from going to competitors.

Respondent 4:

Thirdly, and this is a very important component, that is, client-centricity. An enterprise serves clients, consumers, and anyone who benefits from its production or services. Sustainable growth and profitability of any appropriate and operatable business plan may be achieved most effectively by focusing consistently on client problem-solving or feedback and enhancing customer service and their positive experience with what you provide. This promotes sustained consumption, confidence, value, and expansion!

b) Analytics

More analytics should be done into customer trends and patterns to proactively inform offerings and meet customer needs.

Respondent 4:

Remember that regular customers drive sustainability, while new customers dictate expansion. Thus, analytics is a crucial aspect of my business. Understanding the demands of our consumers is essential, and our most important approach to date is customer engagement and internal customer relationship management. Servicing our clients directly and communicating our promotions via a sale or digital marketing is the fastest and most reliable way to generate a return on investment.

5.4.3.2 External factors

This subtheme examined external factors influencing the sustainability of the business in the 4th Industrial Revolution.

5.4.3.2.1 Pressure

The pressure was seen to be the most highly ranked factor. This was further informed by the following.

a) Competitors

The biggest cause of pressure was competitors. This is a logical argument as more than one business offered clients the same product and services. Hence, a business could lose customers quickly if competitors were capitalising on the 4IR opportunities, promoting environmental sustainability, and offering customers better service. Hence one needed to keep abreast/ahead of competitors.

Respondent 11:

The location of an enterprise's operations can shape its approach to sustainability. Customers may easily switch to rivals that are dynamic in responding to the demands of the modern workplace.

Respondent 3:

The environment where the business operates can influence sustainable practices because you would not want to be left behind. If you don't adopt these practices, customers can buy from your competitors, who would have the upper advantage if they were adapting to the changes brought by the 4th industrial revolution in the workplace.

Respondent 5:

If businesses continue to monitor and adjust to market developments and competition, they may increase their market share and profitability. To cope with loss, it would enable people to acknowledge the challenges and discover solutions to them.

Respondent 6:

Competition that keeps business on the competitive edge.

Respondent 7:

Researching about one's competitors to keep ahead of them.

b) Customers

Relating to competitors, customers were also an added economic pressure point. If customers were not satisfied, they would seek products and services elsewhere. Therefore, knowing customer needs (as outlined in other themes) was crucial. Customers were now also becoming cognisant of environmental welfare and wanted more environment-friendly products and services.

Respondent 11:

Reference 1 -

For a corporation to embrace sustainable practices, I believe pressure from consumers and other stakeholders is necessary.

Reference 2 -

For instance, one may feel compelled to embrace sustainable practices due to increased environmental awareness among their clientele.

Respondent 3:

The company's customers and other stakeholders can influence a business to adopt sustainable practices. For example, most customers are now more concerned about the environment than before,

Respondent 4:

Client contentment may be accomplished by providing a superior experience, creating new products/services, and maintaining staff satisfaction and well-being to enable them to serve as brand ambassadors.

c) Technological advancements

Technology was advancing at light speed, and if businesses did not embrace and integrate technology into their operation, they would indeed be left behind. Competitors could utilise such technologies and become faster, cheaper and more productive, thus overtaking those businesses that did not use 4IR technology.

Respondent 1:

technological advancements within the general business environment have impacted our ability to perform well. Since technology fades out due to other technological advances and innovations, drastically affects our business's ability to sell obsolete technology and keep up with the latest technological advances.

Respondent 4:

Reference 1 -

Technological advances are changing every business, and firms must adapt them to compete. A car GPS manufacturer may see fewer sales due to mobile device integration, which may be overcome by developing new integrated goods.

Reference 2 -

I would assume all but the most astute and well-informed market entrants are regularly caught off-guard by the increasing speed with which innovation is developing and the world is changing. Whatever the case, it has been established beyond a reasonable doubt across all economic spheres that technology ushering in the fourth industrial revolution profoundly affects commerce. Robotic advancements will further digitise the Industry, automate production and services,

and increase the use of underutilised technologies, all contributing to the acceleration of the fourth industrial age.

Reference 3 -

Significant shifts are also occurring on the supply side as companies adjust their approaches to product innovation, digital marketing, and distribution in response to the growing availability of information, the ever-present involvement of the consumer, and the emergence of new patterns of consumer behaviour, mainly driven by the proliferation of mobile networks and data.

Respondent 6:

AI creating opportunities like digital transformation and machine learning. Agile marketing interface and intelligence with businesses moving online. IoTs and BOTS to create an elegant, collaborative environment.

d) Government

Government pressure was also in the background through regulators and policy, compelling businesses to adopt more sustainable practices.

Respondent 11:

Or due to pressure from the government or regulators.

Respondent 3:

But pressure from the government or regulators can also push one to adopt sustainable practices.

5.4.3.2.2 Economics

Economic pressure was also forcing businesses to become sustainable.

a) Inflation and interest rates

The ongoing inflations and interest rate increases were costing business revenue. If they do not think of ways to reduce costs and increase revenue, this could lead to their demise.

Respondent 4:

Economic considerations affect everyday living and enterprise development. Recessions raise the unemployment rate. Businesses must work hard to retain their personnel and make adjustments to sustain income. If the firm makes retail items, it must lower pricing to boost sales and maintain profitability.

Respondent 7:

The economic situation in South Africa, particularly with high inflation and rising interest rates.

Respondent 8:

Also, soaring inflation rates and high living costs impact consumer buying power.

b) Pricing and profitability

It was important to ensure that the pricing of products and services could meet customer pockets as, due to the recessive economy, customers themselves were looking for cheaper alternatives.

Respondent 12:

Economic variables impact enterprise development, and recessions increase the unemployment rate. Businesses owe it to their employees to make every effort to keep them on board and make adjustments to maintain their revenue. If the company develops items for retail sale, it has to lower prices to increase sales and maintain its profitability.

c) Performance

The performance of businesses can dwindle due to economic pressure, thus forcing firms to consider new ways of sustainability.

Respondent 2:

Economic factors impact the business's performance within the marketplace, including interest rates, employment rates, and disposable income.

5.4.3.2.3 Environment

The business environment was a driving force of sustainability in the following ways.

a) Socio-cultural

Socio-cultural factors need to be considered. Customers came from a diversity of backgrounds and cultures. Such backgrounds influenced their choice of products and services needed. Hence businesses needed to understand these factors to reposition themselves in their offering, or they could stand to lose customers.

Respondent 1:

Firstly, socio-cultural factors impact how our business presents itself and advertises its products to consumers. Since these factors include demographics and cultural trends, the business has to continuously favourably position itself to attract its target audience based on these factors, which are more often than not always quite difficult to do due to society's constantly changing attitude/trends.

Respondent 12:

Reference 1 -

Individuals' social backgrounds and the choices they make on a personal level influence both what they purchase and where they shop within the context of an organisation's culture.

Reference 2 -

When developing a product or service for the market, a business must consider the issues, events, and movements that occur in society.

b) Location

Location was also important for businesses, as they needed to physically locate themselves near major suppliers and customers, which could reduce travel costs and be convenient for customers and suppliers.

Respondent 10:

Geographical closeness to major customers and suppliers of goods and services allows SMMEs enterprises to rapidly discover and capitalise on chances for advancement in the market.

Respondent 11:

The location of an enterprise's operations can shape its approach to sustainability.

c) Political

Political factors caused by leadership changes and political inference in the country also changed the business environment, affecting business practices.

Respondent 4:

Every election, newly elected office bearers bring in new and untested policies and eliminate old working ones in the name of radical economic transformation or assisting the previously disadvantaged traders, which affects businesses. Due to political inconsistencies, businesses must pay attention to legislation and impending measures to plan for changes in their working environment.

d) Biological

Biological and environmental factors such as climate change and natural disasters also forced businesses to reconsider their operations and processes.

Respondent 2:

Environmental factors impact business operations along the supply chain. Changes in climate and natural disasters, and trends toward clean energy have impacted the business's choices about how it operates.

5.4.3.2.4 Legal and Policy

The legal and policy environment also played a role.

a) Policy

Government regulations were changing all the time, which influenced policy change. The policy change could involve the labour force, regulations, pricing, supply, intellectual property, and trading, among others. Hence such change meant that businesses needed to comply.

Respondent 2:

Changes in regulations result from who is currently holding government positions. These impact how freely the business can operate within the economy. Some examples include trade tariff policies and tax policies.

Respondent 4:

Enterprises should also be aware of intellectual property and copyrights, import and export restrictions, competition regulations, employment and labour laws, tariffs and corporate tax, as it may affect the company negatively if not compliant.

Respondent 5:

The enterprise should know numerous national and international regulations and laws if it releases its product worldwide. The business should continue to assess the state of the economy, consumer trends, cultural standards, and societal challenges; and provide training/upskilling its staff to address these issues. It enables them to create items/services that satisfy their wants and demands.

Respondent 6:

Policies and legislation that drive innovation.

b) Legal

Relating to the above, this meant that businesses needed to comply with such legal and policy changes or face legal ramifications. Companies also needed to guard against illegal trade and products.

Respondent 1:

Legal factors, including labour laws and employment regulations, also impact business conduct. Adhering to the different regulations relating to the consumer protection act, health and safety regulations, municipal bylaws etc., can be pretty challenging.

Respondent 4:

Legal variables should be considered as they are national laws that affect how a firm operates, and consumers behave. Product viability in particular markets, profit margin, and product transportation come under this category. Legal issues assist in determining whether an enterprise should sell unregulated or illegal products and services. Some significant laws include import and export laws, fraud and anticorruption, labour and employment, health and safety regulations, copyrights and intellectual property, discrimination and biases, consumer protection laws, and demographics. Many enterprises use demographics to determine whether their

target market meets their demands. It helps them understand their market and better serve clients. Demographics may affect enterprise HR processes and decisions to be BEE compliant to receive subsidies, tenders, etc.

c) Ethics

It was also important for businesses to be ethical in their practices. A lack of ethics can create a negative image of the business, compromising customers and revenue.

Respondent 5:

The greatest external factor, I would think, is business ethics and having morals. Since everyone has a unique understanding of morals and ethics, it is increasingly difficult for employers to strike a balance between employee expectations and their personal lives. The sales and marketing team of the business is tasked with steering clear of any actions that might harm the business by being discriminatory. Managers should handle ethical workplace problems, including harassment, disclosing corporate business information, and taking disciplinary measures against offenders.

5.4.4 Subtheme: Technology integration for making businesses more sustainable.

This key subtheme outlined the technology integration process for making businesses more sustainable.

5.4.4.1 Enhanced automation

The 4IR brought more automation possibilities.

5.4.4.1.1 Artificial intelligence

AI was the prominent technology of 4IR and could serve to automate key processes intelligently. Such technology could thin and learn for itself, thereby mitigating human labour and promoting productivity. This type of technology should be considered for sustainability.

Respondent 10:

As information technology becomes increasingly integrated into production in the coming years, traditional businesses will gradually give way to automation. Smart machines are those in which machines contribute intelligently to the production process and help the workers running the business to be more productive.

Respondent 2:

The use of machine learning and AI-powered systems to diagnose problems ahead of time, allowing for speedy intervention and resolution, is one example of how technology can help businesses to become more sustainable.

Respondent 4:

Whatever the case, it has been established beyond a reasonable doubt across all economic spheres that technology ushering in the fourth industrial revolution profoundly affects commerce. Robotic advancements will further digitise the Industry, automate production and services, and increase the use of underutilised technologies, all contributing to the acceleration of the fourth industrial age.

5.4.4.1.2 Smart online

Businesses needed to embrace the online world using smart technologies. Today's customers were doing substantial online shopping through suppliers such as Takealot and Uber, thereby changing the virtual landscape of service offerings. Many services could now be using apps.

Respondent 4:

The expansion of digital information hubs constitutes a substantial movement. Such platforms mix supply and demand and undercut current production systems, and as examples, we may observe emerging business models in the present sharing economy and on-demand economy. These smartphone-accessible platforms, such as Uber, Airbnb, and Takealot, connect users, their assets, and relevant data,

enabling the emergence of novel service delivery models and consumption patterns. Also, they alter the business and individual spheres of employment by making wealth more attainable. Various new services, from laundering to online purchases, house cleaning to parking, spa treatment to commuting, are fuelling the rapid proliferation of these innovative business models.

Respondent 5:

Advantages include more information availability (particularly online),

5.4.4.1.3 Effective integration

Therefore, effective integration of technology was important—all processes and operations involving various stakeholders needed to be carefully integrated via technology systems. Without proper integration, such processes would not be able to work in synchrony and could hinder progress. With proper integration, systems can be unified, and a single large system could serve multiple process needs.

Respondent 10:

Reference 1 -

The business's IT infrastructure will permeate every facet of operations as time passes. To a greater extent, IT will be used to keep tabs on and operate machinery, aid team members, educate clients, and automate the supply chain. For this to work, it will be necessary to harmonise IT integration with business strategy.

Reference 2 -

Businesses must know where the level of cooperation and coordination between consumers, suppliers, and the production team on a scale is unthinkable at present. As part of any successful IT integration project, it will be necessary to harmonise personnel, machines, and business KPIs.

Respondent 5:

Reference 1 -

So many enterprises are pursuing the integration of technology because of its potential to boost production and efficiency. For instance, consider the convenience of purchasing online. E-commerce sites, which sell goods and services over the internet, use a system integration strategy that's often regarded as the most effective. You must maintain one online database to track sales, stock, purchases, and individual client accounts. Consumers may see prices, while merchants can access customers' payment card and account information. Digital updates and calculations allow for instantaneous processing and shipment of orders. Amazon is still testing delivery through drones, so even delivery itself may be automated in the near future. There is no need for any work to be done by hand, eliminating the possibility of human mistakes and the associated expenses.

Reference 2 -

Many SMMEs fail because their owners resist adopting modern computer systems. While it may be seen as an advantage, they perceive it as a challenge. This disagreement, which affects many smaller organisations with several generations of leadership, might be resolved by adopting cutting-edge technology, devices, and software and assuring their integration and communication.

Integrating technology is good for business transformation as a whole. Integrating technologies allows them to evolve with the enterprise while simplifying the infrastructure. Technology will keep everyone informed when new segments are created, new customers are acquired, and new personnel are employed.

5.4.4.2 Efficiency and Productivity

Technology integration should be aligned to efficiency and productivity in the 4IR in order to reap its rewards.

5.4.4.2.1 Efficiency and cost saving

Technology must enhance efficiency by reducing manual labour and processes. This can include the inventory and sales processes, cutting costs and boosting revenue.

Respondent 4:

Reference 1 -

Efficiency and sustainability programmes often work together. For instance, integrating technologies that use less energy and generate less trash may significantly save costs and lessen environmental consequences. Technology solutions that boost both productivity and efficiency may help businesses enhance the long-term viability of their internal operations. Businesses and society both benefit from the use of this kind of purpose-built technology.

Reference 2 -

In addition to saving money on storage, shipping, and handling, many businesses that successfully use ERP systems also realise significant improvements in the effectiveness of their inventory management processes. When implemented at scale, the cost savings from implementing an ERP system may amount to hundreds of thousands of rands. Businesses that use such solutions have a better chance of standing out in their respective fields via increased client loyalty and satisfaction.

5.4.4.2.2 Productivity

Technology integration through efficient systems can boost the production process, promoting productivity and leading to profitability and sustainability.

Respondent 10:

As information technology becomes increasingly integrated into production in the coming years, traditional businesses will gradually give way to automation. Smart

machines are those in which machines contribute intelligently to the production process and help the workers running the business to be more productive.

Respondent 12:

Technology that boosts productivity and efficiency may help businesses improve their business systems. Businesses and communities benefit from this innovation.

Respondent 5:

Reference 1 -

Automated systems and quicker processing

Reference 2 -

By boosting your company's efficiency and production, you can stay ahead of the competition, which is the largest perk of integrating technology. Time is saved when information is centrally located, well-structured, simple to find and use, and can be transferred across several programmes without effort. As a result, you and your staff will no longer have to enter data into several systems manually. In its place, automated data exchange and updates across systems may help you make fewer mistakes and keep more commitments.

Reference 3 -

As a result of having more free time on your hands, you'll be able to put more thought into the choices that will shape the future of your enterprise. Entrepreneurs who aren't rushed may take their time considering the challenges, opportunities, and potential solutions confronting their enterprise and the industry. When it comes to making money, what is the enterprise's latest objective, and how will it be accomplished? Is there anything we can do to make our business more competitive? Taking one's time to deliberate always leads to better outcomes. Every choice, no matter how inconsequential it may seem, may have serious implications for your business. Make the most of the time you have.

5.4.4.2.3 Reduction of physical space

There is also significant monetary saving by reducing physical space as technology allows for documents to be stored online, thereby mitigating the need for physical storage space. Furthermore, businesses can be run online, and people can work or operate from home, mitigating the need for large business premises.

Respondent 12:

While the advantages of cloud computing are clear, the technology's reliance on the internet has discouraged some businesses from making the switch. To achieve corporate agility and sustainability, SMMES must look into the role of the cloud computing paradigm in their daily business operations.

Respondent 4:

The need to obtain additional IT and technological expertise quickly, to work strategically, and be ahead of technologically savvy new entrants that are eating into the market share as they work and run their business from their homes, cutting down on office space or workplace expenses.

Respondent 5:

Storage of information.

Respondent 8:

Management eliminates the need to store physical documents.

5.4.4.2.4 Data-driven Processes and Decisions

Processes and decision-making can finally be driven by data and not just by assumptions. This can lead to better decision-making towards sustainability.

Respondent 1:

The solution is to invest in systems that can harmonise data from many sources and provide critical insight into employee problems or challenges. This is the type of reporting that promotes long-term sustainability. Focusing more on environmental impacts can also help not only to attract and retain staff but customers too.

Respondent 8:

It will enable data-driven decision-making, which will lead to more effective management,

5.4.4.2.5 Resolving anomalies.

Technology can automate manual processes, thereby eliminating anomalies and errors. This can save time and money and enhance productivity.

Respondent 2:

They could also apply a combination of historical data, data analytics, and critical algorithms to detect anomalies and notify the appropriate people quickly. This allows businesses to cut costs by addressing and resolving inefficiencies and stay compliant by rapidly identifying and correcting violations.

Respondent 8:

Accelerate administrative work and cut the number of errors that occur.

5.4.4.3 Marketspace

The market space was a driving factor for technology integration.

5.4.4.3.1 Improve customer base

Customers were becoming more concerned about the environment and were slowly leaning towards environmental sustainability in the product they bought. Hence more engagement was needed to determine the sustainability required to improve

the customer base. Using technology to promote engagement and gain insight into customers was hence important.

Respondent 4:

Reference 1 -

Enterprise resource planning systems and facilities maintenance technologies that guarantee buildings and machinery productivity may improve the quality and longevity of business operations by increasing the efficiency with which they are procured. Similarly, investing in Customer Resource Management systems may boost staff output and show your business cares about its customers, who are more mindful of the environmental effects of their purchases.

Reference 2 -

Consumers are growing more ecologically and socially conscious as time passes, placing a higher value on sustainably harvested or organic foods, items created from recyclable materials, and things manufactured under fair and conflict-free labour circumstances.

Reference 3 -

Consumers are increasingly looking for sustainable products and avoiding those they consider irresponsible. Thus, including sustainability responsibilities in CRM is a valuable strategy for businesses to stay competitive in an ever-evolving market.

Respondent 6:

Reference 1 -

It can increase customer engagement and satisfaction.

Reference 2 -

Leading to business transparency and change in customer behaviour.

Respondent 7:

Digital media and smart technologies have given us the necessary tools to drive our business growth, enabling us to understand our customers better and connect with them in new ways.

5.4.4.3.2 Agility

The business needed to become more agile in the 4IR. There were many technologies that they could utilise to become more agile such as management information systems, business intelligence, knowledge management, and web-based technologies.

Respondent 11:

In the last half-century, technological advancement has occurred at a pace never seen before. A significant portion of the equipment that the wider populace tends to connect with the futuristic worlds depicted in speculative fiction and media clichés is already in use.

It is a daunting issue, but an important one, to imagine how the working environment will have evolved by the time that people of today reach the point at which they may retire. We have no choice but to make urgent adjustments,

Respondent 12:

Management information systems, decision support systems, business intelligence, knowledge management, and web-based collaboration are just some of the ICT technologies that most enterprises utilise to increase their agility.

Respondent 9:

Trying to envision how the working world will have changed by the time today's workers reach retirement age is a challenging problem but an essential one. We must adjust immediately, including re-educating and reskilling older generations whose working lives may have already been drastically altered. At the same time,

we need to prepare for tomorrow's digital natives to work with technologies that don't even exist now.

5.4.4.3.3 Breaking barriers

The technology could break geographical barriers, so businesses would not be confined to operating in physical locations.

Respondent 5:

I think half or more of the earth's population uses social media to interact, train, and network. In an idealistic situation, these partnerships may give possibilities for creating bridges across disparate cultures and, as a consequence, for unity and cohesiveness. These connections can create unachievable and unbelievable views of an individual or team's success and spread radical ideas and ideologies.

5.4.4.3.4 Relationships

Technology should become a key platform for engagement for building relationships with all necessary stakeholders.

Respondent 7:

These technologies are redefining our relationships across the value chain, including our customers, suppliers and online communities.

5.4.4.3.5 New Markets and Marketing

Through technology, digital marketing was possible and could attract more customers and open new markets.

Respondent 5:

Reference 1 -

Digital marketing and retailing via the web and social media,

Reference 2 -

Future technology advancements will transform commercial procurement, increasing efficiency and production. Communication and transportation costs will be cut, logistical and international supply chains will be more efficient, and trading gaps will be minimised; all this will contribute to developing new markets and economic development.

5.4.4.4 Staff

Staff were also pivotal to the 4IR, and technology integration can benefit them.

5.4.4.4.1 Competent workers

Workers can be developed and skilled accordingly to support 4IR technology integration.

Respondent 11:

And this must involve retraining and re-educating unskilled workers whose workforce experiences may already have been significantly disrupted.

Respondent 9:

Untrained workers wasting time on poorly implemented technology is another source of waste for businesses. Despite its critical importance, digital transformation requires careful implementation.

5.4.4.4.2 Remote working

Staff can also work remotely and flexibly.

Respondent 6:

The inevitable shift is to create a hybrid or remote working environment where possible.

5.4.4.4.3 Safety

Reducing pollution and toxicities due to environmental efforts can lead to a safer working environment for staff.

Respondent 3:

But also improve the safety of employees who some toxic emissions from business activities could poison. In addition, the employees will no longer have to go to unsafe areas because robots or AI-driven machines can be deployed to enter such sites.

5.4.4.5 Environment

The overall environment can be saved and protected by using more 4IR technology.

5.4.4.5.1 Reduce pollution.

The 4IR technology integration is built smart, consuming less energy and emitting less pollution.

Respondent 12:

I feel efficiency and sustainability frequently operate together. Integrating technology that uses less energy and produces less pollution may save money and reduce environmental impact.

Respondent 3:

I think the introduction of 4th industrial technologies in business will reduce the pollution of the environment.

5.4.4.5.2 Carbon footprint

The 4IR technologies can lead businesses to lower their carbon emissions and carbon footprint.

Respondent 3:

Deploying 4th industrial technologies can also reduce carbon emissions to the atmosphere and help deal positively with climate change. It will also help small businesses to expand their footprint across different regions.

Respondent 4:

A prime example of the efficiency-sustainability relationship is the reduction of energy use. It's possible to save significant money by switching even five incandescent bulbs with more energy-efficient alternatives. Adjusting thermostats by only one or two degrees closer to the average outside temperature may save businesses thousands of rands annually in energy costs. A business's carbon footprint and air pollution consequences may be lowered with these easy energy-saving measures.

5.4.5 Concluding remarks

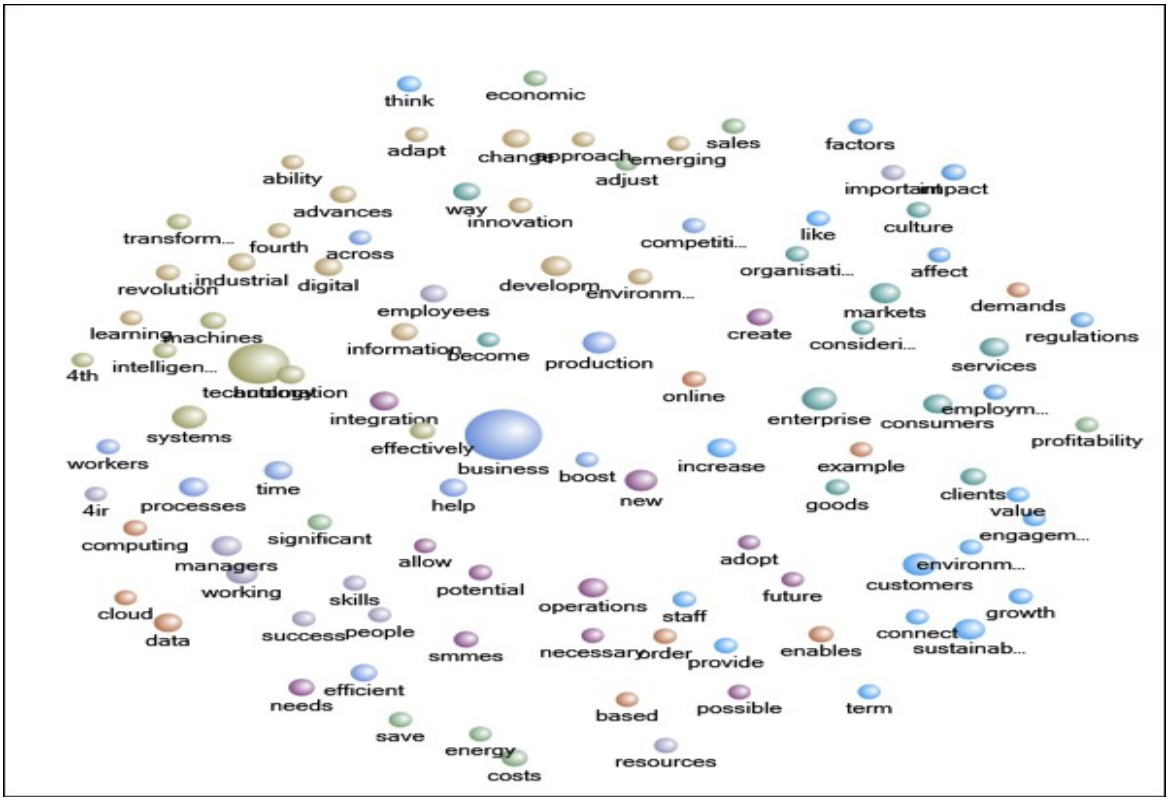

Figure 5.4.5: Cluster analysis of the 4IR (Researcher, 2023)

The 4IR represents a transformative phase in human history, marked by the fusion of advanced technologies and the blurred boundaries between the physical, digital, and biological worlds. After conducting a detailed analysis of the interviews and exploring the various subthemes, it is clear that the 4IR is reshaping the landscape of business and society. The cluster analysis above provides a dynamic and captivating visual background, symbolising the interconnectedness and complexity of the 4IR. Just as the various elements in the image converge and interact, so to do the technological, societal, and economic dimensions of the 4IR. It serves as a reminder of the multifaceted nature of this revolution and the need for collaboration and adaptability in embracing its potential. The 4IR represents a paradigm shift, where advanced technologies, innovation, and collective advancement reshape how SMMEs operate and society's function. As we navigate this transformative era, enterprises must embrace the opportunities and challenges presented by the 4IR, leveraging technology to create a sustainable and inclusive future for all.

5.5 THEME TWO: SUSTAINABLE ENTREPRENEURSHIP DYNAMICS

This theme delves into the dynamics and intricacies of sustainable entrepreneurship, shedding light on its various dimensions and implications. This section discusses the findings related to the understanding of sustainable entrepreneurship and sustainability of business and other SMMEs in the current economic times. A visual representation of this theme is depicted as a tree map below.

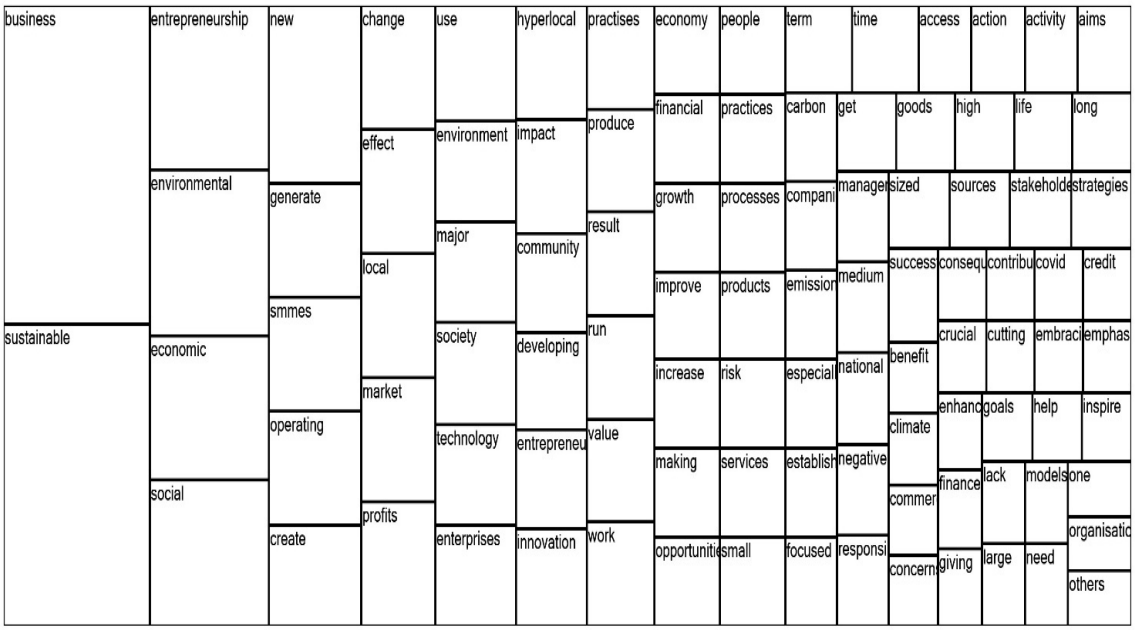

Figure 5.5: Sustainable Entrepreneurship Dynamics tree map (Researcher, 2023)

5.5.1 Subtheme: Understanding of Sustainable Entrepreneurship

The accompanying tree map serves as a visual representation of this subtheme. The word tree presents a comprehensive overview of the concepts and keywords related to sustainable entrepreneurship expressed by the respondents.

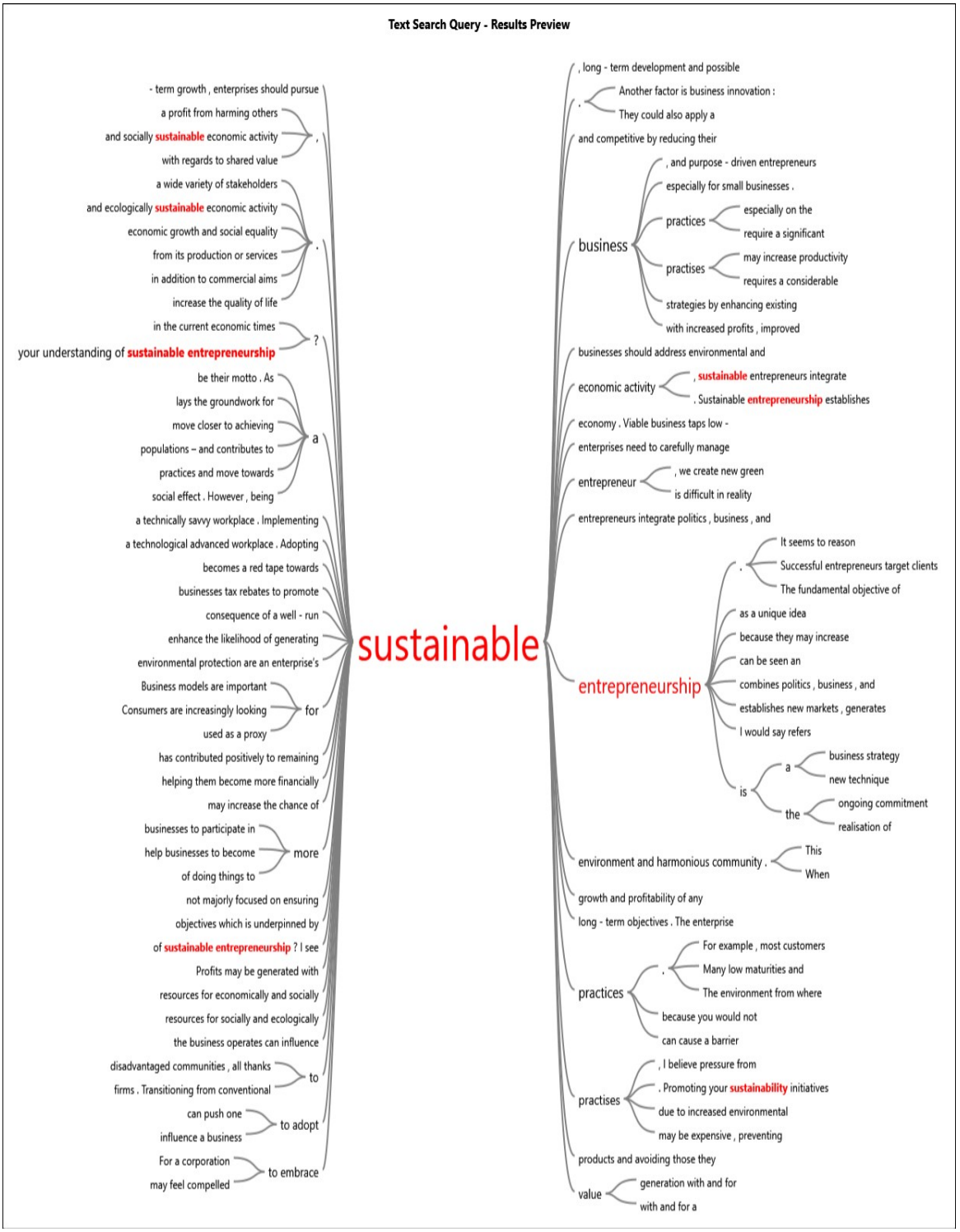

Figure 5.5.1: Sustainable entrepreneurship word tree (Researcher, 2023)

The viewpoints and insights shared by the respondents provide valuable perspectives on the understanding of sustainable entrepreneurship and will be

discussed below. Their experiences and opinions contribute to a deeper understanding of the dynamics and factors in this field. By examining their views, we can identify common themes and gain insights into the intricacies of sustainable entrepreneurship.

5.5.1.1 Economic

Respondents felt that sustainable entrepreneurship was directly related to the economics of the business.

5.5.1.1.1 Economy and Society

Many respondents concurred that sustainable entrepreneurship is about the economy and society collectively. SMMEs could provide employment and economic growth to society while also obtaining customers' benefits. This served as a mutualistic relationship and social benefits.

Respondent 10:

Reference 1 -

Sustainability is now a multifaceted notion that goes beyond environmental preservation to economic growth and social equality.

Reference 2 -

In the vast majority of developing nations, small and medium-sized enterprises are being established for the sole purpose of providing a means of subsistence. While most industrialised nations equate SMMEs to manufacturing services, some countries take a wider definition and include retail.

Respondent 12:

Entrepreneurship and other economic ventures have helped propel the economy's growth—an enterprise, often a small or medium-sized, results from entrepreneurship in the economic sphere. In every country's economy, SMMEs play a crucial role, and profitability has long been used as a proxy for sustainable entrepreneurship.

Respondent 2:

Gain is generally defined as economic and non-economic benefits for individuals, the economy, and society.

Respondent 3:

I see sustainable entrepreneurship as a unique idea about how to run a company in a way that is beneficial to the environment and society simultaneously.

Respondent 5:

Also, concerning shared value, sustainable businesses should address environmental and societal issues by adopting practices that provide both economic and social benefits.

5.5.1.1.2 Opportunity driven

Sustainable entrepreneurship was opportunity driven by capitalising on the opportunity to create new products, services and innovating in processes.

Respondent 1:

It is opportunity oriented and aims at generating new products, services, production processes, techniques.

5.5.1.1.3 Optimum resource usage

It was also about using resources optimally to minimise wastage and save on costs.

Respondent 8:

This entails operating the business in such a way that it is financially secure and makes optimal use of the resources available at the proprietor's disposal.

5.5.1.1.4 Values based

It was also about adding value to the business sector and creating value for society and the environment.

Respondent 2:

Sustainable entrepreneurship is a business strategy focused on increasing value for society, the environment and the company or business.

5.5.1.2 Environmental

Sustainable entrepreneurship was also directly linked to the following:

5.5.1.2.1 Profitability and Environment

While sustainable entrepreneurship was about enhancing profitability, it was also about taking the environment into account in that bottom line. Hence profitability should go hand-in-hand with the environment so the business can be sustainable from an economic and environmental perspective. Sustainable entrepreneurship can hence also serve to resolve environmental issues.

Respondent 12:

The operational circumstances and the level of rivalry have necessitated that businesses seek social and environmental objectives in addition to commercial aims. Sustainable entrepreneurship refers to business as a tool for positive social and environmental change.

Respondent 3:

The profitability of an organisation and environmental responsibility can and should go hand-in-hand, and innovations are often crucial to making that happen.

Respondent 4:

Also, by empowering your suppliers and consumers to do the same, you may create successful, expanding business models with little or even positive environmental and social effects. However, being a sustainable entrepreneur is difficult because people under pressure to think about profit and development and frequently choose the quickest, easiest, and least environmentally damaging option.

Respondent 5:

I think profits aren't the point, but the consequence of a well-run, sustainable business, and purpose-driven entrepreneurs know this. They first determine how they will generate value for stakeholders by developing profitable solutions to issues affecting both people and the environment, and only then take action.

Respondent 9:

Sustainable entrepreneurship is a new technique to solve environmental concerns via business.

5.5.1.2.2 Reducing the negative impact

It was also about reducing the negative impact on the environment by mitigating environmental problems and preventing them from worsening. Each business had a role to play thereof.

Respondent 1:

Organisational modes substantially reduce social and environmental impacts and increase the quality of life.

Respondent 4:

We can't preserve the earth by crashing the capitalist system into a wall, so we have to make changes from the inside. Entrepreneurial activity is a major factor in the worsening of environmental conditions and the widening of income disparities. Still, market mechanisms by local policymakers may also work to reverse these trends.

Respondent 5:

Respecting human and stakeholder rights and not making a profit from harming others, sustainable enterprises need to carefully manage and mitigate the risks of their actions and commercial partnerships that might harm the rights and dignity of others.

Respondent 6:

While reducing environmental, social and economic challenges.

5.5.1.2.3 Community and Nature

Sustainable entrepreneurship must focus on the community and nature and protecting these crucial resources and entities.

Respondent 11:

New markets are created, and revenue is generated, which is particularly helpful for socially disadvantaged communities, all thanks to sustainable entrepreneurship. Successful

Respondent 2:

Emphasis on maintaining nature, life support, and community

5.5.1.2.4 Quality of life

It was also about improving the quality of life for all stakeholders.

Respondent 11:

New markets are created, and revenue is generated, which is particularly helpful for socially disadvantaged communities, all thanks to sustainable entrepreneurship.

Respondent 2:

Emphasis on maintaining nature, life support, and community

5.5.1.3 Change and Innovation

Sustainable entrepreneurship was definitely about change and innovation.

5.5.1.3.1 Competitiveness

Sustainable entrepreneurship was about becoming competitive and keeping ahead of the competition. This could be promoted through innovation.

Respondent 1:

Companies progressively consolidate their competitive position through innovative actions in the field of sustainability.

Respondent 5:

Disruption through innovation should also be their motto. As sustainable entrepreneurs, we create new green solutions, technological services, manufacturing processes, tools, and organisational mechanisms that replace the conventional, untenable older workplace practices and significantly lessen their negative social and environmental impacts, giving them a competitive advantage.

5.5.1.3.2 Change and Adaptability

Businesses need to change and adapt quickly to current trends to become sustainable.

Respondent 4:

Entrepreneurship requires a willingness to change and adapt. Change and innovation are crucial to sustainability. Therefore, I believe that new businesses and young entrepreneurs are responsible for aiding in this movement toward a greener world. That's because the people at the forefront of change can tell you all there is to know about it.

Respondent 7:

The ability to create a viable business platform that can evolve and embrace changing digital technologies

5.5.1.3.3 Sustainability innovations

For a business to become sustainable, it must capitalise on sustainable innovations.

Respondent 1:

Sustainable entrepreneurship is the realisation of sustainability innovations aimed at the mass market and giving benefit to the larger part of society.

5.5.1.4 Development

The critical fundamental area of development also informed sustainable entrepreneurship.

5.5.1.4.1 Create new products and services

Sustainable entrepreneurship was also about looking at areas of development in terms of creating new products and service offerings to customers. The disadvantaged community should also be considered, and various and diverse customers can lead to the sustainability of the business.

Respondent 2:

Pursuit of perceived chances to create new products, processes, and services for gain,

Respondent 9:

Sustainable entrepreneurship establishes new markets, generates new revenue – especially for socially disadvantaged populations – and contributes to a sustainable economy.

5.5.1.4.2 Developmental practices

The developmental practices of the businesses should be aligned with environmental and social aspects to support sustainable entrepreneurship.

Respondent 1:

Sustainable entrepreneurship can be an opportunity for business development practices at the environmental and social aspects nexus.

Respondent 7:

And to practice tested growth and development strategies in fulfilment of this.

5.5.1.5 Multi-stakeholder effect

Sustainable entrepreneurship was further about having multi-stakeholder involvement.

5.5.1.5.1 Multi-disciplinary approach

The multi-disciplinary sectors, such as business, politicians, civil society, and community, should unite to align towards sustainable entrepreneurship.

Respondent 11:

Sustainable entrepreneurs integrate politics, business, and civil society to mobilise new resources for economically and socially sustainable economic activity.

Respondent 9:

Sustainable entrepreneurship combines politics, business, and civil society to mobilise new resources for socially and ecologically sustainable economic activity.

5.5.1.5.2 Stakeholders

Concerning the above, multi-disciplinary stakeholders should be involved in/inform sustainable entrepreneurial activities.

Respondent 11:

Successful entrepreneurs target clients at the bottom of the economic pyramid, especially in developing and emerging economies. To enhance the likelihood of generating sustainable value with and for a broad range of stakeholders,

Respondent 9:

Business models are important for sustainable entrepreneurship because they may increase the chance of sustainable value generation with and for various stakeholders.

5.5.2 Subtheme: Sustainability of Business and Other SMMEs in the Current Economic Times

This subtheme aimed to assess the viability and resilience of SMMEs in the face of the challenges posed by the current economic climate. This subtheme was of great significance as it shed light on the ability of businesses, particularly those on a smaller scale, to adapt, survive, and thrive in uncertain times.

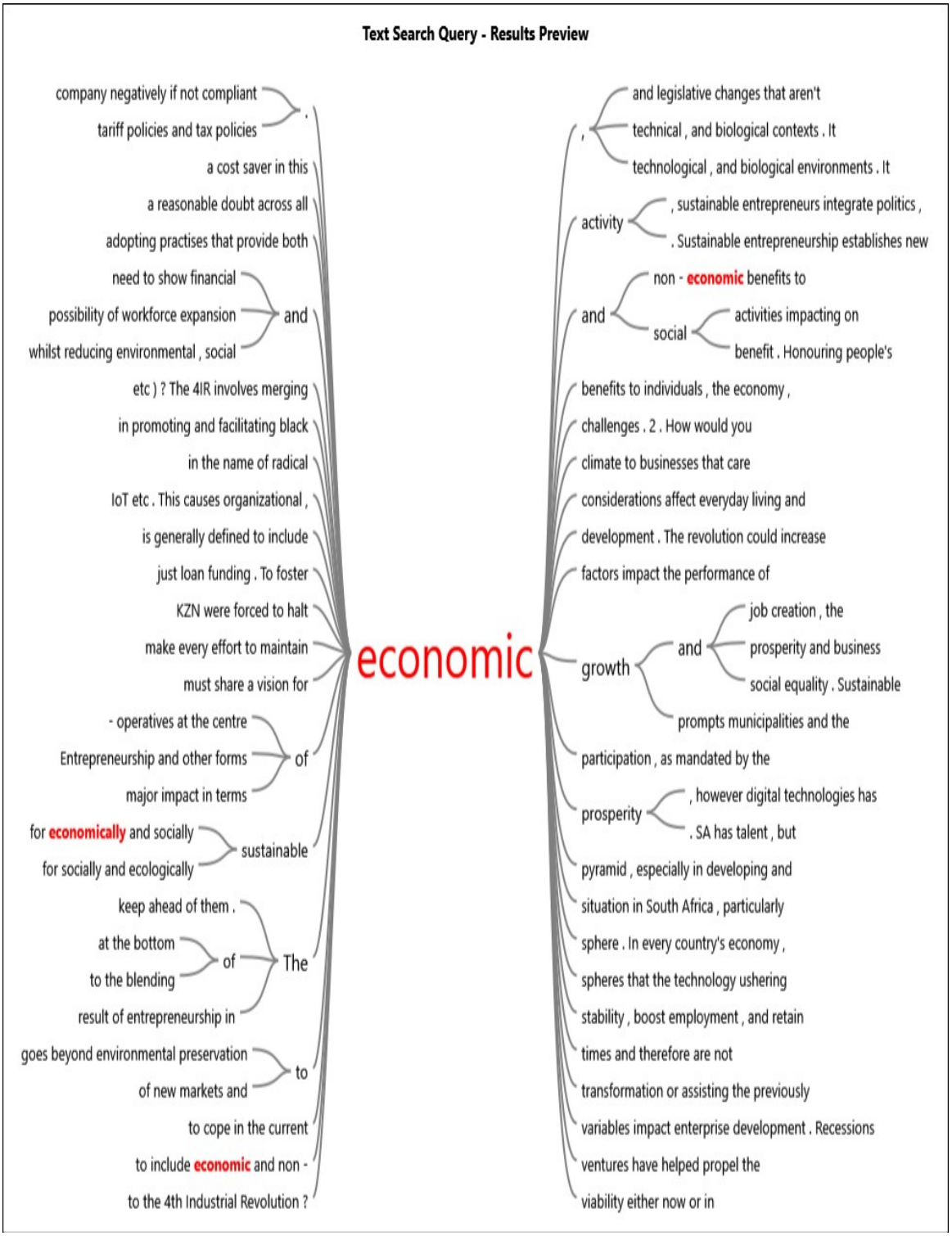

Figure 5.5.2: Economic performance of SMMEs word tree (Researcher, 2023)

The word tree analysis revealed a range of perspectives from the respondents regarding the sustainability of SMMEs in the current economic times. While some

respondents expressed optimism and confidence in the resilience of these enterprises, others raised concerns about their ability to withstand the economic pressures.

5.5.2.1 Limitations

However, the current economic times created significant limitations for SMMEs to be sustainable.

5.5.2.1.1 Limited cashflow

The biggest contributing factor was the limited cashflow. Firstly, SMMEs were still emerging businesses that had limited cash on hand. Furthermore, SMMEs had severe challenges accessing finance. This was because they were not adequately established and lacked financial experience and track record, and this acquired loans and capital challenges.

Respondent 1:

This may be because they have limited cashflow and are highly dependent on clients paying their invoices on time or because they have little knowledge and insight into setting up and running the business effectively and the associated vital metrics to be tracked.

Respondent 5:

Reference 1 -

There is a high credit risk profile for SMME businesses since there are currently no alternative revenue sources, unsustainable income streams, weak business and financial management skills, and a lack of risk mitigation techniques. Because of these concerns, conventional lenders are often unwilling to work with small and medium-sized business owners. As a result, getting a loan may be difficult for businesses, especially new ones, due to the cautious attitude of banks and other

institutional lenders. The credit market sees a need to limit risk, so even if these companies do get access to financing, it will be at exorbitant interest rates.

Reference 2 -

Small and medium-sized enterprises, especially new entrants, have a greater need for easy access to finance than do major corporations, which have more established networks from which to draw funding. Due to the higher perceived risk associated with SMMEs, access to financing is a substantial barrier to their growth. As a result, financial institutions often deny credit applications from SMME business owners or provide loans at exorbitant interest rates.

5.5.2.1.2 Lack of structures

The SMMEs also had a lack of organisational structure and hindered impacted on their business model and operations. This could also hinder productivity.

Respondent 1:

Many low maturities and new SMMEs lack the financial, operational, and strategic structures common in larger businesses. This hinders them from making the best use of available capital to scale their operations.

Respondent 2:

Mainly because small enterprises often lack good performance management systems, precise day-to-day operating models, and management structures with well-defined roles.

5.5.2.1.3 Struggling

Respondent asserted the SMMEs were struggling in their sustainability effort due to the shrinking economy, worsened by COVID-19, unrest and flooding.

Respondent 1:

SMMEs struggle to cope in the current economic times was not focused on ensuring sustainable practices.

Respondent 6:

Over the last three years, SMMEs in KZN were forced to halt economic and social activities, impacting their ability to survive and causing financial distress; as a result, their resilience and sustainability were threatened. This was due TO COVID-19 lockdown restrictions, the 'July unrest' and the catastrophic floods that effected business and society.

5.5.2.1.4 Owner mindset and focus

The SMME owners themselves did not seem to have a focus on sustainability and a sustainability-driven mindset.

Respondent 2:

Reference 1 -

There is not much focus on sustainability within SMMEs.

Reference 2 -

Many SMEs are struggling to break free from a restrictive owner mindset and assume a more strategic role.

5.5.2.2 Opportunities

However, SMMEs should find opportunities in these challenging times, as argued by some respondents.

5.5.2.2.1 Using technology to overcome challenges

Businesses should use technology to find ways around the challenges. Such technologies can improve response time, efficiency, marketing and productivity.

Respondent 11:

Sustainable business practices may increase productivity without significantly impacting the local, national, or planetary ecosystem. Challenges, barriers, and opportunities are inevitable in every enterprise operating on a large scale. Businesses now use various information and communication technology tools to improve their responsiveness.

5.5.2.2.2 Covid-19

COVID-19 did open numerous avenues for technology use and exploration in business.

Respondent 6:

This was due to COVID-19 lockdown restrictions.

Respondent 7:

COVID-19 has created a significant impact in terms of economic prosperity. However, digital technologies have grown and created avenues that enable my business to operate in these uncertain times. It has brought about opportunities in adversity that tested our resilience and commitment to never give up.

5.5.2.2.3 Hyper locality

One respondent mentioned the hyperlocal, which translates into positioning the business firmly within a location accessible to almost all stakeholders, including customers, suppliers, investors and other commodities. This can boost revenue and productivity.

Respondent 10:

Reference 1 -

Hyperlocal is much more. Being hyperlocal implies sourcing from and serving your surrounding community. By embracing hyperlocal practices, businesses may assist local farmers, producers, and innovators and minimise carbon dioxide emissions.

Elite importers understand local demands better than others. Effective business plans should complement customer-focused marketing strategies with language that reflects investor sentiment.

Hyperlocal will not work for all, but analysing your business's procurement processes to see if you can keep things closer to home may impact and help you reach your local market more effectively than global or national competitors.

Hyperlocal goes farther. Hyperlocal implies sourcing and serving the local community. Businesses may assist local farmers, producers, and artists and cut carbon emissions by embracing hyperlocal practices.

Reference 2 -

It is a fantastic way to establish consumer affinity with your business, demonstrate market leadership, and inspire other companies to participate in more sustainable practices. Promoting your sustainability initiatives and projects is a terrific approach to generating customer loyalty with your product.

5.5.2.3 Environment

The environment must be the focus of the businesses.

5.5.2.3.1 Protection

Protecting the environment by minimising carbon emissions and pollution was slowly becoming a business priority. Technology can be the answer, and companies were looking at 4IR technologies to support this.

Respondent 11:

A significant environmental concern is that carbon emissions will rise dramatically, and putting commercial efficiency ahead of environmentalism might have negative consequences in the long run. Virtualisation technology is the finest and most cost-effective answer to the problem since it lays the groundwork for a sustainable business with increased profits, improved health and environmental micromanagement, and more adaptability.

Respondent 12:

With sustainable business strategies, profits could be generated by enhancing existing processes without negatively impacting the environment on a regional or international scale.

Respondent 9:

Reference 1 -

Protecting the environment and people's standard of living requires tackling some of the most pressing environmental problems of our time. The lives of people, animals, and plants can all be protected and improved by cutting down on fossil fuel use and taking action to slow down the rate at which the climate changes.

Reference 2 -

It's crucial to pay attention to these shifts not to wipe out the environment's bedrock. Only by learning about and working toward sustainability will this be possible.

5.5.2.3.2 Recyclable

One business was focusing on using recyclable material for the products.

Respondent 3:

We have tried to adopt technology in some of our operations, and we also only buy recyclable materials like pallets made out of compressed recyclable paper instead of plastic pallets.

5.5.2.3.3 Carbon footprint

Reducing carbon footprint by revaluating energy sources was also a priority.

Respondent 9:

We produce goods using eco-friendly raw materials, improve supply chain efficiency to reduce carbon emissions, use alternative energy sources to run offices or workspaces and contribute to district youth's access to higher education.

5.5.2.3.4 Changing

Society was changing, whereby many people and businesses were thinking out of the box and finding alternative solutions. Hence SMME's needed to follow suite in this trajectory.

Respondent 4:

There has been a recent explosion in the number of health food stores that sell organic items, a direct result of the rising demand for eco-friendly and regionally produced goods. Another case in point is how Tesla has inspired a rethinking of automobile design, construction, and power worldwide with its combination of entrepreneurship and cutting-edge technology. It is more pertinent to our landscape due to high fuel prices and electric cars running on batteries which is a cost saver in this economic climate to businesses that care about the environment and climate change, thereby investing in green energy.

5.5.2.4 Harnessing employment and talent

While some may feel that reducing staff can save costs, retaining talent can benefit the organisation.

5.5.2.4.1 Retaining staff

It was good to retain more dedicated and committed staff as such staff have the business's best interest at heart.

Respondent 4:

SMMEs emphasising social impact attract and retain a more dedicated staff, and team members' outcomes improve due to their dedication to the business's long-term goals.

5.5.2.4.2 Appreciation and value

Staff would want to feel appreciated and valued. They also wish to work for businesses whose values align with theirs. It was essential to identify this in young talent and retain such talent.

Respondent 4:

To succeed in an SMME setting, working with young, inexpensive talent right away is essential. Millennials are seeking a business whose values align with their own. Hundreds of thousands of youngsters have the brightest and most creative minds out there. Do you believe that the promise of a ping-pong table in a nice office is enough to get these high-achieving individuals to join your team? Absolutely not.

5.5.2.4.3 Incentives

Incentivising staff to gain commitment and morale towards business goals was essential.

Respondent 4:

It's not enough to offer one's employees incentives and money if you want to get them to work enthusiastically on your business's short-term and long-term goals, underpinned by sustainable entrepreneurship. It seems that SMMEs with a strong emphasis on sustainability could recruit and retain their most talented workers searching for meaningful employment.

5.5.2.4.4 Ethical

Businesses also need to be ethical in their recruitment processes and retaining staff.

Respondent 4:

Also, good business practice is a must. Ethical business practices not only aid in recruiting new workers but also in retaining and inspiring existing staff.

5.5.3 Concluding remarks

The hierarchy chart below represents the relationship between the central theme and its subthemes, showcasing the progression from the broader concept of sustainable entrepreneurship to the more specific areas of understanding and supporting sustainable practices and the sustainability of SMMEs in the current economic climate.

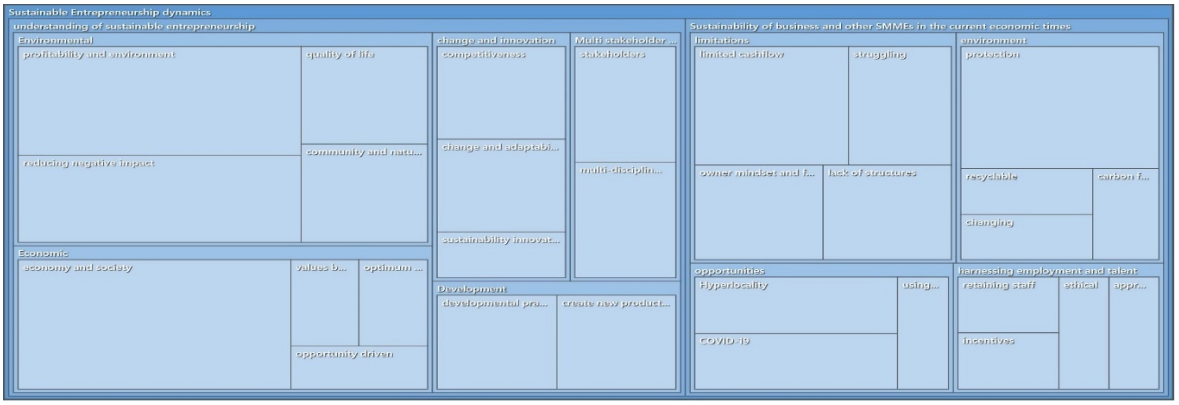

Figure 5.3: Sustainable Entrepreneurship dynamics hierarchy chart (Researcher, 2023)

This theme explored the dynamics of sustainable entrepreneurship and its significance in the current economic landscape. It highlighted the importance of understanding and supporting sustainable entrepreneurial practices for driving economic growth, social impact, and environmental stewardship.

5.6 THEME THREE: CHALLENGES AND FACTORS

The theme of Challenges and Factors within the research context explores the primary challenges and factors that impact SMMEs in the present economic climate and their ability to embrace the 4IR. This section focuses on two subthemes: Reasons for businesses not being successful during the current economic time and challenges contributing to sustainable businesses' failure in the 4th industrial revolution. A visual representation of this theme in a word cloud is shown below. The views of the respondents will be discussed in conjunction with that.

Figure 5.6: Challenges and Factors word cloud (Researcher, 2023)

5.6.1 Subtheme: Reasons for businesses not being successful during the present economic time

This subtheme delves into the reasons behind the lack of success for businesses in the current economic climate. The accompanying word tree visually represents the critical factors identified by the respondents.

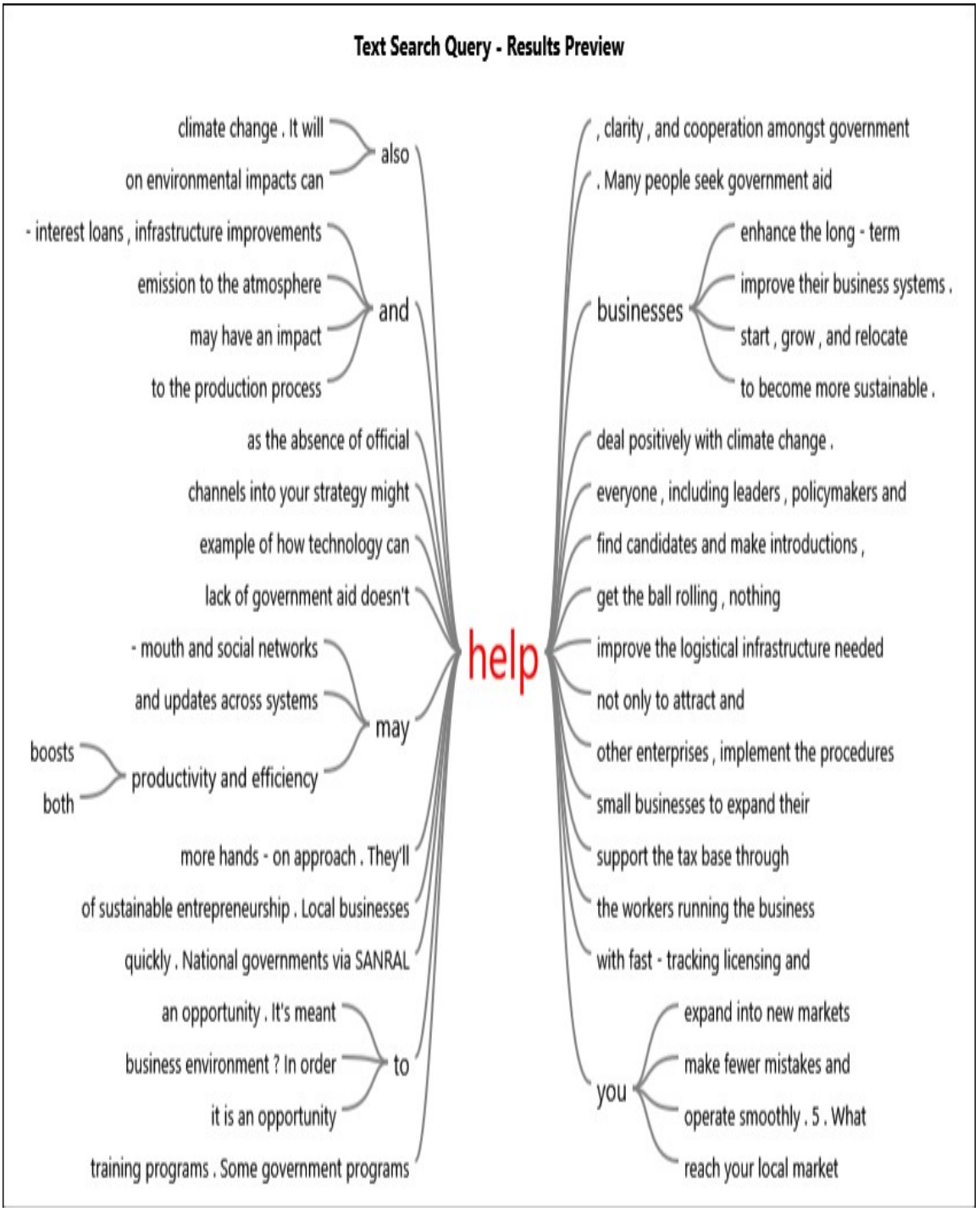

Figure 5.6.1: Lack of success for SMMEs (Researcher, 2023)

5.6.1.1 Business development

Business development limitations were a highly ranked theme and were informed by the following factors.

5.6.1.1.1 Lack of understanding and hesitancy

Business owners did not seem to understand how to embrace the 4IR and utilise technology shifts to their advantage. There was hence a degree of hesitancy.

Respondent 6:

Failure to re-evaluate how business is conducted, not examining the technological shift to be more integrated, innovative and responsive to align the employees' development.

Respondent 9:

Having a thorough understanding of key business lifecycle phases like scaling is much easier with a well-crafted business road map. Explosive development is appealing, but your enterprise might collapse if you don't scale carefully. Finding the middle ground between development and maintenance is essential.

5.6.1.1.2 Failure to invest inwards

Business owners also failed to invest appropriately in internal resources such as staff development, skills, and other related resources.

Respondent 5:

Many business owners neglect to invest in themselves. They aspire to greatness but do not upskill themselves, do research, take management development courses or workshops, or engage in any other activities that may broaden their knowledge base. It would help to improve your attitude and communication abilities constantly. It requires discipline and is a stressful task. You won't be able to succeed without safeguarding and enhancing your attitude. No one advances in life without continually educating oneself.

5.6.1.1.3 Outdated business practices

Some businesses were still outdated in their business practices, lacking innovation and development.

Respondent 10:

Many South African SMMEs are old school and outdated, lacking the capability for research and development activities, innovative procurement, manufacturing, storage and logistics, digital advertising, sales, and operations.

5.6.1.1.4 Marketing

Poor or lack of marketing hindered customer and stakeholder attraction, which impeded progress.

Respondent 1:

Poorly planned or executed marketing campaigns, or a lack of adequate marketing and publicity, are among the other issues that drag down SMMEs.

5.6.1.2 Financial

Financial factors were, by default, a primary reason.

5.6.1.2.1 Capital

Small businesses had a lack of capital. This hindered the ability to capitalise on operations and expansion. This also could not allow them to be competitive. In addition, accessing funds was problematic.

Respondent 1:

A primary reason why small businesses fail is a lack of funding or working capital. In most instances, a business owner is intimately aware of how much money is needed to keep operations running on a day-to-day basis, including funding payroll; paying fixed and varied overhead expenses, such as rent and utilities; and ensuring

that outside vendors are paid on time; however, owners of failing businesses are less in tune with how much revenue is generated by sales of products or services. This disconnects leads to funding shortfalls that can quickly put an SMME out of operation.

Respondent 12:

Lack of finance has prompted numerous businesses to shut soon after opening. Many business entrepreneurs start with little working cash.

Respondent 4:

Lack of capital is another issue that has forced the closure of several enterprises fairly immediately after they have opened. Many business owners make the fatal error of starting their enterprise with insufficient operational capital. Such enterprises fail because their founders are easily demoralised, particularly when several rivals exist.

Respondent 6:

Failure to have financial reserves and solicit investors also enables them to pivot their businesses.

Respondent 7:

Also, businesses that lack the resources and cash flow essential to keep their operations afloat do not have the means to support themselves financially.

5.6.1.2.2 Cost vs Revenue

The costs associated with running the business, including start-up costs, operational costs, staff costs and marketing, outweighed revenue at the onset.

Respondent 2:

When production, marketing, and delivery costs outweigh the revenue generated from new sales, small businesses have little choice but to close.

Respondent 8:

The cost of prime commercial real estate or office space is another issue, regardless of whether it is rented or owned. The rent is typically relatively high, and if the business owns the commercial property, additional costs such as rates and levies, in addition to security, are incurred.

5.6.1.2.3 Pricing

Pricing was problematic as sometimes SMME's had to lower their prices to compete with bigger businesses/competitors; while this may attract customers, profitability would be lower.

Respondent 2:

SMME owners who miss the mark on pricing products and services to beat out the competition in highly saturated industries, businesses may price a product or service far lower than similar offerings with the intent to entice new customers. While the strategy is successful in some cases, companies that end up closing their doors are those that keep the price of a product or service too low for too long.

5.6.1.2.4 Payment Delays from Government

Work done for the government seems to end in payment delays, which causes financial distress.

Respondent 3:

I think there is less assistance and support from the local government. For example, when you do business with a local or national government, they take longer to pay for the service you rendered if you have been awarded a tender and have carried out the service. You can go up to 6 months without any payment, so as a small business, how does one expect to survive when you invested money to buy materials to pay your employees and short-term loans that come with high-interest rates when you are not compensated efficiently for the work done?

5.6.1.3 Resources

Resource constraints were evident as well.

5.6.1.3.1 Human resources

Human resources were challenging as more established firms may already recruit highly skilled workers. Hence low-level/skilled workers were mainly employed by SMMEs, which can compromise technology adoption. Some workforces could also be reluctant to change.

Respondent 1:

The most educated and highly qualified staff has the ability and the skills to be better adapted to automation, and thus they will be widely benefited from the technological achievements. Moreover, people whose income, skills, and wealth are already high will be favoured by the significant increase in their assets' value because of technological progress. In a country like South Africa, there is a high level of low-skilled workers employed by businesses; therefore, technological advancements may not be well-suited for such workers, and consequently, in the long term, sustainability is affected in terms of adapting to emerging trends and technologies.

Respondent 11:

Almost every aspect of your business will profit from hiring the best people. Without revenue, you can't pay your staff, much alone thrive. More competent salespeople may boost sales.

Respondent 6:

A workforce that is resistant to change.

5.6.1.3.2 Supply and demand

Suppliers then supply in bulk rather than based on demand. Hence, the cost of supplies is sometimes higher because SMMEs cannot afford to buy in bulk.

Respondent 8:

There is a self-interested motivation among suppliers to sell their products to the maximum number of business owners feasible. Because of this, there might be an excessive number of businesses offering the same things in a given market. If items were produced according to demand, there would be a reduction in the number of unsold products, and the cost of living would go down.

5.6.1.3.3 Inventory management

Some SMMEs lack inventory management competencies, which negatively impacts operations and sales.

Respondent 11:

Poor inventory management is shockingly common in failing businesses. Using inventory management or dependable software may quickly solve the issue.

5.6.1.3.4 Outdated IT

While some may have IT and technological resources, they might be outdated and ineffective in the 4IR.

Respondent 10:

Reference 1 -

Many outdated and scattered IT systems require upgrades to accommodate the change in a 4IR context.

Reference 2 -

This is also a chance to deploy new 4IR-ready technology, albeit cost will be a crucial consideration in selecting whether to upgrade or replace current IT equipment.

5.6.1.4 Leadership and Management

Leadership and management also presented certain limitations in terms of business success.

5.6.1.4.1 Weak and Inexperienced Leadership

In some instances, leadership was perceived to be weak and inexperienced regarding sustainable business practices. This included not being able to conceptualise a proper business plan and strategy. They were also not adaptable to change.

Respondent 2:

Inexperience managing a business or an unwillingness to delegate can negatively impact businesses, as can a poorly visualised business plan, leading to ongoing problems once the business is operational.

Respondent 5:

One of the reasons for business failure is lack of experience. Your business is effectively dead if you lack expertise or if unskilled people manage it. When launching a new business, hiring professionals with relevant expertise is recommended. They could work for you or be one of your partners. Hire qualified customer care agents and seasoned digital marketers.

Respondent 6:

Weak leadership that is not able to adapt to change.

5.6.1.4.2 Lack of vision, focus and attitude

Leadership lacked the vision for sustainable entrepreneurship and the 4IR. They did not develop business plans to plot the trajectory nor align the business prosses and staff to a specific vision.

Respondent 4:

Reference 1 -

Getting involved in too many little tasks and aspects may quickly distract owners as they can get qualified interns to carry out unimportant tasks while they oversee the entire business. Their thinking becomes narrower every day, and their attention tends to wander. A successful businessperson or entrepreneur never loses sight of what's crucial and their top priorities. They exhibit weakness when they focus on minute details of jobs that should be left to others. Entrepreneurs need to develop their delegation skills. When doing instead of becoming becomes a fixation, the short-sightedness is evident.

Reference 2 -

Before starting any business, I suggest adopting the attitude that you'll do whatever positive it takes to be successful since it will be the first step toward your development. See the importance of optimistic thinking in start-ups. You may expand the scope of your business by adopting that attitude.

Respondent 9:

Without a well-thought-out business plan, conveying your goals to your employees will be difficult. Owners should take their businesses to the next level by creating a road map rather than simply a textbook strategy.

5.6.1.4.3 Risk management

Risk management was important, and sometimes leaders failed to see this.

Respondent 6:

I am failing to have insurance and a risk management plan or not re-evaluating such instruments.

5.6.1.4.4 Accountability

In some instances, there was also a lack of accountability, which was related to sales. Without proper accountability, one could not determine the organisation's financial status and how to budget and plan sales strategies.

Respondent 5:

Any revenue your firm generates has to be your concern. Many business owners often struggle to account for their current sales. Once a deal goes through, they use the money for personal expenses to close another one. You must take responsibility for every cent you make if you want to thrive in business. Make sure to budget your money; if you want your business to expand, you must reinvest 60 per cent of your profits.

5.6.1.5 Customers and Products

The aspect of customers and products also provided its reasoning for business failure.

5.6.1.5.1 Product vs customer

Product overemphasising without doing a careful analysis of customer needs. Hence the product may not serve the customer's needs, and there will be poor uptake.

Respondent 11:

Overemphasising the product above leads to business failure. Diligently serve your customers' needs to avoid business collapse.

Respondent 4:

You cannot launch a business if the product or service is unnecessary, and making it elegant won't cause others to treat you as an elitist. Before choosing a site for a business, a thorough market analysis survey is necessary.

Respondent 9:

Reference 1 -

Putting too much emphasis on the product rather than the customer is a common cause of business failure. Prevent business failure by developing an unhealthy obsession with your customer base and brainstorming endless ways to satisfy their demands. Try to deduce what they're looking for, what they need, and what they don't realise they desire. Make the client an advocate for your business, someone who will spread the word about what you provide. You can only begin to imagine your team's growth once you realise that your customers' lives are your own,

Reference 2 -

Almost every facet of your business will benefit significantly from hiring the proper personnel. Sales are a prime example since without them; you can't pay your employees, much alone expand your business. Increased sales may be attributed to more confident sales staff.

5.6.1.5.2 Customer focus

There must be a complete and clear focus on the customer. By compromising this, one would compromise the success of the business in its entirety.

Respondent 5:

You must prioritise providing excellent customer service. With vital customer service, a business thrives. Good customer service encourages customer loyalty, and customer loyalty encourages referrals. Customers will turn to your competition if you do not treat them properly. Learn to express your appreciation for your consumers.

5.6.1.5.3 Service delivery

Service delivery was crucial, as failure in this can incur the most cost to the business.

Respondent 8:

If service delivery fails, additional funds will need to be spent to procure services, which will be paid for by the taxes paid to the government.

5.6.1.5.4 Competition

There was always competition that became a constant threat.

Respondent 12:

Such businesses fail because their owners are easily disheartened, especially when they have competition.

5.6.1.6 Disasters

Natural and unnatural disasters also played a contributing role to business failure.

5.6.1.6.1 COVID-19

The COVID-19 lockdown impacted heavily on trade.

Respondent 7:

COVID-19 lockdown and trade restrictions.

5.6.1.6.2 Riots

The rioting and unrest, specifically in July 2021, damaged many businesses.

Respondent 7:

The tragic rioting that happened in July of 2021, during which businesses were robbed and burned,

5.6.1.6.3 Natural disasters

Natural disasters like the 2022 flooding also damaged and destroyed many businesses.

Respondent 7:

As well as this year's disastrous floods all contributed to the situation.

5.6.2 Subtheme: Challenges Contributing towards the Failure of sustainable businesses in the 4th industrial Revolution

This key subtheme examined challenges contributing to sustainable businesses' failure in the 4th industrial revolution. The word tree below visually presents the key challenges identified by the respondents.

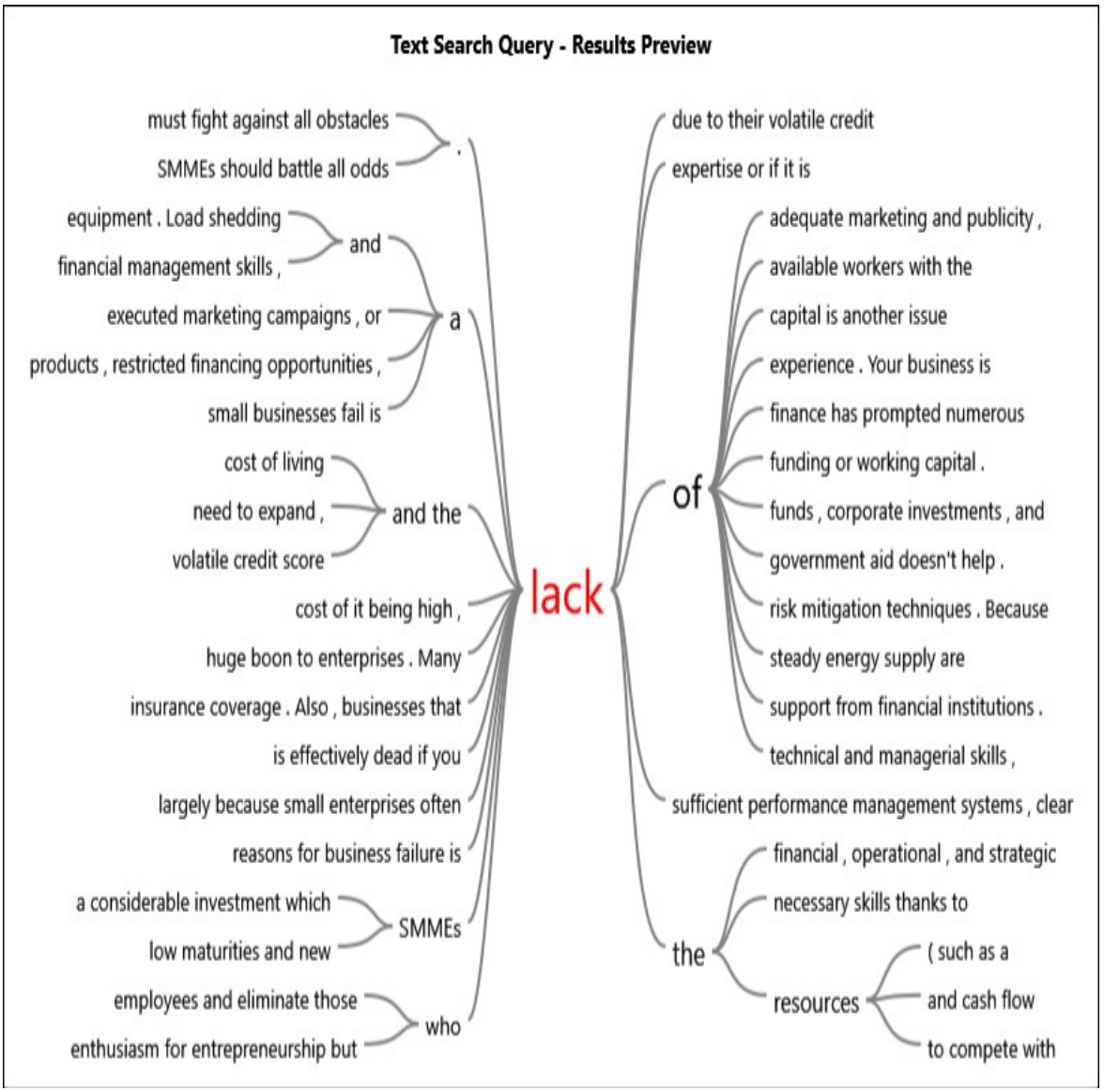

Figure 5.6.2: Key challenges faced by SMMEs (Researcher, 2023)

5.6.2.1 Economic

Economic challenges were the most highly ranked, which is a logical argument.

5.6.2.1.1 Expensive

The 4IR technologies and telecommunications were costly in the country, so SMMEs could not afford 4IR technologies easily.

Respondent 10:

South Africa has some of the world's most expensive, least economical communications, which hinders virtualisation. Cloud computing use grows as telecommunications infrastructure improves and wireless and fibre connectivity expands.

Respondent 11:

Transitioning from conventional to sustainable practices may be expensive, preventing the adoption of automation and a technically savvy workplace.

Respondent 3:

Reference 1 -

Other technologies like those employed in manufacturing, like deep learning, Blockchain, Internet of Things and others, are quite expensive and need a considerable capital investment that we can't afford as small businesses.

Reference 2 -

The cost involved in transitioning from traditional ways of doing things to more sustainable practices can cause a barrier to adopting automated services and a technologically advanced workplace.

Respondent 7:

Furthermore, the cost of these smart technologies means that not every business will be able to afford these advanced technologies.

Respondent 8:

Because of this, costs for 4IR technology and services are exorbitant.

5.6.2.1.2 High investment

Relating to the above, the investment toward 4IR was excessive, and businesses would instead invest this money in their daily operational costs.

Respondent 11:

Implementing sustainable business practices requires a considerable investment which SMMEs lack due to their volatile credit score and the lack of support from financial institutions.

Respondent 3:

Adopting sustainable business practices requires a significant investment. Imagine you have been using plastic pallets because you know they are durable. Still, now you must buy pallets made of paper that can be damaged easily due to the high cost, lack of funds, corporate investments, and assistance from the local authorities.

Respondent 4:

This often includes higher expenditures on technologies, considering operating expenses and upkeep, etc. Might this be an opportunity for these small enterprises to reorganise spending and rotate capital, so improving their chances of success?

5.6.2.1.3 Competition

More established and bigger competitors could pounce on innovation a lot quicker, putting them in an even more competitive position.

Respondent 1:

In combination with factors such as insufficiently regulated financial integration and the growing competition in product and service markets may widen this income inequality gap.

Respondent 12:

Innovative rivals may displace long-standing market incumbents by improving the performance, pace, or cost of producing items for consumption, owing to global digital platforms for digital marketing, sales, and distribution.

Respondent 4:

New technologies are being introduced into the supply and logistics of many different sectors, allowing for entirely new methods of meeting current procurement demands and competing aggressively with long-standing manufacturing and value chains. In a similar vein, the actions of innovative competitors can speedily dislodge long-standing market players by enhancing the performance, tempo, or cost of providing goods for consumption, all thanks to global digital platforms for research, development, marketing, sales, and distribution.

5.6.2.1.4 Income Gaps and Inequalities

The inequality gap was becoming more significant in the country, leading to socioeconomic inequalities. Customers were affected by this, thus limiting their purchase abilities.

Respondent 1:

A major challenge is the income inequality gap widening. Nowadays, global income inequality is at very high levels, and income inequality rises globally quickly in the rapid technological progress and the introduction of new technologies in all sectors.

Respondent 5:

Divisions, increasing societal conflict.

In the 4IR, disparities will also have a significant societal influence. Large shareholders will benefit the most, increasing the gap between capital- and wage-dependent sectors. Digitalisation is one of the critical causes of stagnating and decreasing salaries, even in high-income countries: high-skilled personnel is in

demand, while medium-skilled workers are not. Great-skilled and unskilled workers will be in high demand, but the medium segment will be scarce.

5.6.2.2 Inefficiency in Adaptability

Small businesses seemed inefficient in their adaptability to change.

5.6.2.2.1 Technology rapidly changing

Technology was changing quickly, and companies were not adopting it timeously.

Respondent 7:

Technology is rapidly advancing, and businesses that cannot adopt or leverage these technologies could face many challenges.

5.6.2.2.2 Slow pace

Hence, businesses are adopting 4IR technologies at a languid pace, which could hinder their progress and sustainability. For example, cloud technologies could save space costs.

Respondent 10:

The business has embraced cloud solutions more slowly than consumers, but that will change. Microsoft, Amazon, and Google launched cloud services in South Africa, and this will reduce lag time and improve cloud business solutions.

Adoption will also accelerate as enterprises better comprehend the comprehensive security models and privacy control offered in cloud solutions, which typically improve on office-bound systems they now manage and implement.

5.6.2.2.3 Personal Feelings vs Data-driven

Some SMMEs owners were still making business decisions based on personal feelings rather than data-driven decisions.

Respondent 8:

If the market data researched is disregarded throughout the decision-making process and feelings are prioritised instead, it is ineffective to do such.

5.6.2.2.4 Technical issues

Technical issues could arise; if this is not addressed, it could become problematic for business operations.

Respondent 9:

Technical issues must limit no one's access to this ecosystem. The bulk of the work-related changes you'll be making will include using modern technologies, and technology that doesn't function as expected may be quite problematic for enterprises.

5.6.2.3 Organisational

Organisational challenges included the following.

5.6.2.3.1 Policy and Regulations

Policy and legal regulations could cause barriers for SMMEs. These regulations sometimes do not favour small businesses as they impose conditions on trade, labour, automation, procedures, resources and related. Enforcing or changing these regulations costs money and time.

Respondent 11:

Legal provisions may be a barrier to using 4IR technology, particularly for small firms.

Respondent 12:

This causes organisational, economic, and legislative changes that enterprises don't always favour.

Respondent 2:

Local and national governments and policymakers are unable to adopt the right policies. Governments that will not be able to follow the appropriate long-term policies will set their economies at risk; that is when all the other economies will run with great speed, and their inability to be adapted to the new reality will lead to the deterioration of their competitiveness, the reduction of their revenue, and the increase in their spending with the possibility of bankruptcy increases. This, in turn, affects the sustainability of businesses in that country.

Respondent 3:

Government regulations can pose a challenge towards adopting 4th industrial revolution technologies, which becomes a red tape towards sustainable business, especially for small businesses.

Respondent 4:

Technological advancements will raise new compliance problems around the security of personal data, considering the POPI act or the automated and hence potentially discriminatory allotment of obligations and roles by AI software or machines.

Respondent 9:

Ineffective or out-of-date Standard operating procedures are an excellent example of a negative internal factor.

5.6.2.3.2 Poor Leadership and Management

Poor leadership and management skills can also be a challenge

Respondent 6:

Poor leadership and managerial skills.

5.6.2.3.3 Hesitation

There was also hesitation to pursue 4IR technologies and institutional changes thereof.

Respondent 10:

We must ensure that we address this problem as makers, developing novel, locally optimised, and cost-effective solutions rather than as consumers of value-added from elsewhere. To revitalise our nation's SMME sector, South Africa can take advantage of these technologies quickly and easily, leapfrogging its rivals worldwide.

Respondent 4:

This results in institutional, structural and policy changes, some of which are not readily accepted, especially by businesses.

5.6.2.4 Staff

Staffing could pose challenges in the following ways.

5.6.2.4.1 Staff Redundancy and Skills

Firstly, there was always a possibility that job loss could occur due to technology and machinery replacing manual functions. However, they needed to be developed and capitated to be tech-savvy and capable of retaining staff. However, this process could be slow and costly to upskill staff and also impact on salary/wage aspect.

Respondent 4:

Increasing concerns over recruiting staff with appropriate tech-savvy skills, downsizing to reduce redundancy, and role and skills development necessitate businesses to follow proper procedures and have regulations in place to comply with local government legislation.

Respondent 5:

Reference 1 -

Job loss,

Reference 2 -

The revolution could increase unemployment due to labour changes in the market. Automation, which substitutes physical labour or directly replaces humans with technology, might exacerbate the capital-labour wage gap. This might result in a significant rise in secure, high-paying jobs over time.

Respondent 7:

The slow process of upskilling staff to work with the new technologies will also impact businesses.

Respondent 8:

The high cost of living and the lack of available workers with the necessary skills have a detrimental influence on the capital-intensive nature of technologically adapting enterprises.

5.6.2.4.2 Restricting ideas generation

Sometimes staff are restricted from sharing innovative ideas. Ideas are crucial to innovation; if staff are prohibited, it will hinder innovation.

Respondent 8:

When employees or managers are prevented from selecting the most efficient course of action for reasons that defy logic, mindset, also known as sustainability, is inhibited.

Respondent 9:

The failure to market and develop fresh concepts is to blame. When you innovate, you create new and improved ways to satisfy your customers' wants and requirements. Anybody can be financially stable for a while.

5.6.2.5 Energy and power

Even at a country level, various challenges exist regarding energy and power.

5.6.2.5.1 Unstable power supply

Due to load shedding, the power supply was unstable. This was a huge loss to businesses that have to close doors during power outages.

Respondent 10:

Load shedding and a lack of a steady energy supply are huge issues for South African SMMEs and a barrier to the 4IR digital revolution.

Respondent 7:

Also, the inability of Eskom to keep the power on is another detriment to using technologies without backup power systems, which comes with a huge cost and is not affordable by many SMMEs who are barely trying to survive.

5.6.2.5.2 Energy usage

Using 4IR technology can/will increase energy usage, which could pose an environmental risk.

Respondent 12:

In addition, this might significantly increase energy usage, which is a major environmental risk. Remembering the long-term effects of prioritising business agility above sustainability is important.

5.6.2.6 Risks

There were also risks present in the following ways.

5.6.2.6.1 Privacy

Privacy issues became a challenge with the increase in online interactions and transactions.

Respondent 5:

Breach of privacy and using personal information connivingly or selling it to 3rd parties.

5.6.2.6.2 Business continuity

Businesses lacked business continuity plans in times of disaster or volatility.

Respondent 6:

Inability to pivot the business, failure to cater for business continuity and resilience plans.

5.6.3 Concluding remarks

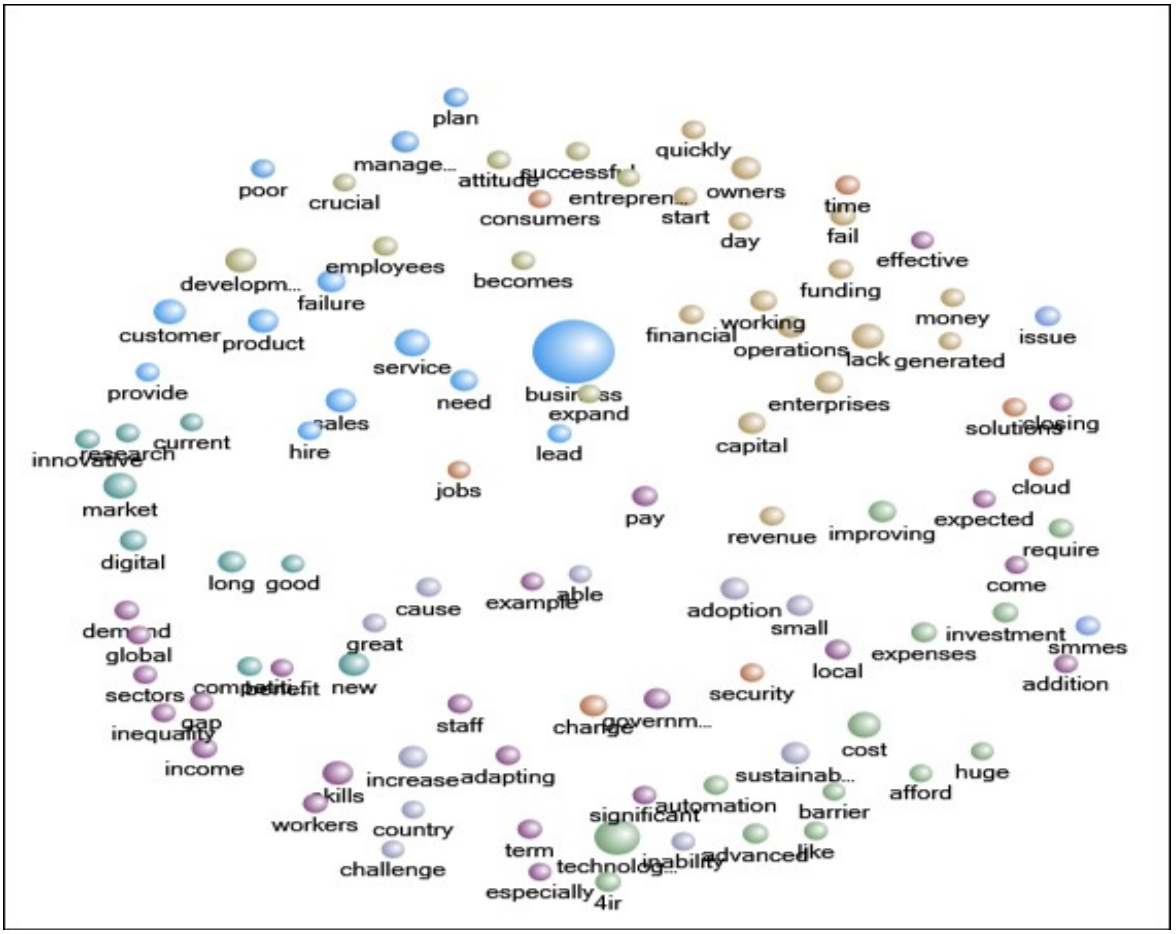

Figure 5.6.3: Challenges and Factors cluster analysis (Researcher, 2023)

The Challenges and Factors theme focuses on the primary challenges and factors affecting businesses, especially SMMEs, in the current economic climate and their ability to embrace the 4IR. The reasons for business failure in the present economic time and challenges for sustainable businesses in the 4IR provide insights into the factors hindering success. The views of the respondents, supported by relevant literature reviewed, deepen our understanding of these challenges. The visual representation above enhances the presentation of the findings. By addressing these challenges, businesses can navigate the complexities of the present economic climate and the transformative nature of the 4IR.

5.7 THEME FOUR: SUSTAINABLE ENTREPRENEURSHIP STRATEGIES AND SUPPORT

This theme explores the current governmental support for SMMEs regarding sustainable entrepreneurship, and it also focuses on strategies to stimulate business performance and growth in the current turbulent business environment. The visual representation below provides an overview of the subthemes, and the respondents' views will be discussed afterwards.

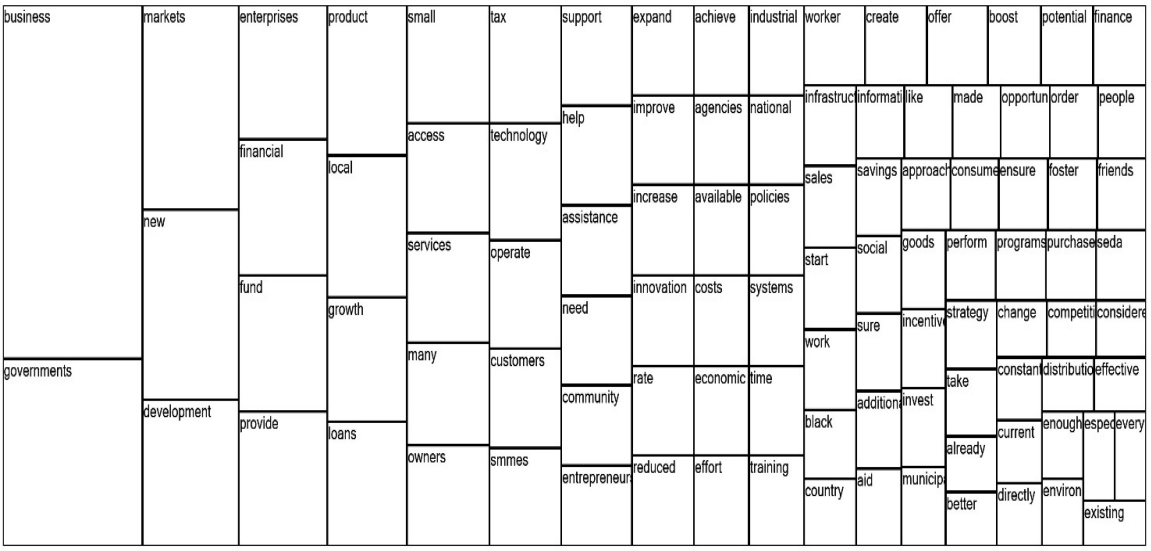

Figure 5.7: Sustainable Entrepreneurship Strategies and Support word tree (Researcher, 2023)

5.7.1 Subtheme: Governmental support towards sustainable entrepreneurship

This subtheme examines the extent of governmental support provided for sustainable entrepreneurship. The accompanying word tree visually represents the respondents' various perspectives and opinions.

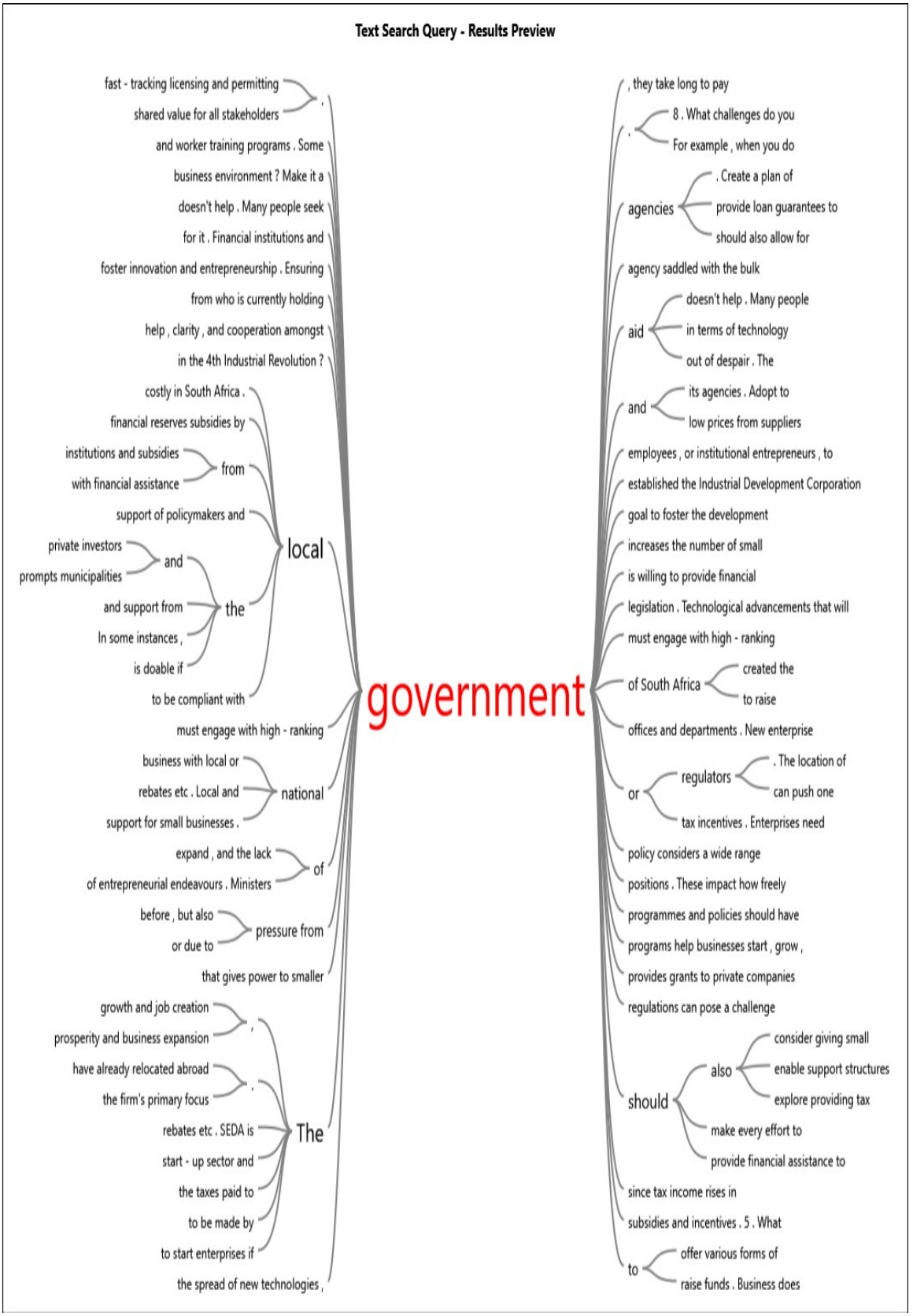

Figure 5.7.1: Government support (Researcher, 2023)

5.7.1.1 Lack of support

There was a lack of support from the government in the following ways.

5.7.1.1.1 Red tape

There was too much red tape regarding processes to follow for small businesses to become registered.

Respondent 7:

Local government should also enable support structures for smaller businesses, as, at present, too much red tape is involved in registering a business.

5.7.1.1.2 Financial

Technology costs were high, and government should assist businesses in acquiring this. Furthermore, loan repayment rates should be lower.

Respondent 7:

Reference 1 -

National government aid in terms of technology infrastructure development and the availability of internet access is still costly in South Africa.

Reference 2 -

Financial institutions and government agencies should also allow for business loans at a reduced repayments rate; this is another challenge that faces many business owners.

5.7.1.1.3 Political

For one respondent, political hindrance seemed to be a problem due to more support offered to the previous disadvantaged (BEE). Other race groups, such as Whites, were not getting adequate support.

Respondent 12:

Being White is a disadvantage from the get-go due to our country's racial past. We hardly qualify for such support as we are not considered black or should forgo

majority ownership to be BEE compliant before we receive any relief. Therefore, significantly less or no help whatsoever.

5.7.1.1.4 Own Strength and Personal Finance

Some respondents had to rely on their own financial strength and personal finance to fund their businesses, indicating a lack of governmental support.

Respondent 10:

Currently, my enterprise is running on its strength due to generational wealth, and my knack for entrepreneurial excellence is what works for me; thus, I'm not actively pursuing governmental support and won't be able to provide insight.

Respondent 5:

Many South African enterprises rely on personal savings or relatives and friends for initial financing. Many business owners have had to rely on loans from family and friends, the sale of personal possessions, or a re-mortgage of their homes to fund the setup that has made their ambitions a reality. However, this funding is seldom enough to keep the business afloat long enough to realise its full potential. And then some are brimming with enthusiasm for entrepreneurship but lack the resources (such as a solid credit history and substantial savings) to get their venture off the ground.

5.7.1.2 Supportive

However, many respondents felt there was governmental support through various avenues.

5.7.1.2.1 Departments

Different governmental departments exist to support small businesses. However, most were geared more towards BEE and most black-owned businesses. The departments improve access to finance and run various empowerment programmes. They also tried to enhance the visibility of the company.

Departments	
Department of Small Business Development	**Respondent 4:** *To foster entrepreneurial growth and position SMMEs and Co-operatives at the centre of economic growth and job creation, the government of South Africa created the Department of Small Business Development in 2014. The Ministry of Small and Medium Enterprises and Co-operatives seeks to improve the access of SMMEs and Co-operatives to financial and non-financial assistance and boost their engagement in local and international markets. The ministry has launched several programmes,*
Collaborative Bonus Programme	**Respondent 11:** *Collaborative Bonus Programme - This programme's goals include boosting co-operatives' visibility via a matching grant award and helping them become more financially sustainable and competitive by reducing their operating expenses. To be eligible for this programme, you must be a member of a new cooperative, at least more than half owned by a majority black ownership.*
National Empowerment Fund	**Respondent 4:** *By offering financial and non-financial support to black-empowered enterprises and fostering a culture of investment and savings among black people, the National Empowerment Fund promotes and facilitates black economic participation, as mandated by the National Empowerment Fund Act. The NEF offers loans from R250,000 up to R75 million for new businesses, growth, and equity acquisitions.*
The Apex Financing Fund	**Respondent 4:** *Reference 1 -* *The Apex financing fund, KHULA, and a contribution fund from the IDC are just a few of the funds pooled together to form the Small Enterprise Finance Agency. The most you may borrow is R5 million. To qualify for loans, enterprises need to show financial and economic viability either now or in the future and operate inside South Africa's borders. There are no stock securities available via the fund, just loan funding.*
IDC	**Respondent 2:** *The government established the IDC to provide development financing to foster economic growth, prosperity, and business expansion. The smallest loan they issue is R1 million, and the largest loan they will offer is R1 billion. Start-ups in South Africa*

	are eligible for loans for fixed assets like buildings and equipment and working capital like cash. For growth purposes, already existing businesses are considered.
SEDA	**Respondent 9:** *Reference 1 -* *SEDA is the government agency saddled with the bulk of the responsibility and mandate to provide quality, accessible and affordable business support to SMMEs through its various activities and schemes, and STP aids SEDA in its effort to create an enabling platform to promote the expansion and development of SMMEs across the country.* *Reference 2 -* *One of SEDAs' primary flaws is that they fund very small businesses with little employment potential, such as survivalist and micro businesses. Contrary to SEDA's assertion that it directs 20 per cent of its assistance to medium-sized businesses, no such support exists. Also noteworthy is that SEDA offers assistance on a flexible, generic, and heterogeneous platform, and such assistance ignores the unique qualities and circumstances comprising the various commercial and industrial sectors.*

Table 5.7.1.2: Different governmental department functions

5.7.1.2.2 Economic growth

One respondent asserted that the potential for economic growth prompted the local government to assist and support small businesses.

Respondent 1:

The possibility of workforce expansion and economic growth prompts municipalities and the local government to offer various assistance, such as grants, research opportunities, beneficial legislation, and worker training programmes.

5.7.1.2.3 Tax base

The small business supported the tax base; hence support should be given to grow the business.

Respondent 1:

Local businesses help support the tax base through businesses taxes and the wages provided to employees.

5.7.1.2.4 Start-ups

There were some incentive programmes for start-ups, such as tax credits, worker training, free land, zoning changes, low-interest loans, infrastructure improvements and assistance with licensing and permitting.

Respondent 1:

Some government programmes help businesses start, grow, and relocate to specific areas. In some ways, local, regional, and local governments compete for jobs. They do this by offering start-up incentives and taking steps to create a business-friendly environment. These steps include tax credits, worker training, free land, zoning changes, low-interest loans, infrastructure improvements and help with fast-tracking licensing and permitting.

5.7.1.2.5 Loans guarantee

The government provided loan guarantees to encourage banks to offer financial loans to start-ups and for expansion.

Respondent 1:

Government agencies provide loan guarantees to small businesses and encourage local banks to work with start-ups or established enterprises that want to expand. If you are a woman or minority or operate a business in select industries, additional loan opportunities also may be available.

5.7.2 Subtheme: Strategies to stimulate business performance and Growth in the current turbulent business environment

This was an important subtheme as it dealt with the strategies and support required to promote business performance and growth in the current turbulent business environment. The word tree visually presents the key strategies and approaches highlighted by the respondents.

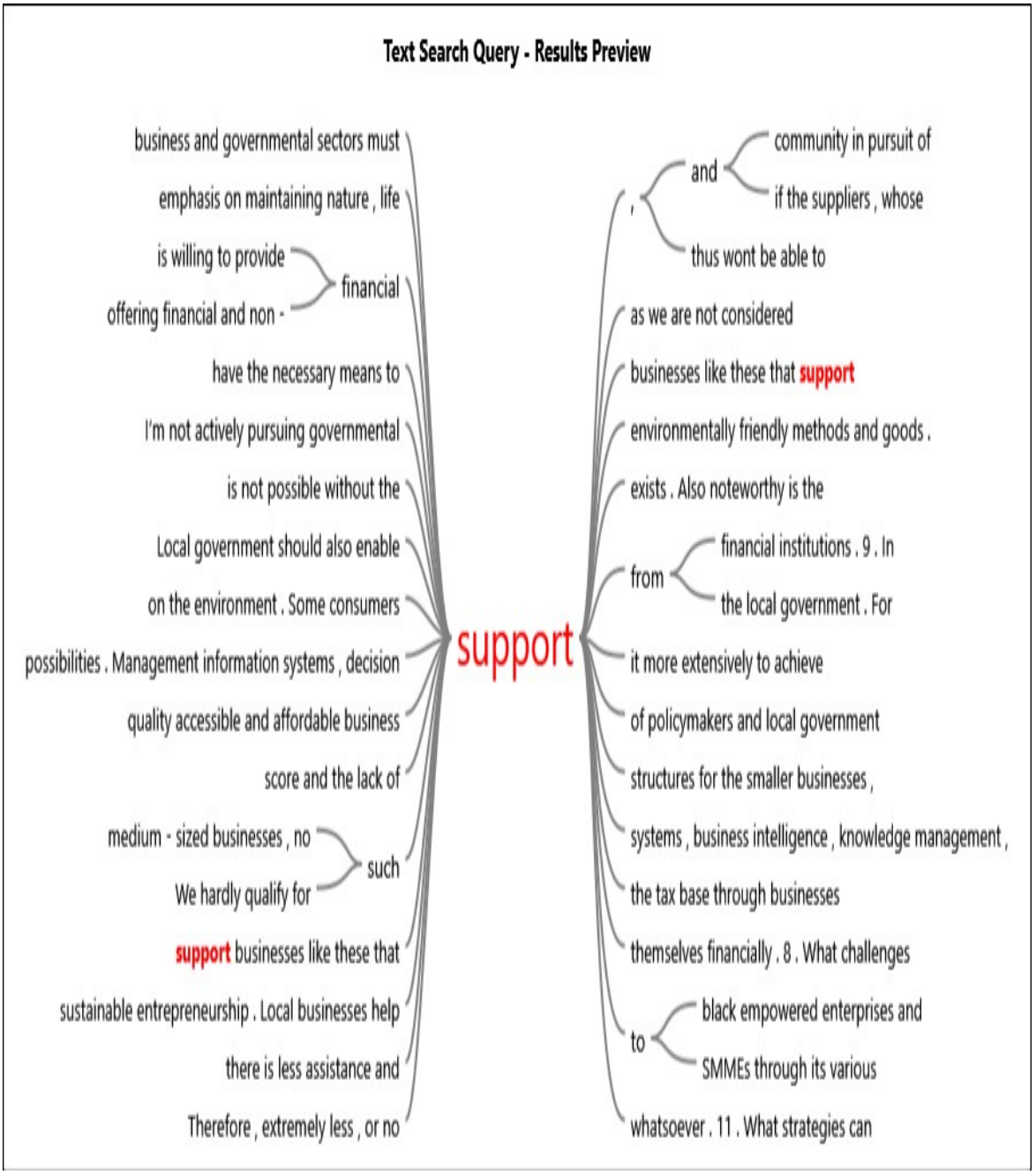

Figure 5.7.2: Key strategies and support approaches (Researcher, 2023)

5.7.2.1 More government support

More governmental support was much needed and called for.

5.7.2.1.1 Funding

In terms of government support, funding was the highest-ranked factor. Funding was the core of attaining sustainability from the start for small businesses. Small

businesses always had difficulties with finance and capital and trying to adhere to the 4IR required substantial investment. New products and services also require research, development, and production costs. Therefore, more funding opportunities must be provided by the government.

Respondent 11:

Small businesses should receive financial assistance from both local and national governments so that we can improve our business practices and move closer to achieving a sustainable environment and harmonious community.

Respondent 2:

In some instances, the local government provides grants to private companies making a new product or service that will improve a vital area of an economy, such as transportation, energy, agriculture, or communications. Some regional municipalities fund research and development projects and work with private investors and the local government to raise funds.

Respondent 3:

Reference 1 -

The local and national governments should provide financial assistance to small businesses to incorporate intelligent technologies from the 4th industrial revolution to improve our business practices and move towards a sustainable environment and harmonious community.

Reference 2 -

I believe investment in smart technology will stimulate the performance and growth of small businesses in the current turbulent business environment. This can be made possible with financial assistance from the local government.

Respondent 5:

Reference 1 -

More entrepreneurs will have access to the capital they need to start enterprises if the government increases the number of small business funds and subsidies.

Reference 2 -

Facilitate accessible funding. However, financial institutions are generally hesitant to lend to entrepreneurs. Small business owners already have a hard time getting the money they need to expand, and the lack of government aid doesn't help. Many people seek government aid out of despair.

Respondent 6:

Have financial reserves subsidies by local government and its agencies.

Respondent 7:

Financial institutions and government agencies should also allow for business loans at a reduced repayment rate; this is another challenge many business owners face.

5.7.2.1.2 Incentives

There must be incentives for small businesses provided by the government. Such can include tax incentives, relaxation of specific regulations, funding for technology, and other related compensation.

Respondent 11:

Reference 1 -

The government should also explore providing tax incentives to SMMEs to encourage environmentally responsible business practices, particularly regarding the acquisition of cutting-edge technology, services, and goods.

Respondent 3:

Government should also consider giving small businesses tax rebates to promote sustainable business practices, especially on purchasing new and innovative technologies, services and products.

Respondent 5:

Reference 1 -

Provide tax breaks to the disadvantaged and struggling SMMEs. Entrepreneurs, especially those running smaller operations, should be given every possible tax relief. South Africa's business owners are stressed, and some even blame the country's high tax rates for their insomnia. Even though being a business owner means never getting a good night's sleep, many entrepreneurs would rather close down than pay more in taxes. Hence many American companies have already relocated abroad.

Reference 2 -

The government should maintain economic stability, boost employment, and retain tax revenues at home. One effective method of stimulating the creation of new businesses is to provide financial incentives to aspiring entrepreneurs. It's a win-win situation for both the start-up sector and the government since tax income rises with the number of new businesses.

Respondent 6:

Continue to create more innovative opportunities, such as pivoting businesses to produce products and services using recycled material and green energy.

5.7.2.1.3 Transportation and Infrastructure

Transportation support is needed, especially for businesses that need to transport goods. The roads and infrastructure must also be maintained to prevent delays and damage to vehicles and goods.

Respondent 2:

Businesses do better when they can efficiently move raw materials to factories and quickly get finished goods to plants and markets. National governments, via SANRAL, help improve the logistical infrastructure businesses need to transport goods and services successfully. They also tend to other infrastructures. This includes building and maintaining roads, bridges, rail lines, airports, seaports, energy transmission lines and telecommunications systems.

5.7.2.1.4 Rewards

Businesses should also be rewarded for their corporate social responsibilities to the community and environment.

Respondent 3:

They should also be rewarded appropriately for their CSR in the local communities they operate in.

5.7.2.1.5 Training and Development

Government must also provide training and development for owners and staff, especially in embracing the 4IR and sustainable entrepreneurship. Such skills include business and technology skills, relevant training and educational institutions to be partnered with.

Respondent 2:

To ensure businesses have access to trained workers, governments provide almost free schooling for primary and secondary students, grants and loans for higher education and worker training programmes. Local governments and municipalities often work with trade schools, community colleges and universities to provide free worker training.

Respondent 5:

Commit skills development. New enterprises need to hire the best people they can find to achieve their expansion goals. When qualified workers are scarce, this challenge becomes more complex for business owners.

More effort has to be made by the government of South Africa to raise the level of education and training available to its citizens. Increased funding for schools, Technikons, and universities means better educated and trained graduates and, ultimately, better executives and employees.

5.7.2.1.6 Reduced levies and rates

Levies and taxes must be reduced for small businesses to utilise the savings towards sustainable business development and the 4IR shift.

Respondent 11:

Reference 1 -

This is doable if the local government is willing to provide financial support and if the suppliers, whose prices are now at an all-time high, reduce their costs.

Reference 2 -

As an incentive for small industrial business owners to spend more on their enterprises and the communities in which they operate, they should be excluded from or pay lower taxes and rates for municipal services.

Respondent 3:

Small business owners should be exempt or pay reduced levies and rates for municipal services to incentivise them to invest more in the business and community.

5.7.2.1.7 Policies and Regulations

Policies and regulations should also be relaxed to some degree, as current such regulations caused businesses to be halted due to red tape and numerous requirements. There should also be policies supporting businesses towards 4IR.

Respondent 5:

Reference 1 -

Efforts should be made to reduce bureaucratic red tape. Many South African entrepreneurs worry about their businesses because of the country's overly cautious regulatory climate. Many would-be entrepreneurs put in their best effort to make it through the maze of regulations and rules, only to give up in defeat. The regulations themselves aren't what grinds people down so much as the absence of official help, clarity, and cooperation amongst government offices and departments.

Reference 2 -

Make it a government goal to foster the development of entrepreneurial endeavours. Ministers of government must engage with high-ranking government employees or institutional entrepreneurs to develop policies and programmes that foster innovation and entrepreneurship.

Ensuring government policy considers a wide range of issues. Instead of cherry-picking certain parts of the ecosystem, policymakers should take a more comprehensive approach.

Respondent 6:

Align innovation policies with its country's innovation system. Drive policies that relax financial inclusion and opportunities for businesses, especially SMMEs. Relax policies for international and cross-border trade for SMMEs.

5.7.2.2 Profitability and Sustainability

There must be strategies related to profitability and sustainability, which can be informed by the following.

5.7.2.2.1 Market Penetration

Businesses need to penetrate the market through the following ways aggressively.

a) Social media

Social media was an inexpensive and effective way of interactive marketing, and this should be capitalised on.

Respondent 1:

Diversify your distribution methods; increase your presence on the web. Tapping into untapped markets is one of the most effective means of expanding a company. Facebook, Instagram, and LinkedIn are just a few social media sites business owners use to spread the word about their products and services. However, it's important to consider how integrating additional channels into your strategy might help you expand into new markets and provide your customers with a more consistent brand experience.

Respondent 7:

You should make sure that you have a digital presence on social media, and you should also make sure that communication and interaction are constantly at the forefront of your customer's attention.

b) Bigger and new markets

Businesses should also seek a bigger chunk of the market and even look at markets outside of South Africa.

Respondent 1:

Achieving a larger slice of the market is achieved via market penetration.

Respondent 6:

Increase competitive advantage by searching for alternative markets to SA.

c) Omnichannel

Due to online, there were a variety of channels to connect to customers.

Respondent 1:

With omnichannel marketing, businesses can connect with clients regardless of where they are and provide them with the services and information they want via any medium.

d) Market development strategy

A full marketing strategy should be developed customised to the specific business, and this could inform sales strategies and improve market reach.

Respondent 2:

You could miss out on a valuable market if you don't have a market development strategy designed to reach new customers. This is especially important if sales of existing products have stagnated or if you want to expand your market reach to a new geography or target demographic. Sales and profits will suffer unless a business finds new product and service markets.

e) Networks

Businesses need to get more networked so that such opportunities should be utilised.

Respondent 4:

*Boost your profile and network with key allies. It's easy to get caught up in the logistics of launching a business that you neglect to keep up with basic marketing tasks like responding to comments on social media and displaying favourable customer evaluations on your website. Always be on the lookout for new distribution and marketing opportunities***.**

f) Targeted interventions

Apart from generic marketing and customer connect methods, businesses should also apply targeted interventions to specific customers/audiences.

Respondent 4:

Achieving substantial development demands constant, extensive advertising. While word-of-mouth and social networks may help get the ball rolling, nothing beats targeted campaigns like webinars, trade fairs, displays, and direct phone calls to key influencers in today's business world.

5.7.2.2.2 Sales focus

There must be a clear-cut focus on sales, as sales were at the forefront of revenue and sustainability.

a) Trials and discounts

There can be free trials on products and services and discounts offered to attract customers.

Respondent 1:

There is a plethora of options for getting there. To retain your current clientele, you may, for instance, provide a trial of your newest service at no cost or a reduced rate. Discounts for bulk purchases or price drops to undercut the competition are also viable options.

b) Online sales and virtual marketplace

Due to technology and online, the virtual marketplace backed by online sales would break geographic barriers and reach wider.

Respondent 1:

Customers may purchase from your Takealot shop without ever leaving your website if you include a link to your store on your site.

Respondent 10:

Virtual marketplaces could propel businesses to diversify and enter new markets as there are no physical restrictions besides transportation and delivery concerns.

d) Campaigns

One should also not underestimate physical campaigns to get to know and understand customer needs.

Respondent 4:

Boost the number of potential customers and the rate of conversion. It's time to put your lead-generating efforts on paper and launch campaigns to increase your sales closing ratio. At the same time as traditional marketing strategies like marketing and newsletter blasts have their place, real growth calls for creative new approaches to reaching your target audience. Reduce the length of the close cycle, and your growth rate will increase.

5.7.2.2.3 Customers

Relating to sales, customers were the drivers of a business.

a) Customer trends and patterns

Customer trends and patterns must be proactively tracked and monitored through engagements, surveys, social media and campaigns. This can allow businesses to gain critical insight into customer preferences.

Respondent 1:

Another tactic available to small businesses looking to expand is market segmentation. To divide your audience into smaller groups, customer preferences, purchasing history, hobbies, geography, and other attributes may be used to be more effectively marketed. Using these subsets, you may develop hyper-specific, one-of-a-kind campaigns that will perform considerably better.

Respondent 12:

The proliferation of wireless network systems and information is mainly responsible for the development of new patterns of consumer behaviour, which in turn is causing significant shifts on the supply side as businesses modify their approaches to product innovation, digital marketing, and distribution to account for the growing access of data, the ever-involved consumer, and the emergence of new patterns of consumer attitude.

b) Offerings

Businesses must also change and improve their offerings and even introduce new offerings to a diverse customer audience.

Respondent 4:

Put out monthly updates and brand-new offerings. Customers already purchased from you are among your most valuable growth assets since they are eager to try new products and services. Take advantage of gaps in the market that you can fill without requiring much in the way of additional resources or effort. Don't be a one-trick pony; always pursue client feedback constantly.

c) New consumer niches and distribution channels

New consumer niches and distribution channels can be opened and explored with technology.

Respondent 4:

Infiltrate new consumer niches and distribution channels with enthusiasm. If you aren't seeing the growth you'd want in your domestic market, maybe it's time to speed up your development to larger cities or international markets. If you aren't seeing the development you want from your website, branching out to Takealot and other channels may be the answer. Innovation in both the product and the market is essential for development.

d) Use friendly APPs

People are driven by apps in the current times, and hence businesses must harness technology and create user-friendly apps to identify with the customers.

Respondent 9:

Accessing the web on mobile devices has become more popular but optimising for smartphones differs from optimising for desktop searches. Make sure that your website looks different on mobile devices than it does on desktop PCs. One option is to create a mobile app with special features and access for your loyal customers, making doing business with you much easier for them.

5.7.2.3 Organisational

There have to be the following organisational strategies as well.

5.7.2.3.1 Technology and digital

A technology strategy must be developed, encompassing the following.

a) Technology vs pace ratio

An analysis must be done on the pace of technology in the business sector, and organisational technology must keep up-to-date. Introducing Technology KPIs can ensure this.

Respondent 4:

Adjust your level of automation to the pace of growth. It is always more costly to scale up manual processes and personnel; thus, KPIs are important for every process to assess whether automation is warranted. Some firms increase headcount to postpone automation, while others lavishly invest in cutting-edge technology. Both approaches will lead to financial ruin for your enterprise.

b) Policy

Policies must be aligned to 4IR and sustainable entrepreneurship.

Respondent 9:

To hasten the spread of new technologies, government programmes and policies should influence the availability of relevant information via direct and indirect mechanisms.

b) Cyber security

You cannot embrace the technology world without cyber security. Cyber security is needed to protect the business and the client, so businesses must consider this.

Respondent 6:

Enterprises will need to improve their cybersecurity practices.

SMMEs that believe they are immune to cyberattacks because of their relatively insignificant size should rethink that assumption. As expected, cutting-edge technology has arrived to the rescue once again. Two-factor authentication is one instrument I think is particularly useful. In addition to the usual login credentials, this enhanced security method necessitates a unique piece of information known only to the individual user. One excellent app that uses this method is Google Authenticator. The app on your phone will generate a code you'll need in addition to your password to access any files or data.

Respondent 9:

Ensure your systems are protected from intrusion to avoid data loss or theft. Adopt the Cloud, which is inexpensive and replaces older systems that were not built with secure infrastructures.

5.7.2.3.2 Labour force

The labour force needed to be a key priority for business owners. One could not only outsource services but should invest inwards to recruit and grow existing staff skills to meet the demands of the 4IR. Training and development were hence critical to this.

Respondent 10:

If the transformation is delegated outside or outsourced entirely, the business will lose access to its existing talent pool.

Respondent 11:

The approach is not straightforward to implement and needs an experienced IT manager. A specialist can ensure that all your subsystems operate together without disrupting your business.

Respondent 12:

Reference 1 -

Business and labour must share a vision for economic prosperity. SA has talent, but the business and governmental sectors must support it more extensively to achieve success.

Reference 2 -

This will need the private sector to play a more vital role as a skills incubator, including value chain enterprises and to boost financial services to assist SMMES in accessing more effective technologies and solutions.

Respondent 6:

Flexible employment agreements to contracts.

Respondent 7:

Since the long-term success of your enterprise depends on it, you need to find and keep personnel that are a good match for the business. Dedicated workers are confident in themselves, and their potential will ensure your business's growth and development.

5.7.2.3.3 Alignment

Business owners and leadership must align staff to technology and create that culture.

Respondent 6:

Adopt a new way of working and invest in technological evolution. Align workforce, systems, people and policies.

5.7.2.3.4 Risk Mitigation and continuity plan

A business continuity plan must be in place to plan for disasters and mishaps and mitigate risks.

Respondent 6:

Have a business continuity plan in place and constantly re-evaluate the business model for risk mitigation!

5.7.2.4 Product

Respondents also emphasised a product strategy.

5.7.2.4.1 Product review

Products should be reviewed continuously to ensure that they still meet customers' needs.

Respondent 2:

By performing a forensic review of your product line, including features, quality, market changes, and competitive factors, you can then determine how to move forward. That may include retiring or upgrading old products, introducing new products, or creating a new market strategy that resonates with new and prospective customers.

5.7.2.4.2 Product development lifecycle

The product development life cycle can assist in planning the lifespan of products from the eyes of the customers.

Respondent 2:

If sales are down, it might be time to revisit your product development lifecycle to see how your product features and prices compare to your competitors. Even if your

product line has been circulating for months or years, you can always benefit from a product review.

5.7.2.4.3 Suppliers

As an alternative source, supplier prices need to be reviewed.

Respondent 3:

And low prices from suppliers, which are currently at an all-time high.

5.7.2.5 Collaboration and collective

Collaboration was crucial for increasing networks and ideas.

5.7.2.5.1 Idea Sharing and Collaboration

Idea sharing and collaboration should be encouraged so all necessary stakeholders can convey their thoughts and ideas toward 4IR and sustainability for the business.

Respondent 10:

Reference 1 -

Take care of your adaptive organisational system by not introducing new ideas into the heart of your operations. The central part has been designed to perform in a particular manner and achieve certain goals.

Reference 2 -

To maximise the success of any initiative, it's important to include both consumers and suppliers and facilitate collaboration to expand your ecosystem.

Respondent 8:

Being aware of ways to improve performance in a given area is egotistical. Still, withholding such information from others one routinely interacts with will bring down the costs of all enterprises and potentially bring down the costs of living.

5.7.2.5.2 Partnerships and Networking

It is recommended that businesses network widely with other businesses to form partnerships and assist each other in expansion.

Respondent 2:

Sometimes joining forces with another business is the most viable path for SMME growth. Partnerships might provide extra resources regarding workforce, skill sets, knowledge, equipment, or technology, depending on your business type. Or it simply might enable both businesses to expand into new markets without directly competing.

Respondent 8:

To help other enterprises implement the most productive procedures, stakeholders should network with one another and share their best practices.

5.7.2.5.3 Collective approach

There must be a collective approach to business strategy and development toward 4IR within the business. It should not be top-down but more an absence of hierarchy and more collective communication.

Respondent 10:

To begin, the inherent opposition to change in every organisation ensures that top-down initiatives to bring about change are doomed to fail. Creating siloed innovation departments that exclude outsiders and isolate participants is counterproductive.

Respondent 5:

Exert leadership yet have subordinates shoulder increasing burdens. Use a combined top-down and bottom-up strategy that gives power to smaller government agencies.

5.7.3 Concluding remarks

The theme delves into the governmental support for sustainable entrepreneurship and strategies to promote business performance and growth in a turbulent business environment. The subthemes of governmental support and strategies offer valuable insights into the challenges and opportunities SMMEs face. The views of the respondents, supported by relevant literature, enhance our understanding of these

subthemes. The visual representation below provides a comprehensive overview of the findings.

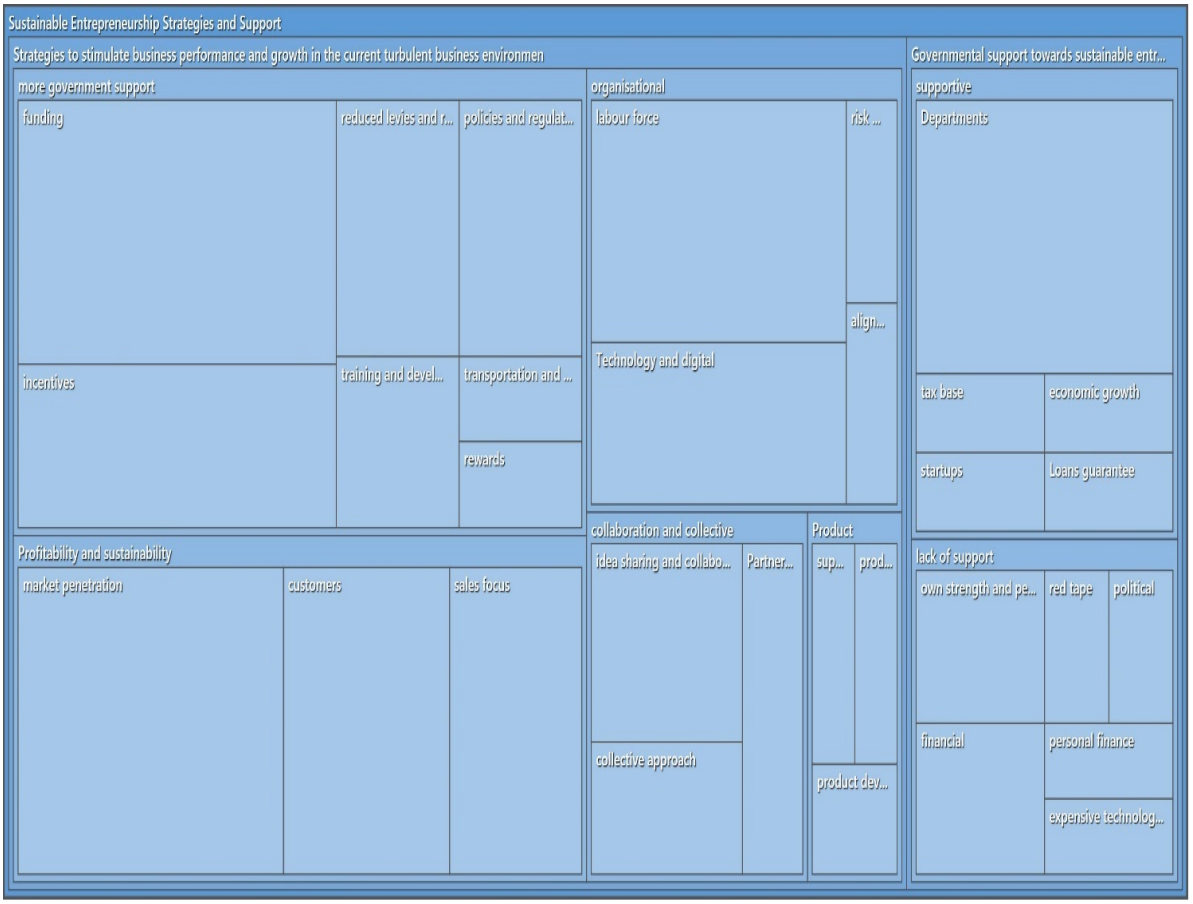

Figure 5.7.3: Sustainable Entrepreneurship Strategies and Support Hierarchy chart (Researcher, 2023)

5.8 Integration of Findings with Theoretical Framework

The study findings were analysed and interpreted in the context of the theoretical framework, which included the Sustainable Development Theory, RBV, Innovation Systems Theory, TBL, and Institutional Theory. This section discusses integrating the study findings with these theories, highlighting their contributions to understanding sustainable entrepreneurship in the 4th Industrial Revolution.

5.8.1 Sustainable Development Theory and Findings

The Sustainable Development Theory emphasises balancing economic growth, social equity, and environmental protection to achieve long-term sustainability (WCED, 1987). The study findings revealed that SMMEs in the eThekwini region of KwaZulu-Natal faced various challenges related to sustainable development's economic, social, and environmental dimensions. These challenges included the rapid technological changes associated with the 4th Industrial Revolution, limited access to resources, inadequate skills and knowledge, and the need for effective government support and policies. The findings also showed that the SMMEs employed various strategies and initiatives to address these challenges and promote sustainable entrepreneurship, such as investing in innovative technologies, developing local partnerships, and engaging in CSR activities.

The study findings support the Sustainable Development Theory by demonstrating the interconnectedness of sustainable entrepreneurship's economic, social, and environmental dimensions in the 4th Industrial Revolution. The SMMEs' experiences illustrate the importance of achieving a balance between these dimensions to ensure their businesses' long-term viability and success, as well as their contribution to the sustainable development of their communities and the broader society. Moreover, the findings highlight the need for effective policies and support mechanisms that facilitate the integration of sustainable development principles and practices into SMMEs' strategies and operations.

5.8.2 Resource-Based View and Findings

The RBV posits that a firm's competitive advantage is derived from its unique resources and capabilities, VRIN (Barney, 1991). In the context of the 4th Industrial Revolution, the study findings indicated that the SMMEs in the eThekwini region of KwaZulu-Natal relied on various resources and capabilities to achieve sustainable entrepreneurship, such as innovative technologies, skilled human capital, and strong networks and partnerships. The findings also suggested that SMMEs faced challenges in accessing and leveraging these resources and capabilities, such as financial constraints, knowledge gaps, and regulatory barriers.

The study findings contribute to the RBV literature by highlighting the critical role of resources and capabilities in shaping SMMEs' strategies and performance in the 4th Industrial Revolution. The results demonstrate that SMMEs must continually invest in and develop their resources and capabilities to adapt to the changing technological landscape, meet the evolving needs of their customers and stakeholders, and achieve sustainable entrepreneurship. Furthermore, the findings underscore the importance of external support mechanisms, such as government policies and programmes, financial assistance, and capacity-building initiatives, in enabling SMMEs to access and utilise the necessary resources and capabilities for sustainable entrepreneurship in the 4th Industrial Revolution.

5.8.3 Innovation Systems Theory and Findings

Innovation Systems Theory emphasises the role of institutions, networks, and other contextual factors in shaping firms' innovation processes and outcomes (Lundvall, 1992). The study findings revealed that the SMMEs in the eThekwini region of KwaZulu-Natal were embedded in various innovation systems, such as local, regional, and sectoral networks, influencing their ability to engage in sustainable entrepreneurship in the 4th Industrial Revolution. The findings also indicated that the SMMEs faced several barriers in navigating and benefiting from these innovation systems, such as limited access to information, inadequate support from government institutions, and a lack of trust and collaboration among stakeholders.

The study findings extend the Innovation Systems Theory by providing empirical evidence of the critical role of innovation systems in shaping SMMEs' strategies and performance in the context of the 4th Industrial Revolution. The findings highlight the need for SMMEs to actively participate in and leverage the innovation systems to access valuable resources, knowledge, and opportunities for sustainable entrepreneurship. Additionally, the findings emphasise the importance of enhancing the effectiveness and inclusiveness of the innovation systems through targeted policies, interventions, and initiatives that foster collaboration, trust, and learning among the various stakeholders involved.

5.8.4 Triple Bottom Line and Findings

The TBL framework proposes that businesses pursue a balanced approach to economic, social, and environmental performance to achieve long-term sustainability (Elkington, 1997). The study findings demonstrated that the SMMEs in the eThekwini region of KwaZulu-Natal were striving to achieve a balance between the TBL dimensions by implementing various sustainable entrepreneurship strategies and practices, such as investing in green technologies, promoting social inclusion and equity, and adhering to environmental regulations and standards. The findings also revealed that the SMMEs faced numerous challenges in pursuing the TBL, such as the high costs of implementing sustainable technologies, the lack of adequate skills and expertise, and the competing demands of different stakeholders.

The study findings contribute to the TBL literature by illustrating the complex and dynamic interplay between sustainable entrepreneurship's economic, social, and environmental dimensions in the 4th Industrial Revolution. The findings underscore the importance of adopting a holistic and integrated approach to the TBL to address the challenges and opportunities associated with the rapidly changing technological and socio-economic landscape. Moreover, the findings highlight the need for supportive policies, programmes, and initiatives that enable SMMEs to pursue the TBL more effectively and efficiently.

5.8.5 Institutional Theory and Findings

Institutional Theory posits that the behaviour and performance of organisations are influenced by the formal and informal rules, norms, and structures of their institutional environment (Scott, 2008). The study findings indicated that the SMMEs in the eThekwini region of KwaZulu-Natal were subject to various institutional pressures and influences that affected their ability to engage in sustainable entrepreneurship during the 4th Industrial Revolution. These institutional factors included government policies and regulations, Industry standards and certifications, and societal expectations and values. The findings also suggested that the SMMEs adopted various strategies to respond to these institutional pressures, such as compliance, adaptation, and innovation.

The study findings enrich the Institutional Theory by demonstrating the significant role of institutions in shaping the SMMEs' strategies and outcomes in the context of the 4th Industrial Revolution. The findings highlight the need for SMMEs to effectively navigate and manage the complex institutional environment to achieve sustainable entrepreneurship. Furthermore, the findings emphasise the importance of creating a supportive and enabling institutional environment that encourages and facilitates adopting of sustainable entrepreneurship practices and innovations by SMMEs. This can be achieved by developing and implementing effective policies, regulations, and incentives that align with sustainable development goals and the specific needs and characteristics of SMMEs.

5.9 Conclusion

This chapter has presented the study's findings, which aimed to explore the experiences and strategies of SMMEs in the eThekwini region of KwaZulu-Natal, South Africa, concerning sustainable entrepreneurship in the 4th Industrial Revolution. The findings were analysed and interpreted within the context of the theoretical framework, encompassing the Sustainable Development Theory, RBV, Innovation Systems Theory, TBL, and Institutional Theory.

The study findings have contributed to a deeper understanding of the complex and dynamic interplay between the various factors and dimensions of sustainable entrepreneurship in the 4th Industrial Revolution. The findings have highlighted the importance of balancing economic, social, and environmental performance, leveraging resources and capabilities, engaging in innovation systems, and navigating the institutional environment to ensure the long-term sustainability and success of SMMEs. Moreover, the findings have underscored the critical role of external support mechanisms, such as government policies, programmes, and initiatives, in enabling SMMEs to overcome the challenges and barriers they face in pursuing sustainable entrepreneurship.

These findings have important implications for policymakers, practitioners, and researchers, as they provide valuable insights and guidance for designing and implementing effective strategies and interventions that support and promote

sustainable entrepreneurship in the 4th Industrial Revolution. By fostering a more conducive and supportive environment for SMMEs, stakeholders can help unlock these businesses' full potential as drivers of sustainable development, innovation, and inclusive growth in their communities and the broader society.

CHAPTER SIX

DISCUSSION OF RESULTS

6.1 INTRODUCTION

This chapter discusses the findings presented in the previous chapter, which focused on the experiences and strategies of small, medium, and micro-sized enterprises in the eThekwini region of KwaZulu-Natal, South Africa concerning sustainable entrepreneurship in the Fourth Industrial Revolution. The chapter is organised into six sections, each addressing a specific aspect of the research question, including the factors influencing sustainable entrepreneurship, Industry 4.0 practices, and the current state of sustainable entrepreneurship in the region. Moreover, it discusses the challenges and opportunities for SMMEs, the role of government support, and the impact of these factors on sustainable entrepreneurship. The discussion draws from various themes and subthemes identified during the data analysis process and insights from the literature to provide a comprehensive understanding of the research problem.

6.2 FACTORS INFLUENCING SUSTAINABLE ENTREPRENEURSHIP IN THE 4IR

6.2.1 Internal Factors

6.2.1.1 Organisational Resources and Capabilities

The study findings highlight the critical role of organisational resources and capabilities in determining the success and sustainability of SMMEs in the 4IR. These include financial, human, and technological resources and intangible assets such as knowledge, skills, and organisational culture as was noted by Barney, (1991) and Wernerfelt (1984). The availability and effective deployment of these resources enable SMMEs to develop and implement innovative business models, products, and services that cater to the evolving needs of their customers, while also addressing the economic, social, and environmental dimensions of sustainability, as postulated by Zahra et al. (2008) and Schaltegger & Wagner (2011).

For instance, financial resources are essential for SMMEs to invest in new technologies, research and development, and workforce training, facilitating the adoption and integration of 4IR technologies and practices as substantiated by Acs & Audretsch (1990) and Hall et al. (2010). Similarly, human resources, particularly those with specialised skills and expertise in areas such as digital technology, data analytics, and sustainable innovation, are vital for enabling SMMEs to exploit the opportunities presented by the 4IR and enhance their competitiveness and resilience in the face of rapid technological change and market disruption, as articulated by Teece et al. (1997) and Zahra & George (2002).

Moreover, the findings underscore the importance of cultivating an organisational culture that values and supports learning, experimentation, and collaboration and a strong commitment to sustainability and social responsibility as mentioned by Zahra et al. (2008) and Schaltegger & Wagner (2011). This can be achieved through effective leadership and management practices and appropriate incentives and rewards that encourage and motivate employees to engage in sustainable entrepreneurship activities actively and initiatives, as emphasized by Lumpkin & Dess, (1996) and Shepherd & Patzelt (2011).

6.2.1.2 Innovation and Adaptability

Innovation and adaptability are essential for SMMEs to thrive in the 4IR, as they enable businesses to continuously refine and improve their products, services, and business models in response to the dynamic market conditions, technological advancements, and shifting customer preferences (Schumpeter, 1934; Teece, 2007). The study findings reveal that SMMEs in the eThekwini region have adopted various strategies to enhance their innovation and adaptability, such as investing in research and development, collaborating with external partners, and leveraging digital technology and data analytics to gain insights into customer needs and preferences, as underscored by Chesbrough (2003) and Laursen & Salter (2006).

Furthermore, the findings indicate that adaptability is not only about responding to external changes but also about proactively anticipating and shaping the future direction of the Industry and the broader economic, social, and environmental

context in which SMMEs operate, reflecting the findings of Teece (2007) and Weick & Sutcliffe (2001). This entails developing a deep understanding of the opportunities and challenges presented by the 4IR, as well as the ability to envision and implement new ways of creating value and addressing sustainability issues through innovative business models, partnerships, and technologies, as observed by Zahra et al. (2008) and Osterwalder & Pigneur (2010).

6.2.2 External Factors

6.2.2.1 Market Dynamics and Customer Preferences

Market dynamics and customer preferences play a significant role in shaping the sustainable entrepreneurship landscape in the 4IR, as they influence the demand for and adoption of new products, services, and business models that contribute to economic, social, and environmental sustainability, as postulated by Porter & Kramer (2011) and Elkington (1997). The study findings reveal that SMMEs in the eThekwini region are facing rapidly changing market conditions, characterised by increased competition, technological disruption, and evolving customer expectations regarding quality, convenience, and sustainability, as recognised by Christensen (1997) and Prahalad & Ramaswamy (2004).

In this context, SMMEs must be agile and responsive to these changes by continuously monitoring and adapting to the shifting market trends, customer preferences, and competitive forces, as opined by Teece (2007) and Weick & Sutcliffe (2001). This may involve embracing digital technology and data analytics to gain a deeper understanding of customer needs and preferences, as well as developing innovative products, services, and business models that address the sustainability challenges and opportunities arising from the 4IR.

6.2.2.2 Technological Advancements and Infrastructure

Technological advancements and infrastructure are critical enablers of sustainable entrepreneurship in the 4IR, as they provide the tools, platforms, and systems that facilitate the development, dissemination, and application of new knowledge, ideas, and solutions that contribute to economic, social, and environmental sustainability,

as explicated by Schwab (2016) and Mazzucato (2015). The study findings suggest that SMMEs in the eThekwini region have varying degrees of access to and adoption of 4IR technologies, such as AI, robotics, and the IoT, which in turn influence their ability to innovate, compete, and create value in the digital economy, as corroborated by Brynjolfsson & McAfee (2014) and Lasi et al. (2014).

Moreover, the findings highlight the importance of investing in digital infrastructure, such as broadband networks, data centres, and cloud computing services, as well as the development of appropriate regulatory frameworks and policies that support the diffusion and application of 4IR technologies across different sectors and regions, as highlighted by Mazzucato (2015) and OECD (2017). This can help to address the digital divide and ensure that all SMMEs, including those in rural and disadvantaged areas, can benefit from the opportunities presented by the 4IR and contribute to the sustainable development of their communities and the wider society (World Bank, 2016; ITU, 2017).

6.2.2.3 Government Policies and Support

Government policies and support play a crucial role in fostering sustainable entrepreneurship in the 4IR by creating an enabling environment that encourages and facilitates the growth, innovation, and competitiveness of SMMEs, while also addressing the economic, social, and environmental challenges and opportunities arising from technological change and globalisation, as underscored by Mazzucato, (2015) and Lund vall & Borrás (2005). The study findings reveal that the South African government has introduced various policies, programmes, and initiatives aimed at promoting SMME development, digital transformation, and sustainable entrepreneurship, such as the National Development Plan 2030, the Industrial Policy Action Plan, and the Black Industrialists Programme, as indicated by DTI 2(017; 2018).

However, the findings also indicate gaps and challenges in the implementation and effectiveness of these policies and support measures, particularly regarding their accessibility, relevance, and impact on SMMEs in the eThekwini region, as illustrated in the research of Rogerson (2008) and Fatoki (2012). For instance, some

participants reported difficulties accessing government funding, training, and mentorship programmes due to bureaucratic procedures, stringent eligibility criteria, and lack of awareness and information about the available support services.

Moreover, the findings suggest that there is a need for greater collaboration and coordination between different government departments, agencies, and stakeholders in the design, implementation, and evaluation of sustainable entrepreneurship policies and programmes, as well as the development of context-specific and targeted interventions that address the unique needs, challenges, and opportunities faced by SMMEs in the eThekwini region and other localities, as revealed by Lundvall & Borrás (2005) and OECD (2017).

6.3 INDUSTRY 4.0 PRACTICES IN SMMES WITHIN THE ETHEKWINI REGION

6.3.1 Adoption and Integration of 4IR Technologies

The adoption and integration of 4IR technologies are essential for SMMEs in the eThekwini region to enhance their productivity, competitiveness, and sustainability in the digital economy, reflecting the views of Brynjolfsson & McAfee (2014) and Lasi et al. (2014). The study findings reveal that there is a wide variation in the level of technology adoption and integration among SMMEs, with some businesses embracing advanced technologies such as AI, robotics, and the IoT, while others are still relying on traditional tools and methods, as documented by Frey & Osborne, (2017) and OECD (2017).

This disparity can be attributed to various factors, including the availability of financial, human, and technological resources, as well as the awareness, attitudes, and capabilities of SMME owners and managers regarding the benefits, risks, and implications of 4IR technologies for their businesses and industries, as underscored by Chesbrough (2003) and Teece (2007). To address these barriers and to foster the widespread adoption and integration of 4IR technologies, it is important to develop and implement targeted policies, programmes, and initiatives that provide financial, technical, and capacity-building support to SMMEs, as well as promote collaboration, knowledge-sharing, and innovation among different actors and

stakeholders in the ecosystem, as detailed by Mazzucato (2015) and Lundvall & Borrás (2005).

6.3.2 Skills Development and Workforce Transformation

Skills development and workforce transformation are critical components of sustainable entrepreneurship in the 4IR, as they enable SMMEs to harness the potential of new technologies, business models, and markets while also addressing the social and environmental challenges and opportunities arising from technological change and globalisation, as outlined by the World Economic Forum (2016) and Schwab (2016). The study findings reveal that there is a growing demand for skilled workers in the eThekwini region, particularly in areas such as digital technology, data analytics, and sustainable innovation, which in turn influences the ability of SMMEs to adapt, compete, and create value in the 4IR, as postulated by Brynjolfsson & McAfee (2014) and Arntz et al. (2016).

However, the findings also indicate that there are significant skills gaps and mismatches in the labour market, as well as challenges in attracting, retaining, and developing talent within SMMEs due to factors such as limited resources, inadequate training, and competition from larger firms and other sectors, as emphasised by the World Bank (2016) and Bessen (2019). To address these issues, it is crucial to invest in education and training systems that are responsive to the needs of the 4IR, as well as fostering lifelong learning, upskilling, and reskilling opportunities for workers at different stages of their careers, as reiterated by the OECD (2019) and WEF (2018). Moreover, the findings suggest that there is a need for greater collaboration between SMMEs, educational institutions, government agencies, and other stakeholders in the development and implementation of skills development programmes and initiatives that are tailored to the specific needs, contexts, and objectives of different industries, regions, and population groups, as asserted by Lundvall & Borrás (2005) and Mazzucato (2015).

6.3.3 Challenges and Opportunities

The 4IR presents challenges and opportunities for SMMEs in the eThekwini region as they seek to navigate the complex and uncertain landscape of technological change, market disruption, and sustainability pressures, as substantiated by Schwab (2016) and Mazzucato (2015). The study findings highlight several key challenges SMMEs face, including financial constraints, access to capital, market access and competitiveness, organisational and leadership challenges, and regulatory and policy environment, as emphasised by Fatoki (2012) and Rogerson, (2008).

At the same time, the findings reveal that there are numerous opportunities for SMMEs to leverage the 4IR technologies and practices to enhance their productivity, innovation, and sustainability, as well as to address the economic, social, and environmental challenges and opportunities arising from technological change and globalisation, as recognised by Brynjolfsson & McAfee (2014) and Lasi et al. (2014). These opportunities include the development of new products, services, and business models, the creation of new markets and customer segments, the optimisation of operations and supply chains, and the improvement of stakeholder engagement and communication, as elucidated by Chesbrough (2003) and Osterwalder & Pigneur (2010).

To seize these opportunities and overcome the challenges, SMMES need to develop and implement appropriate strategies, capabilities, and resources that enable them to adapt, innovate, and compete in the 4IR, as well as to collaborate and learn from other actors and stakeholders in the ecosystem, including government, academia, and civil society (Teece, 2007; Lundvall & Borrás, 2005).

6.4 FACTORS CONTRIBUTING TO THE FAILURE OF SUSTAINABLE ENTREPRENEURSHIP IN THE 4IR

The factors contributing to the failure of sustainable entrepreneurship in the 4IR are complex and multidimensional, encompassing a range of internal and external factors that influence the ability of SMMEs to adapt, innovate, and compete in the rapidly changing economic, social, and environmental landscape, as recognised by Coad et al. (2014) and Wennberg & DeTienne (2014). These factors include

financial constraints and access to capital, market access and competitiveness, organisational and leadership challenges, and regulatory and policy environment, which are discussed in sections 6.2.1, 6.2.2, and 6.3.3.

To address these factors and to enhance the success and sustainability of SMMEs in the 4IR, it is crucial to develop and implement comprehensive and integrated policies, programmes, and interventions that target the specific needs, challenges, and opportunities faced by different industries, regions, and population groups, as well as fostering collaboration, knowledge sharing, and innovation among various actors and stakeholders in the ecosystem, as asserted by Lundvall & Borrás (2005) and Mazzucato (2015).

6.5 THE CURRENT STATE OF SUSTAINABLE ENTREPRENEURSHIP IN THE ETHEKWINI REGION

6.5.1 Successes and Best Practices

Despite the numerous challenges SMMEs face in the eThekwini region, the study findings reveal several success stories and best practices in sustainable entrepreneurship that demonstrate the potential and resilience of these businesses in the 4IR. These examples include innovative products, services, and business models that address the economic, social, and environmental challenges and opportunities arising from technological change and globalisation, as well as the effective use of 4IR technologies and practices to enhance productivity, innovation, and sustainability. Moreover, the findings highlight the importance of strong leadership, organisational culture, and human capital in driving the success and sustainability of SMMEs in the 4IR, as well as the role of supportive ecosystems, networks, and partnerships in fostering collaboration, knowledge sharing, and resource mobilisation among different actors and stakeholders as articulated by Coad et al. (2014) and Wennberg & DeTienne (2014).

6.5.2 Barriers and Limitations

Despite these successes and best practices, the study findings also identify several barriers and limitations that hinder the growth, innovation, and sustainability of

SMMEs in the eThekwini region in the 4IR. These barriers include financial constraints, access to capital, market access and competitiveness, organisational and leadership challenges, and regulatory and policy environment, as well as the digital divide, skills gaps, and mismatches in the labour market, which are discussed in detail in sections 6.2.1, 6.2.2, 6.3.1, and 6.3.2.

To overcome these barriers and limitations, SMMES need to develop and implement appropriate strategies, capabilities, and resources that enable them to adapt, innovate, and compete in the 4IR, as well as to collaborate and learn from other actors and stakeholders in the ecosystem, including government, academia, and civil society (Teece, 2007; Lundvall & Borrás, 2005).

6.6 GOVERNMENT SUPPORT AND ITS IMPACT ON SUSTAINABLE ENTREPRENEURSHIP

6.6.1 Effectiveness and Impact of Government Support Programmes

The effectiveness and impact of government support programmes on sustainable entrepreneurship in the 4IR are critical for fostering an enabling environment that encourages and facilitates the growth, innovation, and competitiveness of SMMEs while addressing the economic, social, and environmental challenges and opportunities arising from technological change and globalisation as noted by Mazzucato (2015). The study findings suggest that there is a mixed assessment of the effectiveness and impact of government support programmes for SMMEs in the eThekwini region, with some participants reporting positive experiences and benefits while others expressing concerns about the accessibility, relevance, and efficiency of these programmes, as observed by Fatoki (2012).

6.6.2 Challenges and Opportunities for Enhancing Government Support

It is crucial to address the identified challenges and opportunities, such as improving the accessibility, relevance, and efficiency of these programmes, as well as fostering greater collaboration and coordination among different government departments, agencies, and stakeholders in the design, implementation, and evaluation of policies and initiatives to enhance the impact and the effectiveness of the government

support programmes for sustainable entrepreneurship in the 4IR (Mazzucato, 2015). Moreover, it is essential to develop and implement context-specific and targeted interventions that address the unique needs, challenges, and opportunities faced by SMMEs in the eThekwini region and other localities, as well as promote innovation, learning, and capacity building among different actors and stakeholders in the ecosystem, as revealed by OECD (2017 and Herrington & Kew (2017).

6.7 CONCLUSION

In conclusion, the findings of this study contribute to a deeper understanding of the factors influencing sustainable entrepreneurship in the 4IR, as well as the current state of SMMEs in the eThekwini region and the challenges and opportunities they face in the context of technological change, market disruption, and sustainability pressures. The study also highlights the crucial role of government support and its impact on the success and sustainability of SMMEs, as well as the need for comprehensive and integrated policies, programmes, and interventions that target the specific needs, challenges, and opportunities of different industries, regions, and population groups.

Furthermore, the study emphasises the importance of fostering collaboration, knowledge sharing, and innovation among various actors and stakeholders in the ecosystem, including government, academia, and civil society, to create an enabling environment that encourages and facilitates the growth, innovation, and competitiveness of SMMEs, while also addressing the economic, social, and environmental challenges and opportunities arising from the 4IR.

CHAPTER SEVEN

RECOMMENDATIONS AND CONCLUSION

7.1 INTRODUCTION

In the wake of the 4IR, sustainable entrepreneurship has become increasingly relevant for small, medium, and micro enterprises. The rapidly changing economic landscape, characterised by rapid technological advancements and increasing sustainability pressures, has compelled businesses to adapt and innovate to remain competitive. This study aimed to investigate the factors influencing sustainable entrepreneurship in the 4IR, particularly among SMMEs in the eThekwini region of South Africa. Through a qualitative research design, the study sought to uncover the challenges and opportunities these enterprises face, the role of government policies and support mechanisms, and the overall state of sustainable entrepreneurship in the region.

This final chapter presents an overview of the study's findings, followed by developing an enterprise sustainability framework for SMMEs in the context of the 4IR. Furthermore, it outlines policy recommendations for government and stakeholders to foster sustainable entrepreneurship and the implications of the study's findings for theory and practice. The chapter discusses the study's limitations and potential future research directions.

7.2 SUMMARY OF FINDINGS

In response to the research objectives, the study's findings present actionable recommendations in 7.3 and 7.4, across six pivotal areas: (1) factors influencing sustainable entrepreneurship in the 4IR; (2) Industry 4.0 practices among SMMEs in the eThekwini region; (3) factors contributing to the failure of sustainable entrepreneurship in the 4IR; (4) the current state of sustainable entrepreneurship in the eThekwini region; (5) government support and its impact on sustainable entrepreneurship; and (6) the role of collaboration and networking in fostering sustainable entrepreneurship.

1) **Factors influencing sustainable entrepreneurship in the 4IR:** The study revealed a range of internal and external factors that influence sustainable entrepreneurship in the 4IR. Internal factors included organisational resources and capabilities, innovation, and adaptability. External factors encompassed market dynamics, customer preferences, technological advancements, infrastructure, and government policies and support.
2) **Industry 4.0 practices among SMMEs in the eThekwini region:** The research found varying levels of adoption and integration of 4IR technologies among SMMEs. While some enterprises demonstrated a high level of technological adoption, others lagged due to financial constraints, lack of skills, and limited market access. Additionally, the study identified the importance of skills development and workforce transformation in addressing these challenges.
3) **Factors contributing to the failure of sustainable entrepreneurship in the 4IR:** Several factors were identified as contributing to the failure of sustainable entrepreneurship in the 4IR, including financial constraints, access to capital, market access, competitiveness, organisational and leadership challenges, and the regulatory and policy environment.
4) **The current state of sustainable entrepreneurship in the eThekwini region:** The study revealed successes and best practices, as well as barriers and limitations, in the realm of sustainable entrepreneurship. Successes included innovative business models, effective resource management, and stakeholder engagement. However, limited access to finance, skills shortages, and regulatory hurdles impeded further progress.
5) **Government support and its impact on sustainable entrepreneurship:** The effectiveness and impact of government support programmes varied across the region. While some programmes effectively addressed the needs of SMMEs, others faced challenges in implementation and reach. The study highlighted the need for enhanced government support tailored to the unique needs of SMMEs.

6) The role of **collaboration and networking** in fostering sustainable entrepreneurship: The research underscored the importance of cooperation and networking among SMMEs, government, academia, and civil society in creating an enabling environment for sustainable entrepreneurship in the 4IR.

7.3 RECOMMENDED ENTERPRISE SUSTAINABILITY FRAMEWORK AND IMPLEMENTATION GUIDELINES

Building on the study's research objectives and findings, an enterprise sustainability framework for SMMEs is recommended and implementation guidelines proposed in the context of the 4IR as shown in figure 7.3. The framework is designed to guide SMMEs in navigating the challenges and opportunities associated with sustainable entrepreneurship in the rapidly evolving economic landscape.

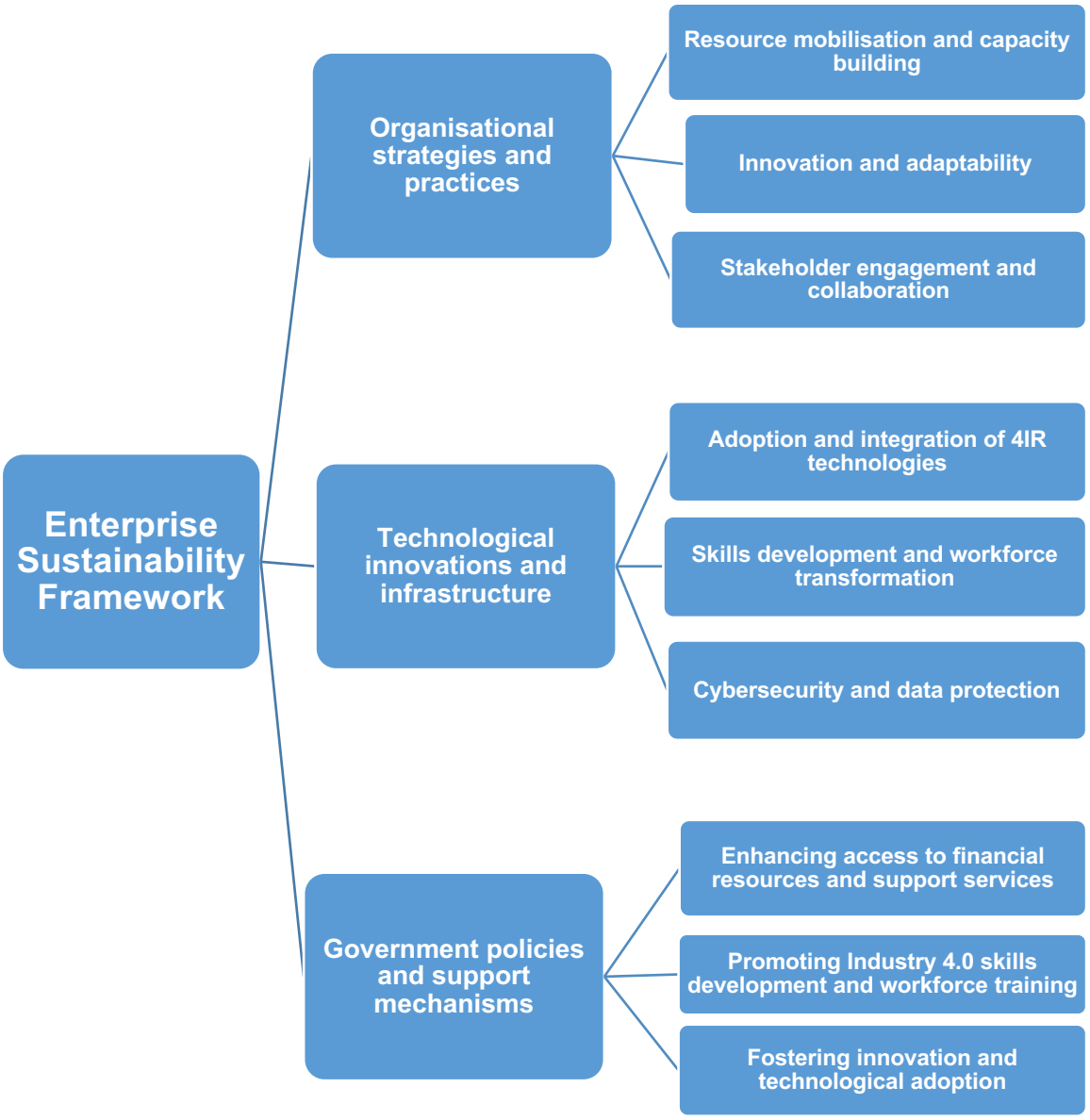

Figure 7.3: Proposed Sustainable Enterprise Framework (Researcher, 2023)

7.3.1 Key Components of the Framework

The framework comprises three key components: (1) organisational strategies and practices; (2) technological innovations and infrastructure; and (3) government policies and support mechanisms.

7.3.1.1 Organisational Strategies and Practices

To foster sustainable entrepreneurship in the 4IR, SMMEs should focus on the following organisational strategies and practices:

a) **Resource mobilisation and capacity building:** SMMEs must prioritise the development of human, financial, and technological resources to improve their competitiveness and sustainability. This includes investing in skills development, workforce training, and access to finance.
b) **Innovation and adaptability:** SMMEs should continuously innovate and adapt to changing market dynamics and customer preferences. This entails embracing new technologies, developing innovative products and services, and adopting agile business models.
c) **Stakeholder engagement and collaboration:** SMMEs should actively engage with stakeholders, including customers, suppliers, employees, government agencies, and civil society organisations, to identify opportunities for collaboration and co-creation.
d) **Monitoring and evaluation:** SMMEs should regularly assess their performance against sustainability goals, using key performance indicators and benchmarking against Industry best practices.

7.3.1.2 Technological Innovations and Infrastructure

Technological innovations and infrastructure enable SMMEs to become more sustainable and competitive in the 4IR. Key aspects to consider include:

a) **Adoption and integration of 4IR technologies:** SMMEs should explore the potential benefits of integrating 4IR technologies such as AI, the IoT, and big data analytics into their business processes.
b) **Skills development and workforce transformation:** SMMEs should invest in upskilling and reskilling their workforce to leverage the opportunities offered by the 4IR. This includes providing training in digital skills, problem-solving, and creativity.

c) **Cybersecurity and data protection:** As SMMEs increasingly rely on digital technologies, they must ensure robust cybersecurity measures and data protection practices are in place to safeguard their operations and customer data.

7.3.1.3 Government Policies and Support Mechanisms

Government policies and support mechanisms are crucial in fostering sustainable entrepreneurship in the 4IR. Key areas of focus should include:

a) **Enhancing access to financial resources and support services:** Government should provide targeted financial support to SMMEs through grants, loans, and tax incentives, as well as offering tailored business support services such as mentorship, market access, and technology adoption assistance.
b) **Promoting Industry 4.0 skills development and workforce training:** Government should invest in skills development initiatives and encourage partnerships between educational institutions, Industry, and SMMEs to address skills shortages and prepare the workforce for the 4IR.
c) **Fostering innovation and technological adoption:** Government should create an enabling environment for innovation by supporting research and development initiatives, facilitating technology transfer, and promoting the adoption of 4IR technologies by SMMEs.

7.3.2 Implementation Guidelines for SMMEs

To implement the enterprise sustainability framework effectively, SMMEs should focus on the following guidelines:

7.3.2.1 Resource Mobilisation and Capacity Building

a) Develop a strategic plan outlining the organisation's sustainability goals and objectives and the necessary resources required to achieve them.

b) Seek partnerships and collaborations with other organisations, such as Industry associations, educational institutions, and government agencies, to access resources and expertise to support capacity-building efforts.
c) Establish an internal team responsible for driving sustainability initiatives and monitoring progress against established goals.
d) Regularly assess the organisation's resource needs and identify gaps that may hinder the achievement of sustainability objectives, addressing them through targeted capacity-building initiatives.

7.3.2.2 Collaboration and Networking

a) Actively participate in Industry events, conferences, and workshops to expand the organisation's network and gain access to valuable resources, insights, and potential partners.
b) Establish strategic partnerships with organisations that share similar sustainability goals and can offer complementary resources, expertise, or market access.
c) Engage with relevant stakeholders, including customers, suppliers, employees, and government agencies, to identify opportunities for collaboration and co-creation.
d) Leverage digital platforms and social media to connect with like-minded entrepreneurs, Industry experts, and potential partners to share knowledge and best practices.

7.3.2.3 Monitoring and Evaluation

a) Establish clear sustainability goals and objectives aligned with the organisation's strategic plan and identify key performance indicators (KPIs) to measure progress.
b) Regularly collect and analyse the organisation's sustainability performance data, comparing results against established KPIs and Industry benchmarks.
c) Conduct periodic internal and external audits to assess the effectiveness of sustainability initiatives and identify areas for improvement.

d) Communicate sustainability achievements and progress to stakeholders, including employees, customers, investors, and regulatory authorities, to foster transparency and accountability.

7.4 POLICY RECOMMENDATIONS FOR GOVERNMENT AND STAKEHOLDERS

Based on the study's findings, the following policy recommendations are proposed for government and stakeholders to foster sustainable entrepreneurship in the 4IR:

7.4.1 Enhancing Access to Financial Resources and Support Services

a) Establish targeted financial support mechanisms, such as grants, loans, and tax incentives, to help SMMEs overcome financial barriers and invest in sustainability initiatives.
b) Develop tailored business support services, including mentorship, market access, and technology adoption assistance, to help SMMEs navigate the challenges of the 4IR.
c) Encourage collaboration between government agencies, financial institutions, and private sector partners to develop innovative financing solutions for SMMEs focused on sustainability.

7.4.2 Promoting Industry 4.0 Skills Development and Workforce Training

a) Invest in skills development initiatives, such as vocational training programmes and digital skills courses, to address skills shortages and prepare the workforce for the 4IR.
b) Foster partnerships between educational institutions, Industry, and SMMEs to develop curricula and training programmes that align with the needs of the labour market.
c) Encourage lifelong learning and upskilling among the workforce through incentives and support mechanisms, such as subsidies, tax breaks, and flexible working arrangements.

7.4.3 Fostering Innovation and Technological Adoption

a) Create an enabling environment for innovation by supporting research and development initiatives, facilitating technology transfer, and promoting the adoption 4IR technologies by SMMEs.
b) Establish innovation hubs and technology incubators to provide SMMEs access to resources, expertise, and networking opportunities.
c) Implement policies and regulations that encourage developing and adopting sustainable technologies, such as renewable energy, circular economy practices, and digital solutions.

7.4.4 Strengthening the Regulatory Environment and Institutional Support

a) Develop and implement policies and regulations that promote sustainable entrepreneurship, addressing barriers such as access to finance, skills shortages, and market access.
b) Strengthen the capacity of government agencies and institutions responsible for supporting SMMEs in their sustainability efforts, providing them with the necessary resources and expertise to effectively deliver support services.
c) Enhance the coordination and collaboration between government agencies, Industry associations, and other stakeholders to create a more cohesive and effective support ecosystem for SMMEs.

7.5 IMPLICATIONS FOR THEORY AND PRACTICE

This study has significant implications for both theory and practice in sustainable entrepreneurship in the context of the 4IR.

7.5.1 Contributions to Theory

a) The study contributes to understanding factors influencing sustainable entrepreneurship in the 4IR, providing insights into the internal and external drivers that shape SMMEs' sustainability efforts.

b) The research expands the knowledge base on adopting Industry 4.0 practices among SMMEs, highlighting the challenges and opportunities associated with technological innovations and infrastructure.
c) The study offers a comprehensive enterprise sustainability framework, integrating organisational strategies and practices, technological innovations and infrastructure, and government policies and support mechanisms, providing a valuable tool for future research and practice.

7.5.2 Implications for SMMEs and Stakeholders

a) The findings provide practical insights for SMMEs seeking to navigate the challenges and opportunities of sustainable entrepreneurship in the 4IR. They offer guidance on critical strategies, practices, and resources to enhance competitiveness and sustainability.
b) The study highlights the crucial role of government policies and support mechanisms in fostering sustainable entrepreneurship, providing recommendations for government and stakeholders to enhance access to financial resources, support services, skills development, and innovation.
c) The enterprise sustainability framework offers a practical roadmap for SMMEs, government agencies, and other stakeholders to collaborate and co-create solutions that promote sustainable entrepreneurship in the 4IR.

7.6 LIMITATIONS AND POTENTIAL FOR FUTURE RESEARCH

While this study provides valuable insights into sustainable entrepreneurship in the 4IR, limitations and future research directions must be acknowledged.

7.6.1 Limitations of the Study

a) The research was focused on the eThekwini region of South Africa, limiting its generalizability to other regions and countries. Future research could explore similar themes in different geographical contexts to enrich the understanding of sustainable entrepreneurship in the 4IR.

b) The study employed a qualitative research design, relying primarily on interviews and case studies. Future research could incorporate quantitative approaches, such as surveys and longitudinal studies, to provide more robust evidence and insights.
c) The research focused on SMMEs across various sectors, which may have led to a lack of depth in understanding specific industries' unique challenges and opportunities. Future studies could explore sustainable entrepreneurship in specific sectors, such as manufacturing, agriculture, or services.

7.6.2 Potential Future Research

a) Investigate the role of emerging technologies, such as blockchain, VR, and 3D printing, in promoting sustainable entrepreneurship in the 4IR.
b) Examine the impact of global trends, such as climate change and shifting demographics, on sustainable entrepreneurship and adopting 4IR technologies.
c) Explore the potential of new business models, such as the sharing economy and circular economy, in fostering sustainable entrepreneurship in the context of the 4IR.

7.7 CONCLUDING REMARKS

This study has shed light on the complex interplay of factors influencing sustainable entrepreneurship in the 4IR, particularly among SMMEs in the eThekwini region of South Africa. By identifying the challenges and opportunities these enterprises face and the role of government policies and support mechanisms, the research has provided valuable insights for both theory and practice. The proposed enterprise sustainability framework offers a comprehensive and practical roadmap for SMMEs, government, and stakeholders to collaborate in fostering sustainable entrepreneurship in the rapidly evolving economic landscape of the 4IR. By implementing the framework and adopting the recommended policy measures, SMMEs can navigate the challenges and seize the opportunities presented by the 4IR, ultimately contributing to a more sustainable and prosperous future for all.

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APPENDICES

Appendix A: Letter of Information and Consent

LETTER OF INFORMATION

Title of the Research Study: An Enterprise Sustainability Framework for harnessing sustainable entrepreneurship in the 4th Industrial Revolution.

Principal Investigator/s/researcher: Ismail Sheik

Co-Investigator/s/supervisor/s: Prof Abdulla Kader

Good day

Brief Introduction and Purpose of the Study: I am Ismail Sheik, a PhD in Management Sciences (Business Administration) student at Durban University of Technology in South Africa. I invite you to participate in a research project on an Enterprise Sustainability Framework for harnessing sustainable entrepreneurship in the 4th Industrial Revolution.

Outline of the Procedures:
The study will involve an interview via Zoom/telephonically. The interview will take approximately 30 minutes, and the data collected will be used by myself for analysis and interpretation**.**

Responsibilities of the participant, consultation/interview/survey details, venue details, inclusion/exclusion criteria, explanation of tools and measurement outcomes, any follow-ups, any placebo or no:
The interview is voluntary; you can withdraw even if you have already signed the consent form or if data collection has commenced. There will be no negative consequences even if you ask for your data to be destroyed.

Risks or Discomforts to the Participant:
There is no risk or discomfort in participating in this study.

Benefits:
The study results will benefit the researcher to complete and submit the study for examination purposes. The research study is for academic purposes and may be used in the university library as a published thesis.

Reason/s why the Participant May Be Withdrawn from the Study:
Your participation in the study is voluntary, and you may refuse to participate or withdraw from participation at any time with no adverse consequences.

Remuneration:
There will be no monetary gain from participating in the survey/interview.

Costs of the Study:

There will be no cost expected to be covered by yourself in the study.

Confidentiality:
All individual responses collected from this questionnaire will not be disclosed to anyone. Your reply will be treated as confidential and will not be used for purposes other than those intended for this research. Your name will not appear in the survey; all answers will be coded to ensure anonymity.

Research-related Injury:
There will be no compensation for carrying out the study.
Storage of all electronic and hard copies, including tape recordings: Data will be collected electronically, and all electronic records will be password protected and kept for five years digitally and, after that, deleted permanently.

Persons to contact in the Event of Any Problems or Queries:
Don't hesitate to contact the researcher, Ismail Sheik, at (_____), or my supervisor Prof. Abdulla Kader at (_____). Alternatively, contact the Institutional Research Ethics Administrator on 031 373 2375. Complaints can be reported to the Director: Research and Postgraduate Support, Dr L Linganiso, at 031 373 2577 or researchdirector@dut.ac.za.

CONSENT

Full Title of the Study: An Enterprise Sustainability Framework for harnessing sustainable entrepreneurship in the 4th Industrial Revolution.

Names of Researcher/s: Ismail Sheik

Statement of Agreement to Participate in the Research Study:

- I hereby confirm that the researcher has informed me _____ (name of researcher), about the nature, conduct, benefits and risks of this study - Research Ethics Clearance Number: _____,
- I have also received, read and understood the above- written information (Participant Letter of Information) regarding the study.
- I am aware that the study's results, including personal details regarding my sex, age, date of birth, initials and diagnosis, will be anonymously processed into a study report.
- In view of the requirements of research, I agree that the data collected during this study can be processed in a computerised system by the researcher.
- At any stage, I may withdraw my consent and participation in the study without prejudice.
- I have had sufficient opportunity to ask questions and (of my own free will) declare myself prepared to participate in the study.
- I understand that significant new findings developed during this research which may relate to my participation, will be made available to me.

_____	_____	_____	_____
Full Name of Participant	**Date**	**Time**	**Signature/Right Thumbprint**

I, Ismail Sheik, herewith confirm that the above participant has been fully informed about the nature, conduct and risks of the above study.

Ismail Sheik	21 May 2021	_____
Full Name of Researcher	**Date**	**Signature**
_____	_____	_____
Full Name of Witness (If applicable)	**Date**	**Signature**
_____	_____	_____
Full Name of Legal Guardian (If applicable)	**Date**	**Signature**

Appendix B: IREC Ethical Clearance Approval

Institutional Research Ethics Committee
Research and Postgraduate Support Directorate
2nd Floor, Berwyn Court
Gate 1, Steve Biko Campus
Durban University of Technology

P O Box 1334, Durban, South Africa, 4001

Tel: 031 373 2375
Email: lavishad@dut.ac.za
http://www.dut.ac.za/research/institutional_research_ethics

www.dut.ac.za

24 January 2022

Mr I Sheik
[redacted]

Dear Mr Sheik

An Enterprise Sustainability Framework for harnessing sustainable entrepreneurship in the 4th Industrial Revolution.

I am pleased to inform you that Full Approval has been granted to your proposal.

The Proposal has been allocated the following Ethical Clearance number **IREC 302/21**. Please use this number in all communication with this office.

Approval has been granted for a period of **ONE YEAR**, before the expiry of which you are required to apply for safety monitoring and annual recertification. Please use the Safety Monitoring and Annual Recertification Report form which can be found in the Standard Operating Procedures [SOP's] of the IREC. This form must be submitted to the IREC at least 3 months before the ethics approval for the study expires.

Any adverse events [serious or minor] which occur in connection with this study and/or which may alter its ethical consideration must be reported to the IREC according to the IREC SOP's.

Please note that any deviations from the approved proposal require the approval of the IREC as outlined in the IREC SOP's.

Yours Sincerely
[redacted]
Professor J K Adam
Chairperson: IREC

[redacted]

Appendix C: Editor's Certificate

Hugo Chandler
BA Psychology and Drama (UCT)
Office Hours: Monday to Friday: 08h00 to 17h00 / Weekends and Public Holidays: Closed
20 Oester Street, Struisbaai, Western Cape, 7285
Cell: +27 (0)72 244 4363 / +27 (0)82 807 0134
Email: info@busybeeediting.co.za / Website: www.busybeeediting.co.za

PROOFREADING AND EDITING CERTIFICATE

I Hugo Chandler have completed the proofreading, editing, syntax, consistency in spelling, hyphenation, numerals, fonts and capitalisation, maintaining internal consistency, correcting spelling, grammar punctuation, syntax, altering sentence structure, creating a cohesive flow, ensuring appropriate paraphrasing, ensuring that formatting and layout are correct on Chapters 1 to 7 to the best of my ability on a PhD Thesis, titled: **AN ENTERPRISE SUSTAINABILITY FRAMEWORK FOR HARNESSING SUSTAINABLE ENTREPRENEURSHIP IN THE 4TH INDUSTRIAL REVOLUTION** for **ISMAIL SHEIK**, Student No. 22173845. Submitted in fulfilment of the requirements of the degree of Doctor of Philosophy in Management Sciences Specialising in Business Administration in the Faculty of Management Sciences at the Durban University of Technology.

Hugo Chandler will not be held responsible for any errors, spelling and grammar mistakes, amendments or alterations that were done to this dissertation after it has been received by **ISMAIL SHEIK** or by his supervisor **PROF. A. KADER**. These errors, spelling and grammar mistakes, amendments or alterations are not covered by this proofreading and editing certificate. It is up to **ISMAIL SHEIK** to ultimately decide whether to accept or decline any amendments done by Busy Bee Editing. It remains **ISMAIL SHEIK's** responsibility at all times to confirm the accuracy and originality of the completed dissertation to his supervisor **PROF. A. KADER**.

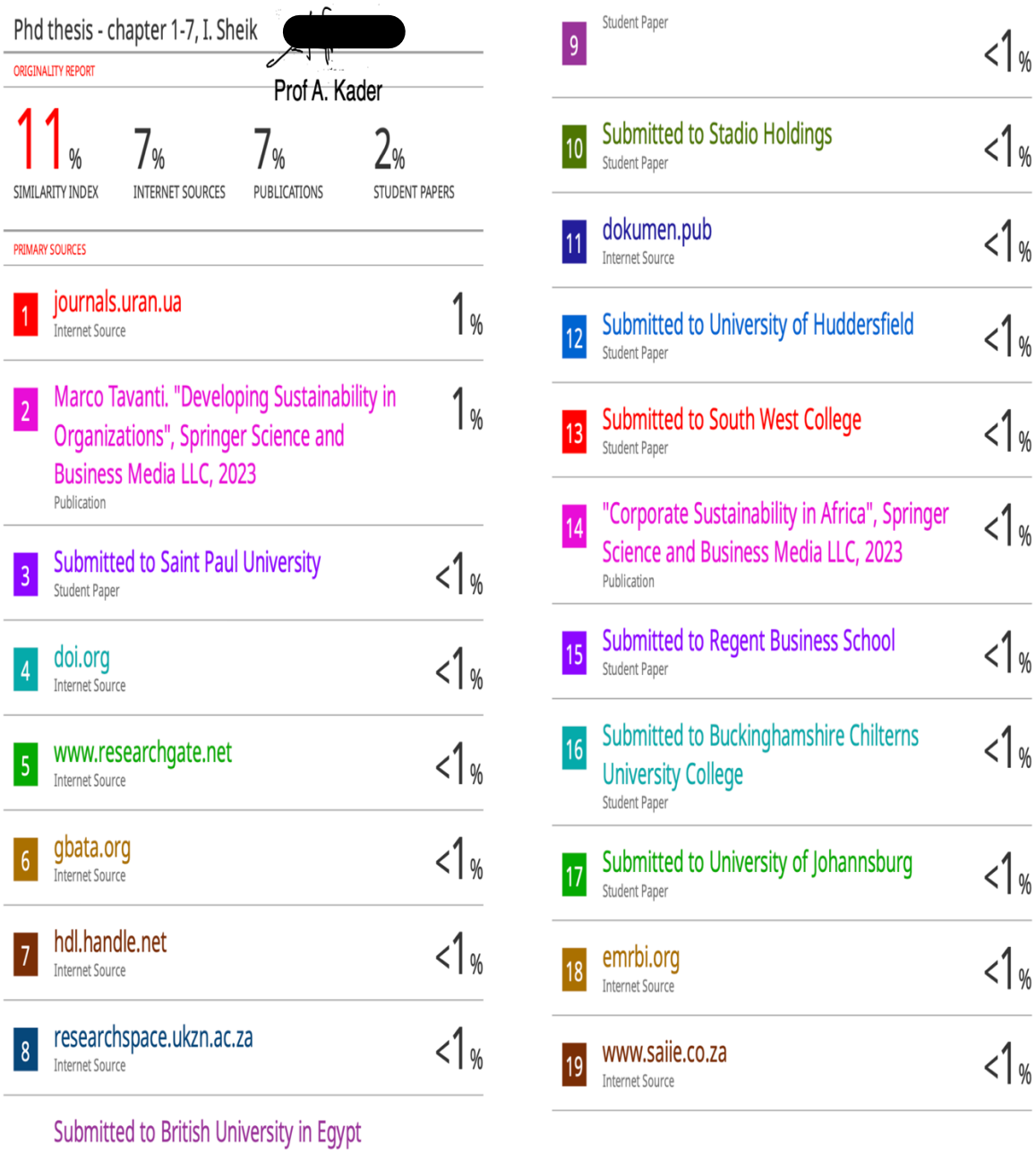
[redacted] BA Psychology and Drama (UCT)

_____

Hugo Chandler

Date: 16 May 2023

Appendix D: Turnitin Similarity Index report



Phd thesis - chapter 1-7, I. Sheik [redacted]

Prof A. Kader

ORIGINALITY REPORT

11%	7%	7%	2%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	journals.uran.ua Internet Source	1%
2	Marco Tavanti. "Developing Sustainability in Organizations", Springer Science and Business Media LLC, 2023 Publication	1%
3	Submitted to Saint Paul University Student Paper	<1%
4	doi.org Internet Source	<1%
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Appendix E: Data Analysis Training Certificate

DUT

DURBAN UNIVERSITY OF TECHNOLOGY

INYUVESI YASETHEKWINI YEZOBUCHWEPHESHE

FACULTY OF MANAGEMENT SCIENCES

Certificate of Attendance

presented to

MR I SHEIK

for participating in

DATA ANALYSIS TRAINING (NIVIVO)

in the Faculty of Management Sciences Postgraduate Research Unit

from the 11 March 2021-25 October 2021.

2022 - 32262A - DUT

[redacted]

Dr E Anwana

Research Co-Ordintor:

Faculty of Management Sciences

[redacted]

Executive Dean: Professor F Netswera

Faculty of Management Sciences

Appendix F: Semi-Structured Interview Schedule

Section A - Demographic Information

1. Which race group do you belong to?

African	
Coloured	
White	
Indian	
Other	

2. What is your gender?

Male	
Female	
Other	

3. What is your age group?

Below 21 years	
21 – 30 years	
31 – 40 years	
41 – 50 years	
51 – 60 years	
61 years and older	

4. How long have you been working or owning this enterprise?

1 year or below	
2 – 5 years	
6 – 10 years	
11 – 15 years	
16 or more years	

5. What is your highest level of education?

Below Matric	
Matric	
Certificate	
Diploma	
Undergraduate degree	
Honours	
Masters	
PhD	

Section B – Interview Questions

1. What internal environmental factors influence sustainable entrepreneurship in the 4th industrial revolution (4IR)?

2. What, in your opinion, are the **external elements that impact** sustainable entrepreneurship in the 4IR?

3. Please describe the current state of Industry 4.0 practices in SMMEs within the eThekwini region of KwaZulu-Natal.

4. What are your opinions on the existing practices connected to Industry 4.0 in SMMEs, and where do you see them headed?

5. What factors contribute to sustainable entrepreneurship's failure in the 4th industrial revolution?

6. What, in your opinion, are some of the reasons that viable business ventures/enterprises have not been successful during the present economic cycle?

7. How would you assess the current state of sustainable entrepreneurship, particularly on SMMEs in the eThekwini region?

8. How supportive are governmental institutions in KwaZulu-Natal towards sustainable entrepreneurship? This can include but is not limited to financial assistance, rebates etc.

9. What strategies can be recommended for SMMEs' towards stimulating their performance and growth in the turbulent digital environments of KwaZulu-Natal?