

- FINAL THESIS -

Enabling leadership of and innovation in South African mining companies: pursuing environmental, social, governance principles and the 2030 SDGs

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ABSTRACT

ENABLING LEADERSHIP OF AND INNOVATION IN SOUTH AFRICAN MINING COMPANIES: PURSUING ENVIRONMENTAL, SOCIAL, GOVERNANCE PRINCIPLES AND THE 2030 SDGS

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In this thesis, titled '*Enabling leadership of and innovation in South African mining companies: pursuing environmental, social, governance principles and the 2030 SDGs*', the candidate explored how leadership practices and processes foster an environment conducive to innovation, aligning with the SDGs and ESG principles.

As a result, the researcher provides descriptive evidence and case studies that demonstrate perspectives of senior leaders in the mining sector concerning the SDGs and ESG, innovation and enabling leadership practices in the South African mining sector. Furthermore, this is examined in conjunction with relevant leadership literature, specifically the Complexity Leadership Theory and Ambidexterity Leadership Theory, which serve as the study's conceptual framework.

The data was collected using semi-structured interviews as well as desktop research. Thirty-one senior mining leaders involved in innovation, the SDGs and ESG was purposefully selected and interviewed for this study. By drawing on Complexity Leadership Theory and Ambidexterity Leadership Theory as theoretical

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underpinnings, the researcher identified codes and themes that align with these theories.

The study found four overarching findings with a number of sub-themes. The four findings revealed that mining leaders' views and their understanding of SDGs and ESG in the mining sector are not homogenous; innovation positively impact sustainability in the mining sector; high levels of ambidextrous leadership practices enable innovation in the mining sector and lastly, that there are leadership behaviours and practices which should be strengthened in the mining sector. The research improves our understanding of how leadership is enabled to foster innovation towards the fulfilment of the SDGs and ESG principles.

KEY WORDS

Leadership, The South African mining sector, Innovation, Complexity Leadership Theory, Ambidexterity Leadership Theory, SDG and ESG

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LIST OF ABBREVIATIONS AND ACRONYMS

AIDS	Acquired Immunodeficiency Syndrome
ANC	African National Congress
B-BBEE	Broad-based Black Economic Empowerment
BBC	British Broadcasting Corporation
BEE	Black Economic Empowerment
CEO/s	Chief Executive Officer/s
CFO	Chief Financial Officer
COO	Chief Operations Officer
COVID-19	Coronavirus disease
CSIR	Council for Scientific Industrial Research
CSR	Corporate Social Responsibility
CTO	Chief Technical Officer
DMR	Department of Mineral Resources
EBITDA	Earnings Before Interest, Taxes, Depreciation and Amortisation
ESG	Environmental, Social and Governance
EU	European Union
GCIS	Government Communication and Information Services
GHG	Greenhouse gas/gases
GPD	Gross Domestic Product
GRI	Global Reporting Initiative
GSIA	Global Sustainable Investment Alliance
HIV	Human Immunodeficiency Virus
ICMM	International Council on Minerals and Metals
IIED	International; Institute for Environment and Development
ILO	International Labour Organisation
IR	Integrated Reporting
JSE	Johannesburg Stock Exchange
KLM	Royal Dutch Airlines (Koninklijke Luchtvaart Maatschappij N.V.)
MDGs	Millennium Development Goals

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MPRDA	The Minerals and Petroleum Resources Development Act, No. 28 of 2002
NGO/s	Non-governmental Organisation/s
NYSE	New York Stock Exchange
PGM	Platinum Group Metals
PwC	PricewaterhouseCoopers
R&D	Research and Development
SDG/s	Sustainable Development Goal/s
SLP	Social and Labour Plans
Stats SA	Statistics South Africa
TCFD	Task Force on Climate-related Financial Disclosures
TSE	Toronto Stock Exchange
UN	United Nations
UNCED	United Nations Conference on Environment and Development
UNEP	United Nations Environment Programme
UNGC	United Nations Global Compact
US	United States
USA	United States of America
WCED	World Commission on Environment and Development

CHAPTER 1

1. INTRODUCTION AND OVERVIEW

1.1 INTRODUCTION TO THE STUDY

In 2016, John Chambers, Executive Chairman of Cisco at the time made a statement that is very relevant to this study (Uhl-Bien & Arena, 2017):

As leaders, if you don't transform...if you don't reinvent yourself, change your organisational structure; if you don't talk about speed of innovation-you're going to get disrupted. And it will be a brutal disruption, where the majority of companies will not exist in a meaningful way 10 to 15 years from now.

This statement offers a valuable starting point for understanding the necessity and significance of leadership to advocate for flexibility and creativity. Globally, business leaders are challenged to innovate and transform businesses to remain competitive and to contribute to a more sustainable environment.

International organisations and nations have put forth Sustainable Development Goals (SDG) and Environmental, Social and Governance (ESG) action plans to tackle the growing and pressing sustainability issues in the environment, society and financial markets. These initiatives aim to create a sustainable and all-encompassing development framework for human society (Li, Wang, Sueyoshi, & Wang, 2021: p1) in response to the escalating challenges. Both concepts are essential to comprehend the advancement and influence of the sustainable development discussion and actions within the business environment. Therefore, in order to appreciate and make sense of what is required from businesses and business leaders, this study appreciates the literature concerning both SDGs and ESG principles and practices.

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Companies across the globe have been urged to embrace ESG principles and collaborate with the United Nations (UN) to achieve the ambitious 17 SDGs by 2030. Mining companies, being recognised for their significant social impact and environmental footprint, are considered crucial in the attainment of SDGs. It is thus not surprising that one of the most debated issues within the mining sector is the performance of mining companies in respect of ESG.

However, beyond merely acknowledging SDGs and ESG principles and frameworks, there is a need for mining companies to effect innovation in seeking alignment to it as well as evidence of the impact of their operations. Researchers have argued that leadership plays a critical role in enabling such transformation.

There remains scant literature on the critical role of leadership in enabling companies to deliver on SDGs and ESG. Moreover, leading for sustainability during the era of smart technology, as brought on by Industry 4.0 and with Industry 5.0 in the making, presents a unique set of opportunities and challenges. In exploring this research gap, as well as the opportunities and challenges, this study looked at evidence-based leadership behaviour, practices and processes within the mining sector that enabled the successful innovation to align business operations with the SDGs and ESG principles. This research gap provided the opportunity to explore how leaders impact processes that enable adaptive spaces for innovation.

This study drew upon several leadership theories to explore the value of leadership whilst probing various leadership styles to assert important deductions. More specifically, the phenomena explored, drew on theories such as Complexity Leadership Theory and Ambidextrous Leadership Theory as a guide for creating a strategic theoretical framework for this study. In addition, the study also focussed on entrenched taxonomies of leadership methods (De Rue et al., 2011, Borgmann et al., 2016 & Yukl et al., 2016), in particular three controlled leadership styles such as Transformational Leadership, Transactional Leadership and Strategic Leadership. Drawing on these different theories allowed the researcher to deal with complexity evolving from introducing the SDGs and ESG principles and stimulating

innovation for its attainment as well as the opportunity to make meaningful deductions.

The study focussed on multiple units of analysis both at an individual business leader level and at a corporate organisational level. The qualitative study employed semi-structured interviews which was conducted with business leaders, who have a role in driving SDGs, ESG and innovation strategies in the company along with followers who are responsible for implementation thereof. These interviews were conducted with mining companies in South Africa and the thematic data analysis approach was applied. The findings in this research illuminated the strength, gaps and prospects of enabling leadership practices and innovation in the mining sector towards the attainment of SDGs and ESG.

In this chapter the researcher sets the scene by discussing the background and research rationale, the research problem, the aims and objectives, demarcates the study by outlining the boundaries, scope, assumptions and outlines the chapters in this thesis.

1.2 BACKGROUND AND RESEARCH RATIONALE FOR STUDY

Literature affirms leadership as a catalyst for business success (Yahaya & Ebrahim, 2016). However, with the increase in unprecedented challenges, there are calls for innovative leadership to successfully navigate the business processes for change (Edward & Mbohwa, 2013:125-130). An evolutionary approach to leadership is required to deal with the enormity and complexity of the challenges the world faces today (Edward & Mbohwa, 2013:125-130). Leadership is required to deal with the intractable nature of sustainability and to inspire innovation and the use of smart technology for change. Scholars García-Morales, Matías-Reche and Hurtado-Torres (2008) assert that leadership style is considered a key feature that induces the connection between innovation and organisational performance, as leaders are the people who have the power to define objectives and inspire innovation by their followers.

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Despite the importance of leadership in contemporary debates, there is no singular agreed upon definition of leadership. Many schools of thought and theories have prevailed over several decades with some trying to differentiate leaders from non-leaders; some demystifying the opinion that leadership is inherent and cannot be learnt; and others differentiating between leadership and management.

Burns (1978) highlights that although leadership is observed in many aspects of daily life, it remains the least understood. Much has been written about leadership (Bryman, 2011; Landis, Hill & Harvey, 2014, Van Seters & Field, 1990; Wilson, 2013) ranging from the different leadership paradigms and accounts on the historical overview of leadership studies which will be further discussed in Chapter 2. As per Spoelstra's (2013) argument, the study of leadership poses a challenge because "it is not an objective phenomenon: we cannot physically grasp leadership and objectively dissect or measure it" (de Klerk, 2019). However, we all know that it exists and that it is needed even more so, as increasing uncertainty and complexity is at the core of leadership in the twenty-first century.

Literature abounds with studies which focus on leadership from the perspective of a designated leader as an individual (Dinh *et al.*, 2014; Morgeson, De Rue & Karam, 2010). However, there are growing calls for a shift that moves beyond the old style of leadership, which thrived in stable environments (Elkington & Booyesen; Bäcklander 2019). In addition, scholars such as Schulze and Pinkow (2020) argue that the concept of enabling leadership, which allows innovation, has largely remained at a conceptual level and fails to offer detailed descriptions of how enabling leadership and adaptive spaces are practically created.

This study aims to heed the call to shift leadership perspectives by moving beyond the "traditional, hierarchical views of leadership" and leadership at a purely conceptual level by offering an important empirical contribution to the leadership discourse. The "traditional, hierarchical views of leadership" is becoming less effective, given the complex nature of the challenges of the twenty-first century. Therefore, this study seeks to explore fresh perspectives that account for adaptive practices (Lichtenstein, Uhl-Bien, Marion, Seers, Orton & Schreiber, 2006:2). A

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further research gap pertains to enabling leadership practices that supports sustainable development as innovative ways are critical for addressing the SDGs and ESG principles.

Thus, given the greater need for adaptability and innovation in organisations that requires a different approach to problem solving, governance and addressing worldwide challenges (Niestroy *et al.*, 2019:12), this study uses Complexity Leadership Theory and Ambidexterity Leadership Theory as the conceptual frameworks to understand and navigate leadership. Complexity Leadership Theory transcends the traditional views of leadership.

A core proposition shifts the focus from an individual leader to that of a systems perspective without reducing the significance of “leadership as an organizational phenomenon” (Lichtenstein, Uhl-Bien, Marion, Seers, Orton & Schreiber, 2006). Influenced by complexity science, the Complexity Leadership Theory provides a unique framework within which to conduct leadership research anchored in complex adaptive systems (Lichtenstein, Uhl-Bien, Marion, Seers, Orton & Schreiber, 2006). Companies seeking to innovate and transform business models to align with SDGs and ESG principles can be viewed as complex adaptive systems.

The Complexity Leadership Framework comprises three distinct components: Administrative Leadership, Adaptive Leadership and Enabling Leadership (Mäkinen, 2018). Enabling Leadership manifests in the context of balancing Administrative and Adaptive Leadership (Uhl-Bien & Marion, 2009). It considers leadership approaches to creating environments that are ideal for “problem-solving, adaptability, and new learning” (Mäkinen, 2018). Enabling Leadership transpires across hierarchical levels and includes the ability to ease the “tension between exploration and exploitation” (Schulze & Pinkow, 2020). This tension between exploration and exploitation is known to create favourable conditions for innovation therefore this study also draws on Ambidexterity Leadership Theory as a basis to understand how to lead organisations for adaptability and innovation.

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Ambidexterity underscores an organisation's capacity to simultaneously balance between exploitation of present organisational abilities and exploration of future prospects (Rosing, Frese & Bausch, 2011). Ambidextrous leadership for innovation involves "opening leadership behaviour to encourage explorative behaviour, closing leadership behaviour to encourage exploitative behaviour" (Rosing, Frese & Bausch, 2011). Thus, an ambidextrous leader would be able to foster an environment where their "followers attempt to be ambidextrous" themselves (Rosing *et al.*, 2011:957). Given the nature and complexity of an organisation pursuing innovation and transformational change, Complexity Leadership Theory and Ambidextrous Leadership Theory are complementary as both offer a suitable research lens to make sense of how companies and leaders navigate the nuances induced by change and innovation. These theories assist with understanding leadership practices at a company level that creates a climate for enabling leadership at an individual level, who in turn practise opening and closing behaviours to switch between exploitation and exploration.

In the present day, "complexity is occurring on multiple levels and across sectors and contexts" (Uhl-Bien & Arena, 2017) thus creating the urgency for leadership to play a role in helping organisations "pivot in real time with the changing needs of the environment" (Uhl-Bien & Arena, 2017). For businesses, the urgency for real change is increasingly driven by serious global problems for example climate change (outlined in the SDGs and ESG principles), which poses a serious threat to the well-being of humans and the environment (Cöp, Olorunsola & Alola, 2020:2). Therefore, an increase in environmentally friendly systems has become a key driver for "innovation, cost reduction, and revenues increment" (Dangelico, 2015). The influence of green practices has impacted how industries are formulating strategies to thus reduce their negative impact on the environment (Vandenbrande, 2019). These strategies consider methods to "reduce waste, conserve energy, foster healthy environmental practices, and so forth" (Cöp, Olorunsola & Alola, 2020:2).

Initially, sustainability was grudgingly considered as an additional charge to operations. However, this view has shifted to sustainability strategies being viewed by business leaders as a way to drive value (Cöp, Olorunsola & Alola, 2020:2) and

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innovation (Van Holt *et al.*, 2020). Moreover, scholars have argued that organisations should use intangible resources to deal with the complexity that comes with environmental sustainability challenges, in doing so, embracing methods that meet diverse stakeholder pressures (Singh, Del Giudice, Chierici, & Graziano, 2020). Research affirms that “organizational culture (Brettel *et al.*, 2015), psychological traits of workers (Palmer, Niemand, Stöckmann, Kraus, & Kailer, 2019), and the organisational capacity (Morrow & Mowatt, 2020)” are critical components influencing business strategy and business performance (Cöp, Olorunsola & Alola, 2020). Therefore, a vital question for business will be, ‘what kind of leadership practices will be required to adapt business strategies for sustainable innovation?’

Therefore, the achievement of the Sustainable Development agenda is dependent on the active involvement and contributions of the private sector. Without their engagement, the success of this agenda would be unattainable (Pederesen, 2018:22). Business leaders should anticipate a rise of attention from stakeholders, such as employees, customers and investors with respect to addressing SDGs (PwC, 2019:4). According to the PwC’s Global Sustainability & Climate Change Leader, Malcolm Preston, “once CEOs and senior leadership are on board, momentum builds quickly in tandem with the opportunity to drive real change” (PwC, 2019:4).

Eight years into the SDGs, together with unprecedented global challenges and opportunities for innovative responses to the challenges, the question remains to what extent are company leaders enabling swift innovation which intentionally and purposefully disrupts business operations to address these challenges and adapt to the SDGs and ESG principles. This is especially important as business leaders must balance the decisions based on short-term needs, demand and crises versus long-term sustainable choices. Business leaders might either see these complexities as catalysts for change or adaptation to the opportunities; or, see it as an irritation causing them to rush to revert to hierarchical bureaucratic structures and processes to create order.

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In this study, the researcher focused on the South African mining sector. South Africa boasts rich mineral reserves of precious metals and minerals, energy minerals, non-ferrous metals, ferrous minerals and industrial minerals (Brand SA, 2018). The South African mining sector makes a significant contribution to the global output of minerals such as diamonds, gold, coal iron ore vanadium and titanium (Cole & Broadhurst, 2021). Moreover, South Africa is the largest global producer of “Platinum Group Metals (PGMs) (48%), chrome (44%) and manganese ore (31%)” (Cole & Broadhurst, 2021). The Mining sector is among South Africa’s most significant economic contributors to gross domestic product (GDP) (Cole & Broadhurst, 2021).

The Mining Sector has not escaped the scrutiny in respect of sustainability practices. Although there has been an increase in sustainability initiatives since the launch of the Mining and Metals for Sustainable Development project in the late 1990s, the SDGs have presented mining companies with an ideal opportunity to reassess its impact and to embrace a broader approach to Sustainable Development (Sturman *et al.*, 2018). In addition, the SDGs also create a potential pathway for companies to initiate and strengthen trust with surrounding communities and advance their process for attaining their ‘social licence to operate’ (Fraser, 2019).

The mining sector has the ability to “contribute to achieving the SDGs by providing raw materials for technological progress, economic growth and human development (Vidal *et al.*, 2013; Elshkaki *et al.*, 2016), royalties and taxes (which in turn support national government efforts), employment, infrastructure and corporate social investment, and also by operating sustainably (avoiding negative social, environmental and governance impacts)” (Sturman *et al.*, 2018). In particular, this sector can have a substantial impact, negative or positive, on the strengths of the ecosystems supporting local economic and social development (Cole & Broadhurst, 2021).

Mining companies are well placed to drive sustainability practices, especially since many of the big mining companies declared their support for the SDGs and ESG principles. This support requires a shift away from simple “SDG mapping to

embedding the SDGs in business strategy” (Chicksen *et al.*, 2018). Whilst the SDGs and ESG principles provide a promising framework for mining companies to analyse broader sustainability challenges and opportunities, it will require enabling leadership and innovation to transform business operations and outcomes.

This gap in research presents an opportunity to investigate the influence of leaders on the mechanisms that foster adaptive environments for innovation, with the ultimate aim of advancing progress towards the 2030 SDGs and associated ESG principles. By delving into this research gap, along with its opportunities and challenges, this study examined evidence-based leadership behaviours, practices and processes within the mining sector of South Africa. The focus was on how these factors facilitate effective innovation, specifically aimed at addressing the SDGs and ESG principles in mining operations.

The study aimed to make two specific contributions to theory and practice to the Business Management discipline. Firstly, this study enhances contemporary leadership debates by exploring leadership practices and process that fosters innovation to advance the SDGs and ESG. By drawing on Complexity Leadership Theory and Ambidextrous Leadership Theory, the study contributed to the leadership discourse by providing valuable empirical research by contextualising leadership adaptability and innovation when implementing the 2030 SDGs and ESG principles. Secondly, it also adds to the advancement of knowledge amongst business leaders through narrowing the gap between theoretical and practical understanding of the SDGs and ESG principles, within mining companies in South Africa.

1.3 RESEARCH PROBLEM

Despite multiple studies focusing on the development of Integrated Reporting with indicators and measurements for the SDGs (Gusmão Caiado *et al.* 2018), there is a dearth of empirical corroboration of critical leadership examples, illustrating how to lead organisations for adaptability (Uhl-Bien & Arena 2018). For example, evidence of leadership practices and processes that enable and address complexities in business operations to successfully adapt and align with the SDGs and ESG principles. Kørnø, Lyhne and Davila (2020) revealed that there is very little clarity

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on leadership as an enabling factor in the alignment of the SDGs into business operations. Leaders require insight with respect to exploring and exploiting opportunities for innovation towards the delivery of the SDGs and ESG principles.

Many researchers have linked leadership as an important predictor of innovation (Mumford, Scott, Gaddis & Strange 2002) and highlight the important relationship to organisational development (Nemanich & Vera 2009). However, the concept of enabling leadership which allows innovation, has largely remained at a conceptual level and fails to offer detailed descriptions of how enabling leadership and adaptive spaces are practically created (Schulze & Pinkow 2020). In addition, there have been calls for “leadership in innovation contexts” to consider the “complexity of the innovative process” including complexities such as “leadership behaviors, creativity and innovation and fluctuations of situational requirements” (Rosing, Frese & Bausch 2011). Thus, agile corporate innovation practices remain an under-researched area (Bäcklander 2018; Havermans, Den Hartog, Keegan & Uhl-Bien 2015; Rapp, Gilson, Mathieu & Ruddy 2016).

In terms of the SDGs and ESG principles, best practices could serve as an antidote for scholars who ask whether “companies actually make a contribution to solving SDG challenges” (van der Waal, Thijssens & Maas 2021). The Complexity Leadership Theory and Ambidexterity Leadership Theory offer a theoretical framework which could assist in providing solutions for the complex innovation and implementation process of the SDGs and ESG principles. There is a need for research to delve into organisational processes and leadership approaches within a complexity paradigm, which influence a company's capacity to align with SDGs and ESG through innovative means.

1.4 RESEARCH AIMS AND OBJECTIVES

This research is grounded on the premise that business leaders are increasingly confronted with complexity and pressure from various stakeholders to deliver sustainable-effective strategies. Hence, acknowledging the necessity of leadership and innovation in tackling the sustainability challenges outlined in the SDGs and

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ESG principles, it becomes crucial to integrate them into the operational plans of businesses.

Examining critical elements pertaining to leadership, innovation, the SDGs and ESG principles provides an opportunity to explore whether there is uniformity in approaches towards the SDGs and ESG principles among companies within the mining sector. This research lens focuses on business leaders and their practices in relation to the SDGs and ESG principles.

Research Aim

The aim of this research is to explore leadership processes and practices that enable innovation towards alignment with the SDGs and ESG principles in the mining sector.

The research objectives for this study are outlined in the Table 2 below;

Table 1 : Research Objectives of the Study

PRIMARY RESEARCH OBJECTIVE		
To explore key aspects such as leadership, innovation, the SDGs and ESG principles with respect to the mining sector in South Africa.		
SECONDARY OBJECTIVE 1	RESEARCH	To determine the aspects of leadership processes and practices that enable innovation towards the fulfilment of the SDGs and ESG principles.
SECONDARY OBJECTIVE 2	RESEARCH	To explore the perceptions of business leaders in the mining companies about creating an enabling environment for innovation, the SDGs and ESG principles.
SECONDARY OBJECTIVE 3	RESEARCH	To explore the relationship between enabling leadership, innovation, the SDGs, ESG principles and related challenges.
SECONDARY OBJECTIVE 4	RESEARCH	To propose recommendations which could provide insights to serve as enabling leadership guidelines for an innovation ecosystem towards the attainment of the SDGs and ESG principles in the mining sector.

Source: Compiled by the author

The significance of these research objectives is premised on the understanding that enabling leadership is central to solving complex challenges as outlined in the SDGs and ESG principles. To fulfil these research objectives, a series of case studies were

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undertaken, utilising data obtained from 11 South African mining companies that participated in the study.

1.5 RESEARCH QUESTIONS

The main question of this research study is ‘**How do business leaders practice enabling leadership for innovation and adaptation to the 2030 Sustainable Development Goals (SDGs) and Environmental, Social and Governance (ESG) principles?**’ The main research question is supported by a number of sub-questions as reflected in Table 2.

Table 2: Research Questions

How do business leaders practice enabling leadership for innovation and adaptation to the 2030 Sustainable Development Goals (SDGs) and Environmental, Social and Governance (ESG) principles?’	
SUB-QUESTIONS	OUTCOMES
1. How has leadership evolved and what leadership behaviour and practices are required in the 21 st century?	Provide a historical overview of leadership theories and propose a relevant leadership framework for the study.
2. How has the SDGs and ESG principles evolved to its present form?	Provide a historical overview of the SDGs and ESG principles.
3. How are SDGs and ESG principles aligned and operationalised in the South African mining sector?	Provide a review of the SDGs and ESG in the South African mining sector.
4. How do mining companies conduct innovation to address the SDGs and ESG principles?	Provide case studies of innovation in mining companies that are intended to solve challenges highlighted in the SDGs and ESG frameworks.
5. How do business leaders shape the SDG and ESG strategies?	Provide an analysis of enabling leadership practices and processes which shape the SDGs and ESG in mining companies.

Source: Compiled by the author

Resulting from this research, an empirically proven understanding of business leaders’ practices and processes that enabled innovation and adaptation to the SDGs and ESG principles emerged. From a theoretical perspective, this research enhanced understanding and the knowledge on the interconnections among leadership, innovation, SDGs and ESG principles. It specifically focused on examining the existing comprehension and implementation of these concepts by business leaders within South African mining companies.

1.6 CONCEPTUAL FRAMEWORK

The complexity of this research question is most effectively demonstrated through a visual representation and a concise overview of its various constituent parts.

FRAMEWORK FOR RESEARCH

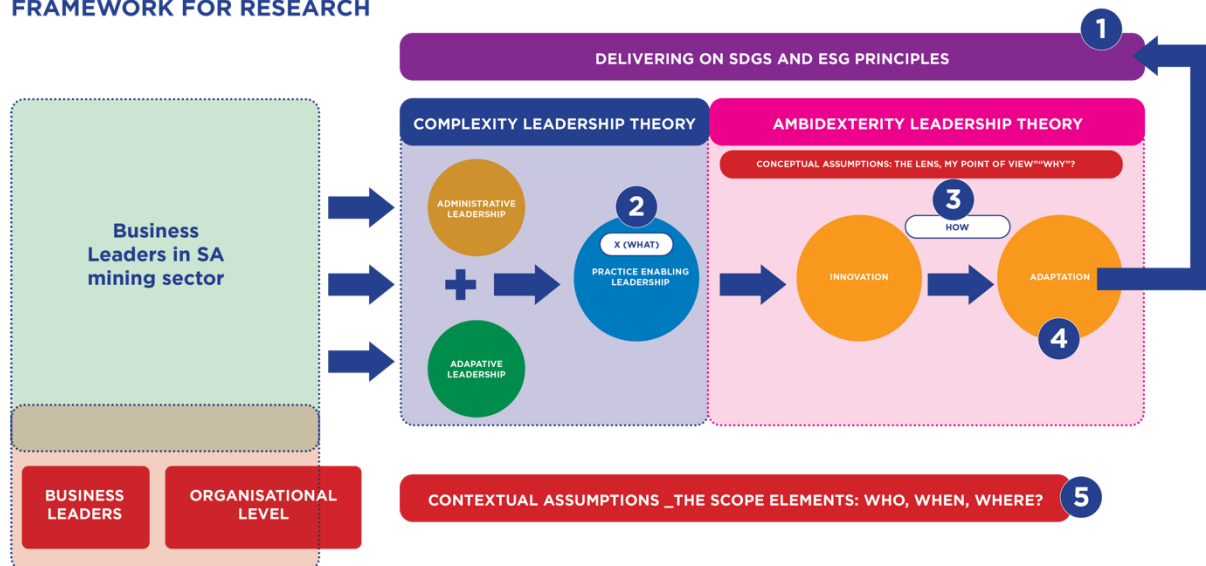


Figure 1: Visual Summary: Framework for Research

Source: Compiled by the author

The research question gave rise to the conceptualisation of the research phenomena, depicted in Figure 1, where all elements of the phenomenon are interconnected in a dynamic manner.

1. The researcher's objective is to comprehend the historical and current debates around the SDGs and ESG, considering them as significant business imperatives. This exploration of the literature aims to establish connections and contribute to the ongoing discourse in this field.
2. Utilising Complexity and Ambidexterity Leadership theories as a framework, the researcher examines how leaders implement enabling leadership practices.
3. Drawing from the findings, the researcher formulates recommendations for leadership practices that facilitate adaptation to the SDGs and ESG principles.

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4. This research introduces a unique paradigm, using Complexity Leadership and Ambidexterity Leadership Theory, to establish meaningful associations between leadership, the SDGs, ESG and innovation.
5. The research is specifically applied to senior leaders in the South African mining sector, considering the rapid growth and significance of the SDGs and ESG principles during this period.

1.7 PROJECT SCOPE

This study focused on the socially and environmentally sensitive mining sector. In particular, the South African mining sector and its business leaders who produce a wide range of commodities including platinum, iron ore, gold and coal. The lack of empirical research into leadership and the SDGs and ESG principles specifically in the mining sector has been considered.

1.8 SIGNIFICANCE OF RESEARCH

This research is significant because it will potentially help business leaders better understand how to enact enabling leadership which is central to solving complex challenges. In doing so providing, insights of enabling leadership and successful innovation in mining companies which is aligned to the SDGs and ESG principles.

Past researchers have paid much less attention to empirical research revealing “how to lead organisations for adaptability” (Uhl-Bien & Arena, 2017:1). As a result, a limited number of studies that explain the leadership role and practices that navigate the complexity of companies when it comes to enabling innovation and adaptation which contribute to the SDGs and ESG principles. This research may thus prove important in five respects:

- It conducted an in-depth literature review on leadership, innovation and the SDGs and ESG principles with respect to the mining sector in South Africa.
- It investigated and described the elements of leadership which enable successful innovation towards the fulfilment of the SDGs and ESG principles.
- It contributed to the leadership literature in three specific ways. Firstly, by paying attention to how leaders influence processes underlying the

emergence of outcomes such as organisational adaptiveness and innovation as called by Dinh *et al.*, (2014) and Uhl Bien and Arena (2018). Secondly, by contributing to Complexity Leadership Theory and Ambidexterity Leadership Theory by providing an empirical account of how enabling leadership can be practiced.

- Finally, this study contributed to the existing body of literature on the SDGs and ESG principles.

1.9 LIMITATIONS OF THE STUDY

This research study confines itself to interviews with senior business leaders in the mining sector in South Africa. It does not include any political leaders or government officials from relevant national government departments or local government. However, it does not preclude from the importance of government's role through appropriate regulation in national targets and obligations for a viable mining industry which meets the international concerns on how to integrate SDG and ESG issues with leadership styles.

The purpose of the study was to explore the experiences of the senior leaders in the South African based mining companies in order to gather an empirically and qualitative account of the leadership practices and processes that enables successful innovation to address the SDGs and ESG principles in mining operations.

As a qualitative research study grounded in an interpretivist theoretical perspective, this research operates on the assumption that reality is shaped by the interpretations of the diverse participants (Simon, 2011). Consequently, the examination of leadership practices and processes is analysed through the perspectives provided by the respondents. The methodological decisions made in this study are justified by the study's objectives as elaborated in Chapter 5 and should not be interpreted as leading to generalisable findings. However, the transferability of the findings to similar contexts is supported (Matshoba-Ramuedzisi, 2021).

1.10 OUTLINE OF THE THESIS

The study consists of the following chapters:

Chapter 1: Introduction to the Study

Chapter 1 provides an introduction and contextual background to the study. It outlines the research problem and discusses research questions. In addition, this chapter highlights the significance and value of this study.

Chapter 2: Leadership Literature Review

This chapter provides an examination of significant leadership debates and theories relevant to this study. After introducing various leadership debates and theories, it presents the Complexity Leadership Theory and Ambidextrous Leadership Theory as the framework for this research. The last section of the chapter explores the connection between business leaders and innovation in the context of achieving the SDGs and ESG principles within South African mining companies.

Chapter 3: Sustainable Development Goals and Environmental, Social and Governance principles

This chapter provides a comprehensive overview of pertinent literature crucial to the study, namely, the SDGs and ESG principles. It commences with a historical review of the SDGs and traces the evolution of Sustainable Development, delving into the philosophical underpinnings of the concept and highlighting contemporary advancements in sustainability while addressing the implementation of the SDGs.

Subsequently, the chapter offers an introduction to ESG, establishing connections between SDGs and ESG, and discussing their significance both globally and within the South African mining sector. Moreover, the chapter concludes by examining literature on sustainability practices and principles in business, exploring innovation and opportunities utilising the SDGs and ESG in business contexts, and investigating how leadership can drive progress in achieving SDGs and ESG objectives.

Chapter 4: The South African Mining Sector

Chapter 4 offers a concise summary of the South African mining sector, emphasising its significance to the economy. It delves into the challenges confronted by the sector concerning ESG principles. Furthermore, the chapter establishes connections between innovation, leadership and the mining industry, recognising their crucial roles in effectively aligning with SDGs and ESG principles.

Chapter 5: Research design and methodology of the study

Chapter 5 outlines the research design and methodology. The research questions are discussed. In addition, the credibility and trustworthiness of the research study is elaborated upon, while the interview framework which is utilised as a data collection tool is highlighted. Lastly, this chapter discussed the data processing and analysis while explaining the research techniques employed in this study.

Chapter 6: Data Analysis, Research findings and Interpretation

This chapter provides an extensive examination of the results on the demographics of the mining companies and respective leaders participating in the study. It subsequently moves on to the data analysis phase, where key findings derived from the collected data are presented. By utilising important themes and case studies, the chapter thoroughly discusses the findings and establishes connections with the existing literature. Finally, the chapter concludes by offering a succinct summary of the primary findings and an interpretation of the data.

Chapter 7: Discussion and Interpretation

Chapter 7 outlines the research findings which is analysed and interpreted. This analysis is grounded in both the Complexity Leadership Theory and the Ambidexterity Leadership Theory. In addition, this chapter addresses the Secondary Research Objectives. The discussion delved into to each of the secondary research objectives.

Chapter 8: Conclusions and recommendations

Chapter 8 outlines the conclusions and recommendations of the study, while summarising its key findings. Lastly, this chapter revisits the key research question

while discussing the limitations of the study, highlighting the contribution of the study and concluding with recommendations for future studies.

1.11 CHAPTER SUMMARY

The purpose of this chapter was to provide an overview of the background to the study and research rationale. It also addressed the research questions, aims and objectives of the study. Furthermore, the chapter outlined the scope and importance of the research, while outlining the structure of the thesis by delineating the subsequent chapters. The following chapter discusses the leadership literature and provides an overview of the theoretical framework for this research study.

CHAPTER 2

2. LEADERSHIP LITERATURE REVIEW

2.1 INTRODUCTION

This chapter explores leadership literature, which together with literature on innovation and the SDGs, serves as an important foundation for this research study. As discussed in the previous chapter, the purpose of this research study is to explore how leadership practices and processes create an enabling environment in support of innovation towards the alignment with the SDGs and ESG principles. The study assumes that leaders are important decision makers who have significant influence and power to shape a company's strategy and operations. This study thus explores leadership practices in mining companies with substantial operations in South Africa and registered in terms of the South African Companies Act, No. 71 of 2008.

It is further assumed that these leading decision makers are key to solving critical challenges through encouraging innovation which could change the future of mining in South Africa specifically; as well as mining on the continent and globally, more broadly. Daily, senior leaders in the mining sector are confronted with a complex challenge. Simultaneously, these leaders have to balance difficult decision making. The intricate balancing act involves making decisions ranging between short-term gains versus long-term sustainability within complex environments.

The complexities business leaders are confronted with, present both a need and an opportunity to review the importance of leadership and its link to innovation to address the SDGs. Hence, this research study explores how senior leaders manage sustainability as part of their company's business strategy and operations.

The most relevant leadership literature is highlighted in this chapter as well as various definitions of leadership and an overview of the discourse on leadership. The chapter concludes with the implications of different theoretical approaches to the implementation of SDGs and ESG and aspires to provide a contextual analysis of leadership theories and innovation which could assist in developing recommendations for mining leaders for enabling innovation that supports SDGs and ESG principles. As scholars (Bennis, Warren, 2007) warn, this “subject is vast, amorphous, slippery, and, above all, desperately important.”

2.2 BACKGROUND

Leadership is viewed as a critical societal phenomenon and can be traced back to earlier theories such as the Great Man Theory and Trait Theory which emerged in the 20th century. With the passage of time, the scholarship on leadership has evolved and expanded with researchers investing substantial effort in understanding and developing different leadership theories and perspectives on leadership styles (Nawaz and Khan, 2016). It is not surprising that there are more than two hundred leadership theories and ideas with many scholars seeking to define this concept (McCleskey, 2014: 117-130). Burns (1978) asserts that leadership is one of the most witnessed phenomena in all facets of life, but remains the least understood.

Earlier theories such as Great Man Theory and Trait Theory placed significant emphasis on the “on the qualities that distinguish leaders from followers, later theories looked at other variables including situational factors and skill levels.” (Vasilescu, 2019: 47-52). As the leadership paradigm evolved, greater attention was given to the different contexts, working environments, regulations, organisational complexities which impact on leadership and the fluidity of organisational dynamics (Amabile *et al.*, 2004). This gave rise to theories such as the Behaviourist Theory, Situational Leadership Theory and Contingency Theory which shifted the focus to “what leaders do versus what traits they have” (Kostopoulos *et al.*, 2011). A further expansion of leadership theories included the Transformational Theory and Transactional Theory which explored the relationship

between the leader and followers which will be discussed in further detail in this chapter.

Building on the various theories, contemporary scholarship “seeks to understand the skills, characteristics, traits and situations in which leadership can effectively exist to lead and inspire an organization” (Green, 2014:18-33). Thus, the leadership approach and style practised in organisations became important and garnered much scholarly attention over time. Yahaya and Ebrahim (2016) argue that in an organisational context, leadership is a critical element in the success of any organisation and an aspect such as the style of leadership is recognised as a critical enabler to achieving and maintaining the viability and effectiveness of an organisation.

In respect of leadership styles, Vasilescu (2019: 42-52) contends that “a style represents a distinctive or characteristic behaviour, a particular method of acting”. G.W. Allport (1937) first introduced the concept of leadership styles with specific reference to various categories of personalities or behaviours underpinned by psychology. Leadership style is often associated with a leader’s behaviour which is circumscribed in Behaviourist Theory where “different patterns of leadership behaviour are observed and then categorized as leadership styles” (Kostopoulos *et al.*, 2011). Behaviourist Theory was a popular area of research as it provided insights into the “ability to alter their style based on the beliefs, values, preferences and culture of the organization they work for” (Kostopoulos *et al.*, 2011).

Undoubtedly, in an organisational context, leadership is a critical element in the success of any organisation and an aspect such as the style of leadership is recognised as a critical enabler to achieving and maintaining the viability and effectiveness of an organisation (Yahaya and Ebrahim, 2016). Given its salience, it is not surprising that so many studies focus on leadership and its impact on organisational functioning and success. For the purposes of this study, specific attention was given to organisational leadership in businesses as a key focus area.

Leadership nonetheless continues to mean different things to different people in different settings. Part of the ambiguity and elusiveness that surrounds leadership is also the conflation between leadership theories and leadership styles. It is important to note the difference between leadership theories and leadership styles. Leadership theory is an academic discipline which is concerned with investigating the ingredients of “what makes successful leaders excel in what they do” (Kostopoulos *et al.*, 2011), while leadership style pays specific attention to traits and behaviours of leaders which can fall under leadership theories (Kostopoulos *et al.*, 2011). In this chapter both leadership theories and leadership styles are discussed.

Despite different schools of thought and theories that have pervaded over multiple decades, some theories attempted to distinguish leaders from non-leaders; others defended or debunked the view that leadership is innate and cannot be acquired; and moreover, others distinguished between leadership and management. In this research study, it is postulated that the leadership function, practices and processes are critical variables in understanding how business leaders create an enabling environment in support of innovation towards the alignment with the SDGs and ESG principles.

Before exploring the leadership theories and shedding light on enabling leadership styles, the next section explores a few definitions of leadership and the perspectives of some scholars in their attempt to make sense of the leadership phenomena.

2.3 DEFINING LEADERSHIP

Despite the importance of leadership in contemporary debates, there is no singular agreed-upon definition of leadership. Table 3 below highlights the perspectives of some of the leading scholars and their definitions on leadership.

Table 3: Leadership Definitions

	SCHOLAR	DEFINITION
1	Burns (1978)	Burns contends that leadership is when people mobilise “institutional, political, psychological, and other resources so as to arouse, engage and satisfy the motives of followers.” (Burns, 1978:18).
2	Bass (1990a:19)	Bass (1990a:19) asserts that “leadership consists of influencing the attitudes and behaviours of individuals and the interaction within and

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	SCHOLAR	DEFINITION
	Chemers, 1997	between groups for the purpose of achieving goals.” Leadership is also defined as “a process of social influence in which one person is able to enlist the aid and support of others in the accomplishment of a common task.” (Chemers, 1997).
3	Antonakis <i>et al.</i> , (2011:5)	Another school of thought defines leadership as influencing the process and the subsequent outcomes between the leaders and followers (Antonakis <i>et al.</i> , 2011:5).
4	Northouse (2016)	For Northouse (2016), leadership pertains to individuals influencing groups of individuals in pursuit of a collective goal (Northouse, 2016:6).
5	Northouse quoting Kouzes & Posner	Kouzes and Posner describe leadership as a dynamic process where leaders mobilise “others to get extraordinary things done.” (Northouse, 2014). Within this perspective of leadership, leaders engage five levers, namely, “model the way, inspire a shared vision, challenge the process, enable others to act and encourage the heart.” (Northouse, 2016).

Source: Compiled by the author

Common features from the myriad of definitions are the concepts of influence and the process to achieve a common goal as well as the symbiotic relationship between leaders and followers. Although the definitions above are silent on power, one can also assume a set of power relations between leaders and followers as well as among leaders. Further, the effectiveness of the leader is dependent on the extent to which the inherent power is understood and deployed as an enabling or coercive force.

The leadership discourse enjoys multiple views and definitions which speak to the complexity and dynamism of leadership. This study leans towards the definition which describes leadership as a dynamic process where leaders mobilise “others (also sometimes referred to as followers) to get extraordinary things done.” (Northouse, 2014). The researcher is therefore in agreement with this definition of leadership. At the time of the study, there were no subsequent updates on these definitions by these seminal authors.

In order to understand the relationship between leadership, innovation and SDGs and ESG principles, it is necessary to understand the historical contribution of scholars who paved the way for present day studies. The next section discusses the evolution of leadership theories and its contribution to the leadership discourse.

Many of these classical theories discussed, are largely based on the work reviewed by scholars such as Khan, *et al.* (2016), Uys and Webber-Youngman (2019) and Cameron & Green (2017).

2.4 EVOLUTION OF LEADERSHIP THEORIES 1840s TO 1980s

The leadership discourse has evolved over many decades with countless scholars attempting to define 'leadership.' Whether influenced by politics, the prevailing global context or by the discipline in which leadership was examined, there remain hundreds of definitions in the leadership literature.

Despite the absence of a common definition, a few dominant schools of thought on leadership have emerged, as depicted in Figure 1.

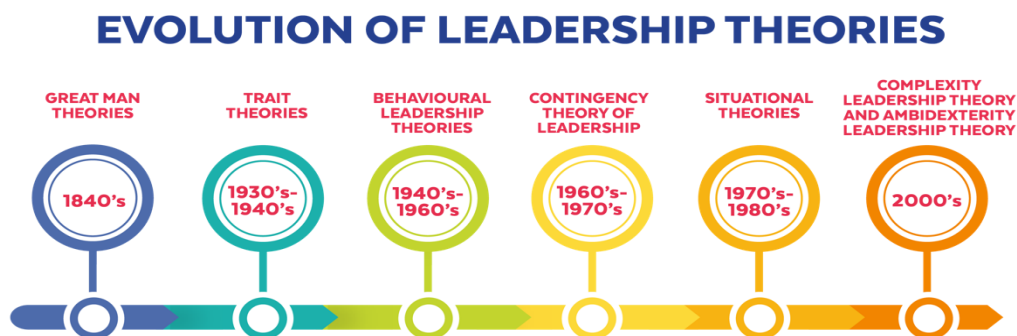


Figure 2: Evolution of Leadership Theories

Source: Compiled by the author

The following section of this chapter will provide an overview of the evolution of leadership theories between the 1840s and the 1980s, that have played a

significant role in shaping the research paradigm on leadership scholarship over time.

2.4.1 GREAT MAN THEORIES (1840'S)

The search for commonalities in terms of leadership traits has evolved over centuries as most communities sought heroes to describe accomplishments and to rationalise failures (Nawaz and Khan, 2016). For example, the celebration of heroes, or the Hero's Journey, which has its genesis in Greek mythology, to this day dominates the plots of films, novels and games (Rickett, 2020). A leading philosopher and thought leader of the 18th century, Thomas Carlyle outlined prominent and exceptional individuals whose actions had a great impact on history. It was through observing and describing the behaviours of main office bearer's with reference to "their leadership behaviour of influence, impact and effect," that the leadership field of study was born (Uys & Webber-Youngman, 2019).

During this time Carlyle, a pioneer in this field, argued for his "Great Man Theory" which essentially claimed that leaders are born and only those men gifted with innate heroic abilities could develop into leaders (Nawaz and Khan, 2016; Uslu, 2019). The term "Great Man", clearly rooted in patriarchy, is generally associated with military leaders and warfare, which historically was a male-dominated profession (Uys & Webber-Youngman, 2019; Uslu, 2019). Carlyle expounded that "great men were born, not made" associating leadership with genetics (Nawaz and Khan, 2016; Uslu, 2019).

Grounded in this theory, ordinary people are distinguished from great men based on a unique set of features such as attractiveness, reasoning ability, commandments, courage, credibility and action high initiatives (Carlyle, 1993). Therefore, leaders are distinguished from non-leaders based on characteristics (Uslu, 2019). The Great Man Theory advocates that ordinary people are differentiated from great men based on "the anatomy, psychology and personality" (Uslu, 2019). Thus, concluding that leadership is a gift from God and that not everyone can be a leader and cannot want to be leader (Uslu, 2019; Spector, 2016). Moreover, asserting that the characteristics of a leader are passed on

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genetically supposedly making these characteristics innate. Based on this premise “leadership is something that cannot be learned, and leadership characteristics cannot be acquired afterwards” (Uslu, 2019)

Expanding on Carlyle’s theory, American theorist Sidney Hook pointed out the difference between the “eventful man vs. the event-making man” (Dobbins and Platz, 1986). Hook noted this difference in terms of impact and suggested that the eventful man continues to be riddled by complexity in notable cases, but did not necessarily determine progress. Conversely, Hook emphasised that what altered the course of events, are the actions of the event-making man, who, if not present in the process, would result in a different outcome. Thus, grounding the event-making man’s impact in “the consequences of outstanding capacities of intelligence, will and character rather than the actions of distinction” (Nawaz and Khan, 2016).

However, this notion of leadership was morally flawed and was challenged by subsequent events. Particularly conduct and consequences of the decisions and actions of infamous leaders such as Hitler, Napoleon and Mussolini, discredited the credibility of the “Great Man Theory.” History has proven how irrelevant the supposedly great men became and their role in stifling the growth of the organisations (Burns, 1978). A further example of events that challenged the “Great Man Theory” was the advent of the First World War between 1914 and 1918. Preceding this war, “only nobility and royals went to military academies” with very few outsiders, who if they did attend, needed the approval of the royal family or its chosen representative serving on selection boards (Uys & Webber-Youngman, 2019).

In the First World War, the United States of America (USA) played a significant role in the victory of the Allied forces by displaying their military leadership prowess which was underpinned by decisive, strategic capability and skill (Uys & Webber-Youngman, 2019). These American commanders, who were not descendants of royalty, were competent military leaders of their armies, therefore, presenting a different element to leadership and effectively debunked the “Great Man Theory” (Uys & Webber-Youngman, 2019). The “Great Man” leadership theory or discourse

thus shifted from the belief that leaders are born or are “destined by nature to be in their role at a particular time to a reflection of certain traits that envisage a potential for leadership” (Nawaz and Khan, 2016).

The Great Man Theory is not without criticism. A key criticism lodged against this theory includes gender-based prejudice which is not surprising given the name of the theory (Spector, 2016; Uslu, 2019) and the silence on the ability of females to lead in this theory is palpable. While this is an important critique in balancing these perspectives, the Great Man Theory originated during the 19th and 20th century when women were generally not seen to be leading or at the forefront of “business, politics, religion and state administration in these years” (Uslu, 2019; (Kirkpatrick and Locke, 1991). A further criticism is that this theory “lacks scientific rigour and reality,” thus asserting the theory as being speculative (Uslu; 2019; Harrison, 2017).

2.4.2 TRAIT THEORIES (1930’S-1940’S)

The criticism lodged against the Great Man Theory provided room for the evolution of the Trait Theory which asserts that “leadership is not only a congenital, but a combination of both congenital (Dunham and Pierce, 1989) and acquired characteristics” (Uslu, 2019). The Trait Theories share many similarities with the “Great Man Theories” (Uys & Webber-Youngman, 2019; Uslu, 2019).

Core to the beliefs held by earlier Trait Theorists was the notion that some people are inherently gifted with physical characteristics and personality traits which set them apart from non-leaders (Nawaz and Khan, 2016; Uslu, 2019). Despite similarities, the Trait Theory is thought of as a form of modification to the Great Man Theory (Kirkpatrick and Locke, 1991). Trait Theories paid little attention to the notion of whether leadership traits were genetic or could be developed (Nawaz and Khan, 2016).

Early Trait Theory scholar, Jenkins, highlighted two streams of traits. The first set of traits were emergent traits which were largely attributed to heredity such as “height, intelligence, attractiveness, and self-confidence and effectiveness traits” (Ekvall, 1991). The second stream of traits identified were “self-confidence and

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effectiveness traits (based on experience or learning), including charisma, as fundamental components of leadership” (Ekvall, 1991). Scholar Max Weber underscored charisma as a key feature of Trait Theory whereby he argued that charisma is “the greatest revolutionary force, capable of producing a completely new orientation through followers and complete personal devotion to leaders they perceived as endowed with almost magical supernatural, superhuman qualities and powers” (Nawaz and Khan, 2016).

When viewing leadership through the Trait Theory lens, the emphasis on a combination of personal features could be assumed. For decades, the cognitive and behavioural reactions to situations and settings, constructed in personality typologies prevailed (Uys & Webber-Youngman, 2019). Along with the evolution of the theory into many branches, Trait Theory has not been without criticism.

A key criticism lodged against the Trait Theories paradigm revolves around the question that although many people enjoy these identified traits linked to leadership, not everyone who has the traits strive or aspires to any form of leadership (Uys & Webber-Youngman, 2019). Thus, the critics of the Trait Theory paradigm raise an important question: If the main assumption of the Trait Theories are located in the understanding that certain traits are central features of leadership, how would we explain individuals who have these traits but who are not leaders (Uys & Webber-Youngman, 2021).

Harrison’s (2017) critique highlights the fact that the Trait Theory was not grounded in empirical research and thus its assumptions are speculative (Uslu, 2019). Essentially it was argued that the Trait Theory failed to provide detailed explanations and credible evidence to identify leaders. Similar to the Great Man Theory, the Trait Theory came under scrutiny for advancing a very narrow perspective (Uslu, 2019), which only elaborates leadership characteristics but failed to account for “environmental factors (Robbins, 2003) such as the group values affecting the leadership and the structure of the tasks” (Uslu, 2019).

In addition, there appeared to be inconsistencies with characteristics discussed in the limited studies conducted on the Trait Theory studies (Judge *et al.*, 2002). For example, the concentration on physical characteristics in explaining leadership are discussed in some studies while internal characteristics such as personality are discussed in others.

According to scholars Uys and Webber-Youngman (2021), Trait Theories failed to convincingly articulate the anticipated list of beneficial leadership qualities as a source for distinguishing leadership qualities and features in all circumstances. Trait Theories have also not been proven to be fixed and to remain the same over time (Uys & Webber-Youngman, 2019). A question that is not clearly answered by Trait Theorists is whether “traits make leaders, or do leadership positions cause individuals to develop these traits?” (Uys & Webber-Youngman, 2021). Nonetheless, there remains significant value in the Trait Theories’ offering of dispositional traits which focus largely on customary forms of behaviour, thought and emotion (Uys & Webber-Youngman, 2021).

2.4.3 BEHAVIOURAL LEADERSHIP THEORIES (1940’S-1960’S)

There was a visible shift in research focus following the Second World War (1939-1945). This shift is evident in the emphasis from research that considered personality traits to an emphasis on research that explored behaviour impacting followers in terms of performance and satisfaction (Badshah, 2012).

According to Uys and Webber-Youngman (2019), Behavioural Leadership Theory emphasises “the actions of successful leaders” rather than their psychological and emotional attributes suggesting that the behavioural approach is anchored in the belief that leaders can be trained (“conditioned”) (Deshwal & Ali, 2020: 38-43; Uys & Webber-Youngman, 2021). Thus, completely opposing historical theories, which held on to the beliefs that “leaders are born” (Deshwal & Ali, 2020: 38-43; Uys & Webber-Youngman, 2019). In addition to teaching leadership, scholars assert that leadership behaviour can be developed or influenced by experiencing or witnessing role models (Uys & Webber-Youngman, 2019). As Uslu 2019 points out, “the effectiveness of the leader does not depend on the characteristics of the leader but

depends on his/her behaviour.” Thus, shifting the view from innate characteristics of leaders to behaviour which can be learned and acquired with training.

Dimensions of leadership that are often discussed in leadership behaviour are (a) consideration and (b) initiating. Nonetheless, scholars believe that ‘consideration’ is grounded in a “concern for people and relationship behaviours” while initiating structure is a “concern for production and task behaviours” (Nawaz & Khan, 2016). Consideration is based on a leader’s ability to instil confidence and build a relationship with its subordinates (Nawaz and Khan, 2016; Deshwal & Ali, 2020: 38-43). While, on the other hand, initiating structure is concerned with how a leader’s structure guides and outlines the different roles of subordinates, in attaining optimal organisational performance and the accomplishing of organisational missions and goals (Nawaz and Khan, 2016; Deshwal & Ali, 2020: 38-43).

In an earlier study conducted by Lewin *et al.* (1939), the ratings by superiors negatively correlated with ratings of consideration with respect to leadership effectiveness; conversely the study revealed that the initiating structure was positively associated with leadership effectiveness (Badshah, 2012). However, scholars agree that these leadership dimensions are generally seen as orthogonal (McClanahan, 2020; Weber, Büttgen & Bartsch, 2022: 255 -238; Blake *et al.*, 1964, Casmir, 2001 and Li *et al.*, 2016) recommend that “leadership should be high on both dimensions.”

In addition, a number of scholars discussed three important types of leadership behaviour styles in the Behavioural Leadership discourse, namely autocratic, democratic and laissez-faire styles (Nawaz & Khan, 2016; Uslu, 2019). The autocratic leader is the key decision maker while the laissez-faire leader is hands-off and allows the subordinates to make decisions, thus providing no leadership other than occupying the position (Nawaz & Khan, 2016; Uslu, 2019). The democratic leader engages his or her subordinates and thereafter makes decisions. According to Blake (1964), leaders could fit into any of the aforementioned categories (Nawaz & Khan, 2016; Uslu, 2019). These leadership styles are associated with patterns of leadership behaviour.

A fundamental criticism levelled against the Behavioural Leadership Theory is that it failed to take into account situational factors when explaining leadership (Harrison, 2017; Uslu, 2019). Thus, leaning to what is seen as universal findings and silent on issues, for example such as cultural values and circumstances (Uslu, 2019).

2.4.4 CONTINGENCY THEORY OF LEADERSHIP (1960'S-1970'S)

The Contingency Leadership paradigm is rooted in the understanding that the success of a leader is reliant on the fit between the leadership style and the nature of the situation or context. This approach moves away from the earlier leadership literature which strived to determine the ideal group of traits or characteristics for leaders, departing from the view of a “one size fits all” perspective of leadership (Cameron & Green, 2017; Uslu, 2019). Therefore, underscoring that “there is no optimal leadership style and that different situations and circumstances require different leadership styles” (Uslu, 2019) Thus, highlighting that depending on the conditions and the environment a person might be able to effectively lead in one situation while the same person might not be able to do the same in another situation with different circumstances (Uslu, 2019).

Contingency Leadership Theory moved away from the Traits approach by paying closer attention to things that may hamper or support task accomplishment in a specific context. As a result, an appreciation for contextual influences and a leader's ability to respond to them by employing different leadership styles given the context, became important. Scholars became interested in the various aspects in situations that required leadership. These interests ranged from, for example, analysing whether tasks are structured versus open-ended; the skills and willingness of employees to undertake the task; organisational culture; the authority to reward and punish and teamwork and team cohesion (Cameron & Green, 2017). In the Contingency approach, there is an appreciation of various leadership styles ranging in its success across different situations. Thus, presenting the possibility of developing a matching process that looks at linking a leader with a specific “style to an appropriate situation for that style (Cameron & Green, 2017). The approach

assisted with predicting which type of leaders would excel in particular contexts (Cameron & Green 2017).

A well-known Contingency model developed by Fiedler in the 1960s and 1970s is called the Least Preferred Co-worker Contingency model. In this approach the leader is required to identify and score their least preferred co-worker; and, in doing so, the results would reveal whether “the leader was more relational or more task-oriented” (Cameron & Green, 2017). Fiedler was interested in the nature of the relationship between the leader and team member; understanding the level to which the tasks are structured or open-ended and the level of power and authority the leader had in situations. As a result, the situation necessitating leadership could then be labelled as favourable or unfavourable (Cameron & Green, 2017). Included under favourable leadership are structured tasks, good relationships and substantial power. On the other hand, unfavourable leadership included ambiguous tasks, poor relationships and limited power.

Research illuminated that more task-oriented leaders are more likely to do well in both favourable and unfavourable situations while leaders who are more relational oriented “were seen to be more effective in the middle ground (where there were middling relations, variable structure and variable power)” (Cameron & Green, 2017). Moving beyond the traits, characteristics and behavioural paradigm of leadership, the Contingency approach provided an opportunity to expand the research lens for exploring effective leadership.

Table 4 below is indicative of scholars who widened the inquiry and established an approach in grounded research, which assisted in moving organisations to consider concepts such as matching the best people for the roles and identifying developmental areas (Cameron & Green, 2017).

Table 4: Contingency Theories

CONTINGENCY THEORIES	AUTHORS	YEAR
Leadership Continuum	Tannenbaum and Schmidt	1957
Managerial Grid	Blake and Mouton	1964
Expectancy Theory	Vroom	1964
Least Preferred Co-worker (LPC)	Fiedler	1967; 1978
Path-Goal	Evans; House	1970; 1971
Decision Model	Vroom and Yetton; Vroom and Jago	1973; 1988

CONTINGENCY THEORIES	AUTHORS	YEAR
Situational Leadership	Hersey and Blanchard	1969
Leadership Substitutes	Kerr and Jermier	1978
Multiple-linkage	Yukl	1981; 1989
Cognitive Resources	Fiedler; Fiedler and Garcia	1986; 1987

Through their research, each of these scholars above drew attention to different contingencies as a lens for leadership styles within the Contingency Theory paradigm. What is useful about the Contingency Theory, is that it urges the leader to become more reflective of their own leadership style and it allows room to consider whether the style could be adapted based on what the situation may require.

The theory provides a basic framework for reflection as consideration is given to “whether a more task- or relationship-oriented approach” is required (Cameron & Green, 2017). Despite the Contingency approach allowing for a more rational and scientific approach to leadership, it posited potential challenges in practice. For example, deciding whether, “I as leader need to be ‘relational’ and then immediately being that” (Cameron & Green, 2017). Nonetheless, this approach offered significant value for both reflection and planning.

A criticism levelled against “contingency theories are that they lack adequate research in order to test assumptions of the theory and fail to account for how certain demographic characteristics affect the leader-subordinate relations” (Shonhiwa, 2016; Uslu, 2019). Following the impact on the leadership discourse by the Contingency Leadership Theory, an increased focus on new leadership styles emerged such as political leadership, servant leadership and collaborative leadership (Uslu, 2019). However, many of these new leadership styles have been criticised as it was argued that these “styles do not say anything different from the old leadership styles” and the same criticism was levelled against the Contingency Leadership Theory (Cameron & Green, 2017).

2.4.5 SITUATIONAL THEORIES (1970’S-1980’S)

Expanding on the Contingency Leadership Theory, scholars Paul Hersey and Ken Blanchard developed the Situational Leadership Theory in 1969. Like Contingency

Theory, Situational Leadership Theory was concerned with assessing and adjusting leadership styles based on the situation. In this approach, the situation considered the followers' "level of competence and confidence, or motivation, to carry out the work required of them" (Cameron & Green, 2017). This indicated that behaviour could be controlled and that leaders had the ability to amend behaviour based on the situation (Uys & Webber-Youngman, 2019; Uslu, 2019), a significant move away from focussing on the traits of a leader as highlighted in earlier leadership theories.

In the Situational Leadership approach there are four key assumptions. These include (a) "that no one leadership style is appropriate to all situations; (b) that leadership is primarily a combination of two styles – more or less directive, and more or less supportive – and given different situations, a calibrated balance between supportive and directive styles were needed; (c) that each follower would have different degrees of competence to complete the task, and different levels of commitment to carry out the task; and, (d) that as a follower became more competent and confident (or 'mature'), he or she would require different types of leadership to enable success and growth, culminating in low levels of direction and low levels of support" (Cameron & Green 2017:26; Uslu, 2019).

The theory is underpinned by the four main approaches, as graphically depicted in Figure 3 below: *Directing*: This approach was premised on a directive and an authoritarian style. In this approach, the decision making was done by the leader who informed and instructed employees to do what was necessary to complete a task – particularly in cases where a task was new to the employee or the employee was new to the task (Uys & Webber-Youngman, 2019). *Coaching*: In the coaching approach instead of merely directing, the leader placed more emphasis on communicating and persuading the employees even though the leader remained the decision maker. This approach resonated when employees began to master tasks, providing a clear shift towards more of a teamwork approach (Uys & Webber-Youngman, 2019). *Supporting*: The supporting approach focused on the leader supporting and encouraging employees to improve collective decision making while working with them (Uys & Webber-Youngman, 2019). This approach was

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underpinned by a more democratic leadership style which focused less on the task and more on the team, as at this stage employees would have mastered the task (Uys & Webber-Youngman, 2019). *Delegating*: In this approach the leader allocated the responsibility of decision making to employees while overseeing the team. At this stage individual employees are functioning at an optimal people-and-work balance level. This is otherwise known as self-directed work teams (Uys & Webber-Youngman, 2019).



Figure 3: Situational Leadership based on the Hersey and Blanchard Model

Source: Cameron & Green, 2017

The Situational Leadership approach provided a method to leadership and could be seen as a subcategory of Contingency Theory. Despite this being a practical approach, it was considered difficult for leaders to enact, as leaders could fall back on unconscious behaviours. Nonetheless, it provided a useful framework for leaders to be reflective about engaging with employees.

2.4.6 TRANSFORMATIONAL AND TRANSACTIONAL LEADERSHIP THEORIES (1980'S)

In 1978, Burns introduced key concepts of Transactional and Transformational Leadership which was later enhanced by Bass (1985). Despite extensive developments since these concepts were introduced, 'Transactional and Transformational Leadership' remains an important and powerful concept of enacting successful leadership in the current leadership discourse. These concepts seem to have a strong appeal due to its scope and consideration for the impact on followers (Cameron & Green, 2017).

Scholars earmarked Transformational Leadership as one of the most influential leadership theories (Mhatre *et al.*, 2014; Le & Lei, 2019) and thus it cannot be overlooked in the leadership discourse. As a style of leadership, Transformational Leadership is linked to the "positive impact on follower satisfaction and productivity" and noted to be key in changing employees' and teams' attitudes or the culture of an organisation (Cameron & Green, 2017). Leading scholar Bass (1985, 1990) attributed four key characteristics to Transformational Leadership, namely, idealised influence, intellectual stimulation, inspirational motivation and individualised consideration. Transformational leadership is at times also referred to as the four I's.

Nonetheless, idealised influence reflected the ability of leaders to offer a vision and insight of the mission, stimulating pride, gaining respect and trust. Inspirational motivation revealed a leader's interest in sharing high expectations, making use of symbols to concentrate on efforts, stating key purposes in a simplified manner and infusing optimism. Intellectual stimulation referred to the leaders' ability to encourage intelligence, rationality, creative and attentive problem-solving; while individualised consideration spoke to a leaders' ability to coach and advise, provide special attention and to treat each employee on a personal level.

Subsequent to the Trait's Theory paradigm of leadership, there was a gap in exploring "human emotions, needs, values and yearning, along with the role of inspirational and charismatic leadership" (Cameron & Green, 2017). This led to a

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novel territory of exploring “how leaders enable change and difference through motivating and stimulating their followers” (Cameron & Green, 2017). Burns (1978) asserted that Transformational Leadership was the process in which leaders and followers support each other to grow with greater confidence and inspiration (Cameron & Green, 2017). This practice was inspired and chosen by individuals who were keen in positively shifting culture beyond themselves and who were driven to yield benefits for their teams, companies or communities (Cameron & Green, 2017). Burns (1978) claimed that “leadership is transactional or transformational” and proposed an important point, that leadership is spread and not necessarily concentrated in a few individuals (Cameron & Green, 2017).

Contrary to Transformational Leadership, Transactional Leadership is underpinned by rewards and rules, and leans more towards maintaining the status quo instead of stimulating change (Cameron & Green, 2017). Transactional Leadership is generally defined as a leadership style whereby the relationship between a leader and follower is grounded in a range of exchanges or bargains (Howell and Avolio, 1993). Likewise, Golla (2012) points out that Transactional Leadership is underpinned by self-interest and encourages people through rewards. Thus, the Transactional Leadership style is therefore more akin to traditional management which focused on clarifying employees’ responsibilities and rewarding them for meeting goals or correcting them when goals are not met (Bass, 1999). In doing so, this leadership style seeks to increase higher levels of performance amongst employees (Avolio *et al.*, 1991; Bass, 1985; Howell & Hall-Merenda, 1999).

Scholars Cameron & Green (2017) provide a summary of key elements of Transactional Leadership, namely, “exchanges rewards for effort and achievement (Contingent Reward); searches for and corrects deviations from rules and standards (Management by Exception – Active); intervenes only if standards are not met (Management by Exception – Passive); and abdicates responsibilities and avoids making decisions (Laissez-faire – Non-transactional).”

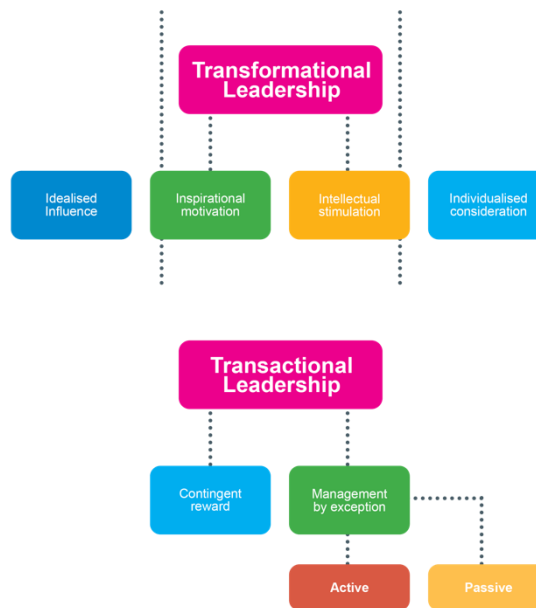


Figure 4: Transformational and Transactional Leadership

Source” Cameron & Green 2017

Burns (1978:18) equated Transactional Leadership with a practice that does not have a lasting purpose and is more concerned with the notion of “give and take” rather than the aim of transforming or developing individuals or organisational culture.

There have been several research studies analysing the impact of Transformational and Transactional leadership. One popular mechanism for measuring Transformational Leadership is the Multi-factor Leadership Questionnaire developed by Bass (1985, 1990: 19-31; 2004). This instrument became a vital tool in measuring leadership features over the past few decades.

Studies conducted by Bass and Alvolio (1996), resulted in assertions that highlight that, while each leader demonstrates both qualities of transformational and transactional leadership, those who are associated more positively with successful leadership tend to be more transformational than transactional. On the other hand,

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a research study conducted by Lowe (1996) cited by Yukl (1999) which reviewed 39 studies using the Multi-factor Leadership Questionnaire method recognised that notable fundamentals of Transformational Leadership were linked to “follower satisfaction and performance” and a weaker link with contingent rewards, a transactional element (Cameron & Green, 2017).

In addition, studies have also explored the relationship between Transformational Leadership and innovation (Tayal *et al.*, 2018; Sattayaraksa & Boon-itt, 2018; Le and Lei, 2019; Zuraik & Kelly, 2019), however, there remains a lack of research that focuses on the application of Transformational Leadership in the pursuit of innovation for sustainability and SDG and ESG alignment. Nonetheless, previous studies identified Transformational Leadership as a significant ingredient for innovation (Rosing *et al.*, 2011; Jia *et al.*, 2018; Zuraik & Kelly, 2019). For example, Transformational Leadership is largely connected with “employees’ innovation capability by creating a supportive culture (Jung *et al.*, 2003).

Despite the popularity and wide appeal that Transformational Leadership enjoys, it has also been found to have grave weaknesses (Cameron & Green, 2017). These weaknesses include the diverse range of definitions for describing different elements of Transformational Leadership, which complicated measurement and meaning making (Cameron & Green, 2017; Yukl, 1999; Tracey & Hinkin, 1998). Scholars also claim that important leadership behavioural elements are absent in the MLQ method, namely elements such as “empowering people, negotiating roles and responsibilities, building teams and thinking strategically” (Yukl, 1999).

Moreover, a common criticism of the Transformational Leadership model is that leaders are portrayed as ‘heroes’ inferring that “follower behaviours are solely reliant on the leader's actions and modes of relating” (Cameron & Green, 2017). Scholars Meindl and Ehrlich (1987) warn that there is a danger in ‘heroic’ leadership which leads to the “over-valuing of leadership as the root of an organisation’s success” (Cameron & Green, 2017). In addition, the Multi-factor Leadership Questionnaire method disregards the ‘moral’ or ‘ethical’ elements which Burns drew attention to, thus leaving room for leaders to abuse this form of leadership in an

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adverse or coercive manner. Scholars such as Tourish and Vatcha (2005) have written extensively about ethical leadership using the 2001 Enron scandal to demonstrate “where non-ethical transformational leadership was used to eliminate dissent” (Cameron & Green, 2017). A more recent and local example of unethical leadership is the 2017 Steinhoff scandal in South Africa in which a range of fictitious and irregular transactions masked by the Chief Executive Officer (CEO), inflated the profits of the group (Reuters, 2019).

On the other hand, researchers have pointed out that studies on the impact of Transactional Leadership on organisational innovation are limited. Instead, they claim that Transactional influence is dependent on the business environment (Vera & Crossan, 2004) and the characteristics of employees (Pieterse *et al.*, 2010). Hence these varying findings point out the inconsistencies in “how Transformational and Transactional leadership are related to organisational innovation” (Prasad & Junni, 2016) which leaves room for further exploration.

Despite Burns’ (1978) theoretical underpinning, which argued that Transactional leadership and Transformational leadership are at the opposite spectrums of leadership behaviours, Bass (1985) makes a case for these two distinct leadership behaviours to work together and to co-exist (Prasad & Junni, 2016).

The above section focussed on the key leadership theories which evolved from the 1840s to the 1980s. The leadership debates have continued over subsequent decades which saw the introduction of more modern theories, such as the Complexity and Ambidextrous Leadership Theories, which are discussed later in this chapter.

Despite leadership as a concept enjoying much attention from scholars, leadership and management are often confused and conflated. The next section discusses the difference between the two concepts and points out the distinctions.

2.5 LEADERSHIP VERSUS MANAGEMENT

The difference between leadership and management has consumed researchers for the longest time and has raised many questions including “whether there is a real difference or whether it is just a difference in style?” (Kotterman, 2006:13). These two terms are also often used interchangeably in the work environment and can result in confusion (Kotterman, 2006:13).

Nonetheless, the leadership concept enjoys a long history which can be traced back to the days of the ancient Greek philosopher, Aristotle (Northouse, 2016:13). A prominent philosopher of his time, Aristotle back then offered lessons on leadership which a person could consider as part of their life journey (Nelson, 2015). Thus, the concept of leadership has gained currency over many centuries and continues to be a burning matter and a vital driver of innovation (Bass, 1990; Kotterman, 2006).

Contrary to leadership, management emerged towards the 20th century as a popular concept with the rise of industrialisation (Northouse, 2016:13). With the advent of the Second Industrial Revolution, also known as the Technological Revolution, management was introduced to run complex organisations more effectively and efficiently (Northouse, 2016:13). With the intention of reducing chaos, a manager or a supervisor in a factory during this period, was probably more concerned with standardising production, following orders and assigning tasks to the right people as opposed to spending too much time on the product or the actual people producing the products in the workplace (Uys & Webber-Youngman, 2020:12).

Leadership and management share similarities. For example, both enjoy elements of influence, focus on the concept of working with people and both are concerned with achieving goals (Northouse, 2016:13). However, despite the similarities and the obvious areas of overlaps, there are distinct differences. Kotter (1990) argues that leadership and management differ primarily in functions. According to Kotter (1990), the predominant function of management is to offer “order and consistency to organisations” while the main function of leadership is to “produce change and movement” (Northouse, 2016:13).

Northouse (2016:13) asserts that management is about pursuing “order and stability” whereas leadership is about undertaking “adaptive and constructive” transformation. For Weathersby (1999:5) management is about controlling while leadership is about creating a common vision and persuading and not commanding people. Kotterman (2006) argues that management takes responsibility for key functions and improving processes whilst leadership looks into the future in anticipation of long-term needs.

Rost (1993) provides a useful lens for distinguishing between leadership and management. In terms of influence, Rost claims that leadership fosters “multidirectional influence relationship” whereas “management is unidirectional authority relationship.” The author asserts that leadership is process orientated to achieve a shared vision whereas management is focussed on the tasks necessary for delivery. Lastly, Rost asserts that leaders and their followers are the architects of fundamental change whereas “managers and subordinates join forces to sell goods and services” (Rost, 1991:149-152). It can also be inferred that power relations differ as leaders work with followers to achieve a vision while managers have subordinates who follow instructions.

What is apparent is the clear distinction by scholars between leadership and management approaches. Kotterman (2006:15) confirms this by asserting that leadership and management “are much more different than they are the same.” It is safe to assume that these distinct roles in any organisation also lead to varied outcomes. This raises the question as to why it is important for scholars to make these distinctions? In distinguishing between leadership and management it can help with measuring, testing, assessing and steadily hiring or promoting for these functions (Kotterman, 2006:14). The seemingly general acceptance of differences between leadership and management does not mean that there is universal acceptance of what those functional differences are amongst scholars.

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However, Table 5 below seeks to provide a practical example of various perceptions of the differences between a manager and leader (Uys and Webber-Youngman, 2020:13).

Table 5 : Differences between Managers and Leaders

MANAGEMENT	LEADERSHIP
Planning	Visioning
Organising	Facilitating
Leading (teams)	Actuate other's aspirations
Control	Setting direction
Budgeting	Future focus
Technical know-how	Develop others
Focus on goals	Focus on vision and meaning
Focus on tasks	Focus on relationships
Production focus	Process focus
I am the boss	Mediate, facilitate, coach, mentor
Positional Power	Personal Power
Telling	Listening
Compliance	Pioneer
Subordinates	Followers
Operations	Strategies

(Source: Uys and Webber-Youngman, 2020:13)

Notwithstanding the differences highlighted between leadership and management, there seems to be consensus among some scholars that organisations require both leadership and management in order for an organisation to succeed (Kotter, 1990; Northouse, 2016, Uys & Webber-Youngman, 2019). Zaccaro and Horn (2003) indicate that rather than leadership and management in the workplace being mutually exclusive, they are in fact, complementary.

For example, if there is a high concentration of management with little to no leadership, it might lead to a rigid, inflexible and stifling organisation (Northouse, 2016:13). On the other hand, if there is a high concentration of leadership without management, this might result in an organisation having worthless, futile or misdirected attempts for change (Northouse, 2016:13). Thus, confirming the views of the above-mentioned scholars that there is a need for both leadership and management skills to be nurtured in effective organisations.

The idea that either of these skills should be practised in isolation, is becoming more and more outdated. The complexities of modern-day organisations, accompanied by the rapid changes driven by technology, require cross-functional qualities to deal with intensified leadership challenges. Leadership challenges in recent times have come under the spotlight, given the increased uncertainty, ambiguity, instability and complexity.

Therefore, it is not surprising that many scholars have called for a reevaluation of leadership, questioning whether there are parts of leadership that should be transformed in order to usher in a new approach to contend with modern times. Particularly, given that much of the existing discourse is entrenched in the historic roots of leadership (Uys & Webber-Youngman, 2020). This study recognises that both effective leadership and management are needed in effective organisations. There is also emerging literature on Strategic Leadership, focussed on the role of top management, who were the participants in this study. Strategic Leadership is covered in the next section.

2.6 STRATEGIC LEADERSHIP

Research on Strategic Leadership focuses on top management vested with the responsibility and accountability for organisational outcomes (Finkelstein & Hambrick, 1996:2). It is argued that these leaders in top management influence strategic decision-making which ultimately impacts the direction and future outcomes of a company (Cortes & Herrmann, 2020). Literature suggests that demographic characteristics of Chief Executive Officers (CEOs') (Barker & Mueller 2002; Wu *et al.*, 2005); the leadership styles (Elenkov *et al.*, 2005; Jansen *et al.*, 2009; Jung *et al.*, 2008), the cognitive characteristics (Li *et al.*, 2013; Nadkarni & Chen, 2014), the personality dispositions (Gerstner *et al.*, 2013; Tang *et al.*, 2015) and the dynamics and engagement at the senior level of a company (Arzubiaga *et al.*, 2018; Qian *et al.*, 2013) are critical factors in a company's appetite and approach innovation.

A further revelation in literature on Strategic Leadership points to the importance of these leaders shaping conducive environments for innovation by crafting structures,

processes and a supporting culture which enables innovation (Michaelis, *et al.*, 2009; Sternberg *et al.*, 2004). Moreover, strategic leaders also play a critical role in innovation by encouraging the generation and advancement of new ideas throughout the innovation process from the conceptualisation, to the development and commercialisation phases (Sternberg *et al.*, 2004; Wong, 2013).

Strategic Leadership is important for this study as the research participants in this study are all strategic senior leaders in mining companies with a responsibility for crafting and implementing the business strategy, which includes elements of innovation and sustainability. The next section discusses innovation and leadership which are critical constructs on which this study is founded.

2.7 LEADERSHIP AND INNOVATION

One of the most prevalent phrases in business is the expression “innovate or die” (Kavadas & Chao, 2008). As seen in the afore-mentioned section on Strategic Leadership, a significant share of the responsibility for creating an enabling environment for innovation is vested in senior business leaders.

Business leaders are under immense pressure to ensure that their companies are competitive, sustainable and are at the forefront of finding new opportunities for growth. To take up this challenge, business leaders need to “learn to inspire their organisations to new levels of inventiveness in everything that they do, not just in marketing or new product development” (Leavy, 2005:38).

Innovation has increasingly caught the attention of researchers due to its importance as drivers for new sources of growth opportunities and for solving complex challenges in the business environment (Leavy, 2005; Suroso & Azis, 2015). Innovation in a business environment is a critical source to obtain and retain a competitive advantage in any industry or sector (Hansen, 2014; Damanpour *et al.*, 2009; Gunday *et al.*, 2011; Lin *et al.*, 2007; Abidin *et al.*, 2013).

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Many scholars, practitioners and policy makers assert that innovation is critical for economic growth and industrial change, hence the preoccupation of researchers with the topic of innovation (Boyne *et al.*, 2006).

Despite the extent to which the topic has evolved, there is no exact formula for successful innovation (Becheikh *et al.*, 2005; Rosenbusch *et al.*, 2010). Scholars such as Carayannis & Provan, 2008, Kostopoulos *et al.*, 2010, Prajogo & Sohal (2006) and Auken *et al.*, 2008 have researched the effect of innovation-related variables (Suroso & Azis, 2015). However, these scholars have not established markers for predictability which can be associated with specific variables in the innovation processes (Carayannis & Provan, 2008; Kostopoulos *et al.*, 2010; Prajogo & Sohal, 2006; Auken *et al.*, 2008). Thus, there is justification in the ongoing scholarly exploration of innovation. This study aspires to advance the discourse and knowledge about innovation and leadership as critical variables within mining companies.

There remain multiple definitions of innovation. Innovation is defined as “the commercial or industrial application of something new - a new product, process or method of production; a new market or sources of supply; a new form of commercial business or financial organization” (Schumpeter & Opie 1983). Similarly, scholar Andrew Van De Ven (1986) describes innovation as the process of developing and institutionalising new ideas within organisations. “Innovation has been consistently defined as the adoption of an idea or behaviour that is new to the organization” (Bon & Mustafa, 2013).

Scholars also view innovation as a process, an attribute, or an outcome (Suroso & Azis, 2015; Van De Ven, 1986). Innovation “is a multidimensional process, with multiple sources, most of the time coming from complex interactions among individuals, organization and the institutional setting” and not necessarily as a result of Research and Development only (Suroso & Azis, 2015).

The value of innovation is varied, “there could be value from radical innovation leading to entirely new products as well as from incremental innovation leading to

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improvement in existing products” (Suroso & Azis, 2015). Whether radical or incremental, the value of innovation is not only to develop ideas but also to ensure that the innovation adds value to the business and to the attractiveness of its goods and services (Suroso & Azis, 2015).

Gupta (2007) argues that in order to have sustainable and profitable growth, there needs to be sustainable innovation actions. Innovation is also argued to be a management discipline as it requires a focus on the company’s mission to explore unique opportunities. In addition, it is necessary to ensure that innovation matches the company’s strategic direction as well as determining indicators for success and for evaluating opportunities. Gaynor, 2002 (in Lin & Chen 2007).

Innovation can be explored from different angles such as from an “individual, an organization, and a nation, focusing on personal traits, innovation management, and nation’s source of competitiveness” (Suroso & Azis, 2015). Many scholars have researched this topic from different perspectives which has helped to enrich this field of study and assisted academics with a more nuanced understanding of the concept of innovation (Lin & Chen, 2007: 115-132).

In the systematic literature review on innovation conducted by Suroso and Azis (2015) the following typologies of innovation (Table 6) were found:

Table 6 : Mainstream Innovation Typologies

INNOVATION TYPOLOGY	KEY CHARACTERISTICS	PROMINENT AUTHORS
RADICAL VERSUS INCREMENTAL INNOVATION	Radical innovation refers to innovations that are new to the world and are exceptionally different from existing products and services. Incremental Innovation involves revisions or alterations to existing products or service	Abrunhosa and E Sa (2008), Lin and Chen (2007), Prajogo and Sohal (2003), Forsman and Temel (2011)
TECHNOLOGICAL VERSUS MARKETING INNOVATION	Technological innovation is the adoption of new technologies incorporated into processes or products Marketing innovation is associated with internal processes supporting the delivery of a service or product	Rosenbusch (2011), Damanpour <i>et al.</i> (2009), Auken <i>et al.</i> , (2008), Bon and Mustafa (2013)
PRODUCT VERSUS PROCESS INNOVATION	Product innovation pertains to creating new or improved goods or	Gunday <i>et al.</i> , (2011), Sigh and Smith (2004),

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INNOVATION TYPOLOGY	KEY CHARACTERISTICS	PROMINENT AUTHORS
	<p>services.</p> <p>Process Innovation is focused on improving the effectiveness and efficiency of production.</p>	Prajogo and Sohal (2006)

Source from Suroso and Azis (2015)

In addition to understanding the importance of the different types of innovation as discussed above, it is also important to note that scholars have also paid attention to measuring innovation using different methodologies focussed on either single or multiple variables. However, based on the review done by scholars Suroso and Azis (2015), the innovation measurement literature can be separated into two main areas. These include firstly, input and output measurement and secondly, metric and methodology measurement. Table 7: below highlights the difference between the two types of measurement of innovation.

Table 7 : Mainstream Innovation Measures

INNOVATION MEASUREMENTS	KEY CHARACTERISTICS	PROMINENT AUTHORS
INPUT AND OUTPUT MEASUREMENT	<p>Researchers stress the importance of output indicators in measurement, but most of the research is still predominantly focused on inputs.</p>	<p>Azis & Osada (2009), Azis & Osada (2013), Gunday <i>et al.</i>, 2011), Auken <i>et al.</i> (2008), Hoang & Igel (2006), Sigh & Smith (2004), Prajogo & Sohal (2003), Prajogo & Sohal (2006), Bon & Mustafa (2013).</p>
METRIC AND METHODOLOGIES MEASUREMENT	<p>Surveys, questionnaires, balance scorecards, various mathematical models and other methods have been developed to measure innovation.</p> <p>Different standards and methodologies are being used in different companies or organisations</p>	<p>Abidin <i>et al.</i> (2011), Damanpur (2009), Lin and Chen (2007), Abrunhosa (2008), Carpinetti <i>et al.</i> (2007), Carayannis and Provan (2008), Siguaw <i>et al.</i> (2006), Rosenbusch (2011), Abidin <i>et al.</i> (2013), Adams <i>et al.</i> (2006).</p>

Table from Suroso and Azis (2015)

It is asserted that many organisations assess their innovation by input and output indicators (Suroso & Azis, 2015:390). However, it was found that often more attention is given to measuring the inputs to innovation which can introduce some bias as it is a controlled variable. On the other hand, the output provides a

demonstrated outcome of innovation making the input the enabler (Suroso & Azis, 2015:390).

In the innovation process, inputs indicators are mainly the assessment of resources such as the intellectual, human, technological and capital resources. Output indicators typically denote the actual “shorter term success of innovative activity” expressed as for example in “patent numbers and rates, patent quotes, number of new products, percentage of sales with innovation” (Suroso & Azis, 2015:390). Inputs in the innovation process can be managed and controlled by the company while outputs are uncontrollable and unpredictable (Suroso & Azis, 2015:390). Notably, high or substantial inputs do not necessarily equate to high innovation outputs.

In the second type of measure for innovation, Metric and Methodologies, is often used to measure innovation in a company (Suroso & Azis, 2015:390). It is challenging for an organisation to assess itself against peers when other companies might use different methodologies (Suroso & Azis, 2015:390) or might be reluctant to share their intellectual property. Nonetheless, it is important to understand and know the different innovation typologies and the distinct measurements for innovation.

This study considers the different typologies such as Radical versus Incremental Innovation, Technological versus Marketing innovation, Product versus process innovation in exploring innovation in the mining sector that seeks to address the challenges highlighted in the SDGs and ESG principles. In addition, this study focuses predominantly on inputs and outputs in measuring innovations in the mining companies discussed later in the thesis, particularly leadership in the form of human capital input as an enabler for innovation. This study will not focus on Metric and Methodologies as a tool to measure innovation.

2.8 LEADERSHIP FRAMEWORK FOR THIS STUDY

In order to achieve the SDGs and ESG principles, radical change and innovation is imperative (Nylund *et al.*, 2021). Thus, the SDG framework asserts that “much hope

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rests on the innovation power of business with its far-reaching global presence and influence” to address the increasingly complex challenges (Muff *et al.*, 2017). Scholar Steyn (2021) points out that within the growing global population, estimated to be at 7.9 billion, “for every 100 people, almost nine are going to bed hungry at night, eight are unemployed, about 10 adults are illiterate and 26 are affected by fragility, conflict or violence, we need targeted disruption from our current existence and way of living to ensure meaningful lives for all people.”

Such sobering global statistics serve as a reminder that it is not enough for business to rely on “efficient resource consumption and production” models, as this operational model has failed to deliver on the radical change which humanity needs (Haywood & Boihang, 2021) and has in fact contributed to unsustainable business practices (Westley *et al.*, 2011 & Sullivan *et al.*, 2018). Thus, scholars such as Haywood and Boihang (2021), call for a fundamental transformation and refocusing of business operations.

Business has the resources to be innovative and responsive to the fast-changing environment and societal complexities of the time (Lucci 2012; Porter & Kramer 2011; Scheyvens *et al.*, 2016 & Sullivan *et al.*, 2018). Importantly it is the business leaders who are confronted with major challenges at a time of enormous complexity and uncertainty (Uhl-Bien & Arena, 2017:9), Hence the need to focus on the readiness of business leaders to deal with innovation within this complexity.

There are growing calls for a shift that moves beyond the old style of leadership, which thrived in stable environments (Elkington & Booyesen, 2015; Bäcklander, 2019). Literature abounds with studies which focus on leadership from the perspective of a designated leader as an individual (Dinh *et al.*, 2014; Morgeson *et al.*, 2010). In addition, scholars such as Schulze and Pinkow (2020) argue that the concept of enabling leadership, which allows innovation, has largely remained at a conceptual level and fails to offer detailed descriptions of how enabling leadership and adaptive spaces are practically created. A further research gap pertains to enabling leadership practices that support Sustainable Development.

This study aims to heed the call to shift leadership perspectives by moving beyond the “traditional, hierarchical views of leadership.” The latter is becoming less effective, given the complex nature of the challenges of the twenty-first century. Therefore, this study seeks to explore fresh perspectives that account for adaptive practices (Lichtenstein *et al.*, 2006).

While there are merits in each of the previously mentioned schools of thought on leadership, this study draws on Complexity Leadership Theory and Ambidextrous Leadership Theory as a lens to make sense of complex adaptive systems in companies. This study thus endeavours to contribute to the discourse on enabling practices of leadership, with particular reference to creating and managing adaptive spaces for innovation in business and the SDGs.

In addition, this study aims to contribute to the leadership discourse in two distinct ways. Firstly, by responding to the calls made by scholars such as Dinh *et al.*, 2014 and Uhl-Bien & Arena, 2018, to explore ‘how’ leaders stimulate evolving processes that enable innovation and organisational adaptability.

Secondly, this study aims to specifically expand on Complexity Leadership Theory and Ambidextrous Leadership Theory. According to Uhl-Bien *et al.*, (2007) Complexity Leadership Theory “implies that leadership only exists in, and as a function of interaction”. This study will offer a practical and qualitative description of the execution of enabling leadership (Uhl-Bien & Arena, 2017). The uniqueness of this study is in examining how agile leaders influence processes, which enable innovation in response to the SDGs.

2.8.5 WHAT IS COMPLEXITY?

An attempt to define or explain complexity typically evokes a range of diverse ideas and intuitive concepts (Gell-Mann, 2002:13). For example, complexity could be associated with “a novel complex if it had many different subplots, scenes, and characters” (Gell-Mann, 2002:13). Similarly, an international conglomerate would be considered as complex if it has international branches and multiple management styles and products (Gell-Mann, 2002:13).

However, for the purposes of this study, the author draws on the definition that “Complexity is about rich interconnectivity. Adding the word “rich” to interconnectivity means that when things interact, they change in unexpected and irreversible ways” (Uhl-Bien & Arena, 2017:9). Scholars studying complexity generally make the distinction between complexity and complicated (Uhl-Bien & Arena, 2017:9). An example used by scholars Uhl-Bien and Arena (2017) to explain the difference between complexity and complicated is the difference between the jumbo jet and mayonnaise. According to Uhl-Bien and Arena (2017) the “jumbo jet is complicated but mayonnaise is complex” (Uhl-Bien & Arena, 2017:9). In the case of the jumbo jet, if you add parts to the jet it makes for a larger jet however the original mechanism does not change - a wheel remains a wheel” (Uhl-Bien & Arena, 2017:9). There might be many different parts, but in the complicated systems “when the parts interact, they do not change each other” (Uhl-Bien & Arena, 2017:9). While on the other hand, when you combine ingredients such as eggs, oil and lemon to make mayonnaise, the ingredients are essentially transformed making it impossible to go back to its original elements (Uhl-Bien & Arena, 2017:9). Thus, in complexity systems, its components are not decomposable back to its unique form (Uhl-Bien & Arena, 2017:9).

Complexity prevails in every aspect of daily life. According to Uhl-Bien and Arena’s (2017) exposition on the theory of complexity, unexpected outcomes, or what they call emergence, manifest when networking or interactions lead to unexpected connections and outcomes.

For example, the Coronavirus (COVID-19) pandemic is an example of an unprecedented global emergence event. The world had experienced previous complexities such as the 2007-2008 financial crisis which wreaked havoc in financial markets. However, no prior experience could prepare the global community for the magnitude and impact of the novel coronavirus.

Global leaders were required to navigate uncharted waters. Undoubtedly, the COVID-19 pandemic exacerbated the challenges outlined in the SDGs and ESG

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principles. Moreover, it tested the ethical basis of choices and corporate appetite for innovation in response to emerging social, economic and environmental challenges (He & Harris, 2020:176). Corporates came under greater pressure to balance short-term gains with long-term sustainability (He & Harris, 2020:177). The world now operates in a very different way with a new reality while yearning for semblance of pre-COVID-19 “normality”.

The COVID-19 pandemic presents a useful context within which to examine how leadership practices influence corporate commitment to address complex problems (He & Harris, 2020:76). Corporates might be overwhelmed by the lack of clarity and speed at which complexities emerge and its concomitant demand for change (Uhl-Bien & Arena, 2017:9). Uhl-Bien and Arena (2017:9), proffered a useful approach to complexity, namely, to equip organisations and individuals with an alternative perspective to make meaning and to lead in a complex world (Uhl-Bien & Arena, 2017:9). Scholars such as Eisenhardt, Furr & Bingham, 2010; Uhl-Bien & Arena, 2018; Worley and Lawler, 2010, suggest that understanding “how to manage innovation and adaptability in dynamic contexts” (Bäcklander, 2019) is critical, hence it is at the top of the research agenda (Eisenhardt *et al.*, 2010; Uhl-Bien & Arena, 2018; Worley & Lawler, 2010).

Multi-level complexity is evident across industries driven by underlying influences such as “greater interconnectivity and redistribution of power resulting from information flows that are allowing people to link up and drive change in unprecedented ways” (Uhl-Bien & Arena, 2017:10). Despite complexity happening at a rapid speed, whether on a social, environmental or political level, many companies are “ill prepared to respond to these threats” (Uhl-Bien & Arena, 2017:10).

This presents a major challenge for leadership fixated on the demands at hand which are mostly concerned with daily productivity in the main business while competition in the market threatens that business. Nonetheless, it is hardly likely that any major sector will escape one or the other form of disruption. This includes the mining sector with significant complexity around issues such as environmental,

social, governance (ESG) and technological disruption, infusing a significant amount of uncertainty.

2.8.6 COMPLEXITY LEADERSHIP THEORY

Complexity Leadership transcends the traditional view of leadership from the perspective of an individual leader to that of a systems perspective without reducing the significance of “leadership as an organizational phenomenon” (Lichtenstein *et al.*, 2006:3). Influenced by complexity science, the Complexity Leadership Theory provides a unique framework to conduct leadership research anchored in complex adaptive systems (Lichtenstein *et al.*, 2006:3).

A key differentiator between complex adaptive systems and bureaucratic systems is the nature of relationships. In complex adaptive systems relationships are generally defined by interactions among multiple agents across networks versus the more linear relationships in traditional bureaucratic systems (Lichtenstein, *et al.*, 2006:3).

Scholars point out that “a complex adaptive system is a dynamic system that is able to adapt in and evolve with changing environments” (Uhl-Bien & Arena, 2017:11). Mining companies seeking to innovate and transform business models to align with SDGs and ESG principles can be viewed as complex adaptive systems.

In the complex adaptive systems paradigm, leadership is understood as an emergent event rather than a person. In doing so, leadership is viewed as “distributed” leadership rather than only focusing on an individual (Brown & Gioia, 2002; Gronn, 2002). This means leadership is viewed as the interactive dynamic in which an individual participates as either a leader or a follower at various stages of a process and for different reasons.

Therefore, leadership is not confined to managerial roles, but evident in emergent interactions in the system between diverse agents (Marion & Uhl-Bien, 2001, 2003). Given this paradigm, Complexity Leadership Theory focuses on understanding and describing “conditions and dynamic processes of these interactions and the emergent phenomena” Lichtenstein *et al.*, 2006:3).

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In line with the complex adaptive systems paradigm, the organisations that endure, are those that are fluid, self-organising structures that make provision for adaptation and change (Uhl-Bien & Arena, 2017:12). Scholars argue that “leadership for adaptability differs from leading change in that, rather than focusing on how leaders can drive change top down...it addresses how leaders can position organisations and the people within them to be adaptive in the face of complex challenges” (Uhl-Bien & Arena, 2018:89).

The Complexity Leadership Framework comprises three distinct components namely Administrative Leadership, Adaptive Leadership and Enabling Leadership (Mäkinen, 2018). In the Complexity Leadership Framework, leadership is viewed as an interactive process between these three components (Mäkinen, 2018).

2.8.6.1 Administrative Leadership

Administrative Leadership, characterises the “traditional, bureaucratic, and hierarchical type of leadership” (Mäkinen, 2018:136). It is also referred to as “operational leadership” (Bäcklander, 2018:43). However, for the purposes of this study the term ‘administrative leadership’ will be used.

Developing a vision, delegating responsibilities and enforcing strategy are some examples of Administrative Leadership practices (Mäkinen, 2018). This form of leadership is often vested in a hierarchical position which is accompanied with the power, allowing for top-down decision making on behalf of the organisation (Bäcklander, 2018:43). In an organisation, this form of leadership characterises the official structure and order (Bäcklander, 2018:43). In addition, this type of leadership leans towards aligning systems and processes to effectively operationalise ideas and produce effective outcomes or products (Uhl-Bien & Arena, 2017:14).

Operational leadership is the formal design and alignment of systems and processes for efficiently executing ideas and converting them into productive outcomes. Complexity Leadership Theory recognises these practices as important for creating stable organisations (Mäkinen, 2018). While appreciating the importance of the stability which bureaucracy generates in organisations, it should

simultaneously create an environment for exploration and innovation (Mäkinen, 2018).

2.8.6.2 Adaptive Leadership

Adaptive Leadership is fluid and not an individual role but rather a complex dynamic which is a “distributed, collective process” (Bäcklander, 2018:44). It is also referred to as ‘entrepreneurial leadership’ (Bäcklander, 2018:43), however this study refers to it as ‘Adaptive Leadership’.

Adaptive Leadership is characterised as an interactive type of leadership that underlies “emergent change activities” (Mäkinen, 2018:137). Scholars noted that “adaptive change is produced by the clash of existing but (seemingly) incompatible ideas, knowledge, and technologies; it takes the form of new knowledge and creative ideas, learning, or adaptation” (Mäkinen, 2018:137). Therefore, it is important for organisations to create adaptive spaces to grow and evolve.

Scholars such as Arena, Cross, Sims and Uhl-Bien (2017; 2018) define adaptive space as “the network and organisational context that allow people, ideas, information and resources to flow across the organisation and spur successful emergent innovation.” In an adaptive space, innovative ideas and data are shared across an organisation (Arena, Cross, Sims & Uhl-Bien 2017: 40). Adaptive space is when ideas are enabled to move into the operations of the organisation (Arena, Cross, Sims & Uhl-Bien 2017: 40). These ideas are developed in the “entrepreneurial pockets of an organization” and manifests in new products and services that result in advancing the organisation (Arena, Cross, Sims and Uhl-Bien 2017: 40). This adaptive space provides an organisation with opportunity for novel ideas, “innovation, learning and growth” (Uhl-Bien & Arena, 2017:14).

Companies can create adaptive spaces by generating an environment where information flows are inspired and “idea discovery, development and amplification” are enriched (Arena, Cross, Sims & Uhl-Bien 2017: 40). Drawing on the Complexity Leadership Theory, this study will explore leadership practices in mining companies which seek to enable and adapt to sustainability as guided by the SDG and ESG

frameworks. In particular, this study aims to contribute to the leadership discourse and share lessons on enabling and adaptive leadership.

2.8.6.3 Enabling Leadership

Enabling Leadership manifests in the context of balancing administrative and adaptive leadership (Uhl-Bien & Marion, 2009 and Uhl-Bien *et al.* 2007). It considers leadership approaches to creating environments that are ideal for “problem-solving, adaptability, and new learning” (Mäkinen, 2018:137). Exploration and exploitation of new ideas are key determinants of innovation. Enabling Leadership transpires across hierarchical levels and includes the ability to ease the “tension between exploration and exploitation” of ideas (Schulze & Pinkow, 2020).

Enabling Leadership practice can be stimulated by “(1) fostering interaction, (2) fostering interdependence, and (3) injecting adaptive tension to help motivate and coordinate the interactive dynamic” (Uhl-Bien, Marion & McKelvey; 2007:309). Enabling Leadership creates conditions which support and sustain adaptive spaces (Uhl-Bien & Arena, 2017:14). Enabling Leadership can assist companies to be “agile in the face of complexity (i.e., operate complex adaptive systems)” if the interaction between administrative and adaptive leadership is engaged appropriately (Uhl-Bien & Arena, 2017:14).

Ideally, leaders with a high rate of agility would be able to have the ability to move between these three components of Complexity Leadership Theory, as reflected in Figure 5 below. Allowing for these different components to influence thinking that will assist in introducing and advancing new ideas into the system that will result in a new adaptive order (Uhl-Bien & Arena, 2017:14).

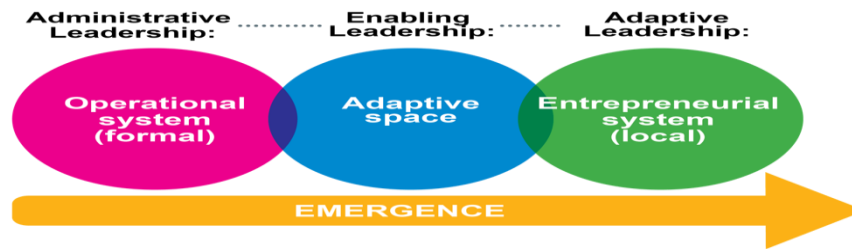


Figure 5: Complexity Leadership Model

Source: Adapted from Uhl-Bien & Arena

2.8.3 AMBIDEXTROUS LEADERSHIP THEORY

In the above-mentioned section, Complexity Leadership Theory placed emphasis on encouraging the creation of adaptive spaces for new ideas and innovation to advance in an organisation. Innovation is argued to be critical to an organisation's growth and sustainability (Rosenbusch *et al.*, 2011). Scholars such as Hammond *et al.*, (2011) and Shalley *et al.*, (2004) maintained that innovation is an outcome of "individual factors (e.g., cognitive abilities, personality and motivation) and contextual factors (e.g., work characteristics and leadership) (Zacher & Rosing, 2015:54). Studies done by Eisenbeiss *et al.*, (2008); Mumford *et al.*, 2002; Oldham and Cummings, 1996; Tierney and Farmer, 2002; Tierney *et al.*, 1999, all propose that leadership is a critical precursor of innovation.

Despite this finding, scholars Rosing *et al.*, (2010, 2011) argue that there remains ambiguity around which leadership behaviours are envisaged to be the best for innovation. Building on the work done by Rosing (2011), this study will employ Ambidexterity Theory as part of its leadership framework to explore leadership behaviour conducive for stimulating innovation in the mining sector.

The meaning of the word ambidexterity is "the ability to use both hands equally" (Zacher & Rosing, 2015:54). Therefore, with respect to organisations the

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Ambidexterity Leadership Theory underscores an organisation's capacity to simultaneously balance between exploitation of present organisational abilities and exploration of future prospects (Rosing *et al.*, 2011)

Ambidextrous Leadership for innovation involves “opening leadership behaviour to encourage explorative behaviour, closing leadership behaviour to encourage exploitative behaviour” (Rosing, Frese & Bausch, 2011). Thus, an ambidextrous leader would be able to foster an environment where their “followers attempt to be ambidextrous” themselves (Rosing *et al.*, 2011, 957). However, the Ambidexterity Leadership Theory also recognises the tension and paradoxes that occur with innovation (Miron-Spektor *et al.*, 2011; Miron-Spektor *et al.*, 2004).

The main idea behind the Ambidexterity Leadership Theory is that “the complexity of innovation activities needs to be matched by an equally complex leadership approach” (Zacher & Rosing, 2015:54). Thus, suggesting that balancing two leadership behaviours, namely, opening and closing behaviours can contribute to individual and team innovation, signifying that innovation is at its peak when both behaviours are high. (Rosing *et al.*, 2011). This means that when leaders can practice both these behaviours, their ability to encourage innovation amongst their followers should be high. Furthermore, Ambidextrous Leadership Theory postulates that in using both these leadership styles, there is a greater chance of success with encouraging innovation amongst followers and teams, rather than just using one leadership style such as Transformational Leadership (Zacher & Rosing, 2015:54).

Opening leadership behaviours are concerned with encouraging followers to question the status quo, obtain new ideas and to apply creativity (Rosing *et al.*, 2011; Zacher & Rosing, 2015:54). Thus, getting employees to do things differently and to experiment, leads to exploration activities (Zacher & Rosing, 2015:55). On the other hand, closing behaviours reduce variance in follower behaviours by “taking corrective actions, setting specific guidelines, and monitoring goal achievement” (Rosing *et al.*, 2011). Therefore, resulting in what Ambidexterity Leadership Theory refers to as closing behaviours underpinned by exploitation activities (Zacher & Rosing, 2015:55).

Ambidextrous Leadership Theory is the combination of interventions that stimulate both explorative and exploitative behaviours in employees (Rosing *et al.* 2011:957). In the Ambidextrous Leadership paradigm, opening and closing behaviours are closely associated with team innovation.

To be precise, the approach involves employing the notion of requisite complexity, which asserts that an organization's internal responses must match the complexity of external stimuli (Boisot & McKelvey, 2010). Scholars argue that ambidexterity necessitates maintaining elevated levels of both exploration and exploitation (Havermans, Den Hartog, Keegan & Uhl-Bien, 2015). However, the emphasis on either exploration or exploitation continually changes in response to the complexity of environmental stimuli as perceived by the organization's leaders, among others. In essence, the focus remains on consistently achieving or restoring concurrent high levels of both exploration and exploitation (Havermans, Den Hartog, Keegan & Uhl-Bien, 2015).

Previous studies on leadership for ambidexterity have predominantly focused on relatively stable traits of leaders or groups, such as transformational leadership, behavioural integration, and trust and discipline among followers (Adler *et al.*, 1999; Cao, Simsek, & Zhang, 2010; Jansen, George, Van den Bosch, & Volberda, 2008; Jansen *et al.*, 2009; Lubatkin, Simsek, Ling & Veiga, 2006; O'Reilly & Tushman, 2008). However, there has been a call for research that considers the role of context, specific leadership practices, and the dynamic nature of leadership in achieving ambidexterity (Boumgarden *et al.*, 2012; Carmeli & Halevi, 2009).

In response to these calls, the study explores leadership for contextual ambidexterity as a dynamic process of dealing with complexity (Uhl-Bien, Marion, & McKelvey, 2007). The researcher investigates how leaders, in their pursuit of contextual ambidexterity, endeavour to influence how others think and behave (Stacey, 2010) in response to the complexity of environmental stimuli. In doing so, the study is focussed on understanding the intricate dynamics at play and how

leadership practices adapt to address the challenges arising from a complex environment.

This study strives to test the Ambidexterity Leadership Theory for innovation in the behaviour of senior business leaders in mining companies. Its purpose is to expand on leadership and innovation literature in mining companies by illustrating what leadership practices are used to stimulate high levels of both opening and closing behaviours practised by leaders. Later in this study, further discussions about the findings and future directions for potential research will be highlighted. Moreover, the findings are likely to stimulate novel insights on leadership training which focus on balancing leadership behaviours to inspire innovation amongst employees. Furthermore, this study is concerned with innovation, particularly innovation in mining companies, which leads to addressing some of the complex challenges outlined in the SDGs and ESG principles.

Given the nature and complexity of an organisation pursuing innovation and transformational change, Complexity Leadership Theory and Ambidextrous Leadership Theory are complementary as both offer a suitable research lens to make sense of how companies and leaders navigate the nuances induced by change and innovation. These theories will assist with understanding leadership practices at a company level that creates a climate for enabling leadership.

Despite each of these leadership theories being extensively explored in their own right, there remain gaps in the literature which explore the link and interrelatedness of these leadership theories with innovation, in particular the SDGs and ESG in the mining sector. This confirms the importance of this research which could be of value and interest for business leaders, researchers, policy makers and sustainability practitioners.

2.9 LEADERSHIP AND SDG INTEGRATION

The integration of the SDGs and ESG principles into business practices will largely depend on the willingness of business leaders to do so. It is encouraging to see that according to the 2019 Edelman Trust Barometer, released by United Nations Global

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Compact (UNGC), there is a high commitment to sustainability. 92% of the CEOs surveyed, indicated that “integration of sustainability will be important to the future success of their businesses” (UNGC, 2019). Despite this significantly high commitment, in reality there appears to be a discrepancy with only 48% of CEOs indicating that they are employing sustainability strategies in their business operations. At the same time only 21% of the CEOs reported that businesses is performing a crucial role in reaching the SDGs (UNGC, 2019).

This begs the question whether businesses are innovating and adapting in order to contribute to fulfilling the SDG and ESG mandate. More importantly, it raises the question as to whether business leaders are creating enabling environments for innovation and adaptability to take place. In particular, crafting adaptive spaces which allow for innovation that supports sustainability and contributes to the delivery of the SDG and ESG principles. Business leaders are thus presented with opportunities and a responsibility to step up and to do their part (UNGC, 2019).

2.10 KEY ISSUES IDENTIFIED – LEADERSHIP LITERATURE

As discussed earlier, there are multiple definitions of leadership. This study leans towards the definition which describes leadership as a dynamic process where leaders mobilise “others to get extraordinary things done” (Northouse, 2016). The researcher believes that this is a critical enabler for innovation in business.

Leadership theories have evolved over many decades. The Great Man Theories and Trait Theory paradigm dominated for many years. A key principle of these theories is that leadership is innate. It advocated that leaders are born with particular characteristics which predestined them for leadership. While the Trait Theory enjoyed strong support for several decades, the value of this approach diminished as its focus on the individual characteristics of leaders proved less valuable in making sense of leadership.

The Behavioural Theories which followed introduced a shift which emphasised the impact of leadership actions or behaviour on followers, rather than the physical, emotional or psychological attributes of leaders. This theory introduced the notion

that leaders could be trained and that it was not reserved for an elitist group born with defining characteristics. The Behavioural Theories paradigm was a welcome shift in the leadership discourse as it introduced a perspective that leaders could be trained for the future.

Behavioural Theories also drew attention to leadership styles. According to Behavioural theorists, consideration behaviours is a style which demonstrates respect for people and an interest in relationship behaviours, while initiating behaviours involves styles which are concerned with how a leader's structure guides and outlines the different roles of subordinates, in attaining optimal organisational performance (Nawaz and Khan, 2016; Deshwal, & Ali, 2020). The latter has a strong correlation with Administrative Leadership, a component of Complexity Leadership Theory.

Contingency Leadership Theory, built on Behavioural Theories, ushered in the notion that the success of a leader is reliant on the fit between the leadership style and the nature of the context. Situational Leadership Theory expanded on the Contingency Leadership paradigm. Whereas both the "Great Man" and the Trait Leadership theories essentially promoted a one-size-fit-all approach, Contingency Theory and Situational Leadership introduced new variables by assessing and adjusting leadership styles in relation to different contexts. The latter two theories are very similar and serve as a useful lens to match people with leadership positions (Russel, 2010). Importantly, the Contingency approach provided an opportunity to expand the research lens for exploring effective leadership.

Transformational and Transactional Leadership Theory signalled a significant shift in the discourse. These theories are two of the most influential leadership theories (Mhatre *et al.*, 2014; Le & Lei, 2019) and continue to enjoy strong appeal due to its scope and consideration for the impact on followers (Cameron & Green, 2017). In addition to the impact on followers it also introduced a focus on organisational culture. Typically, transformational leaders are described as being charismatic, inspirational and encouraging followers to be creative and attentive to problem solving. There is a link between Transformational and Enabling Leadership as the

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latter is concerned with stimulating environments which motivates followers to problem solve, adapt and embrace new learning.

Transactional Leadership is underpinned by rewards and rules, and leans more towards maintaining the status quo instead of stimulating change (Cameron & Green, 2017). Transactional Leadership is generally defined as a leadership style whereby the relationship between a leader and follower is grounded in a range of exchanges or bargains (Howell & Avolio, 1993). The rewards, rules and transactions associated with Transactional Leadership could be likened to Administrative Leadership. It can be assumed that the rules lend itself to structure which could create a system which encourages innovation. Hence there is value in exploring the correlation between the rewards system and innovation in a company.

The literature importantly distinguishes between leadership and management, as these two terms are also often used interchangeably in the work environment which can result in confusion (Kotterman, 2006:13). A useful distinction is that management is preoccupied with “order and consistency to organisations” while the main function of leadership is to “produce change and movement” (Northouse, 2016:13). This study takes the view that both management and leadership are needed in companies.

The difference between leadership and management could be compared to the opening and closing behaviours expounded in Ambidextrous Leadership Theory. Opening leadership behaviour is concerned with encouraging followers to question the status quo and obtain new ideas and apply creativity (Rosing *et al.*, 2011; Zacher & Rosing, 2015:54). On the other hand, closing behaviours seeks to reduce variances in follower behaviours (Rosing *et al.*, 2011). In order to foster innovation, both opening and closing leadership behaviours are required in the same way as companies require both leadership and management.

Given the responsibility and ultimate accountability of top management for influencing strategic decision-making, direction and the future outcomes of a company (Cortes & Herrmann, 2020), the literature reflects on various attributes of

top management. In addition, the literature focuses on Strategic Leadership as a critical factor in a company's appetite and process for innovation.

Many scholars, practitioners and policy makers assert that leadership and innovation are critical for economic growth and industrial change (Boyne *et al.*, 2006). This study takes account of typologies in innovation, in particular the input and output measures for innovation and leadership as critical variables within mining companies.

Given its resources, the world has vested its hope in the innovative power of the business sector to address the complex global challenges (Muff *et al.*, 2017; Scheyvens *et al.* 2016; Sullivan *et al.* 2018). In particular, businesses across the globe are challenged with aligning their practices and operations to the SDGs and ESG principles at a time of enormous complexity and uncertainty (Uhl-Bien & Arena, 2017:9). Thus, radical change and innovation is imperative (Nylund *et al.*, 2021) which demands leadership, fundamental transformation and the refocusing of business operations in response to the complexity whilst remaining sustainable.

The type of leadership practices and processes assumed by business leaders in companies remains critical for innovation which in return can unlock closer alignment with the SDGs and ESG principles. Transformational Leadership is considered a critical leadership style impacting innovation (Le & Lei, 2019). Complexity Leadership offers the leadership discourse a unique lens which moves the sole focus from the individual leader to a more nuanced approach of understanding leadership and innovation within the context of organisational processes. Lastly, Ambidextrous Leadership offers a framework for analysing leadership for innovation from the perspective of encouraging opening leadership behaviour which seeks to explore versus closing leadership behaviour which seeks to exploit (Rosing, Frese & Bausch, 2011).

2.11 CHAPTER SUMMARY

This chapter reflected on definitions of leadership and noted the absence of a universally agreed upon definition of leadership. However, this study leans towards

the definition which describes leadership as a dynamic process where leaders mobilise "others to get extraordinary things done" within an ever-changing environment which requires adaptability, transformation enabling and innovation (Northouse, 2016).

In addition, this chapter examined salient leadership theories which dominated the discourse between 1840 and 1980. Given the limitations of each of the theories and the nature of complexity which has marked the 21st Century, the chapter explored more modern leadership theories, namely, Complexity Leadership Theory and Ambidextrous Leadership Theory as the research lens for this study. This lens is particularly relevant as business leaders face enormous complexity and increasing pressure to demonstrate competitiveness in a volatile and unpredictable market while limiting companies' environmental footprint and enhancing impact in communities in which they operate.

Navigating the complexity which comes with innovation and sustainability is complicated and influenced by many factors. Therefore, it is not surprising that there is no single theory of leadership to explain enabling leadership for innovation in addressing the SDGs and ESG principles. This research aims to develop the understanding of the practices and processes that enables senior business leaders in the mining industry to successfully use innovation to meet the SDGs and ESG targets. It is important to understand how senior leaders develop the environment for this adaptability. This study seeks to understand current leadership practices and processes with respect to innovation, SDGs and ESG principles, in one of the most environmentally and socially sensitive sectors – the mining sector. An overview of the South African mining industry is presented in the following chapter.

CHAPTER 3

3. SUSTAINABLE DEVELOPMENT GOALS AND ENVIRONMENT, SOCIAL AND GOVERNANCE

3.1. INTRODUCTION: SDGs and ESG

Increasingly society is calling for a more sustainable development approach which demands more conscious business practices and leadership. With unexpected events like the global spread of COVID-19, US stock market meltdowns, locust plagues in Africa, and corporate fraud scandals like Luckin Coffee have raised global concerns about environmental, social and governance (ESG) issues (Li, Wang, Sueyoshi, & Wang, 2021: p1). This has reignited discussions about sustainable and comprehensive development worldwide (Li, Wang, Sueyoshi & Wang, 2021: p1).

To address the severe sustainability problems in the environment, society, and financial markets, international organisations and countries have proposed the development and implementation of SDG and ESG action plans to establish a sustainable and comprehensive development framework for human society (Li, Wang, Sueyoshi, & Wang, 2021: p1). Both concepts are essential to comprehend the advancement and influence of the sustainable development discussion and actions within the business environment. Therefore, in order to appreciate and make sense of what is required from businesses and business leaders, this study appreciates the literature concerning both SDGs and ESG principles and practices.

As discussed in the previous chapter, exploring leadership practices and processes is critical in order to achieve greater alignment and impact with respect to the SDG and ESG implementation. Both concepts are critical for understanding the progress and impact of the sustainable development debate and practices within the business context. Therefore, in order to appreciate and make sense of what is required from

businesses and business leaders, this chapter reviews and summarises the literature related to the SDGs and the ESG principles.

Likewise, this chapter presents a background to the SDGs and ESG, the related trends and the pertinent debates regarding these concepts within the mining sector. This chapter also provides an analysis of the factors that impact the practical implementation and integration of the SDGs and ESG while discussing the concepts in detail.

Lastly, this chapter takes a closer look at the links between SDGs, ESG, innovation and leadership. Thus, providing a bridge between these important constructs which are often discussed in isolation.

3.2. BACKGROUND OF SUSTAINABLE DEVELOPMENT GOALS

Sustainable Development is not a new concept. The debate evolved over decades, long before the official Brundtlandt definition, which highlights that Sustainable Development is “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (Weybreacht, 2017:84).

The SDGs (as shown in Figure 6 below) were adopted in 2015 by global leaders as a universal call for action “to end poverty, protect the planet and ensure that all people enjoy peace and prosperity by 2030” (Courtouis, 2019). It shifted the prevailing discourse in Sustainable Development by introducing the moral principle that ‘no one should be left behind’ (United Nations, 2020).



Figure 6: The Sustainable Development Goals

Source: United Nations, 2015

The 17 SDGs and its 169 targets cover interrelated components of Sustainable Development inclusive of the economy, society and the environment (Ramutsindela & Mickler, 2020:2). The adoption of the SDGs followed the end of the Millennium Development Goals (MDGs) in 2015, which were arguably relatively successful as the biggest “global anti-poverty push in history” (Pedersen, 2018:22). The MDGs were mainly aimed at developing countries and created momentum for decreasing the “extreme world poverty by 50%” (Pedersen, 2018:22).

Contrary to the MDGs, which were constructed by the UN Secretariat (Ramutsindela & Mickler, 2020:2), the crafting of the SDGs was the outcome of a widely-consultative international process, which included stakeholders such as governments, non-governmental organisations (NGOs) and notably, business (Weybrecht, 2017:84). The core principle of ‘leaving no one behind’ had thus been inherent to the SDGs since its ideation with multiple stakeholders which included business who played an important role in its conceptualisation and planning of the SDG agenda. The SDGs are particularly important for companies because they are currently dealing with a loss of credibility and are searching for ways to re-establish their role in society (Lashitew, 2021:185). The clearest instance of this can be seen

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in the 2019 declaration on the "Purpose of a Corporation" by the Business Roundtable, which is comprised of top American companies (Lashitew, 2021:185). This commitment, which was endorsed by the CEOs of 181 influential organisations such as Amazon, Apple and JP Morgan Chase, pledge that these leaders will prioritise the well-being of all stakeholders, including customers, employees, suppliers, communities and shareholders, when managing their companies (Lashitew, 2021:185).

Nonetheless, given the intractable nature of the sustainability challenges, it is apparent that the Sustainable Development Agenda should be of equal importance to governments and the private sector (Pederesen, 2018:22). Private sector plays a critical role in the Sustainable Development agenda, as the profits of multinational companies, supported by international supply chains, often surpass the gross domestic product (GDP) of several countries (Pederesen, 2018:22). Moreover, in the process of designing, producing and delivering its goods and services, private sector value chains have a significant influence on social and environmental performance. Therefore, it is undeniable that the success of the Sustainable Development agenda cannot take place without engagement with and contributions from the private sector (Pederesen, 2018:22).

The SDGs embody various characteristics that make it an effective tool for companies to engage in global development (Lashitew, 2021:185). Firstly, their universality makes it easier for companies and other entities, that are typically uninvolved in development discourse and practices, to become more engaged with social and environmental issues (Lashitew, 2021:185). The growing trend of companies adopting SDG-related targets demonstrates this, as evidenced by a 2019 report by PricewaterhouseCoopers (PWC) which states that 72% of a global sample of 1410 companies reported engaging with the SDGs in various ways (Lashitew, 2021:185). Additionally, the SDGs offer a useful framework for communication among different stakeholders, which serves as a common language and facilitates discussion and cooperation between sectors (Florini & Pauli, 2018). The SDGs allow companies to communicate their social and environmental achievements using a commonly used language which is understood governments, regulators and the

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media (Schönherr *et al.*, 2017). Additionally, the SDGs are practical and specific, making them valuable for measuring progress using tangible indicators (Lashitew, 2021:185). Van Zanten and Van Tulder (2018) assert that 126 of the 169 SDG targets are quantifiable and can be measured. This simplifies the process of evaluating performance on a larger scale, but it is still difficult to measure and assign responsibility for outcomes at the individual level (Lashitew, 2021:185).

According to the UN's Sustainable Development Goals Report 2019, "international business organisations such as the World Business Council on Sustainable Development, embrace the concept of SDG transformation" (Sachs, Schmidt-Traub, Kroll, Lafortune, Fuller, 2019:viii). Additionally, this Report indicates that the world is fast falling behind and no country is on the path to achieving all the goals (Sachs, Schmidt-Traub, Kroll, Lafortune, Fuller, 2019:viii). The Report emphasises that the slow advancement and policy alterations are not adequate – society requires significant transformation to meet the SDGs and the United Nations Framework Convention on Climate Change 2020 (Paris Climate Agreement) (Sachs, Schmidt-Traub, Kroll, Lafortune, Fuller, 2019:viii). The Paris Climate Agreement is aimed at addressing climate change and strengthening activities and resources for a reduced carbon footprint, however this study will only focus on the SDGs and ESG and not the Paris Agreement.

Notwithstanding, the increase in awareness in respect of the SDGs and the efforts being made by businesses to incorporate the SDGs into their business strategies, the GlobeScan and Sustainability Survey (2019), found that the private sector makes "the poorest contribution to Sustainable Development world-wide".

Government and business are the two institutions that can have a significant impact, positive or detrimental, on society and the environment (PwC, 2019:4). In order for the efforts of the private sector to have a significant impact, it has been conjectured that the private sector will have to invest an estimated \$5-7 trillion (US) per annum to ensure the global goals are achieved (PwC, 2019:4). Along with such an investment, business leaders should anticipate a rise of attention from stakeholders, such as employees, customers and investors with respect to addressing the SDGs (PwC,

2019:4). According to the PwC Global Sustainability and Climate Change Leader, Malcolm Preston, “once CEOs and senior leadership are on board, momentum builds quickly in tandem with the opportunity to drive real change” (PwC, 2019:4).

In recent years, several approaches or frameworks to implement the SDGs have emerged from recommendations on integrated reporting. An example of such a framework is the SDG Index Report which strives to serve as a Blueprint for Business Leadership on the SDGs (United Nations Global Compact, 2020). However, these normative frameworks lack in-depth analysis that unpacks and appreciates the complexities that business leaders have to navigate when driving the SDG agenda in companies. Therefore, there is a need for further research which explores and appreciates leadership for adaptability and its important significance in business practices. (Uhl-Bien & Arena, 2018:90).

3.3. EVOLUTION: SUSTAINABLE DEVELOPMENT

The SDGs framework is underpinned by the evolution of the concept of Sustainable Development that evolved over many years. History reveals that the notion of sustainable development, the role of business and the impact of its operations on communities and the environment has been an ongoing debate over decades.

As such scholar Ken Peattie (2008) points out, the parameters to curb the impact of business on the society and the environment is not new. In fact, he argues that measures to reprimand offenders date back as far as 3000 years ago to ancient Mesopotamia (Peattie, 2008). For example, rules of conduct were introduced by King Hammurabi that included repercussions for negligent operations when building or farming was undertaken (Russel, 2010). This supports the notion that business even as far back as ancient Mesopotamian times has always had an obligation to behave in a responsible manner towards its environment.

Moreover, Chaffee (2017) demonstrates in his work that monitoring the impact business had on communities’ dates as far back as the ancient Roman Laws. For example, the scholar traced companies’ role and support for “asylums, homes for the poor people and old, hospitals and orphanages” (Chaffee, 2017). His work confirmed

businesses' contributory role to social development and the well-being of those less fortunate in the communities they operate. It was Adam Smith, a prominent 17th century scholar, in his seminal book *The Wealth of Nations*, who argued that profits and efficiency, hold inherent benefits for society (Lantos, 2001). These benefits according to Smith included creating wealth and maximising liberty which in return serves the common good of society (Lantos, 2001). Although these arguments were made centuries ago, it remains relevant for exploring the role and responsibility of business in society today.

In the following section the philosophical concepts of Sustainable Development are analysed in order to understand the development of ethical business behaviour.

3.4. PHILOSOPHICAL CONCEPTS: SUSTAINABLE DEVELOPMENT

As discussed previously, the idea of business and its relationship with the environment has evolved over centuries. This is evident in the earlier philosophical contributions to the concept of Sustainable Development by past researchers. Scholars such as Somerville (1862) and Marsh (1865) grasped the significance of conservation and the consequences of environmental meddling and exploitation for the general welfare of humankind (Ramlogan, 2011).

Earlier on, especially with the rise of industrialisation, these scholarly contributions provided the basis for the expansion of "conservationism as a philosophical underpinning of environmentalism" (Ramlogan, 2011). The growing conservation movement at the time believed in the notion of sustainable development grounded in scientific principles to encourage the responsible utilisation of natural resources (Hays, 1965). During the latter part of the 20th century, the concept of limitless growth came under sharp scrutiny (Ramlogan, 2011). An important study namely 'Limits to Growth' commissioned by the Club of Rome in the 1970s, found that ecosystems could not assist unrestricted growth and that there was a need for policies to control the growth in order to attain environmental and economic balance (Meadows, Randers & Meadows, 1972). Hence, the influence of the conservation movement continues to prevail in environmental philosophies and is embodied in the construct of 'sustainable development' (Ramlogan, 2011).

Sustainable Development has its genesis in two distinct environmental philosophies namely, environmental economics and the concept of future generational trust (Ramlogan, 2011).

The environmental school of thought advocates that normal economic principles can be applied within the present public decision-making structure to accommodate environmental difficulties and processes (Ramlogan, 2011). At the heart of this logic, is the provision for environmental challenges without considerable deviations from the existing neo classical economic rationale, and therefore they advocate for unremitted economic growth (Ramlogan, 2011). However, the cost-benefit approach has been criticised by ecologists as it focuses on the wants of individuals and disregards non-human living species and their inherent value (Ramlogan, 2011). In addition, this approach considers the current generation's preferences and excludes the responsibility to have regard for the impact of current day decisions and actions on future generations (Ramlogan, 2011).

The philosophical concept of generational trust is underpinned by the belief that the earth is entrusted with the current generation to be looked after for future generations (Ramlogan, 2011). Thus, accompanying this notion is the view of intergenerational equity, which argues that people hold "the natural environment of our planet in common with all members of our species including past and future generations" (Ramlogan, 2011, pg.9). This idea is underpinned by three principles.

Firstly, whilst meeting their own needs, generations should protect the multiplicity of natural and cultural wealth in order to prevent overly limiting the choices available for future generations (Ramlogan, 2011). Secondly, maintaining the quality of the earth is the responsibility of each generation in order to ensure that what is handed over to future generations is not poorer than what was received. There should be an intergenerational agreement making it incumbent for each generation to afford its people reasonable privileges of the planet it inherited from previous generations and to protect it for future generations (Ramlogan, 2011).

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The 1970s also saw debates about the different environmental challenges between the North and South. Thus, the Founex Report pointed out that these diverse challenges demand a more comprehensive development strategy that elevates environmental sustainability to greater prominence (Fakuda-Parr and Muchhala, 2019). Along with raising the environmental strategy, the Report recognised resources and international aid as critical enablers to attaining Sustainable Development (Fakuda-Parr and Muchhala, 2019).

Despite debates on Sustainable Development continuing into the 21st century, there is no uniform definition of sustainable development. Sustainable Development, as a more inclusive concept and process, enjoys greater prominence as is reflected in Table 8 below. It appears to have eclipsed the narrow definition as of Sustainable Development being centred on environmental sustainability only, as espoused by scholars like Hart (1995), Starik & Rands (1995) and Opdam (2006).

Table 8 : Sustainable Development is an inclusive Process

AUTHOR	DEFINITION
World Commission on Environment and Development: Our Common Future (WCED, 1987)	“...development which meets the needs of the present without compromising the ability of the future generations to meet their own needs.”
Rees (1991)	“An opportunity for humanity to correct an historical error and develop a gentler, more balanced and stable relationship with the natural world. This view also raises moral considerations such as the need in a limited world for more equitable sharing of the world’s resources.”
Gladwin & Kenelly (1995), Mayer et al., (2004) and Hopwood et al., (2005)	These scholars assert that Sustainable Development includes environmental, economic and social elements to business sustainability.
United Nations Department for Economic and Social Affairs, (2009)	“...promote the integration of the three components of Sustainable Development — economic development, social development and environmental protection — as interdependent and mutually reinforcing pillars. Poverty eradication, changing unsustainable patterns of production and consumption and protecting and managing the natural resource base of economic and social development are overarching objectives of, and essential requirements for, sustainable development.”
Baumgartner and Rauter, (2017)	“Sustainable Development refers to an economic, environmental and social development that meets the needs of the present and does not prevent future generations from fulfilling their needs.”
United Nations 2020	“Sustainable Development has been defined as development that meets the needs of the present without compromising the ability of

AUTHOR	DEFINITION
	future generations to meet their own needs. Sustainable Development calls for concerted efforts towards building an inclusive, sustainable and resilient future for people and planet. For Sustainable Development to be achieved, it is crucial to harmonize three core elements: economic growth, social inclusion and environmental protection. These elements are interconnected and all are crucial for the well-being of individuals and societies.”

Source: Compiled by the author

This study subscribes to a more inclusive definition of Sustainable Development.

While the definition provided by the World Commission on Environment and Development: Our Common Future (WCED, 1987), is authoritative, this concept of Sustainable Development is devoid of practical guidelines in respect of “strategies, plans or activities” to assist business in implementing this normative concept (Baumgartner & Rauter, 2017). Nevertheless, what is apparent is that there appears to be common themes with respect to the debate on sustainability that includes economic considerations and the conservation for future generations (Ramlogan, 2011). This debate continued to evolve into the 19th and 20th century and its progression is analysed below.

3.5. MODERN DEVELOPMENTS IN SUSTAINABLE DEVELOPMENT

A significant breakthrough in the framing of Sustainable Development was the Report “Our Common Future” published in 1987 by the World Commission on Environment and Development (WCED) – the Brundtland Commission. This Report brought together diverse philosophies and laid claim to the term ‘sustainable development’ by defining it as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (WCED, 1987). The Our Common Future Report catapulted the poor to the centre stage as well as the disparity between the consumption and volume levels of developing and developed countries (WCED, 1987). This Report further asserted that the needs of the world’s poor are relative constructs due to being shaped by social and cultural realities. Thus, the Brundtland Commission recommended “the promotion of values that encourage consumption standards, that are within the bounds of the ecologically possible and to which all can reasonably aspire,” and “a

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production system that respects the obligation to preserve the ecological base for development” (WCED, 1987, para 42, 58).

A further milestone was the 1992 Rio de Janeiro UN Conference on Environment and Development (UNCED) and its Platform for Action, Agenda 21. It served as a significant stride in advancing Sustainable Development as it provided guidelines for the realisation of Sustainable Development in the international community (Ramlogan, 2011). Agenda 21 recognises the disparities between the North and South in reaching Sustainable Development and encourages support for developing countries (Ramlogan, 2011). In addition, Agenda 21 highlighted that guidelines and actions were required to develop a global environment “strongly supportive of national development effort” (Ramlogan, 2011:21). Further, Agenda 21 created the platform for goal eight of the MDG and SDG seventeen on global partnerships.

A decade later, in 2002, the World Summit on Sustainable Development and its Plan of Implementation, the Johannesburg Declaration on Sustainable Development, assessed progress on the advancement of Sustainable Development (Ramlogan, 2011, pg. 23). At the Summit, the North-South disparities and the need for the global community to invest in the reduction of inequality in the living conditions in the South, were sources of robust debate (Ramlogan, 2011:21). This Johannesburg Declaration encouraged policies at both national and international levels to overcome the obstacles to Sustainable Development in developing countries (Ramlogan, 2011: 23).

The 1992 UNCED and the 2002 World Summit signalled a clear paradigm shift to a more inclusive definition of Sustainable Development. The 2005 United Nations World Summit Outcome paper describes the “interdependent and mutually reinforcing pillars” of Sustainable Development as the economic development, social development and environmental protection (UN, 2005).

In September 2000, the UNs General Assembly adopted the Millennium Development Goals (MDGs) to be reached by 2015. At the time, the MDGs, which set out to achieve eight measurable developmental goals, were endorsed by 189

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countries. World leaders committed to meet these goals by signing the UN Millennium Declaration. The MDGs included the targets to “eradicate extreme poverty and hunger; to achieve universal primary education; to promote gender equality and empower women; to reduce child mortality; to improve maternal health; to combat HIV/AIDS, malaria, and other diseases; to ensure environmental sustainability; and to develop a global partnership for...” (World Health Organisation, 2020). While the MDGs had limitations, it was the first universal declaration which established clear goals, targets and indicators for development.

The “United Nations Conference on Sustainable Development - or Rio+20 – that took place in Rio de Janeiro, Brazil on 20-22 June 2012” was seminal (UN, 2020). At the time Sustainable Development as an internationally agreed concept had been around since the 1980s, it was framed as pertinent to the environment but did not necessarily incorporate tacit strategies for setting policies on social and economic issues (Fakuda-Parr & Muchhala, 2019:5). It was not until the 2012 Rio + 20 UNCED that Sustainable Development as a key framework was yielded which simultaneously boosted and moulded the mandate to develop the SDGs (Fakuda-Parr & Muchhala, 2019:5).

Despite the view that the SDGs continued to expand and include the MDG poverty agenda, the SDGs also provided an opportunity to test the constraints of the MDGs (Fakuda-Parr & Muchhala, 2019). Although many debated whether to continue with the MDGs post-2015, there was a stronger push to create a “different vision that would be broader, more ambitious and transformative and address crises of rising inequality, persistent poverty, climate change, rising violence and more” (Fakuda-Parr & Muchhala, 2019:5).

“In a world with 7.9 billion humans where, for every 100 people, almost nine are going to bed hungry at night, eight are unemployed, about 10 adults are illiterate and 26 are affected by fragility, conflict or violence, we need targeted disruption from our current existence and way of living to ensure meaningful lives for all people” (Steyn, 2021). As such, there was a strong push by the South in asserting that the MDGs excluded important 21st century complex development challenges and failed to

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challenge the neoliberal economic model as a possible cause and contributory factor to the challenges (Fakuda-Parr & Muchhala, 2019: 5). However, the MDGs were most criticised for its lack of participation and contributions of member states in its formulation (Fakuda-Parr & Muchhala, 2019:5). Furthermore, the 'one size fits all' and subsequent disregard for the local realities of each country was seen as a serious limitation to the MDGs (Fakuda-Parr & Muchhala, 2019:5).

Taking account of the periodic reviews of the MDGs, its limitations and the anticipation that MDGs would conclude in 2015, the UN initiated preparations for a new set of global goals. The UNs General Assembly adopted Transforming Our World: the 2030 Agenda for Sustainable Development and the Sustainable Development Goals, in September 2015 (UN, 2015). This framework was a follow-up from the MDGs which was effective from 2000 to 2015. However, the SDG framework was different and showed growth in the advancement of international consultation (Fakuda-Parr & Muchhala, 2019:2).

What sets the SDGs apart from the MDGs, is that the “SDGs reframe development as Sustainable Development and identify a broad set of inter-related challenges including environmental destruction, social exclusion and inequality, economic transformation, and governance” (Fakuda-Parr & Muchhala, 2019:2).

Therefore, moving the needle in development forward from basically an aid agenda, to redefining Sustainable Development as a worldwide challenge and thus creating goals relevant for all countries and not just the developing world (Fakuda-Parr & Hulme, 2011). At its core the SDGs framework is more ambitious than the MDGs and is underpinned by a transformative agenda as highlighted in the report on Transforming Our World: the 2030 Agenda for Sustainable Development and the Sustainable Development Goals (Fakuda-Parr & Muchhala, 2019:2).

3.6. NAVIGATING THE SUSTAINABLE DEVELOPMENT GOALS

3.6.1. SDGs: NAVIGATING COMPLEXITIES

The SDGs embody the complexity and the interrelatedness between the variety of goals as well as its overwhelming vastness. For example, “factors such as food, water and justice, with no single root cause to address, making these collectively, in design language, an elaborate wicked problem” (Light, Kasper & Hielscher, 2020). Scholars Light, Kasper and Hielscher (2020) argue that framing it as a ‘wicked problem’ infers the element of a challenge and they assert that climate change is considered a ‘wicked problem’ because of its complex nature and difficulties to anticipate solutions.

The uncertainties and endless changes to the challenges contribute to the complex dynamic of implementing the SDGs. In the paper “Wicked Solutions: SDGs, Research Design and the ‘Unfinishedness’ of Sustainability” the authors highlight “there may “be no way to solve a wicked problem neatly and know that we have solved it” (Light, Kasper and Hielscher, 2020). The contradictions of sometimes opposing goals while at the same time aspiring, complicate the quest for problem solving (Light, Kasper & Hielscher, 2020). For example, the friction that occurs between SDG 8: Decent Work and Economic Growth and SDG12: Responsible Consumption and Production (Light, Kasper & Hielscher, 2020). This paradoxical dynamic is important for companies to realise and understand as their strategic alignment of SDGs within their business practices might be challenging based on the overwhelming nature of all 17 goals.

Light, Kasper and Hielsche (2020) suggest that the SDGs allow for an opportune time to rethink approaches to the never-ending complexities and uncertainties especially in times of crises. They offer the design theory method as a way to reflect on the problems and (not to necessarily solve them), but to think of it in terms of reducing the problem (Light, Kasper & Hielscher, 2020). However, Kolko (2008) makes a case for humans solving these problems based on the belief that humans are the creators of the said problems. Kolko (2008) says, “it’s with a human and humane mind that we can both explain and, ultimately, fix the problems that exist in our culture and society’ (Kolko, 2008:80). Nonetheless, complexity should be kept

top of mind when designing adaptation strategies as it is infused in the very nature of the SDG framework and goals.

3.6.2. CREATING AN ENABLING ENVIRONMENT FOR SDGS

In order to reach the global goals, its countries are required to operationalise the SDGs locally (Jones & Comfort, 2019). However, creating an enabling environment at a local level is a critical lever to the achievement of these goals as it is the space where the impact of sustainable communities should be manifested. Another lever of an enabling environment is government's responsibility to create a space for business to deal with the SDGs by enacting appropriate legislation to encourage responsible and sustainable business behaviour (Scheyvens, Banks & Hughes, 2016). For example, "governments are seen as having a key role to play in realizing a business-friendly trade system, pricing incentives, transparent procurement, and to encourage and support responsible business" (Pingeot, 2014:18)

If business wants to be a serious partner in delivering on the SDGs, a paradigm shift for businesses will be required that moves from Corporate Social Responsibility (CSR) reporting for the sake of risk and image management, towards assessing the impact of a company's contribution to sustainability (Scheyvens, Banks & Hughes, 2016). This investigation will include analysing localised SDG enablers particularly those directed at easing the environment for business to operationalise the SDG.

3.6.3. CORPORATE SOCIAL RESPONSIBILITY AND THE SDGS

Despite CSR being a buzzword in the corporate environment, CSR has a variety of descriptions and meanings. Scholars such as Clarkson, 1995; Marrwijk, 2003; Wood and Lodgson 2002 observed that institutions like the World Bank, the UN, the World Business Council on Sustainable Development and researchers hold diverse perspectives on the notion of CSR. The language ascribed to the CSR concept also differs, as labels such as "corporate responsiveness, corporate citizenship, sustainable entrepreneurship, triple bottom line" and the like are also used (Pesmatzoglou *et al.*, 2014:189) to describe the same phenomena.

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Popa and Salanță (2014) argue that the most commonly known example of CSR is the notion of linking it to the “idea of doing good,” subsequently academics often describe CSR as the “requirement of corporations to make additional contributions to the well-being of society.” Moreover, CSR can be regarded as an institutions’ efforts to obtain “a balance between the economic, environmental and social imperatives without foregoing the expectations of shareholders, and give something back to the wider community” (Popa & Salanță, 2014). As earlier scholars, such as Carroll (1979) and Font *et al.*, (2012) asserted, business has a responsibility beyond just generating profit for shareholders (Popa & Salanță, 2014). Their responsibility to society includes elements of “legal, ethical, discretionary and, added later, philanthropic ones” (Popa & Salanță, 2014).

The concept of CSR is important to the debate on Sustainable Development and to the implementation of the SDGs. In spite of the lack of a common definition for CSR, many international institutions have recognised that CSR and Sustainable Development have numerous shared characteristics (Pesmatzoglou *et al.*, 2014:189). In particular the European Union (2002) argues that corporates embracing CSR can contribute towards Sustainable Development (Pesmatzoglou *et al.*, 2014:189). On the other hand, CSR has also been criticised by many scholars. For example, Doane (2005) highlights the four myths believed to be related to CSR, namely, “the positive relationship between voluntary disclosures and performance; codes change corporate behaviour; consumer preferences and the investment of companies’ social aspects” (Pesmatzoglou *et al.*, 2014:189).

Sustainable Development on the other hand is founded in a more extensive theory that embodies a macro or combined understanding in comparison to the CSR concept which permits the exploration of sustainable activities at a business level (Forcadell & Aracil, 2018). Furthermore, the achievement of the SDGs necessitates the development of organisations as more expansive “societal changes in institutions” (Forcadell & Aracil, 2018). This is clearly supported by the SDG 16 goal of “peace, justice and strong institutions” with the vision of constructing well operating institutions at various levels, in particular in developing countries (UN, 2016).

For this study, it would be important to assess whether the SDGs are integrated as part of the organisation's operations and business model. Understanding the internalisation and implementation of the SDGs' strategies, if present, could potentially provide insights on the unfolding of adaptation and alignment to the SDGs by companies.

3.6.4. SUSTAINABLE DEVELOPMENT GOALS IN PRACTICE

The inclusion of business in the consultation process of developing the SDGs was critical as their activities and operations impact on the natural and social environment. Companies, through their business processes and resources, have the ability to lessen the undesirable social and environmental impact and create a more sustainable society. For example, the mining sector directly impacts both the environment and the social conditions of the communities that they operate within. The environmental impact of the extractive industries can range from "land degradation, water pollution and CO₂ emissions," to mention a few (Pesmatzoglou *et al.*, 2014:195).

Moreover, these industries also have a responsibility to the communities, as they employ many of the local people in the mines. The risk for the local community includes the dependency on the mines for an income and livelihoods. This is an unsustainable economic model for the local communities because when mining activities cease so does their income (Pesmatzoglou *et al.*, 2014:195). There are several such examples in South Africa. Besides the Aurora Mines, "the mismanagement of Grootvlei Gold Mine...resulted in premature and unplanned closure of the mine; massive job losses; pollution of a river and its Ramsar wetland site, as well as a significant setback for regional mine closure" (McKay & Milaras, 2017). This is an example of a business which failed to manage the social and environmental impact of their operations.

Making meaning of the social and environmental impact of business operations and aligning these to the SDGs can be a daunting task. Hence, in grouping the SDGs, Niestroy (2016) provides a useful framework for analysis as depicted in Table 9.

Table 3: Niestroy's Framework for SDG analysis

SDGs	GROUPING
1, 3, 4, 5,10	"People-centred and depends on the below-mentioned goals" (Breuer, Janetschek, & Malerba, 2019:3)
2, 6, 7, 8, 9, 11, 12	"Linked to production, distribution and delivery of services and depends on the below-mentioned goals" (Breuer, Janetschek, & Malerba, 2019:3)
13, 14, 15	Linked to "Natural resources and ecosystem (i.e., climate, oceans, biodiversity and land" (Breuer, Janetschek, & Malerba, 2019:3)
16	Focused on "Peace, Justice and Strong institutions" (Breuer, Janetschek, & Malerba, 2019:3)
17	Specific to "Means of implementation, support all goals" (Breuer, Janetschek & Malerba, 2019:3)

Source: Compiled by the author, based on Niestroy (2016) framework of analysis cited by (Breuer, Janetschek, & Malerba, 2019, pg.3)

While it remains a challenge for companies to extrapolate the multitude of possible environmental and social impacts of their value chain, Niestroy's (2016) framework could ease their analysis and alignment to the SDGs.

The SDGs are often discussed in company corridors along with the term ESG. With the increase in popularity that the ESG has received in recent years it is almost impossible to separate ESG from the SDGs as part of the Sustainable Development debate in business. Initially, the researcher planned to concentrate solely on the SDGs during the study's conceptualisation. However, it became evident that this approach would be inadequate since both SDGs and ESG are closely interrelated and hold significant relevance in today's corporate landscape. Recognising this, the researcher decided to incorporate ESG into the study and literature review to ensure a comprehensive analysis of the pertinent discussions.

The next section of this chapter will discuss ESG broadly and draw on the interconnectedness and relationship with SDGs. This link between SDG and ESG is important to understand in order to explore how mining companies are aligning their sustainable practices.

3.7. ENVIRONMENTAL, SOCIAL AND GOVERNANCE (ESG)

Environmental, Social and Governance (ESG) was introduced as an abbreviation in a report published in 2004 by 20 financial institutions, following a request from Kofi Annan, the Secretary-General of the United Nations (Gillan, Koch & Starks, 2021:2). ESG refers to a set of non-financial criteria that companies and investors use to integrate and evaluate a company's performance and sustainability practices in three key areas: environmental impact, social responsibility, and corporate governance (Gillan, Koch & Starks, 2021:2). Table 10 below, illustrates the ESG international framework of broad dimensions which is considered under each ESG theme.

Table 4: International ESG Framework

DIMENSION	FACTORS	DEFINITIONS
ENVIRONMENTAL (E)	<ul style="list-style-type: none"> • GHG emissions • Energy consumption and efficiency Air pollutants • Water usage and recycling • Waste production and management (water, solid, hazardous) • Impact and dependence on biodiversity • Impact and dependence on ecosystems • Innovation in environmentally friendly products and services 	Environmental matters that may have a positive or negative impact on the financial performance or solvency of an entity, sovereign, or individual.
SOCIAL (S)	<ul style="list-style-type: none"> • Workforce freedom of association • Child labour • Forced and compulsory labour • Workplace health and safety • Customer health and safety • Discrimination, diversity, and equal Opportunity • Poverty and community impact • Supply chain management • Training and education • Customer privacy • Community impacts 	Social matters that may have a positive or negative impact on the financial performance or solvency of an entity, sovereign, or individual.
GOVERNANCE (G)	<ul style="list-style-type: none"> • Codes of conduct and business principles • Accountability • Transparency and disclosure • Executive pay • Board diversity and structure • Bribery and corruption • Stakeholder engagement • Shareholder rights 	Governance matters that may have a positive or negative impact on the financial performance or solvency of an entity, sovereign, or individual.

Source: Li, Wang, Sueyoshi, & Wang, 2021: 2

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It is important to note the difference between ESG and CSR. In the past, CSR has been used to describe how companies can become more socially responsible and be good corporate citizens (Gillan, Koch & Starks, 2021:2). However, there is a distinction between CSR and ESG. ESG encompasses governance as a separate and explicit component, while CSR incorporates governance matters indirectly in relation to environmental and social factors (Gillan, Koch & Starks, 2021:2). As a result, ESG typically has a broader scope than CSR. Numerous academic studies have documented the development of CSR and ESG and related ideas such as those by Carroll in 1999 and 2009, Montiel and Delgado-Ceballos in 2014, and Sheehy in 2014). However, an extensive examination of these works is not within the scope of this thesis.

The environmental aspect of ESG evaluates a company's commitment to sustainability, pollution reduction, climate change and resource conservation (Armstrong, 2020). The social aspect considers a company's relationship with its employees, customers, and the communities it operates in (Armstrong, 2020). The governance aspect assesses a company's management structure and practices to ensure transparency, ethical conduct, and risk management (Armstrong, 2020). According to the Principles for Responsible Investment (PRI), ESG factors can have a material impact on a company's long-term performance, risk management, and reputation (PRI, 2021). Thus, ESG is increasingly important for companies that want to attract investment and to meet stakeholder expectations for sustainable and responsible business practices.

Moreover, ESG criteria are used by a range of stakeholders, including investors, analysts, and rating agencies, to evaluate companies' sustainability performance and inform investment decisions (Gillan, Koch & Starks, 2021:2). The adoption of ESG principles has grown rapidly in recent years, as investors have increasingly recognised the importance of sustainability in driving long-term value creation. Today, ESG is seen as an integral part of responsible investing and is used by many investors as a means of managing risk, enhancing returns, and contributing to sustainable development (Sanlam ESG Barometer Report, 2023).

3.7.1. ESG AND SDGs

Although the SDGs received substantial recognition and backing from governmental bodies, business and civil society groups as a means of tackling worldwide issues such as poverty, inequality and climate change, it is crucial to acknowledge that the subject cannot be addressed without taking into account the ESG factors.

SDGs and ESG practices are two frameworks that are increasingly used by businesses to improve their sustainability performance. As referred to earlier, the SDGs are a set of 17 goals established by the United Nations in 2015, with the aim of achieving sustainable development and eradicating poverty by 2030. ESG practices, on the other hand, are a set of criteria used by investors and companies to assess a company's sustainability performance. While there is an overlap between the two frameworks with both focusing on sustainability and social responsibility, there are also differences.

One key difference is that the SDGs are focused on global sustainable development goals, while ESG practices are focused on companies' sustainability performance. A further distinction is that ESG metrics are often "inward looking" as their focus is on providing investors and stakeholders with information about company processes and outcomes, rather than actively promoting sustainability outcomes (Lashitew, 2021:185).

A result of this distinction is that many ESG metrics heavily emphasise internal governance concerns, but do not give as much weight to social impact, which is essential from a societal perspective but is more challenging to link to a company's activities (Lashitew, 2021:185). Another difference is that ESG metrics were initially developed to assist stakeholders in evaluating and managing reputational, legal and regulatory risks (Kotsantonis, Pinney & Serafeim, 2016). ESG is thus generally reactive to sustainability issues, whereas the SDGs are more proactive and opportunity-focused (Van Tulder, 2018).

However, there are also synergies between the two frameworks, as achieving the SDGs can contribute to improving a company's sustainability performance and vice

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versa. For example, companies that prioritise sustainability in their business operations can help achieve SDG 12 (responsible consumption and production), while also improving their own sustainability performance. Furthermore, the adoption of ESG practices can help companies contribute to achieving several SDGs, including SDG 7 (affordable and clean energy), SDG 8 (decent work and economic growth), and SDG 13 (climate action). Overall, while there are differences between the SDGs and ESG practices, there are also synergies and overlaps that make the two frameworks complementary. By adopting ESG practices, companies can contribute to achieving the SDGs while also improving their own sustainability performance.

Moreover, ESG frameworks are now focusing more on purposeful thinking that highlights the importance of companies taking a more active role in addressing social and environmental issues (Lashitew, 2021:185). Initially, the SDGs were not created with the purpose of serving as a framework for reporting ESG factors (Sætra, 2021). However, they are now being used more frequently for this purpose (Sætra, 2021). The underlying concept behind this practice is that the SDGs demonstrate how investors and businesses can have a significant impact on effecting change (Sætra, 2021).

As SDGs and ESG become more integrated into mainstream finance, the distinctions between these two approaches to addressing social and environmental issues are expected to become less prominent (Lashitew, 2021:185). It is important to examine the involvement of companies in both SDGs and ESGs together in order to gain a better understanding of how companies engage these concepts.

According to a report by the United Nations Global Compact and Accenture, achieving the SDGs requires a transformational shift in how businesses operate, including integrating sustainability into their core business models and decision-making processes (United Nations Global Compact and Accenture, 2018). This involves addressing ESG risks and opportunities, such as reducing greenhouse gas emissions (GHG), improving working conditions and promoting diversity and inclusion.

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A study by Harvard Business Review found that companies that prioritise ESG factors tend to have better financial performance and are more likely to attract and retain investors (Eccles & Serafeim, 2013). Likewise, the 2023 Sanlam ESG Barometer Report asserts that ESG not only positively impacts financial performance but also positions organisations sustainably for the future. It helps them handle external risks like climate change (Sanlam ESG Barometer Report, 2023). Thus, it is clear that the SDGs and ESG are interconnected and must be addressed in tandem for sustainable development to be achieved.

Figure 2, below illustrates the interconnectedness of SDGs and ESG and provides a lens for viewing the SDG goals through an ESG lens.



Figure 7:: SDGs through an ESG Lens

Source: Berenberg, 2018 & Sætra, 2021

There is an expectation that large companies should understand and be aware of their ecological and societal footprint and that they should disclose and report activities relevant to their footprint (Sætra, 2021:1). A wide-ranging collection of principles, systems and measurements connected to ESG is employed to achieve this objective (Verbin, 2020). Even though ESG is widely recognised there seems to

be conflicting viewpoints regarding the approach that should be taken to address it (Mooij, 2018:3).

Nonetheless, ESG has also evolved from simple principles to a sophisticated set of metrics and scoring systems, which helps investors to evaluate companies accurately. The incorporation of ESG factors into investment is no longer an option but a necessity for investors who seek sustainable long-term growth and therefore has become critical to companies.

3.7.2. ESG DEBATES IN A GLOBAL CONTEXT

The ESG debate is top of mind worldwide and is finding its way into the political corridors, corporate boardrooms and amongst community activists. Initially, companies viewed ESG concerns, such as climate change, as risky subjects to address (Redondo Alamillos, & Frédéric de Mariz, 2022). However, over time, these matters gained solid footing and acceptance within the corporate realm, mainly due to the implementation of new regulatory standards (Redondo Alamillos, & Frédéric de Mariz, 2022).

The environmental aspect of ESG is considered a significant risk for companies and investors and is attracting considerable attention from consumers and regulators. The increasing momentum of ESG-related regulations serves as a clear signal to both investors and companies that there is a pressing need for change and adaptation of business practices accordingly (Redondo Alamillos & Frédéric de Mariz, 2022).

In addition, shareholders have shifted their focus from the financial performance and profits to a broader and comprehensive oversight of the company's performance and an intentional engagement with ESG concerns (Redondo Alamillos, & Frédéric de Mariz, 2022). Moreover, consumers are urging companies to enhance their performance and contribute towards resolving societal issues, especially climate change (Redondo Alamillos, & Frédéric de Mariz, 2022). According to Sprout Social's 2019 Report, 70% of customers believe that companies should publicly express their stance on political and social concerns. This pressure has increased

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significantly due to the advent of social media and its widespread usage (Redondo Alamillos, & Frédéric de Mariz, 2022).

Furthermore, legislators across the globe are intensifying their endeavours to combat climate change by enacting laws designed for that purpose. The European Union (EU), for example, has proposed a series of guidelines to govern ESG concerns. These regulations comprise disclosure mandates for businesses, asset management sector categorisation, due diligence criteria, fresh approaches such as carbon markets, and non-tariff limitations on international trade (Redondo Alamillos, & Frédéric de Mariz, 2022). There has been a rise in global interconnectedness in the domain of regulation. The actions of decision-makers in one part of the world can often impact lawmakers in other regions, resulting in both individuals and legal entities being impacted by regulations from their own country as well as from abroad (Redondo Alamillos, & Frédéric de Mariz, 2022).

The EU has taken the lead in this context by introducing a range of regulations, establishing aspirational benchmarks in areas such as social protection and banking services, which other nations worldwide have followed (Redondo Alamillos, & Frédéric de Mariz, 2022). Research has demonstrated how the European Union's regulations are disseminated through market mechanisms and, to some extent, are replicated in regulations implemented by third-party nations (Gady 2014; Lavenex 2014). The "Brussels Effect" literature provides evidence of this impact in various domains such as international trade, waste and chemicals legislation, data regulation and ESG (Redondo Alamillos, & Frédéric de Mariz, 2022). For example, the EU's regulations concerning waste (Restrictions on Hazardous Substances—RoHs, Waste of Electronic Equipment—WEE) and chemicals (Registration, Evaluation, Authorization of Chemicals—REACH), as well as the General Data Protection Regulation (GDPR), are considered pioneering in their respective fields. Consequently, multinational corporations have chosen to adhere to these standards in all their subsidiaries for efficiency and effectiveness (Golberg 2019).

In Europe, the main ESG debate is focused on the level of regulatory intervention that should be implemented to ensure companies' compliance with ESG standards.

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Some argue that mandatory disclosures are necessary, while others believe that voluntary measures are sufficient. Nonetheless, stakeholders are increasingly holding companies accountable for their ESG practices. In a recent case, a coalition of French NGOs, such as Friends of the Earth (Les Amis de la Terre) France, Notre Affaire à Tous, and Oxfam France, initiated legal action against BNP Paribas, a global bank headquartered in Paris, over its provision of funding for fresh oil and gas ventures (Segal, 2023).

The NGOs have stated that their objective in filing this lawsuit, which they claim is the first climate-related legal action against a commercial bank, is to compel BNP Paribas to establish a potent climate policy and to halt its assistance for the extraction and use of fossil fuels without delay (Segal, 2023). In a document outlining the context and particulars of the lawsuit, the groups clarify that the legal foundation of the case is grounded in the "duty of vigilance" legislation, which was passed in France in 2017 (Segal, 2023). This statute necessitates that sizable businesses create a plan of vigilance to examine and forestall their environmental and human rights operational impacts (Segal, 2023).

Contrary to Europe, in the United States of America (US), the primary topic of discussion is whether ESG initiatives can generate satisfactory returns for investors. There are multiple American politicians who view ESG as a means of demonstrating moral superiority without any practical benefits (Fiscor, 2023). These individuals question the actual value of ESG initiatives. On the other hand, some politicians view ESG as a guise that enables companies to feign action when, in fact, they are doing nothing (Fiscor, 2023).

There are some Republican states that are strongly opposed to ESG practices (Segal, 2023). For instance, a Bill has been introduced in Texas that seeks to bar ESG investment of the state's public retirement investment system (Segal, 2023). The managers of the retirement system estimate that this measure could result in the loss of billions of dollars in returns (Segal, 2023). The proposed legislation in Texas is merely the latest example of a series of anti-ESG measures taken by Republican states (Segal, 2023).

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In February 2023, a multi-state coalition was formed with the goal of shielding individuals from the ESG movement (Segal, 2023). This coalition aims to prevent the use of ESG criteria in all state and local investment decisions and to prohibit state fund managers from considering ESG factors in their investments on behalf of the state (Segal, 2023). Texas has been especially active in opposing ESG initiatives, with recent actions such as placing several asset managers on a list for potential divestment for "boycotting" energy companies, and conducting a hearing that interrogated executives from investment giants BlackRock and State Street regarding their ESG, climate-related stewardship, engagement voting and investment practices (Segal, 2023).

Moreover, during the annual conference, at the Society for Mining, Metallurgy and Exploration held in March 2023 in Denver, the discussion revolved around ESG policies. The Chief Operations Officer (COO) of the International Council on Mining and Metals (ICMM) asserted that the insurance sector is mostly grappling with the issue of ESG in the USA (Fiscor, 2023). He argues that the insurance and reinsurance industries, especially in mining and metals, are extremely global in nature (Fiscor, 2023). The COO further highlighted that the ESG debate is significant and necessary, but it is hindering progress (Fiscor, 2023) and acknowledged that insurance providers are more focused on risks, such as the potential loss due to the collapse of tailings dams, and that they are lagging in terms of ESG considerations (Fiscor, 2023).

However, despite the pushback by some stakeholders and politicians on ESG in the US, the Biden administration disclosed several efforts designed to lower GHG emissions from the industrial sector, among other, the introduction of the Industrial Demonstrations Programme worth \$6 billion (Segal, 2023). This programme is intended to hasten decarbonisation projects that focus on hard-to-decarbonize industries (Segal, 2023). Despite the arguments made by critics claiming that ESG initiatives may not necessarily result in better financial performance, advocates point to numerous examples of how ESG investing has yielded strong returns. For example, studies have shown that ESG investing can be profitable, with some ESG

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funds outperforming their non-ESG counterparts (Friede, Busch, & Bassen, 2015). Moreover, the U.S. Securities and Exchange Commission has issued guidance on climate-related risk disclosure, which may further encourage companies to adopt ESG practices (U.S. Securities and Exchange Commission, 2021).

Notwithstanding these different perspectives, it is clear that ESG considerations are becoming increasingly important for investors, companies and lawmakers in both the US and Europe. The ESG trends and debates differ somewhat between the US and Europe, with the US being more focused on the financial case for ESG investing and Europe leading the way in regulatory initiatives and investor activism. However, both regions are increasingly recognising the importance of ESG factors for long-term value creation and sustainable development.

The South African mining industry should pay close attention to the ongoing ESG discussions in Europe and the USA, given the global interconnectedness of world trade. The USA and the EU remains two of South Africa's major trading partners. Therefore, ESG regulations and changes in these countries could impact the South African mining companies in terms of trade and investment. Thus, South African mining companies should align ESG metrics as non-compliance could have direct repercussions on investment prospects, reputation, and international market standing. To avoid adverse effects on their local operations, it is crucial for the South African mining sector to stay abreast of international ESG standards, regulations, and debates.

3.7.3. ESG IN SOUTH AFRICAN MINING SECTOR

The International Council on Mining and Minerals (ICMM) has embraced ESG as a key framework for sustainability in the mining industry, with a focus on reducing the industry's environmental impact, improving social performance, and enhancing governance practices (ICMM, 2023). Similarly, according to the Minerals Council South Africa) the South African mining sector has recognised the importance of ESG in improving the industry's sustainability and reputation (Minerals Council South AfricaMCSA, 2023)

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In South Africa, the mining sector has faced significant social and environmental challenges, including labour disputes, community protests and environmental degradation (Hamann, 2003). As a result, mining companies have increasingly focused on ESG to address these challenges and improve their sustainability performance (Steele-Schober, 2021). For example, companies such as Anglo-American and Gold Fields have established sustainability strategies and goals that align with ESG principles.

Moreover, listed companies in South Africa are obliged to adhere to the reporting requirements prescribed by the Johannesburg Stock Exchange (JSE). Starting in 2009, the JSE implemented a mandatory requirement for companies seeking listing to either "comply or explain" in relation to the King CSR Code. JSE's association with the King Codes on Corporate Governance has indirectly emphasised the importance of transparency concerning sustainability (JSE, 2022). Numerous South African companies release individual sustainability and ESG reports, with the initial ones appearing in the mid-1990s from various high-impact companies (JSE, 2022).

As stakeholder expectations continue to rise, some organisations choose to publish additional "supplementary" reports, focusing on specific ESG areas that hold significant importance to their operations (JSE, 2022). These supplementary reports might include separate Task Force on Climate-related Financial Disclosures (TCFD) reports, Global Reporting Initiative (GRI) reports, human rights reports, Broad-based Black Economic Empowerment (B-BBEE) reports, and/or tax disclosure reports (JSE, 2022).

Sustainability reports assess how the organisation manages its considerable economic, social and environmental impacts, addressing sustainability issues that extend beyond the scope of the integrated report to cater to a broader range of stakeholders (JSE, 2022). Chapter 4 discusses the imperative for mining companies to establish and uphold strong relationships with stakeholders and the communities around them to retain their social license to operate.

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The JSE recommends that companies opt to create an integrated report that addresses 'double materiality,' following the vision outlined in the Draft European Sustainability Reporting Standards (JSE, 2022). For example, the information focussed on enterprise value will encompass sustainability issues that directly affect the company's ('financial materiality'), addressing the concerns relevant to investors. On the other hand, the information centred around the company's social and environmental impacts ('impact materiality') will encompass a wider range of its sustainability effects for targeted stakeholders.

The adoption of ESG principles in the mining sector is also being driven by investor demand for sustainable investments. A report by the Global Sustainable Investment Alliance (GSIA) found that sustainable investments in South Africa increased by 40% between 2016 and 2018. This trend is expected to continue as investors increasingly demand greater transparency and accountability from companies.

According to the GSIA the primary market forces in the region revolve around initiatives aimed at promoting the adoption of green bonds and impact investing funds to achieve positive outcomes aligned with the SDGs (GSIA, 2020). Notably, pan-African players like Old Mutual have significantly influenced the investment market in South Africa by actively promoting sustainable investment through the incorporation of ESG factors and corporate engagement strategies (GSIA, 2020). Additionally, both private and public retirement funds are playing a pivotal role in integrating ESG strategies within the region (GSIA, 2020).

In addition, South Africa has embraced a blended finance approach to impact investments aimed at achieving both social and environmental objectives (GSIA, 2020). A noteworthy example of innovation in the country is the Green Outcomes Fund, which facilitates mainstream fund managers' involvement by attracting allocators of concessionary capital to invest in projects with positive environmental outcomes and green job creation (GSIA, 2020). Over the last four years, there has been a notable rise in green bond listings, which can be partly attributed to the establishment of green bond segments on stock exchanges like the JSE in South Africa (GSIA, 2020).

Overall, the adoption of ESG by the international mining community and the South African mining sector reflects a growing recognition of the importance of sustainability in the sector. As the mining sector continues to face environmental and social challenges, ESG will become an increasingly important framework for improving the sector's sustainability performance and enhancing its reputation.

3.7.4. CHALLENGES WITH ESG IMPLEMENTATION

One major challenge is the lack of standardised ESG reporting requirements (Dye, McKinnon, Van der Byl, 2021). Without clear and consistent reporting standards, it can be difficult for investors to compare companies' ESG practices and make informed investment decisions (Grim, Berkowitz, 2020). Another challenge is the subjective nature of ESG metrics. Different stakeholders may have different opinions on what constitutes a positive or negative impact on the environment, society, or governance (Daugaard, 2020). This can lead to inconsistent ESG ratings and make it difficult for investors to assess the true sustainability and ethical impact of a company (Daugaard, 2020).

In addition to these challenges, there is also a lack of transparency and accountability in some companies' ESG practices. Companies may engage in "greenwashing" - the practice of presenting an exaggerated or misleading picture of their ESG practices to appeal to investors (Matos, 2020). There is furthermore a risk that companies may prioritize short-term financial gains over long-term ESG goals, leading to a lack of meaningful change (Matos, 2020).

Despite these challenges, there are initiatives underway to address them. For example, the Sustainability Accounting Standards Board (SASB) has developed industry-specific standards for ESG reporting, which aim to provide a clear and consistent framework for companies to disclose their sustainability and ethical impacts (SASB, 2023). The Task Force on Climate-related Financial Disclosures (TCFD) has developed recommendations for companies to disclose climate-related risks and opportunities in financial filings (TCFD, 2023).

Overall, while there are challenges in implementing ESG practices, there are also efforts underway to address them. Investors and companies should be aware of these challenges and work towards greater transparency, accountability and standardisation in ESG reporting.

3.7.5. ESG AND GREENWASHING

As environmental issues have become more prominent and public awareness has grown, more stakeholders have become increasingly conscious of environmental considerations (Chen & Chang, 2012). In the last decade, stakeholders such as investors, consumers, governments and corporate customers have exerted more pressure on companies to reveal information about their environmental performance (Kim & Lyon, 2015; Marquis, Tofel & Zhou, 2016) and to produce environmentally-friendly products (Guo, Tao & Gao, 2014; de Freitas Netto, Sobral, Ribeiro & da Luz Soares, 2020).

Nielsen Media Research reported that 66% of consumers worldwide are willing to pay extra for products that are environmentally-friendly (de Freitas Netto, Sobral, Ribeiro, da Luz Soares, 2020). When customers view companies as socially responsible, they may be more inclined to purchase products from these companies at a higher cost (Grimmer & Bingham, 2013; Guo, Tao, Gao, 2014; de Freitas Netto, Sobral, Ribeiro & da Luz Soares, 2020).

The increasing demand for environmentally-friendly products has compelled companies to create green marketing strategies to demonstrate their good corporate image and social responsibility (Zhang, Li, Cao, & Huang, 2018:740). According to Delmas and Burbano (2011), the green market has been expanding, encompassing consumers, capital markets, products, services and companies. As the green market continues to grow, the issue of greenwashing has emerged (Majláth, 2017). Greenwashing is characterized by the combination of two behaviours: poor environmental performance and positive or misleading communication about such poor environmental performance (Delmas & Burbano, 2011: 65).

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Certain companies employ green marketing communications to enhance their image as environmentally-conscious and socially responsible. They use advertising and corporate social responsibility initiatives to improve purchase intentions and brand attitudes (Nyilasy, Gangadharbatla & Paladino, 2014). Scholar, Banerjee (2002), points out that corporate environmentalism refers to the acknowledgment and incorporation of environmental considerations into a company's decision-making procedures, providing businesses with a means to tackle environmental challenges.

However, according to Terra Choice, 95% of products claiming to be environmentally-friendly in Canada and the USA committed at least one of the "sins of greenwashing," ranging from the sin of the hidden trade-offs to the sin of worshipping false labels. (de Freitas Netto, Sobral, Ribeiro, da Luz Soares, 2020).

In 1986, activist Jay Westerveld was the first to accuse hotels of greenwashing when they asked guests to reuse towels to conserve water while these hotels did not take any significant environmental action (Pearson, 2010). Ogilvy and Mather, an advertising firm, claim that greenwashing practices have become prevalent in recent decades (Hsu, 2011). As the green market and greenwashing have increased, customers have had difficulty identifying true green claims, leading to scepticism and difficulty in distinguishing genuine green marketing from unreliable green initiatives (Nyilasy, Gangadharbatla & Paladino, 2014; Chen, Lin & Chang, 2013).

Terra Choice developed a study to help customers identify greenwashing by identifying seven sins of greenwashing. Developed countries have been more active in developing regulatory guidelines for greenwashing compared to developing countries. The US has limited regulation on greenwashing, with weak enforcement of regulations (Delmas & Burbano, 2011). Scholars, activists and environmentalists argue that non-binding regulatory guidelines inadequately protect consumers from the harmful effects of greenwashing (Feinstein, 2012; de Freitas Netto, Sobral, Ribeiro, da Luz Soares, 2020).

Greenwashing can make it challenging to distinguish between genuinely sustainable companies and marketing gimmicks used to attract consumers. Greenwashing can

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also weaken efforts in the pursuit of promoting environmental sustainability. Thus, creating a dishonest sense of progress and distracting attention and resources away from transformative solutions. The Executive Vice-President for the European Green Deal, asserts that

“Green claims are everywhere: ocean-friendly t-shirts, carbon-neutral bananas, bee-friendly juices, 100% CO₂-compensated deliveries and so on. Unfortunately, way too often these claims are made with no evidence and justification whatsoever. This opens the door to greenwashing and puts companies making genuinely sustainable products at a disadvantage.” (Segal, 2023)

Greenwashing has been defined in a variety of ways, given the perspective or context. Terra Choice provides a definition of greenwashing as "misleading consumers about a company's environmental practices or environmental performance and positive communication about environmental performance" (Terra Choice, 2010). Delmas and Burbano define greenwashing as "poor environmental performance and positive communication about environmental performance" (Delmas & Burbano, 2011:67). Baum defines greenwashing as "disseminating false information to consumers regarding the environmental practices of a company or the environmental benefits of a product or service" (Baum, 2012:424). Meanwhile, Tateishi (2017:3) summarizes greenwashing as "communication that misleads people regarding environmental performance or benefits by disclosing negative information and disseminating positive information about an organization, service, or product." Yua, Van Luub, Chen (2020) argues that greenwashing is a term used to describe the practice by companies making false or exaggerated statements about their ESG performance or sustainability practices, products, or services by disclosing large amounts of ESG data to deceive their stakeholders. All of these definitions refer to two main behaviours: withholding negative information related to a company's environmental performance and promoting positive information about its environmental performance.

One of the main challenges surrounding greenwashing is the lack of clear and consistent standards for measuring and reporting sustainability practices. Without standardised metrics and reporting requirements, it can be difficult for consumers

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and investors to assess the veracity of sustainability claims made by companies. In addition, there is often limited oversight and enforcement of sustainability claims, which can make it difficult to hold companies accountable for misleading or false advertising.

Despite these challenges, there are efforts underway to combat greenwashing. As such, the European Commission put forward a new proposal called the "Directive on Green Claims." The proposal consists of a fresh set of regulations that oblige companies to provide evidence and validate their environmentally-friendly claims and tags to shield against greenwashing (Segal, 2023). The Commission asserted that these regulations aim to fulfil the requirement for dependable and verifiable information for customers (Segal, 2023). The Commission's study exposed that over 50% of green claims made by companies in the EU were unclear or deceptive, and 40% were entirely unsupported (Segal, 2023). The proposed regulations introduce basic criteria for companies to support, convey and validate their environmentally-friendly assertions (Segal, 2023). As per the proposal, businesses must guarantee the credibility of their self-imposed environmental claims, which will necessitate third-party validation and substantiation with scientific proof (Segal, 2023). Moreover, companies must recognise the ecological effects associated with their products and take note of any probable compromises (Segal, 2023). If not, companies will increasingly be confronted with pressure from their stakeholders to be held accountable for deceptive and misleading action.

Case in point is the lawsuit instituted against the Dutch airline KLM in 2022 over allegations that its advertising was "deceptive," which amounts to greenwashing (Seabrook, 2022). This case is believed to be the first of its kind for the aviation industry (Seabrook, 2022). Climate litigations are rising globally as activists increasingly turn to courts to achieve their goals, and the Netherlands has seen particular success in this regard (Seabrook, 2022). According to Client Earth, KLM's Fly Responsibly campaign, which portrays the airline as contributing to a sustainable future and committed to achieving net-zero emissions by 2050, is misleading (Seabrook, 2022). Furthermore, the Dutch Advertising Code Committee found that

KLM was deceiving its customers by making them believe that they could "offset" their flights through misleading sustainability initiatives (Seabrook, 2022).

Overall, greenwashing presents a significant challenge for promoting environmental sustainability and ethical business practices. Business leaders thus need to be mindful of the risks of greenwashing and the balancing act of being transparent and disclosing information not only for positive marketing purposes.

3.8. SUSTAINABILITY PRACTICES AND PRINCIPLES IN BUSINESS

A PwC ESG Africa Platform Leader asserts that “companies have never been subject to as much scrutiny from society as they are now. In the context of global climate and societal challenges, businesses need to demonstrate their ability to create value, build trust and contribute to solving important problems. ‘Business as usual’, with a sole focus on profitability, has become obsolete” (PwC, 2023:3).

As seen in the earlier discussions on sustainability, examining business’ role in addressing societal challenges is not new. In fact, the correlation between the performance of companies in sustainability aspects, such as social and environmental fronts, and their financial performance is a topic that has been extensively researched in the field of sustainability. There is a large body of literature on this topic, with some new studies even synthesizing previously reviewed meta-analytical studies.

In 2015, Friede, Busch and Bassen compiled a summary of 60 meta-analysis studies, which examined over 2200 empirical studies analysing the correlation between ESG and financial performance. Their findings indicate that ESG investing has a solid empirical basis, as around 90% of the studies found a positive correlation between financial performance and ESG performance, with most reporting positive results (Lashitew, 2021:185).

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Orlitzky, Schmidt, and Rynes (2003) conducted a meta-analysis of 52 studies that showed a slightly positive correlation between disclosing social performance and financial performance. In 2018, Busch and Friede reported a highly significant and positive correlation between corporate social performance and financial performance. The correlation between social and environmental performance and financial performance was positive, and this correlation was influenced by corporate reputation (Lashitew, 2021:185).

Busch and Lewandowski (2018) conducted another meta-analysis that examined 32 studies, which included 101,775 observations. Their research indicated an inverse correlation between carbon emissions and financial performance (Lashitew, 2021:185). In other words, better carbon performance is usually associated with better financial performance. The study also found that relative emissions had a greater likelihood of producing statistically significant results than absolute emissions (Lashitew, 2021:185). Additionally, market-based measures of financial performance were more positively correlated with carbon performance than accounting-based measures (Lashitew, 2021:185). The results of the study support the arguments of signalling theory (Hahn, Reimsbach & Schiemann, 2015) regarding the positive associations between carbon disclosure and stock market performance (Lashitew, 2021:185).

According to the Global Sustainable Investment Review 2018, a robust ESG plan is linked to “higher equity returns, from both a tilt and momentum perspective” (Henisz, Koller, & Nuttall, 2019:2). In addition, improved ESG performance has been found to be associated with lower levels of downside risk, which is demonstrated by several indicators such as decreased loan and credit default swap spreads as well as strengthened credit rating (Khan, Serafeim, & Yoon, 2016).

The evidence from various other studies suggests that businesses that prioritise environmental, social, and governance matters do not hinder their ability to create value. On the contrary, these companies may actually experience a positive impact on value creation (refer to Figure 8 below) (Henisz, Koller, & Nuttall, 2019:2).

Paying attention to environmental, social, and governance (ESG) concerns does not compromise returns—rather, the opposite.

Results of >2,000 studies on the impact of ESG propositions on equity returns

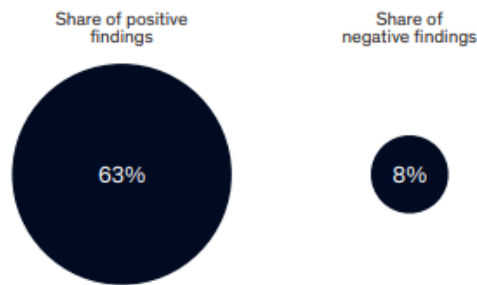


Figure 8:: Impact of an ESG focus on Returns

Source: Gunnar Friede *et al.*,

The increased attention on the expansive influence of companies on society, along with acknowledgement from investors and executives that a robust ESG strategy can guarantee long-term success, has resulted in accelerated growth (Henisz, Koller, & Nuttall, 2019:2). According to a report by the Harvard Business Review, companies with strong ESG performance have lower costs of capital, higher valuations, and better access to capital (Eccles & Serafeim, 2013). ESG can also impact a company's reputation and brand value, with consumers increasingly seeking out sustainable and socially responsible products and services.

Moreover, the amount of investment in ESG initiatives indicates that this trend is more than just a temporary trend or an exercise in positivity (Henisz, Koller, & Nuttall, 2019:2). According to a report by the GSIA, sustainable investing assets under management grew by 15% between 2018 and 2020, reaching \$35.3 trillion globally (Global Sustainable Investment Alliance, 2021). This is further supported by the level of business performance. Recently, it has become even more essential to prioritise proactively thinking and acting on ESG matters (Henisz, Koller, & Nuttall, 2019:2).

There are several reasons why better sustainability performance could provide companies with a competitive edge, such as greater organisational resilience,

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including being prepared for regulatory changes related to emission standards (DesJardine et al., 2020), more efficient use of energy resulting in cost savings, and access to new markets, particularly for environmentally-friendly products (Lashitew, 2021:185).

ESG is therefore important for managing risk and ensuring long-term value creation. Companies that effectively manage ESG risks and opportunities are better positioned to navigate regulatory changes, stakeholder demands and market disruptions. By integrating ESG into their business strategies, companies can build resilience, drive innovation and create competitive advantages. A report by the World Economic Forum suggests that companies that prioritise sustainability are more likely to achieve long-term success and outperform their peers (World Economic Forum, 2020).

On the other hand, companies with better financial performance are more inclined to make the necessary long-term investments to tackle sustainability challenges (Lashitew, 2021:185). Nonetheless, much of the literature on this topic is correlational rather than causal, since it is difficult to isolate specific factors that drive the relationship (Lashitew, 2021:185). Furthermore, the available literature is not entirely conclusive regarding the internal and external factors that support a positive correlation between social/environmental and financial performance (Lashitew, 2021:185). These factors are likely to be varied, intricate and dependent on the specific context (Lashitew, 2021:185).

However, important to note is that ESG and SDGs are increasingly becoming important for businesses and investors for a range of reasons, including financial performance, reputation and brand value, sustainable development, risk management, and long-term value creation. The adoption of these sustainability principles is likely to continue to grow as companies and investors and businesses seek to manage risks, enhance their reputation and contribute to sustainable development.

3.9. CORPORATE MOTIVATION FOR ADOPTING SDGs AND ESG FRAMEWORKS

There are a number of reasons why companies adopt the SDGs and ESG frameworks. These reasons can range from reactive motives such as responding to stakeholder pressure or complying with industry trends and regulations, to proactive motives related to building legitimacy, enhancing reputation and acquiring new skills and expertise (Rosati & Faria, 2019).

It is important for companies to balance stakeholder demands with the alignment and implementation of the SDGs and ESG. For example, traditionally companies focused on satisfying shareholders' interest in maximising profits, which often led to less consideration for the environmental impact of such investment's and profits. However, there is an increase in awareness and consciousness in companies wanting to ensure that their investments are aligned with sustainable practices. Case in point is a letter written by the CEO, Larry Fink of Blackrock (the largest asset management firm in the world), to other CEOs encouraging them to move beyond the narrow purpose of fulfilling benefits of shareholders only to benefiting broader society (Dixon, 2019). Dixon highlighted that "over 8,000 companies are striving to do this by voluntarily adopting a B-Corp (Benefit Corporation) structure that seeks to benefit all stakeholders" (Dixon, 2019).

Companies have many stakeholders ranging from employees, consumers, NGOs, and communities that could be considered as critical for their operations. How stakeholders perceive the social, environmental and economic impact of the business is important (Baumgartner & Rauter, 2017). If the sustainability performance of a business is perceived negatively by its stakeholders, it has the potential to affect the company's bottom line and competitive advantage (Baumgartner & Rauter, 2017).

For example, after the release of "Slaughtering the Amazon" by the environmental NGO Greenpeace, the "sportswear giant Nike Inc. announced...that it will stop using leather from cattle raised in Brazil's Amazon rainforest" (Lehman, 2009, p. 1), followed quickly by "German

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sports goods maker Adidas [which] obliged its suppliers to stop using leather from Amazonia” (German Business Digest, 2009:1). [Helmig, B., Spraul, K., & Ingenhoff, D. (2016)]

Stakeholders therefore can influence not only companies’ bottom line but also their behaviour in relation to its environment and social context. The study is unlikely to highlight significant dynamics between companies and its shareholders and stakeholders.

In addition, some companies may adopt the SDGs because they believe it is their responsibility as corporate citizens or environmental stewards, recognizing the inherent value in doing so (Lashitew, 2021:185). However, this motivation has its limitations as publicly traded companies may face financial penalties if they deviate too much from their focus on meeting quarterly financial goals (Lashitew, 2021:185). According to DesJardine, Marti, and Durand (2020), activist hedge funds focused on companies that aim to maximize their long-term value, resulting in takeovers and the replacement of managers with those who prioritised short-term gains (Lashitew, 2021:185). This highlights the disconnect between institutional regulations and corporate strategies that prioritise long-term value (Lashitew, 2021:185).

Successfully incorporating the SDGs or other ESG objectives into company strategies requires three sequential decisions (Lashitew, 2021:185) as reflected in Table 11.

Table 11: Steps: Integrating SDGs/ESG goals into corporate strategies

STEPS IN DECISION MAKING PROCESS FOR INTEGRATING THE SDGs OR OTHER ENVIRONMENTAL, SOCIAL AND GOVERNANCE (ESG) GOALS INTO CORPORATE STRATEGIES.	
STEP 1:	The firm espouses a purpose linked with (SDG-related) social and environmental issues and devises internal governance mechanisms that facilitate its realization (purpose);
STEP 2:	The firm develops specific (SDG-related) sustainability targets that are aligned with its core activities and internally tracks its performance (internal accountability);
STEP 3:	The firm discloses verified non-financial data to communicate its (SDG-related) sustainability performance (external accountability).

Source: Lashitew, 2021:185

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Companies encounter major obstacles in carrying out each of these stages due to incentive systems that prioritise short-term profitability (Lashitew, 2021:185). As a result, most companies tend to adopt the SDGs in an unplanned manner, lacking a solid organisational purpose and philosophy, and failing to establish proper internal and external accountability mechanisms (Lashitew, 2021:185).

This leads to a disconnect between a company's core profit-driven activities, which may be unsustainable, and its social and environmental engagement, which often becomes a mere public relations exercise (Lashitew, Bals and Van Tulder, 2020). Therefore, successfully integrating the SDGs into companies' strategies may necessitate a systematic overhaul of institutions governing corporate law, regulation and governance (Mayer, 2019).

For example, company law can be modified to incentivise or allow boards of directors to be answerable to stakeholders besides shareholders, as suggested by Johnston et al. (2019). In countries such as the US, where shareholder primacy is a firmly entrenched principle, the possibility of legal consequences deters directors from pursuing long-term sustainability objectives that could potentially affect short-term profitability (Lashitew, 2021:185). Consequently, they may be less inclined to establish incentive structures that encourage managers to prioritise sustainability outcomes (Lashitew, 2021:185).

Similarly, in the absence of regulations that mandate companies to pay for the social costs they generate (such as through carbon taxes), the fear of losing competitiveness may deter managers from making significant investments in reducing or offsetting emissions, as noted by Rosati and Faria (2019). Therefore, regulations that establish minimum standards for disclosure and performance may be crucial in incentivising sustainable corporate practices, as argued by Mayer (2018). As a result, companies face various conflicting incentives that promote the adoption of the SDGs, but simultaneously pose a risk to making strong commitments. Even when managers recognize the long-term strategic advantages of meeting SDG-related targets (DesJardine *et al.*, 2020; Orlitzky *et al.*, 2003), their

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focus on quarterly financial goals could hinder them from making the necessary investments to achieve these targets.

Without effective internal and external accountability mechanisms that connect stated purpose with measured results, companies might misuse the SDGs to improve their corporate image by engaging in "greenwashing" and "impact washing" of their operations. A significant body of prior research demonstrates that companies utilise sustainability disclosures to promote their competitive interests instead of communicating real and substantial improvements in performance, as highlighted by Ott, Schiemann and Gunther (2017) and Guenther *et al.* (2016).

Financial markets could exacerbate this issue as asset managers may ignore corporate greenwashing and categorise stocks as sustainable without rigorous ESG assessment due to high demand for sustainable investments (Lashitew, 2021:185). The objective of this study is to explore how companies adopt the SDG agenda, with a particular focus on institutional changes that can promote the integration of the SDGs and ESG in companies and financial markets (Lashitew, 2021:185).

3.10. CORPORATE SUSTAINABILITY DISCLOSURE AND REPORTING

Corporate non-financial disclosure has become an important tool to communicate a company's environmental and social performance. These disclosures can be driven by various forces including "explicit stakeholder pressure such as regulatory demands to measure and report carbon footprint" (Lashitew, 2021:187). According to DesJardine *et al.* (2020), companies use disclosure as a strategic tool to send signals to key stakeholders. By communicating specific observable actions and outcomes, they aim to highlight their intentions and capabilities, which may not be directly observable (DesJardine *et al.* 2020),

When it comes to sustainability disclosure, the initial step is to determine the type of information to gather and organise (Lashitew, 2021:187). This is a critical decision as collecting data can be resource-intensive and time-consuming (Lashitew, 2021:187). Theoretically, organisations use a "materiality analysis" to identify and prioritise

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sustainability issues that are pertinent and meaningful to both the organisation and its stakeholders (Lashitew, 2021:187). The main aim of this analysis is to prioritise significant issues among many potentially relevant ones based on their importance to the organisation, stakeholders and the broader society and environment, as described by Ranangen *et al.* (2018).

Even though sustainability reporting standards, like the GRI, suggest a solid materiality assessment, there are no universally accepted guidelines for conducting assessments of materiality in relation to the SDGs (Lashitew, 2021:187). The best practices, as exemplified by the 2014 European Commission's Nonfinancial Disclosure Directive, adopt a "double materiality" perspective (Lashitew, 2021:187). This requires organisations to disclose significant sustainability risks that may impact the company, as well as how the company is likely to contribute to environmental and social risks (Lashitew, 2021:187). This approach highlights that non-financial disclosure is not simply an extension of financial materiality, but a process that enables organisations to be accountable to their stakeholders, including those who are affected by their environmental and social impacts (Lashitew, 2021:187).

Schönherr *et al.* (2017) suggest that a comprehensive materiality assessment should involve an inclusive process that includes various stakeholders. However, for companies exposed to numerous sustainability issues that impact multiple stakeholders, achieving this may be challenging (Lashitew, 2021:187).

Additionally, due to the lack of standardisation and the contextual nature of material issues, it is challenging to compare sustainability performance across organisations (Ranangen *et al.*, 2018). The strategic considerations, such as responding to stakeholder demand and signalling that drive sustainability disclosure, further diminish the reliability of sustainability reports (Lashitew, 2021:187). In the absence of mandatory and audited disclosure, there is a significant risk that organisations could provide information that is more beneficial than accurate and impartial (Lashitew, 2021:187). For instance, firms might selectively disclose information on their sustainability performance to improve their public image and legitimacy, without actually making a meaningful impact on stakeholders' lives (Lashitew, 2021:187).

Ott *et al.*'s (2017) study, which used longitudinal data from the Carbon Disclosure Project, found that the determinants for data collection and voluntary publication are different. They discovered that companies voluntarily disclosed their environmental performance when it was better than their peers' environmental performance (Lashitew, 2021:187). In other words, firms only publish their sustainability performance when they believe it will enhance their reputation.

Guenther *et al.* (2016) found a similar result when studying a global sample of 1120 firms that were covered by the Carbon Disclosure Project database. They discovered that organisations with lower emissions were more likely to disclose their carbon footprint (Lashitew, 2021:187). Additionally, firms that faced significant stakeholders, such as the government, the general public, the media, employees and customers, were more likely to disclose their carbon footprint (Lashitew, 2021:187). While disclosing more information may reduce information asymmetries, inaccurate and biased reporting can have the opposite effect by increasing uncertainties (Schiemann & Sakhel, 2019). Misleading market information can exacerbate stock volatility by forcing investors to continuously revise their expectations and reconsider their investment decisions based on new and accurate information (Lashitew, 2021:187). Therefore, to be valuable, sustainability indicators should provide reliable and relevant information on long-term competitiveness that is not included in financial reports (Lashitew, 2021:187).

There are many reporting approaches that have been developed to integrate Sustainable Development reporting in business. Hence, it is assumed the ESG and SDG implementation and reporting could be a challenge as businesses too could be overwhelmed by competing plans and reporting frameworks requiring adherence and compliance.

Table 12 lists some of the codes and reporting frameworks recommended for sustainability reporting both in South Africa and globally.

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Table 12 : Sustainability Codes and Reporting Frameworks

FRAMEWORK	DESCRIPTION	REACH	SOURCE	STATUS
Global Reporting Initiative (GRI)	A comprehensive sustainability reporting framework that covers economic, environmental, and social impacts.	Global	Global Reporting Initiative. (2016): Sustainability Reporting Standards.	Voluntary
Sustainability Accounting Standards Board (SASB)	A set of industry-specific standards that focus on financially material sustainability issues.	Global	Sustainability Accounting Standards Board. (2018): SASB Standards.	Voluntary
Task Force on Climate-related Financial Disclosures (TCFD)	A framework for companies to disclose climate-related risks and opportunities in financial filings.	Global	Task Force on Climate-related Financial Disclosures. (2017). Final Report: Recommendations of the Task Force on Climate-related Financial Disclosures.	Voluntary
Principles for Responsible Investment (PRI)	A set of principles for investors to integrate ESG factors into investment decisions.	Global	Principles for Responsible Investment. (2021). About PRI.	Voluntary
Dow Jones Sustainability Indices (DJSI)	A family of indices that tracks the financial performance of companies with strong sustainability practices.	Global	S&P Dow Jones Indices. (2021): Dow Jones Sustainability Indices.	Obligatory for large organisations
United Nations Global Compact (UNGC)	A voluntary initiative for companies to commit to ten principles in the areas of human rights, labour, environment, and anti-corruption.	Global	United Nations Global Compact. (2021): About the UN Global Compact.	Voluntary
Institute of Directors South Africa (IODSA), Code for Responsible Investing in South Africa (CRISA)	The code for Responsible Investing in South Africa (CRISA) encourages institutional investors and service providers to integrate environmental, social and governance (ESG) issues into their investment decisions.	South Africa	Code for Responsible Investing in South Africa (CRISA). (2023). Home.	Voluntary

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FRAMEWORK	DESCRIPTION	REACH	SOURCE	STATUS
The JSE Socially Responsible Investment (SRI) Index	This is a market-cap weighted index calculated on an end of day basis – benchmark. It comprises all eligible companies who achieve the required minimum FTSE Russell ESG rating as set out in the Ground Rules from time to time.	South Africa	JSE (2023). Home/Services/Indices.	Voluntary
The Organisation for Economic Co-operation and Development (OECD Guidelines for Multinational Enterprises)	A set of guidelines aim to promote positive contributions by enterprises to economic, environmental and social progress worldwide. The Guidelines are supported by a unique implementation mechanism of National Contact Points (NCPs), agencies established by adhering governments to promote and implement the guidelines.	Global	The Organisation for Economic Co-operation and Development (OECD Guidelines for Multinational Enterprises) (2023). The OECD Guidelines for Multinational Enterprises.	Voluntary
The International Organization for Standardization (ISO 26000, International Standard for social responsibility)	ISO 26000 is intended to assist organisations in contributing to sustainable development. It is intended to encourage them to go beyond legal compliance, recognizing that compliance with law is a fundamental duty of any organization and an essential part of their social responsibility.	Global	The International Organization for Standardization (ISO 26000, International Standard for social responsibility) (2023).	Voluntary

Source: Compiled by the author

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These frameworks can provide valuable guidance for companies and investors looking to prioritise SDG and ESG factors. However, it is important to note that each framework has its own strengths and limitations. Investors and companies should consider their specific needs and goals when selecting an SDG and ESG framework to use.

Despite all the reporting frameworks, the SDGs have been criticised for letting business off the hook by allowing them to report voluntarily (Dixon, 2019). Dixon (2019) argues that there needs to be a system change that holds business fully accountable in order to see real progress in sustainability and in the achievement of these goals. The study is unlikely to expose regulatory and reporting protocols which are not within the purview of the author at this stage.

3.11. INNOVATION AND OPPORTUNITIES USING SDG AND ESG IN BUSINESS

Innovation and opportunities play a critical role in driving the adoption of ESG and SDG mandates in business. As companies face growing pressure to address environmental and social challenges, innovation is essential for developing new solutions and approaches to sustainability. According to a report by the World Economic Forum, innovation is key to achieving the SDGs and can create new business opportunities by addressing societal challenges (World Economic Forum, 2017).

Innovation can also help companies to improve their ESG performance by reducing environmental impacts, enhancing social outcomes and improving governance practices. For example, companies can use new technologies to reduce their carbon footprint, improve resource efficiency and enhance product sustainability. They can also leverage digital solutions to enhance transparency and accountability in their supply chains and engage stakeholders more effectively. A report by Deloitte suggests that innovative solutions can not only help companies achieve their sustainability goals but also create new revenue streams and competitive advantages (Deloitte, 2019).

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Moreover, innovation and opportunities are important for driving systemic change and accelerating progress towards the SDGs. According to a report by the Business and Sustainable Development Commission, achieving the SDGs could open up new business opportunities worth up to \$12 trillion and create 380 million jobs by 2030 (Business and Sustainable Development Commission, 2017). By investing in innovation and sustainability, companies can contribute to this transformative agenda and unlock significant economic, social and environmental benefits.

Innovation and opportunities are critical for driving the adoption of ESG and SDG mandates in business. Through innovation, companies can develop new solutions to sustainability challenges, improve their ESG performance and create new business opportunities. By seizing these opportunities, companies can not only achieve their sustainability goals but also contribute to systemic change and realise significant economic, social and environmental benefits.

3.12. LEADERSHIP DRIVING SDG AND ESG

A report by the United Nations Global Compact states that strong leadership is critical for companies to effectively implement ESG principles and achieve sustainable outcomes (United Nations Global Compact, 2017). Leaders who prioritise sustainability can inspire their teams to work towards common goals and drive innovation in sustainability practices. In the mining sector, leadership is particularly important as it involves complex and often controversial decisions that can have significant social and environmental impacts.

Moreover, leadership in the mining sector needs to go beyond just implementing ESG principles and aligning with the SDGs. It also requires a focus on stakeholder engagement and collaboration to build trust with local communities and other stakeholders. According to a report by the ICMM, effective leadership in the mining sector involves engaging stakeholders in a transparent and inclusive manner to understand their concerns and perspectives (ICMM, 2020). By doing so, mining companies can build stronger relationships with stakeholders and gain their support for sustainability initiatives.

In conclusion, leadership is a key factor in driving the adoption of ESG and SDG mandates in the mining sector. Leaders who prioritise sustainability can inspire their teams, drive innovation and engage stakeholders to achieve sustainable outcomes. As the mining sector faces increasing scrutiny and pressure to improve its sustainability performance, effective leadership will be crucial for companies to build trust and credibility with stakeholders and achieve their sustainability goals.

3.13. CHAPTER SUMMARY

The SDGs and ESG reporting have become intertwined in recent years. While the SDGs were not initially designed to serve as a framework for ESG reporting, they are increasingly being used for this purpose. The SDGs highlight the power of investors and businesses to bring about positive change and promote sustainable development. Integrating ESG factors into business operations can not only contribute to achieving the SDGs but also have positive impacts on the environment, society and financial performance. Therefore, it is important for businesses to embrace the SDGs and ESG reporting to play their part in creating a sustainable future.

This chapter provides important background on the evolution of the sustainability debate that led to the development of the SDGs. Moreover, the chapter discusses the SDGs, the challenges and its application. In addition, it provides a comprehensive overview of ESG and the interconnectedness with the SDGs.

This chapter also highlights some of the global debates involving ESG and why it is important for South African mining companies to pay attention to it. Furthermore, this chapter discusses ESG disclosure and reporting while taking a closer look at the concept of “greenwashing” often associated with companies making false or misleading claims about their environmental practices in order to appear more sustainable than they actually are.

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Additionally, the chapter emphasises the role of businesses in adopting transparent and accountable sustainability practices, and the need for regulatory frameworks to prevent greenwashing and promote genuine sustainability efforts. The chapter also highlights SDGs and ESG frameworks which could be helpful for measuring progress while providing decision-making guidelines for integrating SDGs and ESG into corporate strategies. Lastly, the chapter discusses the importance of innovation and leadership in successfully driving the SDGs and ESG in companies.

The SDG and ESG frameworks can assist the mining sector in addressing social issues, such as human rights abuses and community relations. In addition, ESG can help mining companies improve their governance practices, including board composition, executive compensation and risk management. This can improve the overall performance and accountability of the company, reduce risks and enhance shareholder value. However, the challenge will remain whether business leaders are able to balance the short-term financial gains with long-term sustainable challenges.

Chapter 4 discusses some of the detailed sustainable challenges experienced in the mining sector while Chapter 6 provides case studies and findings demonstrating how mining companies are adopting SDG and ESG frameworks and integrating it into business practices.

CHAPTER 4

4. SOUTH AFRICAN MINING SECTOR

4.1 INTRODUCTION

This chapter provides an overview of the mining sector in South Africa. The chapter is grounded in some of the pertinent debates shaped by the SDG and ESG lens. Understanding both concepts is crucial for grasping the progress and impact of sustainable development discourse and initiatives within the mining sector.

Thus, to fully grasp and comprehend the expectations of mining sector leaders and businesses, this chapter examines the relevant literature, with a particular focus on ESG principles and practices. This chapter further intends to illuminate some of the socio-political challenges and explore opportunities for innovation and leadership in mining.

As discussed in the previous chapters, this study is contextually focused on exploring leadership practices and processes in the mining sector; in particular, leadership practices and processes in support of innovation towards the alignment with the SDGs.

Mining is one of the oldest and most economically viable sectors in South Africa and has enormous potential to directly impact several of the 17 Sustainable Development Goals.

Moreover, according to the UN Environment Programme (UNEP), Africa possesses 40% of the global gold and up to 90% of its chromium and platinum (UNEP, 2023). It has the biggest reserves of cobalt, diamonds, platinum and uranium globally (UNEP, 2023). In addition, it has 65% of the world's arable land and 10% of the world's renewable freshwater sources (UNEP, 2023).

South Africa is world-renowned and boasts rich reserves of mineral resources such as precious metals and minerals, energy minerals, non-ferrous metals and minerals, ferrous minerals and industrial minerals (Brand SA 2018). For example, it is believed that South Africa hosts Platinum Metal Group (PMG) deposits which are “estimated as constituting over 80 per cent of world reserves” (African National Congress, 2012: 5).

The country’s economy is built on the back of the mining sector and the sector still enjoys the highly-profitable and beneficial economic returns. Case in point, is the sector’s contribution to the country’s Gross Domestic Product (GDP) which grew from 7.1% to 8.7% (The Minerals Council Facts and Figures Book, 2021) during 2021, at the height of COVID-19 pandemic. In 2021, the mining sector also exceeded the record R1 trillion-mark in mineral production, giving the country “a vital injection of higher taxes, wages and increased employment” (The Minerals Council Facts and Figures Book, 2021). However, despite the significance of the economic value of mining for the country, the sector is also engulfed in complexity, conflict and controversy. Due to these vacillating complexities, the mining sector is subjected to increasing and sharp scrutiny, particularly because of its environmental footprint and social impact.

In a country where there is growing unhappiness with poor service delivery and load shedding, infrastructure challenges, corruption and high unemployment rates; the mining sector is constantly challenged to deliver on a broader social mandate particularly in light of a failing state. Moreover, this sector also has a very high and visible environmental footprint. For example, the mining sector has a direct impact on SDG 13 (Climate Change) with high carbon emissions through its diesel vehicle fleets. In addition, issues such as water usage, electric consumption and land degradation are increasingly gaining world-wide attention from investors, governments, environmental lobby groups, communities and corporate boards.

The mining sector and its leadership therefore offers a rich context to gain insight into businesses which are compelled to reimagine sustainability and to transform its daily operations. Thus, through this study, the researcher explores the mining sector and examines how mining companies make sense of their businesses beyond profit. At the same time exploring to which extent innovation plays a role in addressing some of the broader SDGs and ESG strategies. This chapter assists in that mission as it provides the backdrop and context for the study.

4.2 HISTORIAL OVERVIEW OF SOUTH AFRICAN MINING SECTOR

The mining sector has played a significant role in defining South Africa's history. The Mineral Revolution is associated with the discovery of diamonds and gold in 1867 and 1886 respectively, as well as the subsequent exploitation of these minerals. It is argued that the Mineral Revolution fundamentally shaped the political, economic and social fabric and landscape of South African society (Davenport, 2013:5). As such, the mining sector played an influential role in the evolution of trade unionism while at the same time contributing to the political discourse and skills development in the country. A prime example of the latter is the Witwatersrand University, initially known as the South African School of Mining, which was established 1896 in Kimberley, where the first diamond was discovered (Davenport, 2013:5; Valiani, 2018). A point controversy is the mining sector's close association with South Africa's history of colonialism, land dispossession and the oppression of the indigenous people of South Africa, hence some of the controversies around the mining sector.

However, the South African economy has advanced over the past 100 years and was built on two important sectors namely mining and agriculture (Davenport, 2013:5; Valiani, 2018; Fedderke, 2002). As the country evolved, manufacturing grew into a mainstream sector to service the mining and agriculture sectors (Valiani, 2018; Fedderke, 2002). This resulted in a rising domestic consumer base and expanded markets in developed countries (Valiani, 2018). The mining sector was thus a key driver of the manufacturing sector and the primary source for the production of fossil

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fuels needed for energy generation (Davenport, 2013; Valiani, 2018; Fedderke, 2002).

Since the discovery of diamonds in the Kimberley region as well as gold in Johannesburg, the mining sector has greatly influenced development in the country. In particular, it influenced “South Africa’s spatial patterns of economic development, human settlements and infrastructure networks” (Valiani, 2018). Many of these spatial patterns prevail such as the road and rail networks and the towns which mushroomed around mines and along rail and road transport routes, built to convey the raw minerals to harbours for export.

In addition, the evolution of the mining sector was not devoid of violence and conflict. Between 1899-1902 several military conflicts erupted between the British colonialists and the Boer settlers, which resulted in the Anglo-Boer War (1899-1902). The term "Boer" was employed to refer to the population in southern Africa whose lineage can be traced back to the Dutch, German and French Huguenot settlers that arrived in the Cape of Good Hope in 1652. The word "Boer" is derived from the Afrikaans term for "farmer." The history of colonisation and dispossession of indigenous people as the Boer's migration from the coast to the northern parts of South Africa, is well-documented. Thus, the Boers found themselves on or as owners of the land where diamonds were discovered. As such, the first diamonds were discovered on the farm of a poor Boer farmer, Daniel Jacobs.

The Anglo-Boer War, was prompted by the “British mining magnates pushing the Empire to seize the Boers’ territories - after identifying the vast mineral resource potential therein” (Antin, 2013). In addition, a major priority for the British colonial authority was to source and supply mine labour (Antin, 2013). Hence, the British developed and implemented policies that drove “the African population into the developing urban mining centres (without effectively integrating them into society)” and as cheap labour (Antin, 2013). The assumptions underlying the policies had lasting and detrimental effects. It is thus asserted that the policies adopted and enforced by the British “informed the development of segregationist ideology and

later (from 1948) apartheid” (Government Communication Information Services [GCIS], 2012, p. 22). This remains a highly controversial issue.

The quest of the European settlers to possess the land and the mineral sources contained therein, also gravely impacted access to water by the indigenous South Africans. The settlers blatantly used “government policies during the apartheid era to favour the mining industry at the expense of the population majority” (Adler, Claassen, Godfrey and Turton, 2007). Being a water-scarce country, access to water or the denial thereof posed an inherent risk of conflict. Sadly, the impact of the colonialist policies remained evident with the dawn of democracy in South Africa in 1994. As the scholars Adler *et.al*, (2007) highlight that “if a significant portion of the population remains without access to potable water and the mining industry continues to visibly pollute and modify the water table without consequence, the current government risks losing its legitimacy.”

4.3 MINING SECTOR AND THE ECONOMY

As mentioned previously, the mining sector’s contribution to the GDP over the years has been significant, however it has also experienced significant fluctuations due to market volatility. This notwithstanding, during 2021 the mining sector contributed 8.7% to GDP, making it one of the highest contributing sectors during the COVID-19 pandemic (Stats SA, 2021). This bears testimony to the relevance and viability of the sector generating economic and operational value during very difficult and complex economic times. This is a repetition of a sentence on the 3rd page of this chapter, hence the deletion. However, the mining sector is subject to the “cyclic nature of commodities” resulting in “booms which will invariably be followed by downturns” (Valiani, 2018:83; GCIS, 2012), a pattern which has prevailed since the discovery of minerals in South Africa.

Looking back at the evolution of the mining sector, its contribution to building the country cannot be understated. South Africa transformed from an agricultural society to one of the most industrialised countries in Africa (Antin, 2013; Davenport, 2013). This transformation is often credited to “the discovery of the Witwatersrand goldfields

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in 1886 that was a turning point in the history of South Africa. It presaged the emergence of the modern South African industrial state” (GCIS, 2012: 21).

By the 1860s the largest diamond deposits were discovered in a place which eventually was named as the city of Kimberley in the Northern Cape Province. The De Beers company played a significant role in the diamond industry and with having a monopoly in the industry, the company funded the construction and installation of a railway transportation system (Antin, 2013). However, the most economic impact on the trajectory of the impending Republic of South Africa was brought forth by “the labour and capital-intensive deep-level mining in the gold fields (Antin, 2013; GCIS, 2012: 21).”

In addition, the rise of ‘mining houses’ in South Africa was a further outcome of the discovery of gold (Antin, 2013; Davenport, 2013). Initially the main purpose of the mining houses was to obtain capital, in particular, direct foreign investment. A supporting example is the establishment of the Anglo-American company which was initially established with the objective to attract capital investments from the British and American investors (Malherbe 2000:19). With the passage of time some of the major mining houses such as De Beers, Anglo American, Goldfields and Harmony Gold, established the Chamber of Mines in 1889 to “strengthen their case against global competition and the government” and dominated the economy until the 1990s (Antin, 2013).

The mining houses became a powerful role player in the South African economy by generating money and creating capital markets through operating as investment banks. In addition, these mining houses expanded the mineral resources base beyond gold and used their scale in purchase power to centralise the purchase of mining materials. The mining houses employed highly skilled labour as the basis of their main intelligence unit in management, while monopolising the unskilled labour workforce for the mines (Malherbe, 2000:1921).

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In 1980, the National Union of Mineworkers was established and subsequently in 1984 the black mineworkers held its first legal strike. It was not surprising that those strikes occurred following the nose dive in gold prices which ultimately persisted to be a “burden on the industry until the early 2000s” (Antin, 2013). Due to the improved labour representation, the unskilled labour workforce saw an increase in wages. Conversely, the significant decrease in global commodity prices resulted in pressure on mining companies from shareholders (Antin, 2013). As a result, 1998 was the beginning of an epoch of huge job losses. Within that decade, about 60% of employees lost their jobs predominantly in the gold industry (Malherbe 2000, p. 38). Furthermore, the isolation the South African economy experienced during the latter part of Apartheid, also impacted the weakening of the mining houses in their old form.

Mining houses were forced to branch out into other sectors and into manufacturing due to economic sanctions, prohibiting foreign investments and exports to South Africa (Antin, 2013). This diversification led to some level of inefficiency but at the same time also added value and contributed to formation of big companies such as South African Breweries (Antin, 2013). After the demise of Apartheid, the mid-1990s saw the reintegration of South Africa into the global economy resulting in the mining companies divided by the sale of their non-core assets and emerging as new leaner companies (Malherbe, 2000).

The mining companies pursued a strategy to stay in line with the global economy by seeking access to the abundant financial markets (McKenzie and Pons-Vignon 2012:6-7). This was done at the same time that South Africa held its first national democratic elections which ushered in the ANC as the ruling political party and the new government. The ANC leadership favoured a liberal approach to economic matters (Ashman *et al.*, 2011:11-15).

Antin (2013) confirms that in order to grasp why South Africa's mining sector and economy did not fully benefit from the commodities growth, it is essential to recognise the new order. This is evidenced by the 250% rise from 2000 to 2008 in

the Johannesburg Stock Exchange (JSE) resource index, while the mining sector employment only experienced a rise of less than 25% and the sector's contribution to the GDP kept dropping (Antin, 2013). This dwindling domestic taxation base had significant outcomes such as a decrease in government-funded investments in interventions needed to clear up bottlenecks in infrastructure (Antin, 2013). Additionally, in 2007 capital outflow to foreign places of investment amounted to a peak sum of roughly 20% of the GDP due to the mining industry seeking other safer options (Ashman *et al.*, 2011:22).

In 2008, the South African economy did not escape the ramifications of the global financial crisis. The mining sector, due to its dependence on global prices and demand, was severely impacted by the 2008 global financial crisis and economic recession, as a result of the investment constraints and liquidity in the global economy at the time (Bexter 2009, pp. 113-114). It was only in 2011 that the mining sector saw an increase in its contribution to the GDP and investments (Chamber of Mines of South Africa, 2012b:6-7). The downturn period from 2008 to 2011 saw the emergence and exacerbation of many of the pertinent issues confronting the mining sector, such as “underperformance, labour disputes, nationalisation, and the debate around the right policy approach towards the mining industry” (Antin, 2013).

4.4 THE FUTURE OF SA’S MINERAL RESOURCE BASE

As stated earlier, Africa, and by implication South Africa, boasts rich mineral reserves. This includes “gold in the Witwatersrand Basin; platinum group metals (PGMs), chromium, vanadium-bearing titanium ores and industrial minerals (fluorspar and andalusite) in the Bushveld Complex; manganese and iron ore in the Transvaal Supergroup; coal and anthracite in the Karoo Basin; copper and phosphate in the Phalaborwa Igneous Complex; diamonds in kimberlite pipes and alluvial deposits, and ilmenite, rutile and zircon in heavy minerals sands” (DMR 2018b).

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South Africa is globally renowned for its production of PGMs (48%), chrome (44%) and manganese ore (31%) (Cole & Broadhurst, 2021), with the potential to generate countless benefits that can be seen in the enormous socio-economic growth in the country. According to research, in 2017 mining created 6.8% of South Africa's GDP, with 464,667 labourers who were employed in the sector, who in turn supported an estimated 4.5 million dependents. In the same year R26.6 billion was paid in taxes, royalties, and R300 billion was spent on goods and services, whereas R9 billion was used for skill development and community advancement (MCSA 2018).

Although in recent years, South Africa's mining industry has been undergoing a decrease in production, exploration expenses and employment due to the escalating costs of operations and a decrease in capital investment, all of which can be attributed to policy uncertainty (Department of Mineral Resources [DMR] 2018b). Nonetheless, given the vast reserves of mineral resources, it can be assumed that the mining sector will remain a significant contributor and influencer of the South African economic and social landscape for decades to come.

Despite South Africa having significant mineral wealth and having pro-poor legislation since the country's first democratic elections in 1994, over half of its population live below the poverty line and 32.7% of the labour force is without jobs (Statistics South Africa [Stats SA] 2023). This has led to South Africa having one of the highest Gini coefficients (which measures income inequality) in the world. The inequality is also manifested in the stark differences between the living conditions in areas where the poor and where the wealthy people live, which is a result of the Apartheid spatial planning which has been perpetuated (Department of Planning, Monitoring and Evaluation 2017; Cole *et al.*, 2018; Cole & Broadhurst, 2021).

The mining sector has a responsibility to co-create solutions to the intractable problems of inequality, poverty and unemployment and in the county. Historically, the challenges within the mining sector have been vast and complex and continue to have a major impact, particularly in communities where mines operate. It is thus not

surprising that one of the most debated issues within the mining sector is the performance of mining companies in respect of ESG.

It is nearly impossible to cover all the multi-layered issues in one thesis; however, the next section broadly discusses the most relevant issues related to ESG in order to provide a context for why the alignment to the SDGs is critical for increasing the sector's performance in ESG. In addition, recognising that a particular brand of leadership is required to steer innovation in order to assist with the integration of the SDGs in mining operations.

4.5 ENVIRONMENTAL

There is an inherent environmental risk associated with mining practices due to the nature of mining operations which could result in environmental damage and in some instances cause irreversible damage (Schneider & Wolkersdorfer, 2021). These environmental challenges range from air and water pollution to land degradation and waste management. In an attempt to gain greater understanding of the mining sector's environmental footprint, increasing pressure is placed on mining companies to disclose data and strategies for dealing with environmental sustainability.

Globally, there has been a significant increase in the reporting of companies' performance related to “environmental data (e.g., carbon emissions, water consumption, waste generation), social data (e.g., employee makeup, product information, customer-related information), and governance data (e.g., political lobbying, anti-corruption programs, board diversity)—that is, ESG data” (Amel-Zadeh & Serafeim, 2018).

4.5.1 WATER USAGE AND MANAGEMENT IN MINING

South Africa is faced with the dichotomy of dwindling water supplies due to resource depletion and pollution, while the demand is increasing due to population growth and industrialisation (Ochieng, Seanego & Nkwonta, 2010). The country suffers from

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water scarcity and therefore desperately needs to conserve and utilise the scarce water resource optimally (Department of Water and Sanitation, 2016).

The South African mining sector uses a significant amount of the country's available water, estimated to be about 3% which is mainly used for the "extraction and processing of various minerals" (Railoun, 2021). Although some mines reuse some of their water intake, concerns related to water scarcity, water access and surrounding water quality in the areas' surrounding mines are of major concern for communities (Thomashausen, Maennling & Mebratu-Tsegaye, 2018).

These risks are of grave concern particularly for mining operations located in "water scarce regions, or upstream of communities that rely on the same water source for consumption or agriculture" (Thomashausen *et al.*, 2018). Moreover, water scarcity remains a significant business risk for mining as it is a key imperative for operations. To conserve and ensure sustainable use and management of water, it is essential for all sectors including the mining sector to use water efficiently and effectively (Department of Water and Sanitation, 2016).

The problem of water scarcity and its management recognised in the SDG, specifically SDG 6, which emphasises clean water and sanitation. It has emerged as a crucial global concern. This aspect is also of utmost importance in the "E" of ESG, which pertains to the environment, as emphasised in Chapter 3 of the international ESG framework. Water and clean sanitation have a direct impact on SDG 3 which is good health and well-being especially in the communities where mining companies operate. Thus, it is not surprising that SDG 6 calls for the ambitious goal of "universal access to improved and reliable water and sanitation for all" by 2030 (United Nations, 2023). To achieve this goal, significant resources, which are not always available in some parts of the world, are required, making it difficult to achieve SDG 6 by 2030.

However, there are significant economic opportunities for some of the poorest countries in sub-Saharan Africa (SSA), who possess "rich mineral resources such as diamonds, gold, iron and copper" to develop better public and private infrastructure

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(Dietler, Farnham, Loss *et al.*, 2021). This could include “the expansion of drinking water distribution networks, protection of wells, septic systems or improved toilet facilities” for the surrounding local communities (Dietler, Farnham, Loss, *et al.*, 2021).

Conversely, extracting and processing minerals can be highly water-intensive and can result in environmental pollution depending on the types of the minerals extracted and mining technology used (Dietler, Farnham, Loss, *et al.*, 2021; Kemp, *et al.*, 2010). Mining projects can also result in rapid population growth, which has the potential to put additional pressure on already burdened water and sanitation systems in the affected communities (Dietler, Farnham, Loss, *et al.*, 2021; Kemp, *et al.*, 2010).

Furthermore, the significant water footprint of mining operations can present a risk and diminish access to uncontaminated freshwater supplies for local communities, leading to water stress in the area (Witchalls, 2022). Besides the water scarcity being a serious concern for the sector, pollution resulting from mining operations is a deep concern for communities, government and the sector.

Mining is viewed as one of the main anthropogenic activities that contribute to major and trace elements’ pollution of river basins worldwide, which may lead to serious human health implications and also long-term impairment to waterways and biodiversity (Hatje, Pedreira, de Rezende, *et al.*, 2017). There are two major problems that underpin mining activities namely “the acid-mine drainage and the mine tailings that contribute deliberately and/or accidentally to the burden of anthropogenically derived metals to river basins” (Hatje, Rodrigo, Pedreira *et al.*, 2017).

There is potential for water pollution through the construction of surface openings such as open pits, shafts, adits and declines, which are necessary to extract minerals from the earth (Schneider & Wolkersdorfer, 2021; Tiwary, 2001; Younger & Wolkersdorfer, 2004). These extractions from the host rock encompass various activities, such as treatment plants, disposal of residues in waste rock heaps or tailings ponds, drainage, and groundwater lowering in extensive regions, along with

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all associated transport operations (Schneider & Wolkersdorfer, 2021; Tiwary, 2001; Younger & Wolkersdorfer, 2004). Therefore, extractions have a huge impact on water and thus, mining operations necessitate that water resources should be managed wisely particularly on the surface and underground watersheds (Schneider & Wolkersdorfer, 2021; Tiwary, 2001; Younger & Wolkersdorfer, 2004).

Acid mine drainage is a serious environmental challenge for the mining sector (Ochieng, Seanego & Nkwonta, 2010). In particular, the acid mine drainage problem is of special concern on coal and gold mines (Ochieng, Seanego & Nkwonta, 2010; Akinlabi, Mashinini, Lewandja, Mbohwa, Adedeji, Fatoba & Akinlabi, 2019). A number of studies done in South Africa revealed that water decanting resulting from mining operations are highly acidic and poses a risk and “cannot be released into the natural watercourse (streams and rivers)” (Ochieng, Seanego & Nkwonta, 2010).

The mine water therefore requires water treatment and prevention in order to reverse or neutralise acid levels where necessary (Ochieng, Seanego & Nkwonta, 2010). For example, the water tested in the Blesbokspruit, Klip- and Wonderfontein was below the standard water quality as a result of traces of acid mine drainage (Ochieng, Seanego & Nkwonta, 2010).

Generally, mine rehabilitation is considered as part of mining operations and includes revitalisation of the mining areas subsequent to the extraction of raw materials (Schneider & Wolkersdorfer, 2021; Tiwary, 2001; Younger & Wolkersdorfer, 2004). From a technical standpoint, this involves aspects like the rebound of groundwater after ceasing pump operations (mine flooding), the closure and dismantling of mining infrastructure, the covering of heaps and tailings facilities, as well as the reclamation and landscaping of the land used for mining (Schneider & Wolkersdorfer, 2021; Tiwary, 2001; Younger & Wolkersdorfer, 2004).

Acid mine drainage can cause water and soil contamination leading to serious environmental challenges particularly in densely populated areas where communities are very closely located to the mines (Ochieng, Seanego & Nkwonta, 2010). In coal

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and base metal mines, water drainage often contains elevated levels of sulfuric acid and heavy metals, posing a risk of contaminating streams and agricultural land if the mine water or water affected by the mine is used for irrigation purposes (Ochieng, Seanego & Nkwonta, 2010). Thus, causing serious health risks for communities in the surrounding areas and for the consumers of the agricultural products produced in such areas.

It is argued that human related activities are posing a risk to water sources which everyone depends on and in particular coal mining is seen as a major threat in this regard (Ochieng, Seanego & Nkwonta, 2010). Although, much work has been done to bring about awareness, “change in laws, technologies and attitudes” in tackling this threat, there remains many areas in “coal mining practices and regulations that need to be addressed both in South Africa and on a worldwide scale” (Ochieng, Seanego & Nkwonta, 2010).

Acid mine drainage challenges are significant for the mining sector as it is severely polluted and produced in huge quantities by some mines. At present there “is no industrial-scale method for obtaining economic benefit from mine water; as a result, treatment and disposal still represent the best option available for handling of mine water” (Schneider & Wolkersdorfer, 2021). Nonetheless, critical for all types of mining activities is water management in all phases of mining (Grünewald, 2001; Tiwary, 2001; Wolkersdorfer *et al.*, 2021).

Furthermore, tailing dams in addition to acid mine drainage are other serious environmental concerns for the mining sector. The mining sector has seen some serious and notable tailing dam accidents in recent years causing multiple fatalities. A well-publicised incident is the 2019 Brumadinho dam in Brazil which “contained waste from an iron ore mine but gave way, unleashing a sea of mud which engulfed a staff canteen, offices and farms” (BBC, 2021). This accident was coined as one of Brazil's most horrific industrial accidents which destroyed the nearby rural village of Córrego do Feijão, with the surrounding area flooded with millions of tons of toxic waste (BBC, 2021).

This accident claimed the lives of 270 people (British Broadcasting Corporation [BBC], 2021). After the accident Brazilian prosecutors laid charges of “intentional homicide and environmental offences” against 16 people, including Vale's ex-president Fabio Schvartsman and the mining firms (BBC, 2021). These charges were underpinned by the allegations that “they hid the risk of a dam collapse” (BBC, 2021). Proving that executive leadership of mining companies has a serious responsibility to ensure safety of not only their workers but the environment and the communities they operate in.

South Africa too has multiple tailings dam accidents. From the historic Harmony Golds, Merriespruit tailings dam which collapsed in 1994 killing 17 people and destroying 70 homes (Armstrong, Petter & Petter, 2019) to the recent “tailings dam of the mothballed Jagersfontein diamond mine burst” in September 2022. The collapse of the dam resulted in “killing one person and injuring another 40” and caused wide-ranging damage to infrastructure and property (Dludla, 2022). This was a dormant mine once owned by De Beers, a unit of Anglo American (Dludla, 2022).

The South African Minerals Council subsequently encouraged its members to “review their tailings management operational standards and ensure they are aligned with the International Council on Mining and Metals' Global Standard on Tailings Management” (Dludla, 2022). The development of the tailing's management standard was brought on by the incident at the “Vale owned Córrego do Feijão tailings dam in Brumadinho, Brazil, in 2019, which killed 270 people” (Dludla, 2022).

Scholars Hatje, Pedreira, de Rezende, *et al.*, (2017) explain the risks associated with tailing dams below. The primary distinction between dam accidents and other types of human-made metal pollution, is the magnitude and velocity with which the resulting slurry can move, covering the ground, sediment in rivers, floodplains, and riverbanks, degrading water quality and causing harm to fauna (Hatje, Pedreira, de Rezende, *et al.*, 2017; Simón, *et al.*, 1999). Lewin and Macklin argue that the consequences of tailing wastes can spread either actively or passively (Hatje,

Pedreira, de Rezende, *et al.*, 2017; Simón, *et al.*, 1999). The active transformation happens when these substances produce a drastic upsurge in sediment supply, altering the morphology of river basins (Hatje, Pedreira, de Rezende, *et al.*, 2017). The long-term effects of dam accidents vary based on four variables: (1) the volume and (2) properties of the contamination, (3) the rate at which the matter is released into rivers, and (4) the efficiency of the clean-up processes. (Hatje, Pedreira, de Rezende, *et al.*, 2017).

Tailing dams are an important element of many mining operations. The management of these tailings are critical as it is a high risk for the environment and people in surrounding communities. Thus, the development of innovative and more effective ways to manage the waste and tailing dams warrants great consideration given the direct environmental impact.

4.5.2 CHALLENGES IN POST MINE CLEAN UP

Globally, the issue of post-mine clean-up is fraught with critical challenges and complexities. In South Africa the magnitude of the situation is exacerbated by ownerless and derelict mines, estimated at more than 6000 in the country (Winde, 2018:7). The challenges associated with neglected or resource-depleted mines, include issues such as “acidification of water bodies, degraded soil quality, biodiversity loss, obliteration of natural landscapes and the multiple ripple effects on human wellbeing” (Mujuru & Mutanga, 2016). This is also a result of poor historically mining practices which had little regard for the environment (Kivinen, 2017). Nonetheless, abandoned mines pose serious environmental and health and safety risks.

Associated environmental challenges with abandoned and unrehabilitated mines include land degradation and environmental pollution. In addition, the substances left at or leaking from the abandoned mine sites can also contribute to environmental pollution by contaminating the biophysical environment (Mhlongo & Sigxashe, 2021).

Scholars Zorn and Komac (2013); Jan *et al.*, (2016) and Landrigan *et al.*, (2018) assert that the environmental impact, pollution and land degradation can negatively impact the health, safety and the livelihoods of people. It is well-known in that the soil in areas surrounding these abandoned and unrehabilitated mines, the tailings, waste rock dumps and mine-water discharge are highly concentrated with heavy metals which include zinc, arsenic, copper, nickel, iron and selenium (El Amari *et al.*, 2014; Fashola *et al.*, 2016; Ngole-Jeme & Fantke, 2017). Thus, river sediments and aquatic ecosystems can easily be contaminated by the erosion of such soil and tailings and discharge of drainage from abandoned mine sites (Bini, 2011).

4.5.3 SOIL AND LAND DEGRADATION

Mining waste has a significant effect on its surroundings and can be hazardous for the environment especially on agricultural land (Agboola, Babatunde, Fayomi, Sadiku, Popoola, Moropeng, Yahaya & Mamudu, 2020:1).

For example, coal is often accessed by underground mines. In South Africa approximately 60% of the country's coal deposits are found in eMalahleni (Witbank) and neighbouring areas in the Highveld of the Mpumalanga Province (Akinlabi, Mashinini, Lewandja, Mbohwa, Adedeji, Fatoba & Akinlabi, 2019:814). Ironically, these same areas are also known for the production of "grain, maize, soya beans and dry bean farming (soya beans 51 % maize 24 % and dry beans 23 %)" (Akinlabi *et.al.*, 2019:814). Companies such as "Sasol and Anglo-American Thermal Coal extract coal from deeper underground," which may give rise to environmental challenges (Akinlabi, *et.al.*, 2019:814).

The two methods for extracting coal underground, namely the strip-mining method and the room-and-pillar method, pose great environmental risks. According to Akinlabi *et al.* 2019:814; Limpitlaw, Aken, Lodewijks & Viljoen, 2005, the procedure that is most deleterious to the South African landscape is the coal strip-mining method. Nearby land and the value of the natural environment is decreased by this destruction (Akinlabi *et al.*, 2019:814; Limpitlaw, Aken, Lodewijks, Viljoen, 2005). There remains a high possibility that farms in the area could be destroyed once land

is zoned for coal mining (Akinlabi *et al.*, 2019:814) and the arable land could be permanently alienated from agricultural production.

Moreover, the room-and-pillar method creates waste and when brought to the surface and when in contact with external air and water can become very toxic (Akinlabi *et al.*, 2019:814; Bell, *et al.*, 2001). With the room-and-pillar method to extract coal, air and water can be polluted and lead to the degradation of air and water quality which can cause severe damage to buildings (Akinlabi, *et al.*, 2019:814; Bell *et al.*, 2001) and human life.

4.5.4 MINING AND AIR POLLUTION CHALLENGES

Staying with the example of coal mining, in the Mpumalanga Province of South Africa, where a large number of coal mines exist, the air quality has been recognised as a major problem and the worst in the world (Akinlabi *et al.*, 2019:815). During the coal extraction process “toxic gases such as Sulphur (SF₆), Nitrous oxide (N₂O), Carbon dioxide (CO), methane are all released into the air” (Akinlabi *et al.*, 2019:815). Thus, the air pollution could badly impact the well-being of surrounding communities with health-related problems and others “such as respiratory, emphysema and skin problems” (Akinlabi *et al.*, 2019:815).

Coal can pose some serious environmental risks for society yet coal is the main source of energy, producing nearly four-tenths of the world’s electricity (World Coal Association, 2020). In China it is estimated that more than half of energy and over 70% of electricity is generated from coal (Xie *et al.*, 2019; Xu *et al.*, 2017) with the majority of the coal being extracted through the underground coal mining method (Li *et al.*, 2021).

Moreover, the carbon dioxide emissions into the air from the coal extraction process contributes to the climate challenges and the rise of global temperatures (Akinlabi *et al.*, 2019:815). The methane gas originating from underground coal mining activities, once released in the air, leads to the emission of GHG (Akinlabi *et al.*, 2019:815).

Though not so predominant, methane gas poses greater risk in polluting the air than carbon dioxide and contributes to the climate changes in the country (Akinlabi *et al.*, 2019:815). Moreover, the high levels of toxic gases in the atmosphere can lead to several health and environmental challenges such as cancer, heart problems, and acid rain (Thomas *et al.* 2000; Blowes *et al.* 2003; Akinlabi *et al.*, 2019:815).

4.5.5 CLIMATE ACTION

The spotlight on SDG 13 (Climate Change) has become a “pressing environmental threat and a significant business risk” for the mining sector (Pearce, Ford & Prno, 2011). Climate change is understood to be “long-term shifts in temperatures and weather patterns” (UN, 2022). Beyond the natural shifts in the solar cycle, “human activities have been the main driver of climate change, primarily due to burning fossil fuels like coal, oil and gas” (UN, 2022). GHG emissions generated by burning fossil fuels contribute to raising temperatures on planet earth (UN, 2022).

Therefore, many global frameworks such as the SDGs, UN Framework Convention on Climate Change and the Paris Agreement have been developed to guide and encourage climate change solutions to protect the environment and people (UN, 2022). Some of the general categories of action that are encouraged are “cutting emissions, adapting to climate impacts and financing required adjustments” (UN, 2022).

Thus, the intense global drive for switching from fossil fuels to renewable energy systems in order to reduce carbon emissions. Increasingly countries worldwide have pledged to net zero emissions by 2050 (UN, 2022). However, in order to keep global warming below 1.5°C, half of the emission cuts must be in place by 2030, thus “fossil fuel production must decline by roughly 6 percent per year between 2020 and 2030” (UN, 2022).

The mining sector is known as one of the most energy-intensive sectors and emission contributors based on the carbon intensity of energy supply (Immink, Louw & Brent, 2018). Copper mining serves as an illustrative case study to showcase the

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measurable ways in which mining contributes to climate change through direct and indirect GHG emissions (Azadi, Northey, Ali, *et al*, 2020; Llewellyn, 2023,). It is clear that certain minerals and metals require a huge amount of energy in the course of mining, processing, and transportation (Azadi, Northey, Ali, *et al*, 2020; Llewellyn, 2023,).

The extraction of carbonate minerals contributes to environmental harm due to the release of carbon dioxide (Azadi, Northey, Ali, *et al*, 2020; Llewellyn, 2023). It is estimated that worldwide, primary metal and mineral production during 2018 was responsible for approximately 10% of global energy-associated GHG (Azadi, Northey, Ali, *et al.*, 2020). Moreover, the increase of metal demand due to new technologies and rising population numbers indicates that the energy demand will reach higher levels (Azadi, Northey, Ali, *et al.*, 2020; Llewellyn, 2023). Alternative energy solutions are therefore required. In a bid to help ensure successful deployment of green technology, mining industry entities and governing bodies must provide accurate and transparent information about greenhouse gas emissions in order for remedial tactics to be established (Azadi, Northey, Ali, *et al.*, 2020).

A further factor to consider is that in the mining sector, GHG emission increases as there is a need to “transport ore over increased distances in opencast operations or extract ore from deeper levels in underground operations” (Immink, Louw & Brent, 2018). Therefore, “rising costs of energy sources and enhanced awareness of the impacts of GHG emissions support energy- and emission-reduction initiatives” are contributing to increased climate advocacy (Immink, Louw & Brent, 2018).

The ICMM is a key advocate for climate action and has rallied their member companies to commit to key principles such as:

“Individually — Setting Scope 1 and 2 targets: We will build clear pathways to achieving net zero. Scope 1 and 2 GHG emissions by 2050 or sooner, through meaningful short and/or medium-term targets.

Accelerating action on Scope 3 GHG emissions: We recognise that Scope 3 is critical to minimising our overall impact and we will set Scope 3 targets, if not by the end of 2023, as

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soon as possible. Although all Scope 3 action depends on the combined efforts of producers, suppliers and customers, some commodities face greater technological and collaborative barriers than others. We will play a leading role in overcoming these barriers and advancing partnerships that enable credible target setting and emission reductions across value chains” (ICMM, 2021).

Despite South Africa’s commitment to “limit GHG emissions to 398-510 510 MtCO₂e by 2025, and to 350-420 MtCO₂e by 2030 under the Paris Agreement” (World Resource Institute, 2021) there remains much debate about transitioning to cleaner energy. There have been calls for decarbonisation policies to be handled with care in order to “protect the competitiveness of the mining industry, through the envisaged transition to a lower carbon and climate resilient economy” (Winkler *et al.*, 2010).

4.5.6 JUST TRANSITION

Thus, the concept of a just transition has become an important point of discussion in mining companies, government and international forums. The notion of a just transition seeks to “mitigate the negative impacts of transitioning to a lower carbon economy on workers and communities” (PwC, 2021:7). Swilling (2020:196-197) points out that “a just transition can be defined as a set of complex highly contested socio-political processes that result in (a) significant improvements in well-being for all (including the eradication of poverty and reduced inequalities, in particular asset inequality), and (b) the simultaneous restoration of degraded ecosystems, decarbonization and radical improvements in resource efficiency.” Therefore, understanding that a just transition cannot only focus on the environmental related improvements but must consider the socio-political context as well. South Africa is committed to reduce its GHG emissions according to its international commitments such as the Paris climate agreement.

According to Swilling (2020:212) in addition to Russia, South Africa is known to be “the most carbon-intensive major developing economy in the world” and understood to be “one of the ten largest coal producers and the fourth largest coal exporting country in the world” (Akinlabi *et al.*, 2019). It is estimated that South Africa has approximately “30 billion tons of coal reserves which can produce more energy

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output for the next 200 years” (Akinlabi *et al.*, 2019:812). This confirms the importance of coal mining to the South African economy (Akinlabi *et al.*, 2019). Thus, suggesting that discontinuing the extraction of coal as a means of decarbonisation and reducing the GHG emissions in South Africa will not be an overnight process.

There remains a serious transition risk as some of South Africa’s key economic players are also considered to be in the primary polluting industries (PwC, 2021:7). Moreover, the industries facing the highest transition risks are the “coal value chain, metals value chain and petroleum-based transport value chain among others” (PwC, 2021:7). For example, the coal value chain is estimated to be responsible for about 335 000 livelihoods in South African communities (PwC, 2021:7). The transition to a cleaner economy will take time as people will need to be retrained and reskilled for jobs in a cleaner economy (PwC, 2021:7). The transition will impact particularly communities surrounding the coal mines. Hence in a country with record high unemployment rates, the socio-economic factors need to be integrated into considerations on the transition to a just economy.

A more gradual approach to a just transition does not diminish the fact that coal exploration can be harmful to South Africa’s environment (Dunmade *et al.*, 2019) (cited by Akinlabi *et al.*, 2019: 812). Consequently, the damaging effects of coal mining can be found in “the contamination and pollution in the soil, underground and surface water, ecosystem, landscape” which in turn negatively impact the health of mine workers and communities surrounding these mines (Akinlabi *et al.*, 2019: 812).

Due to its potential to damage the environment, coal is of great interest worldwide especially hence the focus on the main coal producing countries (Akinlabi *et al.*, 2019:813). However, a study conducted by the World Coal Institute (WCI), highlighted that coal was classified as the “cheapest, most abundant, affordable, and safe and secure source of energy” (World Coal Institute) cited by (Akinlabi *et al.*, 2019:813). The World Coal Institute states that at present, coal-fired power plants are responsible for providing 37% of the world's electricity. The International Energy Agency's data suggests that by 2040, coal will still be responsible for generating 22%

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of the world's electricity, meaning it will remain the primary source of electricity worldwide (World Coal Institute) cited by (Akinlabi *et al.*, 2019:813).

Thus, besides its harmful effects on the environment which include “carbon dioxide emission when coal is combusted, together with the release of methane when coal is mined, coal is still the cheapest, most affordable and widely available source of energy” (Akinlabi *et al.*, 2019:813). Although Hydropower might be considered an inexpensive energy source globally, South Africa does not have the “terrain nor the rainfall pattern support construction of major hydropower plants” (Akinlabi *et al.*, 2019:813).

4.5.7 ENERGY AND THE ELECTRICITY CRISIS IN SOUTH AFRICA

The nature of the South African economy is coal-based carbon-intensive (Swilling, 2020:212-214). For example, South Africa’s state-owned utility, Eskom, “provides 95% of South Africa’s electricity (mostly from coal) and has been struggling for over a decade to build an additional 17,000 MW of capacity to meet growing unmet demand” (Swilling, 2020: 212-214).

Moreover, annual increases in tariffs introduced since 2010 have seen electricity in South Africa move from the lowest price in the world (R0.25c/kWh) to over R1.00/kWh by 2018 (Swilling, 2020:212-214). Expressed with concern, the chief economist at the South African Minerals Council remarked that the recent tariff increases of 18.65% and 12.74% would result in a substantial rise in the mining industry's electricity costs, amounting to R13.5 billion, or 33.7%, reaching a total of R53.5 billion by the conclusion of 2024. (Will, 2023). This rise in electricity costs “means the share of energy in intermediary inputs will increase from 24% to 38% in gold mining, from 22% to 37% in iron ore mining, and from 13% to 19% in the platinum group metals sector” (Will, 2023).

Eskom is increasingly struggling to supply the economy with reliable electricity. The power cuts, called load shedding in South Africa, together with the increase in electricity cost and a dismally high unemployment rate, are negatively contributing to

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economic sentiments in the country. The Minerals Council has urgently advocated for fundamental structural and regulatory reforms aimed at stimulating the economy. (Will, 2023). The government announced reforms in the electricity arena in 2022 and “the Minerals Council welcomed the removal of the cap on the size of private sector electricity generation projects” (Will, 2023).

In mining, the smelters need adequate time “to ramp down as sudden loss of power will result in catastrophic damages” (Will, 2023). With South Africa’s current load shedding schedule which at times have escalated to Stage 6, which means longer hours of power cuts, has already impacted smelters as they are “experiencing uncharacteristic trips as they were not designed to operate under these conditions (Will, 2023).

In an already declining production climate, the added cost with the new electricity tariffs increase could put pressure on mining profit margins. As Langenhoven highlights, the unfavourable operating conditions characterised by unreliable and costly electricity, along with logistical challenges in bulk mineral exports, are eroding the global competitiveness of the mining sector and could potentially result in job losses within the industry. (Will, 2023). At the time of authoring this chapter, it seemed evident that Eskom would continue to serve as a primary source of baseload electricity supply for the mining sector, given that solar and wind energy sources are intermittent in nature (Will, 2023).

However, the “The Minerals Council estimates 3 GW of the 9 GW of private sector’s electricity generation will be completed by the end of 2024” that will help in reducing the mining sector’s reliance on Eskom (Will, 2023). These challenges along with “cost-efficient transport and export channels” will also impact decisions on “starting new mines and extending the lives of older, marginal assets” (Will, 2023).

4.6 SOCIAL

South Africa's legacy in mining has made a significant impact on the economic development of the country. Despite the strong economic role which the sector plays in the country, there remains serious socio-economic concerns for mining companies to navigate on a daily basis. Operating in an increasingly unequal society with grave past racial exclusion and socio-economic segregation, leaves mining companies to conduct business in a very complex and challenging socio-political environment. Thus, the question of sustainable development could not be more pertinent as there is a globally push to get business to make a more concerted effort in contributing to a more sustainable future for all.

This sentiment is echoed throughout the UNs 17 SDGs, in particular the goals which are primarily concerned with people, such as: Goal 1 (No poverty); Goal 2 (Zero hunger); Goal 3 (Good health); Goal 4 (Quality education); Goal 5 (Gender Equality); Goal 8 (Decent work); and, Goal 10 (Reduced inequality). These objectives are also mirrored in the "S" under Social in the ESG framework, as outlined in Chapter 3.

However, the mining sector has seen an increase in sustainability initiatives especially since the 1990s when the Mining and Metals for Sustainable Development (MMSD) initiative began (Sturman *et al.*, 2018). Although the effectiveness of these sustainability initiatives may be in question, the growing contestations around the issues of labour, economic development, access to amenities and education elevate the relevance of sustainability initiatives in the mining sector.

Nonetheless, the SDG framework can assist in identifying and tracking where and how mining companies can impact the socio-economic climate of mining communities. Moreover, the SDGs can serve as an opportunity for mining companies to develop and strengthen trust with their surrounding communities which could contribute to facilitating and maintaining their social licence to operate (Fraser, 2019; Cole & Broadhurst, 2020).

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The mining sector has a huge opportunity to play a significant role in achieving the SDGs as the demand for minerals and metal is increasing globally (Dunbar *et al.*, 2020). The mining sector can contribute to the achievement of the SDGs through the provision for “technological progress, economic growth and human development (Vidal *et al.*, 2013; Elshkaki *et al.*, 2016), royalties and taxes (which in turn support national government efforts), employment, infrastructure and corporate social investment, and also by operating sustainably (avoiding negative social, environmental and governance impacts) (Sturman *et al.*, 2018)” (Cole & Broadhurst, 2021).

Due to the general longevity of mine sites and accompanying processing plants there is a potential for mines to substantially impact local communities, ecosystems and economies in both a positive or negative manner (Cole & Broadhurst, 2021).

Mining companies are in a unique position to significantly impact the SDGs, given their experience in coordinating and working with governments, civil society and development agencies to obtain their licence to operate (ICMM: 2018). The mining sector is not short of examples for generating shared value for both their surrounding communities and the company, which include “education and health facilities and programmes, water supply and wastewater treatment plants, which all contribute to achieving the SDGs” (Yakovleva *et al.*, 2017; Broadhurst 2019; Kumi *et al.*, 2020; Cole & Broadhurst, 2021:234).

Good progress has been made as many of the main mining companies have expressed their support for the SDGs whether through SDG mapping or entrenching it into their business plans (Chicksen *et al.*, 2018). This has also led to an increase in companies aligning their reporting on sustainability with the SDGs. However, these reports often highlight only the positive contributions while remaining silent on the negative impacts which could hamper and delay progress in achieving the SDG targets (Responsible Mining Foundation 2020).

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Moreover, there also seems to be a lack of understanding between “company-wide policies and standards versus on-the-ground actions at mining sites, and there is little or no evidence of sharing mine-site-level information on issues of strong public interest for neighbouring communities, workers, governments and investors” (Responsible Mining Foundation 2020) (Cole & Broadhurst, 2021:234).

Although reporting on sustainability for South Africa mining companies is voluntary, there is a legal obligation for mining companies to contribute to the socio-economic development of the communities they operate in and where they absorb labour from (Cole & Broadhurst, 2021:234). The Mineral and Petroleum Resources Development (MPRDA) Act, No. 28 of 2002, implemented by the South African government, aims to address past imbalances and ensure that the mining industry plays a role in advancing socio-economic development (Cole & Broadhurst, 2021:234).

The Mining Charter (DMR 2018a), the Guideline for Implementation of a Social and Labour Plan (DMR 2010a), and the Housing and Living Conditions Standard (DMR 2019) are crucial regulations that accompany the MPRDA. These are collectively known as the Broad-Based Black Socio-Economic Empowerment Charter for the Mining and Minerals Industry. Additionally, the multiple policies of legislation on National Environmental Management and the Mine Health and Safety Act also has significant implications for the mining sector.

Given the legacy of apartheid and the inherent tension and conflict that persists in the mining environment, finding ways to ensure greater responsiveness of mining companies to address and meet the social needs of the local community are critical for the smooth and effective operations of the mines (Matebesi & Marais, 2018: 372). Trust between the communities and mining companies has been fraught with fragility due to the of mining companies' association with adverse outcomes, leading to dissatisfaction within communities and society (Matebesi & Marais, 2018: 372).

Owen and Kemp (2014) assert that a social licence was a concept introduced to reduce local dissatisfaction. It is described as an informal agreement which

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Koivurova *et al.* (2015:194), point out, has to do with the relationships between company and the community and “how different actors interact to resolve, or not, the social and economic impacts on local communities and other stakeholders.” The idea of social licence can be traced back to the 1970s when Shocker and Sethi (1973) advocated for the need for businesses to have a social contract to function. Despite there being little consensus on the definition and applicability in the sector (Beckerman, 1994), the mining sector has seen an increase in the notion of ‘social licence to operate’ being used (Prno Slocombe, 2012).

Since around 2017, the South African government implemented the concept of social licence as a legal requirement. The government used the concept in a multi-pronged approach, legally requiring mining companies to have “Social and Labour Plans (SLP) which are formally linked to licensing agreements, and local ownership as a form of social licensing” proposed in the 2017 Mining Charter” (Matebesi & Marais, 2018: 373). Thus, companies wanting to mine in South Africa must submit an SLP to the Department of Mineral Resources (DMR) to be granted mining rights (Cole & Broadhurst, 2021:234).

In the SLP the mining companies outline how the company intends to share the benefits of mining with local communities (Centre for Applied Legal Studies,, 2016; DMR, 2023). In addition, the SLP should also highlight the “promotion of employment, advancing social and economic welfare, contributing to transforming the mining industry and ensuring that mining companies contribute to the development of the areas where they operate” (Social and Labour Mining Community Toolkit, 2017; 1). The SLP consists of an array of promises that mining companies make and once the DMR approves its application these promises are viewed as legal commitments (Social and Labour Mining Community Toolkit, 2017; 1). There is an expectation that the SLP should be developed in consultation with the mining communities and that the SLP should reflect basic socio-economic data and community needs (DMR 2010a; Cole & Broadhurst, 2021:234). However, Cole and Broadhurst (2021:234) point out that consultation is not always done at individual community level, rather it is done at a municipality level and is silent on “defining the

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mine communities and seldom describes any community engagement.” Moreover, the Housing and Living Conditions Standard of 2019 requires mining companies to ensure that their employees have adequate housing with access to electricity, piped water, sanitation and roads, as well as healthcare services and sufficient, balanced nutrition (Cole & Broadhurst, 2021:235; DMR 2019).

Nonetheless, the legal SLP approach in South Africa is not devoid of criticism. One such criticism is that “social and labour plans are not public documents (being part of the agreement between Department of Mineral Resources and the mining company)” (Matebesi & Marais, 2018:373). Moreover, “that a weak Integrated Development Plan (IDP) (local strategic plans) mean weak social and labour plans, and that social and labour plans cannot take into account the long-term consequences of mine closure (Marais, 2013)” (Matebesi & Marais, 2018:373). Additionally, there are also major concerns with the government’s capacity and capabilities to oversee local planning processes (Matebesi & Marais, 2018: 373).

Resulting from the challenges related to the SLP, the Mining Charter now requires “8% local ownership that is to be acquired through community trusts” (Matebesi & Marais, 2018:373). The prominence of the concept of local ownership is driven by two notions, namely that historically, white people have owned and dominated the mining industry and that in pursuing local ownership the historical legacy will be addressed (Matebesi & Marais, 2018:373). Furthermore, establishing community trusts is also an attempt to grow local buy-in. Community trusts have become an integral part of “obtaining and maintaining a social licence to operate” (Matebesi and Marais, 2018:373).

However, it is not without challenges. Mining operations are independent of community trusts through “which equitable community shares related to mining-community social responsibility are directed” (Matebesi and Marais, 2018:373). Therefore, community trusts serve as important platforms for driving “sustainable socio-economic development projects (Chaplin *et al.*, 2017; Harvey, 2017)” (Matebesi & Marais 2018:373). According to Matebesi and Marais (2018:373),

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certain mining operations take place in areas under the jurisdiction of traditional authorities, and the partnership agreements between mining companies and traditional leaders include community trusts. Several trusts formed in partnership with traditional leaders prioritise the objectives of traditional leaders over community development (Harvey, 2017). Consequently, community trusts have become a recurring cause of disagreement between mining companies and local communities in South Africa (Matebesi & Marais, 2018:373). The Royal Bafokeng Nation Development Trust is an exception, known for being the most efficient trust that benefits from mining royalties (Matebesi & Marais, 2018:373).

Criticism of the concept of a social license is worth noting, including the opinion that it fails to restore trust in impacted communities and stakeholders and instead limits discussion and debate (Owen & Kemp, 2013:29). Despite its intended broad scope, the focus of a social license is often short-term, resulting in a narrow perspective that resembles a mere permit (IIED, 2002). According to Owen and Kemp (2013:35), a community-oriented and context-sensitive approach promotes collaborative dialogue about local and regional priorities without being constrained by the politics of permitting. Furthermore, the existing guidelines for implementing the concept are inadequate and often overwhelmed by ideological debate, making them unhelpful at the local level (Matebesi & Marais, 2018:373).

In summary, although the concept of social licensing, whether legal or not, aims to alleviate some of the negative consequences associated with mining in local communities, the reality is that communities have not always responded favourably. As seen in the media, there is not always community-based agreement on issues and the mining communities are not devoid of tension and conflict. These tensions are underpinned by several issues whether its unemployment and labour issues, service delivery, access to water and sanitation or land and housing etc.

In addition to the SLP, the SDGs provide a framework for mining companies to address these social challenges with clear targets and intentionality. Leadership in mining companies play an important role in addressing these challenges and making

sure it remains at the top on the company's priority list. Moreover, these challenges present an opportunity to drive innovation to find solutions for some of the complexities and tensions inherent in the South African mining landscape. The following section brings attention to and examines some of the challenges and tensions that exist within the mining sector, which are also relevant to the social aspect of the ESG principles.

4.6.1 LABOUR IN THE MINING SECTOR

The mining sector is essential for the overall South African economy, as it contributes significantly to the economy, the government revenue (fiscus), and employment opportunities or the labour market (The Minerals Council Facts and Figures Book, 2021). With the country's high unemployment rate of 34.9% in 2021 (Stats SA, 2021), the mining sector was an exception and managed to create more job opportunities despite the adverse economic climate caused by the COVID-19 pandemic (The Minerals Council Facts and Figures Book, 2021). The industry's efforts to increase employment not only offset the job losses in 2020 due to the pandemic but also contributed additional jobs to the economy (The Minerals Council Facts and Figures Book, 2021).

The areas in the mining sector that are enjoying large employment figures are the platinum group metals, coal and the gold industries while iron ore is a much smaller recruiter (Stats SA, 2021). In the Mining Industry Report 2019 released by Stats SA, the employment figures revealed that during the period 2015–2019 “the mining workforce expanded by 3 737 individuals” (Stats SA, 2021). Although it is understood that the increase in employment is due to “a number of employees from subcontractors and labour brokers” while revealing a noteworthy decline in the direct employment of workers by mining companies (Stats SA, 2021). Despite the mining sector being an important source of employment for the country, the sector is also known for its ongoing labour instability.

4.6.2 LABOUR UNREST IN THE SOUTH AFRICA MINING SECTOR

Strikes have become a common occurrence in South Africa and can profoundly impact labour stability in the country (Murwirapache, G and Sibanda K, 2014). Due to the regular occurrence of strikes in all sectors, economic commentators have characterised South Africa “a striking nation” (Greg, 2013).

The mining sector is not immune to strikes and in fact have seen some severe negative consequences resulting from strikes. The most notable strike in South African mining history, internationally renowned as the Marikana Massacre that took place on 16 August 2012 in Marikana, in the North West Province. The strike was initiated by miners demanding a wage increase at the Lonmin platinum mine. This strike saw the South African Police open fire on striking mine workers. As a result, 34 mine workers were killed and 78 seriously injured (Twala, 2018).

The reasons and events surrounding the Marikana Massacre are layered with complexity and a “one dimensional analysis could lead to superficial responses” (Twala, 2018). Twala (2018) highlights that initial wage demands escalated into airing a broader set of grievances of mine workers. Grievances articulated by miners included “the brutal role of employers and the mining industry, the government’s ineffectiveness in implementing the Mining Charter, ineffectiveness of the labour movements to handle the workers’ grievances, criticisms against the ANC and the State machinery in their perceived failure to address the workers’ problems” (Twala, 2018).

The grievance about the brutal role of employers and the mining industry has dominated the narrative in the public domain. As scholar Coleman (2012) points out that the platinum boom in the Rustenburg area in recent years “has generated ‘fabulous wealth’ for companies and executives, but social squalor, tensions and poverty for workers and communities” (Coleman, 2012:4). It has emerged that the mining sector deliberately fragmented its core workforce by exploiting and indirectly employing 46% of the mineworkers via labour brokers, at great cost. As these workers are not on the company’s payroll, they use this as an excuse to justify why

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they are not providing 46% of the workforce with benefits or improved living conditions. The mining industry intentionally divides its workforce of 180,000 into smaller fragments, employing approximately 82,000 workers through labour brokers who are often subjected to exploitation (Coleman, 2012:4). Further fragmentation along ethnic, racial and local divisions has caused tremendous aggravation to the workers as they grapple with squalor, exposure to danger and impoverishment while the industry and employers become more prosperous (Coleman, 2012:4).

Following the fatal strikes, there were severe consequences. As a result of the strikes, the value of the Rand against the US Dollar dropped by several percentage points (Baxter, 2013:14), and the market capitalisation of the top 39 mining companies with a primary listing at the JSE or a secondary listing with main operations in Africa dropped by five percent between June and September 2012 (PwC, 2012:4). The strikes resulted in an estimated loss of approximately R15 billion in sales and production (Baxter, 2013:13), particularly the "wildcat strikes" that followed the Marikana tragedy and spread to several other platinum, gold, and iron ore mines within the country (Reuters, 2012a).

Moreover, in 2022, the sector saw a 90 days strike by mine workers at three of Sibanye Stillwater's Ltd. Gold mines. During the negotiation process the Association of Mineworkers and Construction Union accused Sibanye-Stillwater of "arrogance" in the prolonged strike. The President of Association of Mineworkers and Construction Union, expressed his shock concerning a R300 million pay-out to Sibanye CEO, pointing out the huge discrepancy between their request of a R1,000 increase and R1,500 per minute and R215 per second rates (Eyewitness news, 2022). He further showed his disbelief that this figure is much more than the minimum wage of R23 per hour (Eyewitness news, 2022). However, a spokesperson for Sibanye-Stillwater, asserted that the unions had, in the past, declined their idea of introducing profit share, which would have benefited the employees (Eyewitness news, 2022).

Nonetheless, the strike ended in June 2022 with a pay deal linked to inflation. It is said that Sibanye has agreed to give its lowest paid staff members an increment of

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R1,000 during the first year, followed by R900 and R750 increments in the second and third year, while those in higher-paying categories was bestowed a boost of 5% in the first 12-months, 5.5% in the second 12-month period, and 5% in the following period (Njini, 2022). In addition to this increase, the lowest-paid workers were given a non-refundable one-time allowance of R3,000, with the agreement being backdated to July 2021 (Njini, 2022). Although this was not the initial demand by the unions, they accepted the deal as negotiations were difficult (Njini, 2022).

What is clear from the above events is that the mining industry will continue to be fraught with strikes from workers in search for better wages and living conditions. A notable risk for future strikes and considerable tension to the country's economy, is the modernisation of the mining industry (Chigbu & Nekhwevha, 2021:2; Valiani, 2018). As technology advances it increases the prospect of unemployment, triggering distress within the labour movement (Chigbu & Nekhwevha, 2021:2). It is no longer possible to ignore this trend, and it is something that cannot be resisted for much longer (Valiani, 2018).

Since the COVID-19 pandemic, there has been an increase in executives reporting an increase in the adoption of automation across sectors (Chigbu, & Nekhwevha, 2021:2). Some companies increased and fast-tracked their investment in automation, robotics in particular, yielding irreversible outcomes within four months instead of 24 months (Chigbu & Nekhwevha, 2021:2), with investment equivalent the the budget for two years of investment robotics in some cases took just four months. This progress in job automation and the investment is irreversible (Chigbu & Nekhwevha, 2021:2).

Mining companies will have to consider critical factors in modelling future modernisation. These factors include the "quality of jobs that would emerge from modernisation, job opportunities from operations in areas either ignored or abandoned as un-minable, improvement in safety standards, sustainable post-mining activities and the employment opportunities that the establishment of a mature

mining cluster would generate in backward, forward and other linkages” (Valiani, 2018).

In a country with high inequality and slow economic growth, balancing labour, profit and innovation will always remain on the top of the mining sector’s agenda. That is why the concept of people, profit and planet is critical for the sustainability of the mining sector. Mining companies need to go beyond their primary goal of maximising profits for shareholders, and address the issues raised by workers while taking measures to improve the living conditions of mining communities (Twala, 2018).

4.6.3 MINING AND GENDER EQUALITY

The mining sector is no stranger to the protracted gender inequality and segregation in the workplace. In fact, in the past many governments barred women from being employed by mines, especially working underground (Mangaroo-Pillay & Botha, 2020:475). This was supported by the International Labour Organisation (ILO) who instituted a convention in 1935 prohibiting women from being employed in underground mining work (Minerals Council South Africa, 2020:1). In the case of South Africa, the South African Minerals Act (No. 50 of 1991) prohibited women from underground work (ILO, n.d.; South Africa, 1991) until 1996. However, most countries who have kept women out of underground mining are now mainly “signatories to the ILO’s Convention 176 (Safety and Health in Mines, 1995), which covers the rights of all workers” (Minerals Council South Africa, 2020:1). This Convention 176 highlights that “contrary to the old approach based on the outright prohibition of underground work for all female workers, modern standards focus on risk assessment and risk management, and provide for sufficient preventive and protective measures for mineworkers, irrespective of gender, whether employed in surface or underground sites” (Minerals Council South Africa, 2020:1). Therefore, the mining sector as a historically male-dominated industry which has an important role to play in addressing gender parity as highlighted in SDG 5.

In South Africa, some strides have been made in the employment of women in the mining sector (Kaggwa, 2019:399). These strides can partly be attributed to the “to

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progressive legislation on equity in workplaces, and to some extent, to the changing mind-set of mining companies on women workers” (Kaggwa, 2019:399). The South African government introduced both the MPRDA and the Broad-based Socio-economic Empowerment Charter in 2002 to tackle the inequities in the sector, “calling for 10% of the workforce to be women by 2009 (South Africa, 2002, 2004a)” (Mangaroo-Pillay & Botha, 2020:475). This legislation has certainly assisted in an increase in women representation in the sector. As pointed out by the South African Minerals Council (2018: 41) there has been an increase of women’s representation in the South African mining sector from 11 400 in 2002 to 56 691 in 2019 (Minerals Council South Africa, 2020:2). The table below reflects the participation of women working in mining across various commodities in South Africa.

Table 13 : Women in Mining across commodities

	No of women employees	%of women employees
PGMs	19 694	12
Gold	11 271	12
Coal	13 059	14
Chrome	3 387	17
Iron Ore	2 916	15
Diamond	2 229	15
Cement, lime aggregates and sand	1 385	14
Manganese	1 713	16
Other Minerals	1 037	17

Source: Minerals Council of South Africa (2020:2)

However, despite this progress the mining sector remains one of the most male dominated industries and much more can still be done to bring about gender equality. Studies conducted on the employment of women in South African mines since the MPRDA was introduced in 2002, reveals that the “employment of women remains a challenge and that women still face barriers to some extent” (Botha, 2016, 2017; Botha & Cronjé, 2015; Chamber of Mines of South Africa, 2017; Hancock, 2014; Kolisi & Rithaa, 2016; Mavuso, 2015; Ntombela, 2014)” (Mangaroo-Pillay & Botha, 2020:475).

Earlier research conducted in South Africa revealed several challenges that women face in the workplace (Kaggwa, 2019:399). The study 'Women in Mining in SA'

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(Women in Mining in South Africa, 2013) found that unequal treatment is a significant challenge, while Botha and Cronje's (2014) study highlighted the absence of mentors, unsupportive supervisors, and misconceptions about women's ability to perform tasks as challenges for women in the workplace in South Africa (Kaggwa, 2019:399). The study also identified other challenges such as the double-bind, sexual harassment, discrimination, isolation, a male-dominated culture and long work hours (Kaggwa, 2019:399).

The Minerals Council of South Africa (2020:2) also highlights that the challenges facing women in mining includes safety especially the “risk of sexual harassment, and even sexual violence, directed at them by their male colleagues and by illegal miners.” Women are particularly vulnerable in underground conditions. There are several working conditions which makes working underground for women more challenging, this includes “crowded conveyances, poorly lit tunnels and work areas, the lack of toilets and changing facilities, and the fact that there are very few other women working near them” (Minerals Council of South Africa, 2020:2). Nearly every day, there is an incident reported by women ranging from “physical assault, verbal abuse, being asked to trade sexual favours for employment or other benefits, or being placed in more junior positions with less pay than their male counterparts” (Minerals Council of South Africa, 2020:2). Moreover, there has also been cases of rape (Minerals Council of South Africa, 2020:2). The prevailing patriarchal and sexist culture which is very prevalent in South African society and in mining, is a huge part of the problem.

In a previous study conducted by Kwagga (2019:400), the research revealed that “the majority of women in the country’s mining sector worked as ‘general workers’, as opposed to managerial and/or professional positions.” This meant that the essential work responsibilities of the general workers category were not related to core mining activities and rather included activities such as “assistant back washers, bagging attendants, belt cleaners, brick rappers, cashiers, car-washers, casual, change house attendants, and cleaners among others” (Kwagga, 2019:400). One can assume that these are junior jobs and that women are poorly paid in this context

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(Kwagga, 2019:400). Moreover, the study revealed that there was a considerable amount of “women 31.2% (738) whose job titles indicated that the position they held was critical to mining, such as operators” (Kwagga, 2019:400). However, it was discovered that the job titles and responsibilities did not match the actual responsibilities linked to the jobs (Kwagga, 2019:400).

Nonetheless, the mining sector has over time improved in recognising and handling many of these challenges in order to create better conditions for an increasing number of women to work underground (Minerals Council of South Africa, 2020:2). The sector has taken strides in addressing issues of safety for women working underground by “improving lighting; providing safe toilets, showers and changing facilities; and (in some instances) ensuring that women have work buddies who make sure they do not have to move around quiet areas on their own.” Also, making sure that personal protective equipment and work clothing is appropriate and provide a suitable fit allowing women to be safe and active in their work; and by considering women and the future of mining as the industry moves to a more mechanised and modern way of mining where less will depend on physical strength and stamina (Minerals Council of South Africa, 2020:3).

Moreover, the Minerals Council of South Africa has produced a White Paper which is directed at “streamlining industry strategies to advance women in mining.” (Minerals Council of South Africa, 2020:3). The White Paper is geared towards member companies and serves as an action plan to address the issues discussed earlier. Table 14 below highlights the strategies to encourage the representation of women in the sector and to enable decisions that are in the best interest of women (Minerals Council of South Africa, 2020:3).

Table 14 : Strategies on Women in Mining

	GOALS	ACTIVITIES
1	Promoting gender diversity and inclusion at all levels.	Diversity and inclusion programmes that include men.
2	Helping women to attain their full potential and to close the gender pay gap.	The development of industry guidelines for women in mining.
3	Developing policies and programmes that advance and protect women, including policies on gender-based violence, sexual	The inclusion of women in mining KPIs in senior management performance plans.

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	GOALS	ACTIVITIES
	harassment and alternative placements during pregnancy.	
4	Adapting workplaces to accommodate women, including ablution facilities, lockable toilets, changing rooms, and childcare and lactation rooms.	Job shadowing, training, recruitment, retention, talent pools and succession planning.
5	Improving safety measures.	The review and adaptation of workplaces to ensure that the needs of women are met.
6	Recognising and adjusting for the different physical capacities of women.	The review of physical work capacity requirements in line with the capabilities of women.
7	Establish collaborations with relevant partners that advance the cause of women in mining, e.g., MHSC and WIMSA	Collaborations with relevant partners that advance the cause of women in mining The Minerals Council will develop a Women in mining' task team from within the Minerals' Council and its member companies that will oversee the implementation of the white paper as well as its monitoring and evaluation.

Source: Minerals Council of South Africa (2020:4)

These initiatives undertaken by the Minerals Council of South Africa and the sector at large are steps in the right direction. In a fact sheet compiled by the Council in 2020, it pointed out that 17% of women are in top management in the mining sector, 17% in senior management, 24% professionally qualified and 18% skilled technical professions, with women representing 12% of South Africa's total mining labour force of 454 861 people (Kaggwa, 2020:1-2). These numbers are encouraging as the participation of women in the sector has seen a steady increase in the mining sector over the years. However, given the prominence of the sector as one of the country's largest economic contributors, these numbers are still a far cry from reaching the sector's true potential and the achievement of the goal of a 50/50 gender split (Minerals Council of South Africa, 2020).

There is significant room for improvement as women constitute more than half of (50.1%) of the South African population (Stats SA, 2022). In addition, "South Africa also lags behind other mining countries such as Australia and Canada, whose representation of women in mining sits at 17% and 16% respectively" (Minerals Council of South Africa, 2020).

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Therefore, to achieve the vision of an all-inclusive society, women must play a fundamental role in mainstream economic activities (Kaggwa, 2019:400). Moreover, it is prudent that the mining sector continues to enable and create these favourable working conditions and initiatives that attract more females into this profitable industry (Kaggwa, 2019:400). The CEO of Vedanta Zinc International and the Minerals Council board member, affirms this position as she indicates that “the participation of women in business has been shown to positively influence the bottom line of companies and to contribute to enhanced sustainability” (Minerals Council of South Africa, 2020).

Leaders in the mining sector have a responsibility and an opportunity to use innovation as an intentional driver to address gender inequality in mining. With the rapid advancement of technology modern jobs could provide women with more prospects of being included in technical and operational activities which in the past were induced precluded by physical limitations.

Moreover, as the Minerals Council of South Africa’s White Paper for Women in Mining (2020) suggests, addressing the inclusion of women in mining, needs to be part of the key performance areas in senior management performance plans. This will assist with the intentionality and actively moving the needle of increasing the number of female participants in the mining sector. A survey conducted by the Minerals Council revealed that “successful women in mining strategies are those that are led by CEOs.” Thus, modernisation and intentional transformation in mining could pave the way for the equitable redress of gender disparity with the view of meeting the targets outlined in SDG 5 (Gender Equality).

4.6.4 SAFETY AND HEALTH IN MINING

In South Africa mining is characterised with significant capital investment and expansion. Yet, this investment and expansion has come at a high cost. The pollution generated by mining is one of the main sources of environmental health problems in South Africa, particularly rural and underprivileged communities,

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surrounding mines. The sector's inherent physical, environmental and health risks make it one of the most hazardous workplaces in the world.

Mineworkers face numerous occupational health and safety risks along with socio-economic difficulties (Pelders & Nelson, 2019:67). The hazardous mining operations can lead to "injuries and fatalities, cumulative trauma disorders, noise-induced hearing loss, and heat stroke or exhaustion, pulmonary diseases, including silicosis and lung cancer, exposure to dust and hazardous chemicals, while fatigue and shift work are accident risks (Chamber of Mines of South Africa, 2018; Cronjé & Chenga 2009; Pelders & Nelson, 2019).

According to Pelders and Nelson (2019), mining is associated with various psychosocial risks, including drug and alcohol abuse, stress caused by being away from their families in the case of migrant workers, working conditions, lack of control over work, high workloads, work schedules, stress from incidents and accidents, and socio-economic effects of occupational injuries (Deloitte, 2015, Cronjé & Chenga 2009; Republic of South Africa, 2009; Republic of South Africa, 2009). The health and social issues faced by workers and communities affected by mining in South Africa are complex, multi-faceted and often long-term.

Moreover, the diminishing health and safety of mine workers can negatively impact the mining sector (Pelders & Nelson, 2019:67), with direct and indirect costs such as absenteeism and a loss of productivity (Pelders & Nelson, 2018; 2019; Republic of South Africa, 2008).

Given the long and troubled history when it comes to the health and safety of mineworkers in South Africa, it is not surprising that it remains a top priority for mining companies. Since 2019, mining companies in South Africa have taken extensive steps to protect workers by implementing improved safety standards. The Mine Health and Safety Council of South Africa is at the forefront of implementing and monitoring safety standards in the mining sector.

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In the 2020/2021 financial year, the safety performance statistics published by the Minerals Council of South Africa indicated a regression for the “second consecutive year in 2021, with a 23% increase in reported fatalities, compared with 2020” (Minerals Council, 2023). In 2021 there were “74 fatalities reported, compared with 60 fatalities during the previous year, a 23% regression” (Minerals Council, 2023).

The number of fatalities is unacceptable and far too high while the regression in safety performance is alarming and the reasons are cause for great concern. The fatalities reported by the different mining commodities are as follows: “the gold sector reported the highest number of fatalities with 30 fatalities in 2021, compared with 25 (20% regression) in 2020; the platinum sector reported 21 fatalities compared with 15 during 2020 (40% regression); the coal sector recorded 10 fatalities, compared with 6 fatalities (67% regression) and the other commodities (zinc, dolerite, diamond, iron ore, chrome, copper, sand and manganese) reported 13 fatalities, compared with 9 fatalities (44% regression)” (Minerals Council, 2023). According to the Minerals Council of South Africa, “additional resources have been immediately dedicated to conduct research in order to understand the “causes of these accidents and how they can be prevented” (Minerals Council, 2023).

Yet, in the bigger picture “the number of fatalities overall declined by 75% with fall-of-ground fatalities in particular declining by 85%” between the period of 1995 and 2021 (Minerals Council, 2023). Despite the “second consecutive regression in the number of fatalities reported in the industry following the 60 fatalities reported in 2020,” overall improvement in safety and health standards can be regarded as significant as improvements in safety and health standards have been put into practice. This demonstrates that mining companies in South Africa are becoming increasingly more serious about improving safety measures and moving toward better safety and performance in the sector.

Innovation is critical in improving safety for South African mineworkers. Mining companies should continue to develop new and better safety measures in the future (Minerals Council South Africa, 2019). Leadership in mining companies should

continue to drive the safety strategies to zero harm and enable effective tactics of reducing and eliminating fatalities through innovation but also the safety culture in mines. Appreciating the South African mining sector as a driver of economic development, however its negative impacts on health and social well-being of affected communities must be addressed.

4.7 GOVERNANCE

South Africa is a developing country with extraordinary mineral wealth (Hayes, 2022). However, translating this resource of wealth into economic growth and development for the country, requires strong and stable governance (Hagan, Tost, Inderwildi, Hitch & Moser, 2021:2). Many mineral resource-rich developing countries have not been able to build sustainable economies or secured take-off agreements which favour growth; instead, many of these countries have been plunged into “deep economic crises and conflict in spite of their resource blessing” (Hagan, Tost, Inderwildi, Hitch & Moser, 2021:2).

Although, in countries with natural resources such as oil and gas, it has assisted in improving the living standards but in some cases, countries fell short of creating self-sustaining growth (Friedrichs and Inderwildi, 2013). Researchers have been fascinated with the concept of “resource curse” or the “paradox of plenty” (Auty, 1993) particularly in countries that are greatly endowed with natural resources.

Seminal work done by scholars Sachs and Warner (1995) and Collier (2003), highlight that a paradox exists with resource rich countries as the opportunity for wealth that goes with the “discovery and extraction of minerals and other natural resources, such endowments all too often impeded rather than further balanced sustainable development” (Sachs & Warner, 1995; Collier, 2003).

However, scholars Brunnschweiler and Bulte (2008), argue that the resources curse is triggered by resource dependence and not necessarily resource abundance. Hagan, Tost, Inderwildi, Hitch and Moser (2021:2) point out that many nations with

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“strong governance are able to translate resource wealth into economic growth (for instance Norway, the US and the UK) while countries with weak governance (like Zaire, Congo and Sierra Leone) are likely to head for corruption and conflict” (Klare, 2002).

The resources curse is thus somewhat attributed to the lack of or poor governance and therefore can result in the failure to “turn resource receipts into productive assets” (Hagan, Tost, Inderwildi, Hitch & Moser, 2021:2).

Therefore, it is critical for a country like South Africa to ensure and maintain strong corporate and public governance. Strong governance, which allows for the responsible and ethical stewardship of resources is a gateway to generate productivity and economic growth for its people. To ensure fair and sustainable value creation for all stakeholders, the South African government has implemented governance regulations for the mining sector.

This includes the MPRDA which came into effect in 2004 and which regulates the exploration and exploitation of mineral resources and promotes responsible, accountable and gender sensitive governance. Moreover, in the mining sector, the Black Economic Empowerment (BEE) is governed by the Broad-Based Socio-Economic Empowerment Charter for the Mining and Minerals Industry, 2018 (Mining Charter III). Mining Charter III took effect on March 1, 2019 and raised the BEE threshold requirements for ownership, procurement and employment equity. The Implementation Guidelines for the Broad-Based Socio-Economic Empowerment Charter for the Mining and Minerals Industry, 2018 (Guidelines) published by the Minister of Mineral Resources and Energy on December 19, 2018 should also be considered to understand the extent of BEE obligations for South Africa's mining industry. The Department of Mineral Resources and Energy (DMRE) (formerly known as the Department of Mineral Resources) is responsible for the administration and enforcement of mining legislation. (Leon, Leyden & Burnell, 2019; Hayes, 2022).

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The introduction of the MPRDA was a radical and significant shift from the previous regulatory environment, which was in existence for more than 100 years preceding the MPRDA (Hayes, 2022). With the past legislation, the “right to mine was based on a system of private ownership of 'mineral rights' (being essentially limited real rights and servitudes in respect of land), which could be freely traded” (Hayes, 2022). The MPRDA accommodated the transition by detailing provisions permitting “for the conversion of 'old order rights' into prospecting rights and mining rights regulated by the MPRDA” (Hayes, 2022).

Additionally, the South African mining sector is subject to numerous regulations and laws governing different aspects of the sector. This includes topics such as labour, mineral resources, environmental protection, health and safety and corporate governance.

Table 15 below highlights thirteen key pieces of additional legislation that is pertinent to the mining sector.

Table 15 : South African Mining Sector: Applicable Legislation

	RELEVANT LEGISLATION	DESCRIPTION
1	The National Environmental Management Act, 1998 (NEMA)	The National Environmental Management Act, 1998 (NEMA) establishes a legal framework for environmental protection and sustainability in South Africa.
2	The National Environmental Management: Waste Act, 2008 (NEMWA)	The National Environmental Management: Waste Act, 2008 (NEMWA) provides a regulatory framework for the sustainable management of waste in South Africa.
3	The National Environmental Management: Air Quality Act, 2004 (NEMAQA)	The National Environmental Management: Air Quality Act, 2004 (NEMAQA) provides a framework for the management of ambient air quality and the control of emissions of air pollutants in South Africa.
4	The National Water Act, 1998 (NWA)	The National Water Act, 1998 (NWA) in South Africa provides a legal framework for the management of ecosystems and efficient use of finite water resources.
5	The National Environmental Management: Protected Areas Act, 2003 (NEMPAA)	The National Environmental Management: Protected Areas Act, 2003 (NEMPAA) seeks to protect areas of environmental importance by providing legal protection and measures to manage these areas.
6	The National Environmental Management: Biodiversity Act, 2003 (NEMBA) (and the relevant provincial conservation ordinances and statutes)	The National Environmental Management: Biodiversity Act, 2003 (NEMBA) creates a framework for the conservation, protection and sustainable use of South Africa's biodiversity.

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	RELEVANT LEGISLATION	DESCRIPTION
7	The National Heritage Resources Act, 1999 (NHRA)	The National Heritage Resources Act, 1999 (NHRA) in South Africa provided for the protection, promotion, management and conservation of South Africa's heritage resources.
8	The Mineral and Petroleum Resources Royalty Act, 2008	The Mineral and Petroleum Resources Royalty Act, 2008 in South Africa established the legal framework for the collection of mineral and petroleum resource royalties from those who exploit such resources.
9	The Mining Titles Registration Act, 1967	The Mining Titles Registration Act, 1967 in South Africa established a system for the registration of mining titles and governs the transfer of such titles.
10	The Diamonds Act, 1986	The Diamonds Act, 1986 in South Africa established regulations related to the mining, export and taxation of diamonds and other precious stones mined in the country.
11	The Precious Metals Act, 2005	The Precious Metals Act, 2005 in South Africa regulates the processing, refining and trading of gold, platinum and other precious metals.
12	The Labour Relations Act, 1995	The Labour Relations Act, 1995 in South Africa is designed to protect the rights of workers and to promote productive and harmonious workplace relations between employers and employees.
13	The Mine Health and Safety Act, 1996 (MHSA)	The Mine Health and Safety Act, 1996 (MHSA) is a cornerstone piece of legislation that outlines the safety and health regulations for those in the sector, including measures for reporting and managing hazards in the workplace.

Source: (Leon, Leyden & Burnell, 2019 and Hayes, 2022).

Legislation such as these in Table 15 above promote and enforce responsible and sustainable extractive practices in South Africa. Besides, the mining sector in South Africa is facing challenges beyond the shortage of electricity, uncooperative workforce, and local community tensions, as it has also been hindered by policy and legislative ambiguity, according to the sector (Hayes, 2022). Case in point is the Amendment Bill to the Mineral and Petroleum Resources Development Act, 2002 (MPRDA) which has been pending in the South African Parliament since 2012 (Davies, Berman & Pillay, 2018). Furthermore, when the 2018 Mining Charter was released, the Minister also declared that the MPRDA Amendment Bill had been withdrawn and that a new law would be drafted to govern the upstream petroleum industry (Davies, Berman &, Pillay, 2018).

A further pressure point for the South African government is the balancing act of managing business interests and investment while addressing the racial and colonial

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legacies of the past. For more than 100 years, since its inception, the sector introduced and perpetuated racial discrimination (Davies, Berman & Pillay, 2018). Despite a major overhaul of the applicable laws and regulations which shifted minerals from private ownership to that of public control in 2004, the industry's ownership has remained the same and remains one of the major sources of contention in the country's politics (Davies, Berman & Pillay, 2018).

Nonetheless, the South African government advocates that investment in the mining sector is accepted and desired in order to attract businesses. The South Africa government also seeks to pursue domestic agendas such as black economic empowerment, affirmative action, land restitution and redistribution and decolonisation, which complicate the situation in practice (Hayes 2022). It is asserted that these agendas and policies discourage investors. This notwithstanding, the South African mining sector remains highly profitable and continues to make up a notable portion of the GDP. The sector has been heavily endorsed by the President as being essential to furthering the nation's economic potential, exports and employment opportunities (Davies, Berman & Pillay, 2018).

Trade unions, stakeholders and communities were all consulted on the formulation of the 2018 Mining Charter, which stipulates that the new mining rights must contain at least "30% Black Economic Empowerment (BEE) shareholding distribution in the following way; at least 5% non-transferable carried interest to qualifying employees; at least 5% non-transferable carried interest or "equity equivalent benefit" to host communities; at least 20% effective ownership in the form of shares to a BEE entrepreneur, 5% of which must preferably be for women" (Davies, Berman, Pillay, 2018). To guarantee successful enforcement of these regulations in the mining sector, ethical direction and sound corporate management are both essential. These principles are encompassed in both the SDGs and ESG frameworks, as elaborated in Chapter 3, and are crucial elements of good corporate governance that companies should adhere to.

4.7.1 CORPORATE GOVERNANCE AND INTEGRATED REPORTING

Corporate Governance in the mining sector in South Africa has been a popular topic in recent years. As the industry is a major economic contributor in the country, it is important to ensure that the sector is managed effectively and ethically. South Africa has introduced a well and highly-accepted protocol on Corporate Governance in the mining industry. This framework is based on the King Report on Corporate Governance, first introduced in 1994, which sets out the country's corporate governance principles. The ultimate aim of this King Code is to instil an ethical culture, moral leadership, and effective governance in organisations, ultimately promoting corporate governance. In addition, this Code seeks to encourage companies to carry out sustainable operations and comply with checked regulations to protect their reliability, legality and notoriety. This Code encourages companies to act ethically while adhering to the guidelines set by the governing body (Institute of Directors in Southern Africa (IoDSA), 2016; Corvino, Doni & Martini, 2020).

For companies listed on the JSE it is mandatory to adopt Integrated Reporting (IR) which was enforced as from 1 March 2010 (Hoffman, 2012). The driver for this was the King Code of Governance Principles for South Africa 2009 (King III) becoming a JSE listing requirement. King III recommends that organisations should adopt Integrated Reporting on an 'apply or explain' basis (Hoffman, 2012).

To promote transparency and environmental responsibility, mining companies are placing greater emphasis on IR. This reporting approach goes beyond financial performance and includes reporting on the company's impact on broader economic, social and environmental sustainability. IR has become an important global standard adopted by most significant bodies, and it is supported by investors, preparers and regulators (Corvino, Doni and Martini, 2020).

For instance, the International Council on Mining and Metals (ICMM) has developed a framework, the Sustainable Development Protocol to enable the standardised reporting of the Corporate Social Responsibility practices by ICMM members. Additionally, the Global Reporting Initiative (GRI) has also provided guidance for

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mining companies to better report on ESG issues, which includes the impact of companies on natural resources, water and waste, labour rights and surrounding communities. By incorporating integrated IR into their operations, mining companies can better demonstrate their commitments to sustainable development and demonstrate improved financial performance (ICMM).

Moreover, studies (Al-Shammari & Al-Sultan, 2010; Doni, Corvino & Bianchi Martini, 2019; Carels, Maroun & Padia, 2013; Solomon & Maroun, 2012; Abeysekera, 2013; Doni & Fortuna, 2018; Steyn, 2014, Haji & Anifowose, 2016) have been conducted in South Africa to show that IR may have a constructive influence on decisions through its ability to stimulate coordinated thinking and management practices (Corvino, Doni & Martini, 2020).

The importance of integrating sustainability into IR needs to be acknowledged, as it allows companies to show how they generate and sustain value (Eccles & Krusz; 2010; Eccles, Krusz, & Ribot, 2014). Additionally, the combination of financial, social, and environmental factors can help companies to address the necessary changes stemming from the worldwide economic crisis (Boddy, 2011), environmental goals, and the demand for more openness in corporate reports (Corvino, Doni & Martini, 2020). Moreover, IR has the potential to revolutionise how businesses plan and create value, in addition to how they report on their sustainability (Corvino, Doni & Martini, 2020). IR is also a reliable way to report to and to engage meaningfully with stakeholders and local people (Corvino, Doni & Martini, 2020).

In addition, IR is an effective way to report on ESG (data and to motivate companies to increase their social and environmental activities with a special emphasis on climate-related disclosure that was released in December 2016 by the Task Force on Climate-Related Financial Disclosures (TCFD) (Corvino, Doni & Martini, 2020). Since 2010, South Africa has been globally recognised for the remarkable shift from traditional financial reports to integrated reporting (Corvino, Doni & Martini, 2020). This is supported by various studies mentioned earlier which confirmed that South

Africa has implemented principles of corporate governance (Corvino, Doni & Martini, 2020).

Thus, IR in the South African mining sector serves as an important tool for mining companies to demonstrate the impact they made in terms of the SDGs and ESG. At the same time IR, underpinned by agile and ethical leadership and good governance can be used as a useful mechanism to showcase innovation and to attract investment.

4.7.2 LEADERSHIP AND GOVERNANCE

Leadership is an essential factor in effective corporate governance. Strong leadership helps organisations identify and address issues and challenges that arise in the workplace, develop corporate culture and to ensure adherence to corporate objectives, values and ethics (Gans & Moeller, 2011). Leaders create an engaged and supportive work environment and show appreciation for team members' efforts, which makes it easier for employees to trust that their contributions are valued (Cairns & Tilbury, 2019).

Moreover, ethical leadership and good governance are essential in fostering trust between stakeholders, promoting public and investor confidence, and in helping to ensure equitable distribution of a company's resources (Falk & Smith, 2019). Leaders who demonstrate sound ethical values through their actions and decisions promote integrity, fairness, and moral reasoning. Such leadership styles provide direction, motivate employees and other stakeholders to act ethically, and strengthen partnerships through mutual trust and respect (Jayaraman & Chai, 2020).

Good governance, with ethical leadership at its core, also helps to ensure that the values and interests of all stakeholders – from shareholders to customers – are taken into account in organisational decision-making (Collier, 2019). This helps to build a positive corporate culture, develop trust and respect among stakeholders, strengthen stakeholder relationships, and lead to fruitful outcomes for a company. Ultimately, ethical leadership and good governance benefit both the business and wider society.

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All of these aspects of leadership are crucial in helping organisations achieve effective corporate governance.

In the past, starting a mine and making it publicly available for investment was a lucrative venture, but the risks and expenses associated with it were significant (Major, 2020). Mining companies have the resources to easily navigate and confront any external issues, which include fluctuations of the market, laws issued by the government and the expectations of different communities and other stakeholders. However, the success of the company directly depends on how skilled and experienced the leaders are in managing the said matters (Major, 2020).

In today's era, the hazards of initiating a mining operation are even more significant and hence having a strong support system and a substantial financial base is crucial (Major, 2020). Due to the extensive range of responsibilities involved in setting up a mining company, particularly in South Africa, it has always been the realm of larger businesses (Major, 2020). These responsibilities include negotiating with various stakeholders such as the government, associations, communities, environmental organisations and the power utility (Eskom) (Major, 2020). Moreover, the Mineral and Petroleum Resources Development Act and Black Economic Empowerment laws, which are official and constantly evolving, must be considered (Major, 2020). As a result, mining leaders in South Africa face continuous challenges in navigating the complexities of the business environment, maintaining positive stakeholder relationships, and demonstrating transparency, good governance and accountability.

4.8 INNOVATION IN THE MINING SECTOR

Research and innovation are paramount in addressing some of the serious challenges facing humanity, as reflected in the SDGs. By utilising and developing new technologies, mining companies can be more efficient in their operations which particularly impact environmental challenges such as reducing carbon emissions. Increasingly, new technologies are being developed to reduce emissions, improve worker safety, and to increase the efficiency of operations. These innovations can range from improved ventilation and dust control systems, to the use of biodiesel fuel

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to help reduce emissions, to the development of more sustainable extraction techniques. Companies are also beginning to use drones and artificial intelligence to enhance their environmental monitoring and detection capabilities. These developments have the potential to help miners reduce their environmental impacts, while still extracting the minerals.

Innovative mining technology can help mining companies be more environmentally conscious, and as such, is essential for ensuring the sustainability of the mining sector and the environment. However, a company's ability to create and implement new ideas, approaches and products has come to be known as its 'innovativeness'. This can enable mining companies to remain one step ahead of their competition. However, innovativeness comes with its own set of challenges and possible costs (Mallen, Dominguez, Gomez & Alcami, 2020:615-633). There are wide discrepancies between organisations regarding how innovative they are, due to the conflict between needing to innovate and the price tag associated with it (Mallen, *et al.*, 2020:615-633). Research has been conducted to look into why some companies are more innovative than others and the results concluded that the organisational and managerial components play a role in this (Prasad & Martens, 2015).

The actions of leaders can have a substantial influence on a company's innovativeness, as noted by Aragon-Correa *et al.* (2007). To foster a productive atmosphere, Topcu *et al.* (2015) suggest that supervisors should carry out procedures that inspire employees to adopt creative conduct.

Notably, the media and social media have drawn attention to misconduct in business, resulting in a decrease in stakeholders' trust as well as monetary losses (Rodriguez-Carvajal *et al.*, 2014). Hence, there is increased pressure on businesses to ethically pursue their goals while also valuing people. Therefore, this shift in leadership commands the interest of research that explores leadership in navigating complexities and focuses on the different outcomes in ensuring successful pursuits of innovation and sustainability strategies in the mining sector.

4.9 CHAPTER SUMMARY

The South African mining sector has a long and tumultuous history marked with changing legislation, land ownership disputes, and labour contestations. Despite its turbulent history, the sector has made great strides in contributing to the country's GDP, providing employment, and in generating billions in revenue for the South African economy. The country is endowed with abundant mineral resources and therefore the mining sector continues to be a cornerstone of the South African economy. However, the inherent risk and impact of the mining sector on the environment and surrounding communities has come under great scrutiny in recent years. Significantly, both the SDG and ESG frameworks offer a valuable approach for the mining sector to foster change and create a positive impact on society.

This chapter therefore discusses some of the key challenges in the mining sector with regard to the environment, social and governance. Vitaly important are concerns around water usage and management, challenges in post-mine clean up, soil and land degradation, air pollution, climate action, the just transition and the energy and electricity crisis in the country. In addition, this chapter deliberated on the Social Labour Plans, a legal requirement for South African mining companies, the labour unrest, gender equality and safety and health challenges within the mining sector. This was followed with a detailed discussion on governance and in particular corporate governance, integrated reporting and leadership in the sector.

Lastly, the chapter explored innovation in the mining sector which could potentially assist in combating some of the serious ESG challenges highlighted in the SDG framework. There is a definite need for business leaders in charge of mining companies to act responsibly and be good corporate citizens by balancing profits, people and planet. The proactive approach in this regard also positions mining as an attractive investment destination and continued healthy financial returns. Moreover, the combination of technological improvements and ESG compliance has the potential to put South Africa at the forefront of global mining innovation, positioning the sector for an even brighter future. However, in order to achieve this and to practically conduct this balancing act might be easier said than done.

Therefore, the question of how this balancing act is conducted becomes of significance for the mining sector and is the core focus of this research. Chapters six and seven of this thesis focuses on the case studies and findings of the research that seeks to provide some concrete illustration of how leaders in mining companies are navigating these complexities and using the SDG framework along with innovation to address the ESG challenges.

CHAPTER 5

5. RESEARCH DESIGN AND METHODOLOGY OF THE STUDY

5.1 INTRODUCTION

The intricate fabric of society woven with a rich tapestry of threads, colours and textures, remains a complex phenomenon and is not always simple and straightforward to explain (Creswell & Poth, 2016). Scholars likened qualitative research to this complex metaphorical concept of society, in which the “loom on which fabric is woven, general assumptions and interpretive frameworks holds qualitative research together” (Creswell & Poth, 2016). Qualitative research is generally employed as a method to explore a particular problem in a group or population and to make sense of the complex details of an issue (Creswell & Poth, 2016).

Appreciating the suitability of the qualitative research approach, this study employs this research method to answer the research questions outlined. This chapter provides an explanation for choosing this approach. In addition, this chapter discusses the data collection methods, which include semi-structured interviews (Miles & Huberman, 1994; May, 2001); contextual observation (Yin, 1994); and an examination of present day academic and business literature along with participating companies’ publications and documentation.

Furthermore, this chapter outlines the data analysis methods employed in this study, ranging from qualitative thick description (Ryle, 1949; Geertz, 1973; Lincoln and Guba, 1985; Blaikie, 2000; Cohen & Crabtree, 2006), analytical comparison (Neuman, 1991), and pattern coding (Miles & Huberman, 1994). This chapter

concludes with the discussion regarding the afore-mentioned methods along with ethical considerations.

5.2 RESEARCH PHILOSOPHY AND STRATEGY

Selecting the qualitative rather than a quantitative approach in this study, was motivated by the research subject and questions at hand. The qualitative research process is underpinned by “three interconnected generic activities ...theory, method and analysis; or ontology, epistemology and methodology” Denzin and Lincoln (2005:21).

These accepted approaches characterise a researcher’s background, personal views, including ethical and political issues (Creswell & Poth, 2016). The researcher influences the research problem with a set of ideas or a framework which serves as the guiding theory or the research ontology, illuminating the way the researcher sees reality (Blaikie, 2000). Furthermore, the research questions are derived from the selected ontology along with ways to corroborate which serve as the epistemology of the study (Blaikie, 2000). Lastly, through methodological examination, the data is analysed within a specific context determined by the research process (Blaikie, 2000; Creswell & Poth, 2016).

Empirical evidence gathered in the pursuit of answering the research questions are analysed, interpreted and written about (Blaikie, 2000). The topic of this empirical study induced the philosophical view of Interpretivism as the theoretical lens. Interpretivism provides a theoretical lens for social studies, in doing so assisting in making sense of how people in society comprehend their own actions (Travers, 2001). A key characteristic which underpins Interpretivism, is its hermeneutical value, however, it does not preclude the prospect of crafting new theories or testing theories (Russel, 2010). Yet, recognising that this theory has limitations such as time and space (Russel, 2010). Despite these limitations, Interpretivism makes a strong case for discovering the meaning behind people’s actions which ultimately results in patterns (Blaikie, 2000). Therefore, concluding that in the Interpretivism paradigm, statistical patterns or correlations should not be viewed on their own but rather

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attempting to understand it by making sense of people's actions behind those patterns (Blaikie, 2000).

Thus, important to Interpretivism is the belief that members of society experience their social world from the inside which they interpret and make sense of accordingly. This provides the opportunity for social researchers to discover the 'insider' view rather than imposing an 'outsider' view on the enquiry (Blaikie, 2000).

Inspired by the Interpretivism theory, the researcher selected the inductive strategy for exploring leadership that enables innovation in the pursuit of the SDGs and ESG principles in the mining sector. The inductive strategy includes firstly, the gathering of data, followed by analysing the data and lastly the development of generalisations (Williams, 2002). These generalisations could culminate in lawlike propositions used to describe facets of social life, if tested appropriately (Williams, 2002).

Scholars Rudestam and Newton (2001:42) assert that "on the more inductive end of the continuum, the researcher develops theory out of the descriptive and interpretive process...", "which fits with the epistemological assumptions of the inductive research, where the researcher does not make hypotheses "...about the inter-relationships among the data prior to making observations" (Rudestam and Newton, 2001: 37). However, the researcher analyses and uncovers the data connections during the research journey. In the epistemological research phase this is referred to as ethnomethodology. In ethnomethodology, the researcher is encouraged to view people as the focus of the research, "...in everyday ways of producing orderly social interaction..." (Silverman, 2000: 77).

In this study, the researcher draws on the assertions made by Silverman (2000:37) that "observational work in particular settings" could be employed through contextual observation (Yin, 1994). The use of ethnographic research is a useful research technique to observe the attitudes of senior business leaders during research interviews. Moreover, observation along with in-depth analyses of interviews

provides for a “deep understanding [and] indwelling with the subject of [the] inquiries” (Miles & Huberman, 1994: 8).

The selection of the inductive strategy for this study provides the researcher with the opportunity to gather data (Bryman, 2001; Ritchie & Lewis, 2004) while using inductive logic (anchored in interpretive research) to develop useful generalisations (Williams, 2002). A key goal of this study is to ascertain common occurrences or their interrelationships in a particular social context. When these are determined, it can be useful in clarifying the manifestations of particular events by tracing it within patterns which allow for recognised regularities. In “...locating a particular pattern of thoughts within a known and more general pattern or network of relationships” (Kaplan, 1964: 298) the researcher achieves meaningful exploration of the topic.

Despite the value that the inductive strategy brings to social science, it is not without criticism. Earlier scholars such as Hempel (1966), Chalmers (1982) and Blaikie (1993) lament that objective observation is impossible, due to the researcher’s preconceived ideas and personal bias which could result in erroneous observation. Therefore, asserting that generalisations as a result from the use of inductive logic in interpretive research is flawed (Denzin & Lincoln, 1998). Notwithstanding these critiques, the researcher takes these views seriously and discusses the issue of potential research bias later in this chapter.

5.3 RESEARCH METHODOLOGY AND DESIGN

Research methodology refers to studying a particular research problem in a scientific way (Babbie & Mouton, 2011). Rajasekar, Philominathan and Chinnathambi (2013) emphasise research methodology as comprehensive methods through which knowledge is gained. It is also understood as a platform for understanding the significance that people or collectives attribute to a social problem (Creswell, 2013). The selected research methodology is thus a useful tool to comprehend the social phenomenon under examination, from the perspective of the researcher.

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The research design is a comprehensive blueprint that offers answers to research questions underpinning this study (Ramadhani, 2014). As discussed earlier, this study will employ a qualitative and interpretive research approach. According to Cohen *et al.*, (2007:415) qualitative research is “an approach which attempts to understand human behaviour and the meaning people attach to their settings”. In using the qualitative research approach, it provides room for a diverse range of answers and enables the researcher to adjust to unanticipated matters arising throughout the research process (Gay, 1992).

As part of the qualitative research approach, the multiple case study method is employed. According to Yin (1989: 23) multiple case study is “...an empirical inquiry that investigates a contemporary phenomenon within its real-life context, when boundaries between phenomenon and context are not clearly evident, and multiple sources of evidence are used”. In recognition of potential weaknesses of the case study method (Benbasat *et al.*, 1987 (refer Bandara article: 351), various case study protocols are utilised to strengthen its scientific rigour. The case studies draw on qualitative data collected through in-depth semi-structured interviews along with related documentation which has been analysed to enhance the richness in understanding the SDG integration process in mining companies. In addition, the use of observation techniques was employed to enhance and substantiate interview data which serves as the primary contribution to the data analysis.

This study focuses on multiple units of analysis (Yin, 1998) both at an individual business leader level and at an organisational level to understand patterns of important changes and adaptability within the mining companies. The sample of participants are discussed in detail in section .5.4 Noting that organisations and individuals do not necessarily possess identical parameters, there are enough similarities and common purposes that can be derived from the data. Thus, appreciating and analysing the shared characteristics in the data assists the validity and reliability of the research.

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Through the utilisation of semi-structured interviews, contextual observation and secondary data, this study explored how business leaders champion enabling leadership practices and processes that stimulate innovation in the pursuit of the SDGs in South African mining companies. Temporarily, the study focuses on leadership and innovation practices and processes since the ushering in of the SDGs in 2015. Since the beginning of this research, particularly through the desktop research of company documents, the importance of ESG principles has significantly grown. As a result, ESG was incorporated into the study following the desktop research. Although the interview questions do not specifically focus on ESG, it is important to mention that it does emerge in the responses provided by the participants.

The main benefit in collecting data in this manner is that it afforded the researcher an opportunity to gain detailed information while presenting broad insights on the business leaders' leadership capabilities in enabling innovation with respect to SDG integration in mining companies. Simultaneously, participants were provided with an opportunity to share their experiences and insights.

The interviews were not limited to the questions which the interviewer prepared. Instead, the interviews allowed for a certain level of fluidity which provided an opportunity to pose additional questions. The results produced were successfully achieved due to the one-on-one interaction between the researcher and participants (Dei, 2014).

Contrasting the interview data, observation and documentation allowed for triangulation which assisted in strengthening the validity and reliability of the findings. Findings compared in this manner provide an opportunity to derive meaning from people's everyday life. According to Erickson (1977: 58) "...by hanging around and watching people carefully and asking them why they do what they do..." it is possible to derive social meanings.

Since all interviews were conducted online, due to concerns connected to the COVID-19 pandemic, physical contextual observation in each mining company was not possible.

5.4 SAMPLING

Research sampling is understood as a selection of a tiny and distinct group of ‘rich information’ that allows the researcher to simply understand a particular social phenomenon in detail (McMillan & Schumacher, 2006). It can be assumed that sample representation and understanding assist with generalising characteristics of the phenomenon studied (Sekaran, 2005).

This study was conducted among mining companies based across South Africa. The purposeful sampling method was employed at two levels, in order to assist in the selection of the participating mining companies and individual business leaders. In this study, the researcher chose the purposeful sampling method, because it assisted the researcher in selecting the contributors who held valuable insights on the topic under study (Leedy & Ormrod, 2010).

5.4.1 SELECTION OF COMPANIES

As discussed previously, this study specifically focuses on mining companies across South Africa. The selection of this sector is underpinned by the fact that the mining sector is a critical source of economic growth and employment in South Africa in addition to having a considerable social and environmental footprint. The mining sector is among South Africa’s most significant contributors, 8.7% (Minerals Council, 2021), to the country’s gross domestic product (GDP). This is testimony to the relevance and viability of the mining sector generating economic and operational value during very difficult and complex economic times.

Despite the country being well endowed with mineral resources, there is also a direct spotlight on the mining sector to improve its social impact and to limit its environmental footprint as outlined by the SDGs and ESG frameworks.

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The mining companies earmarked for participation in this study were selected on three-tier criteria. These criteria include mining companies with substantial operations in South Africa, are registered in terms of the South African Companies Act, No. 71 of 2008, have a staff complement of more than fifty people and operate in more than one geographic location. In doing so, it includes companies which are either multinational or nationally focused, are publicly listed or private companies and which have complex business operations based on size, impact and reach. Therefore, excluding small and medium size enterprises which might not deal with the same level of complexity as a larger company.

The participating companies represent an adequate balance of well-known and established brands in the South African mining sector and newer mining houses. 27% of the mining companies have been in existence and operating in South Africa for over 100-years; 18% of the companies between 99 to 25 years and 55% between 24 and 9 years. Due to changes in shareholding and structure, the ownership and thus the names of some of the “newer” companies have changed. Consequently, these companies offer a reliable representation of the South African mining sector and how the sector has innovated and aligned the SDGs and ESG within their operations. None of the companies selected and participating in this research are mentioned due to the confidentiality of this research. Later in this chapter reference is made to the companies via code names which assist with company distinction.

Although the 27% of the participating mining companies are well-established brands, who have been in existence more than 100 years, in order to avoid bias by only selecting the larger and older mining companies, the decision was made to include a limited number of companies who are less established. Thus, in doing so providing a different and richer perspective with respect to innovation, SDG and ESG alignment in the mining sector.

Given the nature of the study, which was based on interviewing senior business leaders in the mining sector, the researcher was fully aware that obtaining

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permission from the selected companies to participate in this academic study was going to be difficult. For this reason, the selection process consisted of companies where the researcher had a contact or individuals in the researcher's network who had contact with either the CEO or a senior employee, who could facilitate potential access and permission for the company to participate in this study.

The companies selected to participate in this study have significant operations in South Africa noting that many of the participating companies also have operations internationally. The headquarters of 82% of the participating mining companies are located in Johannesburg, Gauteng Province in South Africa. The Gauteng Province is the economic capital of the country with a 34% contribution to the country's GDP (StatsSA, 2019). However, the bulk of the mining operations of the selected companies locally, takes place in six of the country's nine provinces, namely, Limpopo, Mpumalanga, Northern Cape, North-West, KwaZulu Natal and Gauteng provinces, thus resulting in a large economic, social and environmental footprint across South Africa.

Due to the COVID-19 pandemic and concerns with respect to conducting interviews in person, the pandemic allowed for the opportunity to conduct virtual interviews with business leaders irrespective of their physical location. Conducting virtual interviews further mitigated the limitation of travel resources of the researcher which could have impacted selecting companies based on geographic location.

It is important to note that given the scope and constraints of this research, this sample does not fully represent the mining sector although an attempt has been made to include a diverse range of mining companies with their business leaders in the research scope. The participating mining companies produce a wide range of minerals and metals.

The mining sector is often criticised for the social and environmental impact of their operations in the pursuit of profits and value for shareholders. However, increasing pressure has been placed on mining companies to align and fulfil ESG and SDGs

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requirements. Therefore, understanding how mining companies are innovating and seeking to address these issues is critical for improving operations in the sector. In particular, understanding how business leaders in these companies enable practices and processes for SDG and ESG alignment can be useful for the future of mining leadership and the sector. Findings in this study could serve as a basis for theoretical generalisations, given that many business leaders in the sector experience similar challenges and opportunities when it comes to innovating and addressing the SDGs and ESG principles.

Given the importance and the nature of this sector, the study will provide a useful lens to understand and appreciate how SA mining companies are innovating and aligning their operations to the SDGs.

5.4.2 NEGOTIATING ACCESS TO PARTICIPANTS

As mentioned earlier, one of the key units of analysis for this study are business leaders who are directly involved in creating an enabling environment for the implementation of the SDGs and ESG agenda and innovation within South African mining companies. These participants were targeted and representative of the top executive management structures. The selection of the participants was guided by reviewing the mining companies' websites, annual reports, networking and online news.

The participants ranged from the Chief Executive Officer (CEO), the Chief Financial Officer (CFO), the Chief Operations Officer (COO), the Chief of Technology and Technical Projects, and the Heads of Risk and Sustainability, Stakeholder Management and Corporate Affairs.

In the event where the researcher was unable to identify the appropriate person responsible for the SDGs and ESG agenda in the company, the snowballing method was employed. This involved using recommendations and information provided by other interviewees to identify potential participants. In particular, asking the

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participating CEOs interviewed who they thought were best suited to participate in the study based on the research topic.

In general, all the participants were very helpful and recommended the appropriate colleagues accordingly. After each interview, the researcher followed up the recommendations via email by asking that the participants send introductory emails to their recommended colleagues. In these introductory emails where the researcher was copied, participants were encouraged to meet the researcher and to participate in this study. This tactic proved to be very successful in helping the researcher to negotiate and gain access to the appropriate individuals in the participating mining companies.

Access to these participants was negotiated over several months. Due to the level of the participants, usually considered as being part of the “elite and ultra-elite” cluster of business leaders, direct contact with a researcher was not always possible (Stephens, 2007: 203). Further difficulties included the busy schedules of business leaders, thus making scheduling of research interviews challenging (Morrissey, 1970) along with the participants’ assumptions of what they thought the study was about (Zuckerman, 1996; Odendahl & Shaw, 2002). As a result, the final number of participants and interviews was highly dependent on the participants’ availability and willingness to partake in the study.

The researcher approached participants, built rapport and set up interviews with them and their secretaries mainly via email (an example of the request to participate email can be found in Appendix A), WhatsApp and the telephone. In a day and age where electronic communication such as emails and online technologies are critical for communication, these methods “can significantly improve [its] robustness”; aid the process of participant selection; improve the rate of responses; and “...lead to much more targeted lines of enquiry during in-depth interviews by identifying key research themes and issues, thus enhancing the depth and richness of the insights obtained” (Loane *et al*, 2006:438).

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The researcher agrees with Loane *et al.* (2006) regarding the point made about information technologies helping in providing more information to evaluate and assist the researcher to secure replies.

In some cases, gaining participants' consent to participate in the study proved challenging. There was one incident where an individual business leader who agreed to participate had to withdraw on short notice due to time constraints. Experiencing difficulties is not a novel occurrence for researchers, as Saunders *et al.* (2000), explains that there can be a number of reasons for these difficulties, including time constraints, lack of interest and external events affecting the organisation. These are all issues that are outside the control of the researcher.

Overall, the researcher appreciated the goodwill as all participants were generally keen to participate and 97% kept to their scheduled interview appointments. Once they understood the topic, they expressed keen interest in receiving the final outcome as many of them alluded to the topic being critical for the sector and that it is evolving. However, there was one CEO who was unable to conduct the interview online due to time constraints, but offered to answer the questions in writing. This was not ideal but the researcher agreed to it as the CEO remained a valuable participant in the sample given that there were only nine participating CEOs. The researcher is aware that this might impact the purity of the methodological approach of the study as observing participants is key. However, the views of the CEO whether online or in writing are critical for this topic.

The researcher developed an understanding with all participants and gained their trust. Scholars have touched on the risk of failing to develop trust with participants, citing that the participants might only share what they think the researchers want to hear (Easterby-Smith *et al.*, 1991: 77). Developing trust with senior business leaders in general might be difficult. However, due to the researcher being an older PhD student and also holding a management position at a local University assisted with developing rapport with participants. Non-threatening techniques and language were

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also used to help build the trust. Some of these non-threatening techniques included gaining as much knowledge about the company and participant prior to the interview.

The researcher assured participants that the focus of discussion was on the company and the participants' experience and knowledge. Participants were also assured that the interview was confidential and that they had the option of withdrawing at any point in time (this was also highlighted in the attached Consent Form – See Appendix B). In an attempt to make the participants feel more at ease, the researcher referred to the interview as a conversation. This might have set business leaders more at ease “...with the potential for genuine exchange.” (Easterby-Smith *et al.*, 1991: 78).

Participants were also sent an abstract of the PhD study before the interview to help them understand the nature of the research and themes which would be discussed (See Appendix C for an example of the Abstract). Moreover, besides getting the consent from the individual business leaders at the beginning of each interview, a formal statement of Informed Consent was also sent to each participant providing clarity on confidentiality.

The semi-structured interviews were guided by a set of prepared questions, however there were instances where the questions might have differed depending on the background, experience and knowledge of the participants. This is what the semi-structured interview method allows for (Miles & Huberman, 1994; May, 2001). An example of the interview guide can be seen in Appendix D. Ensuring the confidentiality of the participants and the companies, information shared by them has been referenced without referring to any of their names, titles or companies.

5.4.3 PARTICIPANTS SELECTION

This study took the approach of analysing multiple units of analysis (Yin, 1998) which allows the researcher to collect data from different sources at multiple levels. The primary unit of analysis are business leaders who are directly involved in creating room for innovation to address the SDGs in South African-based mining companies.

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These business leaders include Chief Executives Officers (CEOs), Chief Operating Officers (COOs), Chief Financial Officers (CFO) and other key and relevant portfolios of mining companies, as captured in Table 16 below.

A further unit of analysis includes the companies. That is, mining companies, with significant operations in South Africa or South African-based mining companies which were selected to participate in this study. The criteria, discussed earlier, include mining companies with substantial operations in South Africa, are registered in terms of the South African Companies Act 71 of 2008 and have a staff complement of more than fifty people and operate in more than one geographic location.

The participants were not selected randomly (Silverman, 1993) but rather through the method guided by purposive sampling (Patton, 1990). Despite there being variance in some of the participants' titles, the purposive sampling method enabled recognition of comparative characteristics such as actual job functions. Further criteria included individual participants who are representative of the senior executive echelons of the company and an expert in a field relevant to or responsible for enabling innovation to address the SDGs in mining companies.

Expert interviews have been discussed at length by scholars such as (Meuser & Nagel, 1991) and can be a form of semi-structured interviews (Miles & Huberman, 1994; May, 2001). While expert interviews created a platform to analyse and compare knowledge it also offered an opportunity to compare softer elements such as the personal attitudes of participants and organisational culture. However, a key challenge in this type of interview is "...whether or not the interviewer manages to restrict and determine the interview and the interviewee to the expertise of interest. The need for the interviewer to make clear in the interview that he or she is also familiar with the topic in general, is a condition for successfully conducting such interviews" (Meuser & Nagel, 1991: 92). As such prior to the interviews, the interviewer had studied key company publications such as annual reports and documentation on the mining sector.

As discussed previously, the interviews were conducted with persons in the portfolios directly involved in creating room for innovation to address the SDGs and ESG in mining companies. For the purposes of this study and to maintain confidentiality, the following code numbers (See Table 16) were assigned to research participants representing a specific cluster of portfolios or groups. In addition, interviews and questions were also categorised accordingly.

Table 16 : Coding of Participant Groups/Participants

#	PARTICIPANTS' GROUPS/PORTFOLIOS	CODE
1	Chief Executive Officer (CEO) of Mining Company	CMC
2	Chief Operating Officer (COO) of Mining Company	COM
3	Chief Technology Officer (CTO) of Mining Company	CTM
4	Chief Financial Officer (CFO) of Mining Company	CFM
5	Risks/Sustainability Portfolio of Mining Company	RSM
6	Enterprise Development Portfolio of Mining Company	EDM
7	Community Development/Stakeholder/Management/Corporate Affairs	CDM

Source: Compiled by the Author

In grouping the responses from the above-mentioned portfolios, it was possible to collate the findings from various participants into sub-sections linked to the questions discussed in the interview guideline attached as Appendix D. For example, the reply provided to an interview question by the CEO of the first mining company interviewed was coded as CMC1, whereas the first COO was coded as COM1.

The snowball sampling method was applied in instances where the researcher was not able to find the appropriate person to interview (Patton,1990). In allowing the extension of the sampling, it provided an opportunity for comparison of the selected units of analysis. Thus, resulting in analysing the differences and similarities to the point of reaching theoretical saturation (Glaser & Strauss, 1967), that is, "...the diminishing marginal contribution of each additional case..." (Gummesson, 1991: 85).

The concluding sample can be grouped as "heterogeneous or maximum variation sampling" (Patton 1990), which has value in presenting diverse cases with distinctiveness, however, with basic comparable themes (Saunders *et al.*, 2006). This increases the validity in making generalisations based on the outcomes of this

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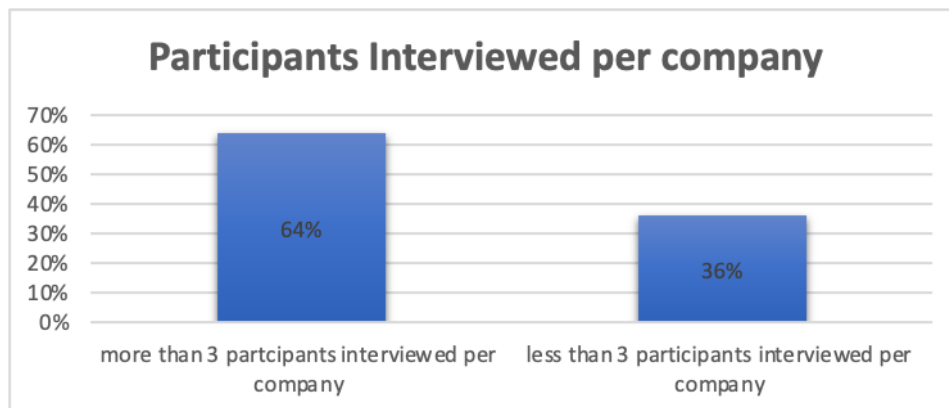
research. Despite the variance in the sampling method, it is complementary and provides an acceptable depiction of the sample of the units of analysis.

5.4.4 SAMPLE SIZE

The sample size for this study collectively is eleven South African-based mining companies. This includes four national and seven multinational companies. The aim of the study was to interview at least three business leaders from each of the selected companies. However, in some cases there were less than three business leaders interviewed per company. This was due to limited access to particular business leaders, the lack of interest or response from individuals to the invitation.

Figure 9 below illustrates that out of the 11 companies interviewed, 64% of the participants came from seven mining companies from which at least three participants per company participated in the study; 36% of the participants came from four mining companies where there were less than three participants per company.

Graph:!: Number of Participants Interviewed per company



Source: Compiled by the Author

The selected participants were chosen based on the criteria which have been discussed at length. In total there were thirty-one interviews with business leaders mentioned in Table 17. This sample size offers a reasonable representation of

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mining companies operating in South Africa and a reasonable enough sample to deduce some generalisations with respect to the findings.

This study explored how business leaders in South African mining companies enable innovation to address the SDGs and ESG principles. Table 17 below provides a summary of the sampling design.

Table 17 : Summary: Sampling Design

SAMPLING	COMPANIES	INDIVIDUAL PARTICIPANTS
MAIN INCLUSION/EXCLUSION CRITERIA:	Operating in South Africa Operating internationally Nationals and Multinational Companies Registered in terms of South Africa's Companies Act No.71 of 2008 Staff complement over 50 people Researcher had access through an employee/CEO	Chief Executive Officer Chief Operations Officer Chief Financial Officer Chief Technology Officer Head of Risk Management Head of Sustainable Development Unit Head of Corporate Affairs Other
OVERALL MINIMUM TARGET SAMPLE SIZE:	11 Mining Companies	31 Individual participants
MINIMUM TARGET SAMPLE SIZE PER PARTICIPATING ORGANISATION:	1-5 individual participants	
SAMPLING METHOD(S) TO BE USED:	Purposeful and snowball sampling	Purposeful sampling and snowball sampling

Source: Compiled by the Author

5.5 METHODS OF DATA COLLECTION

As part of the primary data collection method, semi-structured interviews (Miles and Huberman, 1994; May, 2001). The researcher used direct methods (i.e., semi-structured interviews) of data collection to research leadership which enables innovation and SDG alignment. This is a useful way of gaining information to understand the leadership features that create the enabling environment.

The researcher employed the critical incident technique (Flanagan, 1954) that provides an opportunity for the participant to recall any event (as "any observable human activity that is sufficiently complete in itself", an 'incident') (Easterby-Smith *et al.*, 1991: 83) specifically related to the nature of the research. At the core of this

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technique is the participants' ability to recollect a critical event/incident where the researcher can visibly recognise the purpose and the outcome (Easterby-Smith et al., 1991; Edvardsson & Roos, 2001). The critical incident technique (Flanagan, 1954) is a popular technique Chell (1998) used in social and managerial studies and it is valued for the context-rich and personal perspective of participants (Symon and Cassell, 1998). In this study, the critical incident technique (Flanagan, 1954) provided an opportunity to pursue a more conversation-discussion-type questions format that allowed for more of a narrative approach to the participants' answers.

The conversation would start with some general questions ranging from the participants' background, main responsibilities at the company, their views on the SDGs and ESG, recalling of specific instances where innovation was enabled to address the SDGs and ESG, and then unpacking the role they played in the critical incidents. In doing so, assisting the researcher to explore and understand their perspectives in how they practice enabling leadership.

Interviewing evidently has become a very common research practice in business management studies (e.g., Trevion, 2003; Jenkins, 2004; Rose, 2005; Stevens, 2007; Worthington *et al.*, 2006 a, b; Griffiths, 2008; Worthington *et al.*, 2009), providing an opportunity for the researcher to observe the participants besides just gathering their responses to the questions (Russel, 2010). However, since the advent of the COVID-19 pandemic, the traditional approach of face-to-face research in social science has fundamentally been altered, at least temporarily (Howlett, 2022). Globally, human interaction, the way one works and lives has changed fundamentally, ushering in a "new normal." Accessibility has been redefined and has affected how researchers engage with participants (Howlett, 2022), particularly researchers who have to conduct their study in the 'field'. This type of research is often "based on personal interaction with research [participants] in their own setting" for a certain amount of time (Wood, 2007: 123). Thus, online interviews render immersive in-person contact in the field nearly impossible (Howlett, 2022).

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With the unexpected and unanticipated COVID-19 pandemic, the researcher was forced to amend the research plan from the initial plan of immersive in-person contact interviews to online interviews. In doing so, moving the field “from the physical realm into a digital reality” (Howlett, 2022). Despite the intensification of online research brought on by the pandemic, it is certainly not a new phenomenon as there are many comparable examples such as surveys, digital ethnographies, or ‘netnographies,’ which include online material and social media platforms (see Beaulieu, 2004; Bluteau, 2019; Coleman, 2010; De Seta, 2020; Hine, 2000, 2005). Moreover, online interview methods have been used for a number of years such as Skype and instant messages (see Cater, 2011; Deakin & Wakefield, 2014; Jenner and Myers, 2019; Johnson et al., 2019; Sullivan, 2012).

Expanding on these techniques, and as alternative to face-to-face interviews, the researcher employed a mediated approach, namely the Zoom Online video-conferencing as a way of collecting data. The Online Zoom call provided a real-time way of exchanging information which “resemble the ‘honesty’ of onsite interviews (O’Connor & Madge, 2017), as the dynamic environment prevent participants from overthinking their answers or considering the most socially desirable responses” (Mann & Stewart, 2000, Howlett, 2022). Moreover, the Zoom video call also provides an opportunity for the researcher to pick up verbal and nonverbal signals, making the experience authentic similarly to the in-person interviews (Sullivan, 2012). In contrast to asynchronous methods or other types of synchronous interviews, for example, instant messaging, the Zoom Call interview allows for personal interaction, spontaneity and instantaneous response to interview questions (Howlett, 2022).

As scholar Howlett (2022), points out that “with the advancements in technology in-person interactions are therefore no longer the gold standard against which the performance of computer-mediated interaction is judged (Hine, 2005: 4), as online methods are indeed equally valid and legitimate approaches to research”.

However, the question of whether the study could still achieve the research objectives, given that there were no face-to-face immersive experiences in the ‘field’,

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plagued the researcher at the beginning of the research process. It is important to note that the researcher was not entirely keen to conduct the study online. The researcher had reservations at the start of the process that the online interviewing might be limiting in terms of immersive and data collection. However, this interview format proved to be very useful as the researcher was able to build rapport with participants in their comfort zones, while still being able to engage participants through the video facility.

The Zoom platform was used for all interviews. Except for one participant, all other participants had their cameras turned on during the interviews. During these interviews' participants were sitting in their homes, offices or walking outside. Instead of the researcher travelling to the participants, the participants were comfortable to invite the researcher into their 'worlds' (Tillmann-Healy, 2003) by taking the call from where they felt comfortable. In some cases, there were minor distractions during the interviews, such as push notifications from their digital devices. Nonetheless, it was observed that participants generally felt relaxed in their personal space. The sense of comfort of participants was manifested in their casual attire, especially if they were taking their call from home. Except for one participant taking the interview call on a Saturday morning, due to scheduling pressures, the rest of the participants took the interview call during their work day.

Most interviews lasted for an average of 90 minutes, with a few interviews running over the 90 minutes adding to the richness of the data. The researcher was mindful of the time and continuously gave participants a time-check to make sure it was still suitable for them. The mechanism of remote working, which being commonplace and more widely applied during post-COVID 19, allowed for more flexible interview times and often longer interviews than possibly a formal in-person interview would allow for.

While the interviews were recorded on the Zoom platform it was also recorded on the Otter transcription application on the researchers' mobile phone thereafter it was automatically transcribed and saved on the researchers' online Cloud along with the

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Zoom recording. Each recorded video interview and transcript were saved in a file name under each company and under each participant's name and title. The researcher subsequently also read each transcript and compared it to the respective video recording, in cases where words were spelled wrong due to the different accents of participants.

The researcher followed the criteria outlined by Bruce (1992:145) to evaluate the transcription, "The following very general criteria can be used as a starting point in the evaluation of a transcription system for spoken discourse: manageability (for the transcriber), readability, learnability, and interpretability (for the analyst...). It is reasonable to think that a transcription system should be easy to write, easy to read, easy to learn and easy to search". Thus, the double checking of transcripts enabled the reliability of the primary data collection method.

In addition, the transcripts were analysed and themes, topics and recurring patterns were isolated and interpreted, resulting in the initial phase of pattern matching (Russel, 2010).

Moreover, secondary methods were also employed in this study which included the analysis of theoretical and business literature, and relevant SDG documentation, annual reports, presentations, articles, websites and videos from the selected organisations. The secondary information, joined with the primary data collected from the interviews was used to develop an "in-depth and a rounded picture of the business culture" (Russel, 2010), which placed the participant's perspectives on innovation and SDGs in the mining sector within the context of their individual companies. The blend of these data collection methods, triangulation, contributed to the process of developing a comprehensive dataset (Russel, 2010).

In addition, the interview with the coded participant CMC3, who is a CEO of one of the mining companies, illustrates how the researcher was able to obtain additional documentation which is not in the public domain. This document provided a useful background of innovation aimed at addressing SDG 15. The unexpected but valuable

outcome is evidence of the rapport between the participant and the researcher, and the trust and comfort of the participant.

More information regarding this process is provided in the 5.8.1 Data Reduction, organisation and Interpretation section. All these methods assisted in a more inclusive approach to responding to the research questions.

As with any research, there are complexities associated with methods that illuminate ethical issues normally encountered in social research (May, 2001), which was no different for this study. These issues are analysed and discussed further in the next section.

5.6 ETHICAL CONSIDERATIONS

Scholar May (2001) points out that challenges regarding philosophical ethics are not uncommon for researchers especially when equating their own views with the views of their research participants. In this study the researcher takes the ‘consequentialistic’ approach. This approach allows for the research to be guided by “a set of rules for the conduct” while still allowing room for thought for the “context and consequences of the research” (May, 1997; Russel, 2010). The researcher maintained the utmost respect for confidentiality and paid significant attention in ensuring the protection of the identities of the participating companies and individuals.

This study adheres to the Codes of Research Ethics of the University of Pretoria. In addition, it also adheres to the South African Protection of Personal Information Act 4 of 2013 (POPIA) pertaining to the collection, analysis, confidentiality of the documents and the interviews. The researcher had an informed consent agreement in place to protect confidentiality between the researcher and the participant. This study employed the concept of voluntary informed consent to allow for individuals to participate freely and for them to be fully aware of the terms and conditions for participating (May, 2001:60). An informed consent statement drafted by the

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researcher and sent to each participant prior to the interview can be seen in Appendix B.

Each participant had the right to request the “original data and to have this data destroyed” (Russel, 2010). To ensure the validity and reliability of the research, several ethical perspectives should be considered (Russel, 2010). A key consideration is “elite bias” (Miles & Huberman, 1994:263), which could be a “stumbling block for the researcher in objectively answering the research questions” of this study (Russel, 2010), if the collection of data is only from “...articulate, well-informed, usually high-status informants...” (Miles & Huberman, 1994:263). This is important to note as this study concentrates on senior business leaders in the mining sector involved in enabling innovation to address the SDGs, which could constitute a degree of elite bias. In mitigating this bias, the data triangulation approach was employed to assess information from several sources.

A further ethical concern which the researcher took account of, was the “Hawthorne or reactivity effect” (Sarantakos, 1994: 246), this is where the participants’ behaviour might be influenced by the fact that they are aware that they are being studied. Particularly because business leaders in the mining sector would want to be seen doing the right thing with respect to fulfilling the SDGs as it also affects the social licence to operate. Thus, the researcher also considered ethical dilemmas such as white washing which refers to assumed behaviours, fully aware that such behaviours are nothing more than a public relations stunt to enhance a company’s market share. Therefore, the researcher was also concerned with observing behaviour that demonstrates genuine commitment from leaders towards innovation and the support for the SDGs versus it being a public relations and image building exercise for the company.

Moreover, another ethical bias concern was social desirability, which has to do with the participants portraying themselves in a particular way in order to meet what they perceive socially and the researcher’s expectations are (Edwards, 1953; Fisher, 1993). Important to note, scholars such as Zerbe and Paulhus, 1987; Nyaw and Ng,

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1994; Geiger & O'Connell, 2000; Bernardi, 2006 has asserted that the validity of any social study can be undermined by “self-imposed alterations to the participants' intentions demonstrated through their responses” (Russel, 2010).

In an attempt to mitigate the risk of social desirability bias, the researcher has taken recommendations from scholars such as Randall and Fernandes, 1991; Thompson and Phua, 2005; Nederhof, 2006 and Worthington *et al.*, 2006 who suggest using several methodological tools. These include a blend of “purposive and snowball sampling methods (Patton, 1990), triangulation of data from the individual interviews and companies' documentation; strict confidentiality at all stages of data collection and analysis; and the avoidance of closed-ended and multiple-choice questions in order to offer the participants the freedom to express their personal thoughts and opinions rather than follow the researcher's lead (Myers & Newman, 2007) on matters raised as part of primary data collection” (Russel, 2010).

In addition, the researcher employed the “mirroring interviewing” method (Myers & Newman, 2007: 17) to guard against the altering attitudes as discussed above which could potentially result in bias. The “mirroring interviewing” method is where the researcher draws on the participants' understanding of the topic and uses their language to avoid imposing their own. Moreover, the information received during the interviews was also cross-checked with other participants within the same company, which allows for drawing comparisons between data and contextual observations (Russel, 2010).

According to Myers and Newman (2007) the mirroring technique is not widely reported to be used in qualitative interviewing, this may possibly be because of publishers' limitations on “too extensive descriptions of methods used” (Russel, 2010). Notwithstanding, the researcher asserts that the benefits of applying this method to the interviews, assist in increasing the validity and reliability of the research with respect to the data collection process. Lastly, the mirroring technique also assists in limiting the researchers' bias (Myers & Newman, 2007), discussed further in the subsequent section.

5.7 RESEARCHER'S BIAS

Researchers in social studies are generally concerned with potential research bias. In this study, the researcher was committed to avoiding the bias and shaping an all-inclusive perspective in the research. In addition, the researcher strived to be upfront and clear about the researcher's own liability and bias. A concept found especially in management research called researcher's 'preunderstanding,' (Gummesson, 1991) speaks to the "researcher's knowledge about a specific problem and / or social environment before they embark on a research journey" (Russel, 2010). According to Gummesson (1991) the concept of 'preunderstanding' in academia manifests as theories and models which generally "... lack institutional knowledge such as knowledge of conditions in a specific company, industry or market" (Gummesson, 1991: 12).

An advantage for this study was the researcher's pre-understanding of the academic leadership discourse as well as being in a professional management position. Thus, giving the researcher deeper appreciation for "institutional knowledge" Gummesson (1991) that manifests in organisational culture and leadership styles. However, the researcher's lack of experience in the mining sector would be considered as a limitation. This limitation might impact the researcher's understanding of technical and operational terms related to the mining sector used during the research.

However, this was mitigated by research and follow-up questions for the sake of clarity. Nonetheless, the researcher is of the view that it is precisely this limitation that could be considered an added advantage to the research as the researcher had no preconceived judgements or opinions on the mining sector or mining companies. The researcher also purposefully did not develop hypotheses for this study and preferred asking exploratory questions (i.e., "how" type questions) as a further mitigation of this limitation (Russel, 2010).

Another potential bias that the researcher was mindful of is "selective perception" (Gummesson, 1991). The researcher was aware that there remains a possibility to

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observe only fragments of reality influenced by the researcher's preunderstanding whether it is with respect to earlier familiarity of theory or the research topic (Russel, 2010). Scholars such as Glaser and Strauss (1967) stress the risks in being biased by prevailing theories, in particular, theories which might be outdated or not well suited for the specific context.

In mitigating this bias, Glaser (1978) encouraged researchers to show "theoretical sensitivity" and to have the ability to alter their paradigm as a consequence of their study. In doing so, demonstrating the ability to produce a new theory or develop an enhanced understanding of the "relationships between existing theories and concepts" (Whetten, 1989; Russel, 2010). One way of achieving this is through using the concept of "lateral thinking" proposed by Bono (1971), which talks to the notion of uncovering "deeper layers of what is already known, but searching for answers somewhere else (Russel, 2010)."

The researcher agrees with this concept, hence there were no hypotheses in this study but instead this study was guided by questions that are explored and answered. In addition, the triangulation method was used to ensure the approach of lateral thinking in this study. In the triangulation method, the data collected from example, pilot interviews and interviewing findings from contrasting samples are compared (Russel, 2010).

A research study can manifest a researcher's values in ways that might be hard to detect. In order to mitigate against bias and enhance the accuracy of the research, scholars (Patton, 1990; Sapsford & Jupp, 1996) recommend that the following actions should be taken in a study, namely; "1) submitting reports to participants, from whom data were collected and incorporating their critique; 2) use of multiple data collection methods; and 3) adoption of the chain of evidence techniques to trace the progress of the data collection and analysis" (Russel, 2010). Lastly, in adhering to these actions in order to protect against bias, "adequate supervisory control through the review of the research" is needed (Russel, 2010).

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The researcher took the ethical considerations seriously as discussed above and strives to comply with ethical protocols.

5.8 METHODS OF DATA ANALYSIS

The central method employed in this study for data analysis is thick qualitative description (Ryle, 1949; Geertz, 1973; Lincoln & Guba, 1985; Blaikie, 2000; Cohen & Crabtree, 2006). This permits for the expansion of the knowledge of social connections and their context (Holloway, 1997) including direct quotes from the recorded interviews (Myers & Newman, 2007) in order to better demonstrate the understanding of the participants': "...interpretations of what is going on and for the researcher to produce analysis and explanations which do justice to the milieu in which his or her observations and interviews are conducted" (Blaikie, 2000: 251-252).

5.8.1 DATA REDUCTION, ORGANISATION AND INTERPRETATION

It is argued (Barton & Lazarsfeld, 1979), that in analysing individual units of data, the outcome will take the form of different groupings with similar phenomena leading to systematic comparison. This will then result in identifying key aspects that impact the behavioural processes and relationships among the areas of research, thus allowing an opportunity for the research question to be answered in a more integrated approach.

The researcher is in agreement with scholar Sarantakos (1994) who argues that data analysis done in a cyclical continuous process can be separated into data reduction, organisation and interpretation. This study draws on the following data reduction method which is described as "...the process of manipulating, integrating, transforming and highlighting the data while they are presented" (Sarantakos, 1994: 300). This includes in-depth reading of the transcript interviews along with listening to the video recordings; preparing their analysis, identifying the overarching themes in each transcript and categorising the data.

Data reduction technique was also employed during the observation process while interviewing the participants. In addition, gathering and organising findings around specific themes and ideas supported the data organisation process which in turn

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enabled the development of data patterns in the study. Two key activities guided the initial data analysis (Lamnek, 1989) of the qualitative interview, firstly analysing the transcripts for the purposes of integrating and assessing the data and secondly developing typologies for generalisations based on identifying similarities and differences.

Moreover, the application of the following data analysis techniques, data interpretation was achieved:

- Analytic Comparison (Neuman, 1991), which allowed for developing ideas or assumptions about the data based on already established theories and by employing the inductive process. The researcher identified regularities within the data, compared them with different ideas and assumptions and then established regularities going outward from the initially restricted area to the more general level;
- Pattern Coding (Miles & Huberman, 1994), which, at the stage of open coding (Strauss & Corbin, 1998), allowed assigning codes to the collected data in terms of key words, lines or paragraphs, and then condensing data into categories and promoting emerging themes to surface. Thereafter, the next coding stage, selective coding (Strauss & Corbin, 1998), which allowed finding precise evidence for the particular themes by comparing them with the data from other instances. King (1998) proposed using hierarchical coding for grouping clustered codes in order to produce higher-order codes (Symon & Cassell, 1998). Finally, as these foremost themes became evident, they were extended in the context of the whole research. Application of these techniques can be found in other managerial studies (e.g., Trevion, 2003; Griffiths, 2008).

Analytic Hierarchy (Ritchie & Lewis, 2004) is a useful concept to explain the approaches such as Analytic Comparison (Neuman, 1991) and Pattern Coding (Miles & Huberman, 1994). Moreover, this concept is particularly suited for interpretative analysis grounded in making sense of the participants' social worlds.

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The researcher draws on Miles and Huberman's (1994: 224) "steps on the abstraction ladder" to guide the process, thus, assisting in turning each task into an analytical platform which created an overview of the data. Included in the different stages are data management, descriptive accounts and explanatory accounts (Ritchie & Lewis, 2004). As scholars Ritchie and Lewis (2004: 262) point out, the classification and organisation of "...data according to key themes, concepts and emerging categories" is understood to be a "theoretic framework" which underpins the data management approach. As previously discussed, Data Management manifests in a set of codes merged in Table 18 below is an extract from the Coding Set which was matched with examples of the language used by participants.

Table 18 : Extract from the Discussion Coding List

INNOVATION FOR SUSTAINABILITY	
11: Embracing SDGs	11.1 Appetite for SDGs 11.2 Embracing SDGs 11.3 SDG Alignment
12: Strategic Planning Process:	12.1 Develop big goals 12.2 Drive innovation for big goals 1.2.3 Resourcing innovation
13: Collaboration:	13.1 Sustainability is not a competition 13.2 Creating partnerships 13.3 Collaborating across functions

Source: Compiled by the author.

The researcher drafted the coding list from numerous sources such as the researcher's understanding of relevant theoretical concepts, academic and business literature associated with the research areas, participating organisations' documentation, general terminology used by leaders and sustainability practitioners and integrating expressions by participants during the interviews. Strauss and Corbin (1990), originally described this way of generating codes which was echoed by Miles and Hubermans (1994), as the method of developing a list of codes starting with the research questions and the researcher's self-identified themes (Basit, 2003) to the expansion of the codes based on data accumulation.

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Descriptive Accounts is the next step in the Analytic Hierarchy (Basit, 2003) and is a critical step in analysing the spirit of the participants' views and along with the importance of their accounts and the sense making of it. At this stage in the process a certain level of discernment and judgement must be applied to distinguish between the use of language pertaining to certain terms, especially if used interchangeably e.g., "ESG" versus "SDGs". This process allows for the creation of typologies which Ritchie and Lewis (2004:214) describe as "...specific forms of classification that describe and explain the segmentation of the social world...They may apply to groups of people within the population or to sets of phenomena like beliefs, circumstances or behaviours". This became pertinent as the researcher analysed, for example, the different clusters of executive positions amongst the interviewees such as the CEO versus the COO or the CFO versus the CTO.

The following step is the Explanatory Accounts (Ritchie & Lewis, 2004) which are shaped at the highest level of data analysis and form the foundation for the argument of the outcomes of the analysis. The shift from descriptive to explanatory accounts is motivated by the emerging patterns based on association revealed in the data (Ritchie & Lewis, 2004). This research study found associated linkages between participants' "...experiences, behaviours and perspectives..." (Ritchie & Lewis, 2004:215) relating to their attitudes towards innovation, SDGs and ESG.

In the event of analytic comparison, particularly at a theoretical level, pattern coding provides a tool to sort through the concepts and ideas and group them into more "generalisable" patterns. Ritchie and Lewis (2004: 224) describe this process as "labelling or tagging the data". With the assistance of a thematic framework, every sentence from an interview was examined and salient data was allocated a code/index within a main theme.

To demonstrate pattern coding, Table 19 provides an example of allocated codes from an interview transcript.

Table 19 : Example of Assigned Codes from an Interview Transcript

Q3.3	WHAT SHIFTS DO YOU THINK SHOULD BE MADE TO DEVELOP A MORE CONDUCIVE ENVIRONMENT FOR EXPLORING INNOVATION IN THE MINING SECTOR?
RSM3	“...you really need to rethink how to encourage innovation, because innovation for somebody at the coalface is not the same as innovation for me.”

Source: Compiled by the author.

The growing body of raw data resulted in the thematic framework being amended on several occasions. However, there was a cut-off point whereafter no further amendments were made to the framework evolving from additional interviews, therefore reaching the data saturation point (Glaser & Strauss, 1967), which allowed the researcher to conclude the interviewing process.

In addition to categorising the data obtained from the participants, an analysis of the features of participants, as a unit of analysis was also important. Thus, the researcher categorised participants into various groups in terms of gender, years of experience, management roles, age and other demographic features. This categorisation made it possible to see “what characteristics of participating units of analysis are under-represented and, therefore, regulate the overall sampling” (Russel, 2010). This method was reinforced by the theoretical sampling method discussed earlier (Gummesson, 1991).

Interpretation is the last stage of the data analysis process and forms the foundation for deducing conclusions connected to the research scope (Russel, 2010). The researcher draws on Basit’s (2003) approach to qualitative data analysis which allows for the interpretation of the data analysis in two ways. These two ways are underpinned by firstly, illustrating the relationship between data and the codes and is found in the presented graphs and tables. Secondly, the descriptive analysis is more extensive and allows for quotations to be included which demonstrates the statements of the participants in order to share the essence of the data in their own words (Bliss *et al.*, 1983). The researcher was guided to the point of data saturation (Glaser & Strauss, 1967) by the identification of patterns, themes and concepts leading to answering the research questions and thus providing research validity.

5.8.2 DATA TRIANGULATION

The various methods of data collection and analysis discussed previously, allowed for “between-method triangulation” (Paul, 1996: 135). Such triangulation (Paul 1996) includes analysing interviews, contextual observation (Yin, 1994) and archival organisational data, which resulted “...in a more complete assessment of organisational problems than any one method” (Paul, 1996: 135). In using the qualitative examination approach, it assisted in creating and testing concepts, organising it into categories and using the findings from the analysis of interviews as a basis of comparison of “participants’ observation, and respective organisations’ information, providing data triangulation” (Russel, 2010).

The method used to assess the validity of the participants’ answers included triangulation which allowed for checking data from numerous sources (Silverman, 2000). At the interpretation stage the researcher employed the pattern-matching method of data analysis (Ritchie & Lewis, 2004) which was vital for comparing the patterns, “empirically generated and verified within individual findings, and patterns predicted at the beginning of the data analysis stage” (Russel, 2010).

The internal validity of the findings was achieved by matching the observed and projected patterns. The study employed pattern matching as an important method of data analysis because of the use of past experience “(the researcher’s observational techniques and participants’ opinions) and logic (theoretical basis) to specify what is expected to be found” (Russel, 2010). Thus, this allows for the comparison of findings to expectations; “When the findings fit, the pattern is confirmed” (US GAO, 1990: 73).

In the event where findings did not match, the expectations are adjusted or elaborated on, resulting in the development of a case or explanation for reaching the unexpected findings. In doing so, laying the foundation for potential future research.

The researcher’s ability to do direct observation was restricted due to the majority of the interviews being conducted via Zoom Video call as discussed earlier. However,

the findings in this study is based on the contextual observation (Yin,1994) grounded in the interviewees and researcher's recollections of events and processes surrounding innovation, SDGs and ESG in the company. Despite these observations being included into the findings, it should be cautioned that there remains a possibility of researcher and participants' bias with respect to objectivity about events.

In addition, the contextual background was provided as part of the analysis of the primary documentary data, making it important to check the sources that '...were written by the people, directly involved and at a time contemporary or near contemporary with the period being investigated'. Key to the research and findings were the secondary analysis of sources (Sapsford & Jupp, 1996) which provided a theoretical framework for the study. Contemporary academic literature and business publications formed part of the secondary data. The issues of validity and reliability become particularly important during the collecting and analysing stages. In the following paragraph these issues are discussed in more detail.

5.9 VALIDITY AND RELIABILITY OF RESEARCH AND GENERALISATION

Data were collected with the aim to employ a qualitative thick description analysis (Ryle, 1949; Geertz, 1973; Lincoln & Guba, 1985; Blaikie, 2000; Chen & Crabtree, 2006), thus allowing for better understanding the data in its social context (Holloway, 1997), and to enhance the research's external validity (Lincoln & Guba, 1985). In doing so, this method assisted in generating patterns from several data sources such as secondary data collection methods and contextual observations (Yin, 1994). Moreover, it assisted with data triangulation resulting in enhancing the reliability and validity of the study.

In applying the ideas of validity and reliability in the study, the question of generalisation is validated in the efforts to "extrapolate the findings of a limited number of observations" (Gummesson, 1991; Glaser & Strauss, 1967).

Generalisations found in interpretative research are “...both necessary and inevitable...”, arising from “...cultural consistency and ... [being the] basis of inductive reasoning...” Williams (2002:138). While generalisation from this study can be “extrapolated to other cases, provided they represent similar theoretical conditions (Yin, 1998), testing of the results and proposed models should be carried out in future studies within the scope of other industries to verify their applicability and generalisability” (Russel, 2010).

5.10 TRUSTWORTHINESS

Scholars Polit and Beck (2012) highlight key features to ensure the trustworthiness and quality of a study in their framework. These features include credibility, dependability, confirmability and transferability which were core to this research study (Polit & Beck, 2012:583).

5.10.1 CREDIBILITY

In a research study, credibility is critical as it denotes the accuracy of the findings of the study and the truthfulness with which the research participants’ views are revealed in the findings (Lietz & Zayas, 2010:191; Polit & Beck, 2012:584-585; Shenton, 2004:64-69). In this study several tactics were employed to augment the credibility of this study.

In preparing for the interviews, the researcher gathered comprehensive information on each mining company which equipped the researcher with knowledge and familiarity (Shenton, 2004:65). A further important tactic that was used is the data triangulation method. Interviews with various participants from the same company enabled triangulation of diverse views and practices with respect to the implementation of the SDGs, ESG and innovation in the respective organisations (Polit & Beck, 2012:590; Shenton, 2004:65-66). Various strategies were employed during the semi-structured interview process which assisted in boosting the credibility of the findings and ensured that the research participants presented their real views.

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All participants in the study were notified before the start of the interview, that they had a choice to not answer questions with which they are uncomfortable and that they also had the option of exiting the interview at any time. The researcher encouraged participants to be truthful, straightforward and candid in their response to the questions (Shenton, 2004:67).

During the interview, the researcher probed the participants with questions to obtain as much information as possible. At the end of each interview the researcher provided the participant with an opportunity to add any additional information, thereby allowing the participant another chance to add more information if required and to amend or validate the accuracy of the summary (Milne & Oberle, 2005:418; Polit & Beck, 2012:591).

5.10.2 DEPENDABILITY

Dependability considers the stability and reliability of information collected during a period and within a specific context and environment. Thus, it raises the question of probability, which is concerned with whether a study will arrive at similar results, if the study were conducted with more or less the same conditions, methods and similar participants (Polit & Beck, 2012:585). Dependability offers people not involved in the study clarity in recognising and understanding the research process and actions taken, which enable them to assess the research study and its outcomes (Lietz & Zayas, 2010:195). This study demonstrated dependability through its detailed research methodology plan as mentioned earlier, which includes the research design and methods that were employed.

5.10.3 CONFIRMABILITY

It is the researcher's responsibility to ensure that the views, actions and ideas of study participants are accurately represented in the outcomes of the study (Polit & Beck, 2012:585; Shenton, 2004:72). Linking the research data and findings through data triangulation is imperative (Lietz & Zayas, 2010:197; Shenton, 2004:72). Gathering data from multiple viewpoints is a method which allows for data triangulation (Curtin & Fossey, 2007:91).

In this study the data triangulation method was used by interviewing various senior business leaders within the selected mining companies. The researcher used open-ended questions in the interviews which afforded participants the opportunity to share their personal viewpoints and perceptions (Milne & Oberle, 2005:415). In an attempt to get the most information out of each interview the researcher asked appropriate probing questions where necessary while noting observations including participants' behaviour (Milne & Oberle, 2005:416). All interviews were transcribed verbatim in order to ensure that the data is reflected accurately (Milne & Oberle, 2005:416, 418).

5.10.4 TRANSFERABILITY

Transferability is concerned with the degree to which the study's outcomes can be applied to various settings and environments (Polit & Beck, 2012:585). This can be done through offering a thorough account of the participants, the data collection methods employed and the number of interviews. (Elo, Kääriäinen, Kanste, Pölkki, Utriainen & Kyngäs, 2014:6; Shenton, 2004:70). This study's sampling strategy is discussed in detail in the Research Methodology section 5.3 and offers readers essential information to make informed decisions about the prospects of transferring this research study to other settings and environments (Shenton, 2004:69).

5.11 CHAPTER SUMMARY

This chapter discussed the research design and methodology that was employed through a qualitative research (Denzin & Lincoln, 2005:21) approach which underpins this study. In addition, this chapter expands on the selected research methods for this study which includes interviews (Miles & Huberman, 1994; May, 1997) which were conducted via Zoom Online video conferencing (Howlett, 2022), contextual observation throughout the interviews (Yin, 1994) along with primary and secondary data analysis.

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Moreover, highlights of the electronic engagement with participants in the initial stage to establish contact and to build rapport while probing any possible bias of the respondents were discussed. This chapter also reflected on Ethical considerations and tactics to mitigate research bias along with discussing important matters such as research generalisation through the validity, reliability and trustworthiness of the study. In the next chapters, the findings of this study are presented resulting from the research data collection methods and analysis discussed earlier. Likewise, the subsequent chapters also deliberate on these findings in an attempt to make meaning of it.

CHAPTER 6

6. DATA ANALYSIS, RESEARCH FINDINGS AND INTERPRETATION

6.1 INTRODUCTION

In this critical chapter, the researcher conducts a comprehensive analysis of the data collected, present the research findings, and provide an interpretation of the results. This chapter builds on previous groundwork established in previous chapters, Chapter 6 shifts the attention towards revealing and uncovering the insights nestled in that vast array of data gathered.

The research aimed to examine how leadership practices and processes foster an environment conducive to innovation, aligning with SDGs and ESG principles. To achieve this, a qualitative study was conducted, focusing on a group of senior mining leaders as participants. The sample was drawn from the South African mining sector.

The mining sector was selected for the survey due to its significant contribution to the GDP, amounting to 8.7% in 2021, making it one of the top contributors during the COVID-19 pandemic (Stats SA, 2021). This highlights the sector's relevance and resilience in generating economic and operational value amidst challenging economic conditions. Furthermore, considering the increasing attention on the mining sector's environmental and social impact, as discussed in Chapter 4, it becomes essential to investigate how leadership practices and processes are driving innovation to address the SDGs and ESG concerns.

As outlined in Chapter 5, the participants in this study were selected from a diverse group of senior leaders representing various portfolios and functions within the

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mining sector. The goal was to capture insights from individuals actively involved in facilitating innovation to address the SDGs and ESG concerns in mining companies. The final sample included 31 senior leaders from seven distinct portfolios, each representing a specific cluster of portfolios or groups.

The participants did not receive the interview questions beforehand. The interviews were semi-structured, and additional follow-up and probing questions were asked as required during the interviews.

The researcher deliberately adopted this approach to gain insight into the perspectives of mining leaders on topics such as the SDGs, ESG and innovation. By using these broad questions at the start of the interview process and not sharing them with the participants beforehand, the aim was to avoid creating an "artificial awareness" among the interviewees, as discussed by Öberseder *et al.*, (2011:449).

The primary objective of this chapter is to concentrate on summarising the research participants and mining companies as the subjects of analysis. It involves presenting a well-organised breakdown of the analysis conducted on the interviews, as well as providing a concise overview of the research findings. The analysis of the interviews is approached in three distinct sections: the participants' perspectives on the SDGs and ESG, the exploration of innovation and sustainability in South African mining companies, and finally, an examination of enabling leadership behaviour.

This research study used a number of techniques to collect data, such as conducting in-depth interviews (referencing Miles and Huberman, 1994 and May, 1997), and cross-referencing with company documents related to innovation, the implementation of the SDGs and ESG. In order to analyse the collected data, methods such as analytical comparison and pattern coding were used, which are explained in Chapter 5 Research Design and Methodology. The researcher undertook meticulous examination of the data in order to protect the integrity and accuracy of the study.

Following the presentation of the research findings, the researcher sets out to interpret the data while providing in depth insights and contextualisation of the data. In doing so, this step in the research process allows for drawing connections, revealing new insights and contributions to the scholarly discourse.

In summary, Chapter 6 serves an important part of the research process as the data become more meaningful through sense making and providing a comprehensive understanding of the research questions at hand.

6.2 OVERVIEW OF PARTICIPANTS

The researcher negotiated access to participants over several months due to the senior level of the participants in the mining companies as discussed in 5.4.2 (Negotiating Access to Participants). After implementing the sampling methods outlined in section 5.4.3 (Participants' Selection) a final sample that included multiple variations (as defined by Saunders *et al.*, 2006: 174) was selected.

The sample includes leaders from various mining companies, each with different roles and responsibilities including those related to the SDGs, ESG and innovation. A total of 31 interviews were conducted using the Zoom online platform. During the analysis of the collected data, the researcher prioritised ethical considerations, such as ensuring that all participants were willing to participate, as outlined in section 5.6 (Ethical Considerations). The purpose of the final sample selection was to assist in ensuring that a detailed representation of the dominant trends, challenges and perspectives of business leaders within the South African mining industry regarding SDGs, ESG, and the related aspects of innovation.

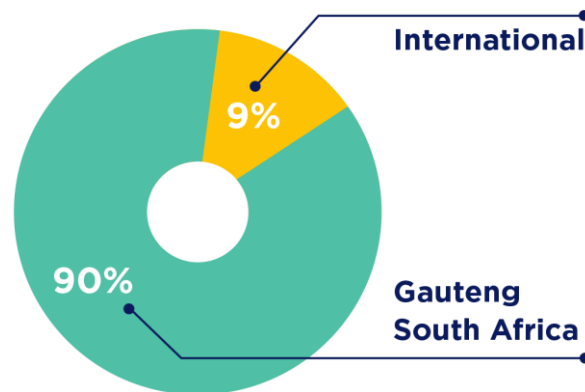
The following section presents an organised approach to examining the mining companies and senior leaders who participated in the study. The distinctive themes emerging from the study will be accompanied by deep reflections as part of the analysis process.

6.2.1 PARTICIPATING MINING COMPANIES

6.2.1.1 Geographic location and operations of participating mining companies:

It is evident from Graph 2 that the headquarters of 90% of the 11 mining companies examined are located in Gauteng Province, South Africa, whereas the headquarters of 9% of the companies are located internationally.

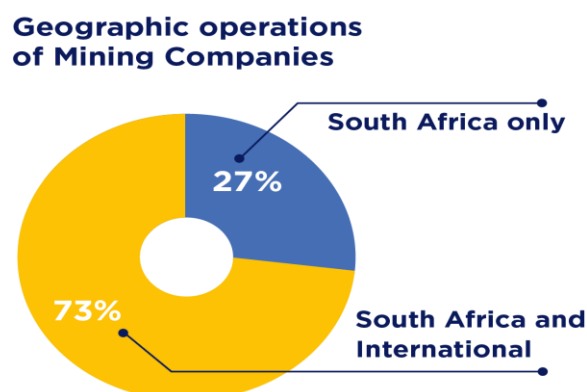
Graph 2: Geographic location - Headquarters of participating companies



Source: Compiled by the author.

Furthermore, depicted in Graph 3 below is the geographical distribution of operations of the 11 mining companies included in the study. It is noteworthy that 27% of the mining companies solely operate in South Africa, while the remaining 73% have operations both in- and outside of South Africa.

Graph 3: Geographic location - Operations of participating companies



Source: Compiled by the author.

The noted findings regarding the geographical location of the headquarters and operations of the mining companies involved in the study are to be expected. The fact that 90% of participating companies are headquartered in South Africa while 72% of the companies operate both in South Africa and internationally is a significant choice. Not surprising, given South Africa is a leading mineral producer on the African continent (Mining Digital, 2022). With 35 gold mines in operation, South Africa is a substantial producer of coal, diamonds, iron ore and chromium. Moreover, it boasts the largest reserves of manganese and platinum group metals worldwide (Mining Digital, 2022).

Endowed by the wealth of natural resources, this has made South Africa attractive for significant investments from numerous mining companies around the world. Many of these mining companies choosing to establish their headquarters in the country. This notable observation points out the ongoing interest and feasibility of the mining industry in South Africa, despite the challenges discussed in Chapter 4. The viability of this sector can be credited to the skilled labour, solid infrastructure and extensive history and experience in the industry.

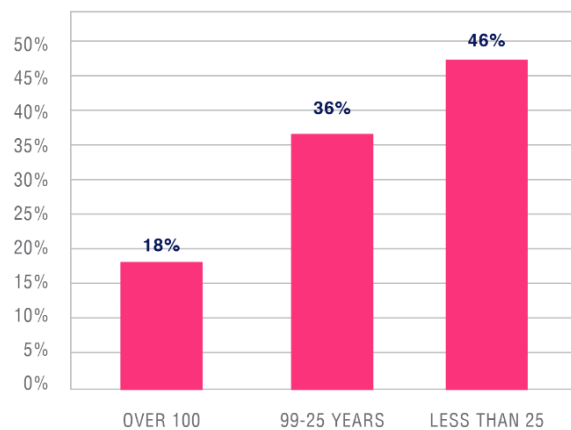
The fact that 73% of the mining companies participating in the study have operations both within and outside of South Africa, is a clear indication of the diversification of their activities beyond the country's borders. However, mining leaders are concerned about the economic sustainability of the sector given the industry challenges and declining investments. (ESI Africa, 2023). Although, South Africa has held on to its leading position in the mining sector, its future viability depends on the ability of key stakeholders such as the investors and government to establish and maintain sustainable partnerships (Mining Weekly, 2023).

6.2.1.2 Years of Existence of participating mining companies

One notable finding regarding South African mining companies is the diverse range of their years of existence. The study revealed a significant variation in the operational history of participating mining companies. Participating mining companies collectively represent a mining history spanning over 200 years. Graph 4 which reflects the distribution of years of existence, indicates that 18% of the companies have surpassed the century mark, showcasing a remarkable longevity in the industry.

Furthermore, 36% of the mining companies were established between 99 and 25 years ago, representing a substantial portion of companies with a considerable history. Additionally, it was found that 46% of the participating mining companies are relatively young, being less than 25 years old.

Graph 4: Participating Companies: No. of Years of Existence



Source: Compiled by the author.

These findings highlight the dynamic nature of the South African mining industry, encompassing both long-standing companies with a deep and rich mining heritage and newer entrants, reflecting the sector's evolution and development over time.

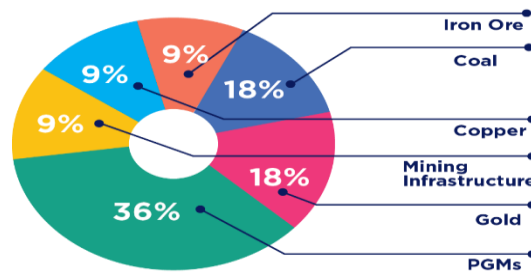
6.2.1.3 Primary commodities mined participating mining companies

The diverse nature of the mining activities conducted by the 11 participating companies is evident from Graph 5 displayed below. It illustrates the primary commodities mined by these companies. It is notable that 36% of the participating

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companies are primarily engaged in mining Platinum Group Metals (PGMs), while 18% focus on Gold mining. Additionally, 18% of the companies are involved in Coal mining, 9% in Copper mining, 9% in Iron Ore mining, and another 9% concentrate on the mining infrastructure value chain.

Graph 5: Primary commodities mined by participating companies



Source: Compiled by the author.

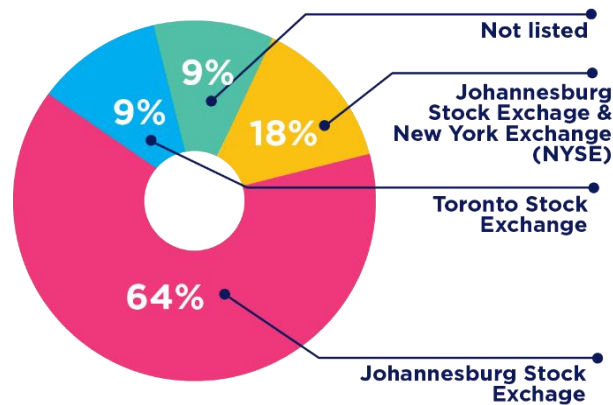
This wide array of commodities mined by the participating companies showcases the breadth and variety of mining operations in the study.

6.2.1.4 Listed participating mining companies

The majority (91%) of the participating mining companies are publicly listed, a reflection of the country's well-established mining sector and the sector's contribution to the country's economy, as discussed in Chapter 4. However, these participating companies have varying ownership structures, ranging from large multinational mining corporations to privately owned firms.

According to Graph 6, of the 11 mining companies that participated, 64% are listed on the Johannesburg Stock Exchange (JSE), 18% are listed on both the JSE and the New York Stock Exchange (NYSE), 9% are listed on the Toronto Stock Exchange (TSE), and the remaining 9% are private and not listed on any public exchange.

Graph 6: No. of participating companies listed



Source: Compiled by the author.

The significance of the majority of companies participating in the study being publicly listed is that these companies are often required to comply with sustainability reporting standards imposed by public stock exchanges. For example, Chapter 4 discusses how the JSE mandates adherence to the King Code of Governance Principles for South Africa 2009 (King III) and the adoption of Integrated Reporting. Integrated Reporting goes beyond financial performance by including reporting on the company's impact on the broader economy, society and the environment.

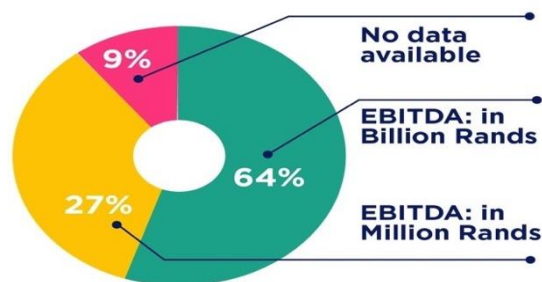
This approach, which has been embraced by major entities and supported by investors and regulators, has become an important global standard. The researcher was able to corroborate the data collected by using the Integrated Reports of the listed companies for the years 2021-2022.

6.2.1.5 2021 EBITDA of participating mining companies

Earnings Before Interest, Taxes, Depreciation, and Amortisation (EBITDA) is a profitability measure that differs from net income (Hayes, 2023). It aims to reflect the cash profit generated by a company's operations by excluding non-cash expenses such as depreciation and amortisation, taxes, and debt costs that depend on the capital structure (Hayes, 2023). The researcher chose to use EBITDA as a measurement because it was a widely used financial metric that could be found in the mining companies' financial reports.

Graph 7 below illustrates that of the 11 participating mining companies, 64% have an EBITDA ratio of billions of Rands, while only 27% have an EBITDA ratio of millions of Rands, and 9% of the participating companies has no data available on their EBITDA.

Graph 7: 2021 EBITDA of participating mining companies



Source: Compiled by the author.

One important indicator of the sustainability of the mining industry is its impact on the national economy. It is noteworthy that a total of 11 mining companies generated significant earnings (Billion Rands) based on their combined turnover in this study.

6.2.1.6 Employment data of participating mining companies

In addition to its profitability, the mining sector also plays a crucial role in providing employment opportunities for the country, as discussed in Chapter 4.

Table 20 below shows the number of direct employees, plus the estimated indirect employees sourced via labour brokers, as discussed in 4.6.1 in Chapter 4. CO7 provides the most employment opportunities, with 84,981 employees (direct and indirect), whereas CO9 has the least number of employment opportunities with 9,393. The collective figure of 281 906 employees is significant since the mining industry in South Africa had around 458,954 employees in 2021 (StatsSA, 2023). This implies that the 11 mining companies that participated in the study employed roughly 61% of the entire mining workforce at the time of this study.

Table 5: No. of direct & indirect employees of participating companies

COMPANY	NO. OF DIRECT AND INDIRECT EMPLOYEES
CO1	48, 113
CO2	20, 928
CO3	22, 110
CO4	10, 632
CO5	25, 538
CO6	18, 813
CO7	84, 981
CO8	18, 000
CO9	9, 393
CO10	12, 374
CO11	11, 024
TOTAL	281, 906

Source: Compiled by the author.

Considering the scale of the mining companies that participated in the study, it can be inferred that their leaders have to deal with a multitude of complexities and challenges. These companies bear significant responsibility for ensuring the sustainability of their operations and the employment they provide.

6.2.1 PARTICIPATING MINING LEADERS

6.1.2.1 Participants' Position in Mining Company

The study included mining leaders holding different positions, as reflected in Table 21 below, in the organisational structure, which offered the researcher a wide array of viewpoints to analyse. This variation in perspective allowed for an exploration of business leaders' beliefs and practices with regard to the SDGs, ESG factors, and innovation.

Table 6: Participants' positions in mining companies

#	PARTICIPANTS' GROUPS/PORTFOLIOS	CODE	NUMBER OF PARTICIPANTS
1	Chief Executive Officer (CEO) of Mining Company	CMC	9
2	Chief Operating Officer (COO) of Mining Company	COM	2
3	Chief Technology Officer (CTO) of Mining Company	CTM	7
4	Chief Financial Officer (CFO) of Mining Company	CFM	2
5	Risk/Sustainability Portfolio of Mining Company	RSM	6

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6	Enterprise Development Portfolio of Mining Company	EDM	1
7	Community Development/Stakeholder/Management/Corporate Affairs	CDM	4
		TOTAL PARTICIPANTS	31

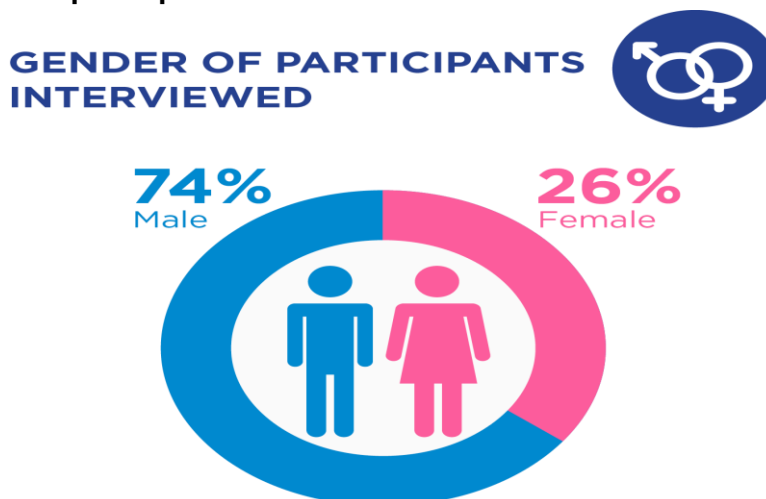
Source: Compiled by the author.

The table demonstrates the willingness of mining executives at various managerial levels to take part in the study. It should be highlighted that out of the 11 mining companies involved, 9 (81%) of the CEOs were interviewed, while the remaining two CEOs were unable to participate due to conflicting schedules. Consequently, it can be inferred that the views of mining leaders in this study can be reasonably generalised since the majority of CEOs, who hold the most senior executive positions, were included in the research.

6.1.2.2 Gender of all participants interviewed

In addition, a noteworthy aspect of the study's final sample is the gender composition of the participants. The gender breakdown, depicted in Graph 8 below, reveals that 74% of the 31 participants were male, whereas 26% were female. The sample was not selected to balance the gender ratios. As shown in Graph 8, the final number of participants is significantly biased towards males.

Graph 8: Gender of participants interviewed



Source: Compiled by the author.

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This observation aligns with the long-standing gender disparity and segregation that has historically characterised the mining industry, as discussed in Chapter 4. Additionally, the research revealed that a significant majority of the mining companies involved (81%) regarded SDG 5, which focuses on attaining gender equality, as a top priority in their endeavours to foster increased participation of women in the sector. This insight will be further explored in a subsequent section of this chapter.

6.1.2.3 Age-range of all participating mining leaders

Figure 9 below illustrates the age distribution of the 31 participants who were interviewed as part of this research. The data indicates that 42% of the participants between 40 to 50 years of age, another 42% fall within 50 to 60 years of age range, and the remaining 16% are between the ages of 60 to 70 years.



Figure 9: Age-range of Participants

Source: Compiled by the author.

A significant portion of the participants involved in this study are within to the age group of 40 to 60 years, indicating that the majority (84%) fall within this range. This observation is noteworthy because the mining industry is often perceived as being dominated by older individuals, and this is reflected in the age demographics of the participants.

The fact that 84% of the participants fall within the age range of 40 to 60 years implies that the mining sector may be undergoing a generational shift in leadership. Older, more traditional leaders may be gradually giving way to younger, more forward-thinking individuals. This change in leadership could also signify a shift in

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perspectives regarding sustainable development, environmental stewardship and innovation.

It is important to note that age is not the only factor that may influence a leader's opinion on these topics, and other factors such as education, experience, and cultural background may also play a role. Nonetheless, understanding the age distribution of the participants interviewed in this study provides insight into the mining sector's current leadership landscape and how it may evolve in the future.

6.1.2.4 Participants tenure with the company

Figure 10 provides an overview of the length of tenure of the mining leaders who participated in the study. The data reveals that 13% of the leaders have been in their respective positions for 0-5 years with the participating company, while 29% have served for 5-10 years. Additionally, 42% of the leaders have a tenure ranging from 10 to 20 years, while 13% have been in their roles for 20 to 30 years. Only a small percentage, 3%, have held their positions for over 30 years.

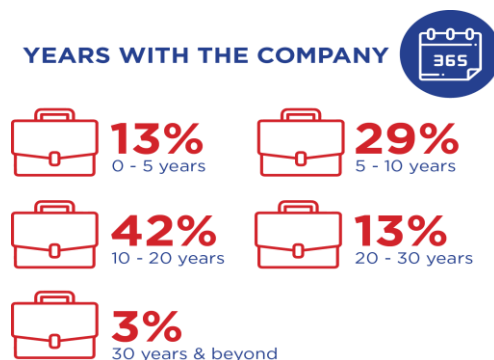


Figure 10: Participants- No. of years with the company

Source: Compiled by the author.

An interesting observation is that a significant majority of the participants have devoted a substantial portion of their careers to their current companies, as indicated by 42% of them having served their respective companies for a period ranging from 10 to 20 years. This extensive tenure suggests that these leaders have accumulated considerable experience and expertise in the mining industry, potentially influencing

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the reliability of their viewpoints on the mining sector and on topics such as SDGs, ESG and innovation.

Furthermore, it is worth highlighting that 13% of the participants have been associated with their companies for less than five years. This implies that they may bring a distinct perspective to the table, influenced by their prior experiences in different organisations or industries. Their relatively shorter tenure could shape their opinions in unique ways when considering SDG, ESG, and innovation.

Conversely, the inclusion of a select few individuals who have remained with their companies for over 30 years offers a distinctive viewpoint on the mining industry's evolution and progress over an extended period. This rare perspective provides valuable insights into the changes and developments that have occurred in the mining sector and in their companies over time.

In summary, the duration of the mining leaders' tenure with their respective companies has the potential to shape their beliefs and attitudes towards sustainability, innovation, and the future trajectory of the mining industry.

6.1.2.5 Gender and ethnicity of CEOs interviewed

The study aimed to investigate the views of mining industry leaders towards SDGs, ESG and innovation, and therefore, it was important to analyse the gender and ethnic breakdown of the CEOs from participating mining companies.

Figure 11 below shows that out of the 9 CEOs who participated in the study, 33% were African males and 11% were African females. In contrast, 33% were Caucasian males and 22% were Caucasian females.

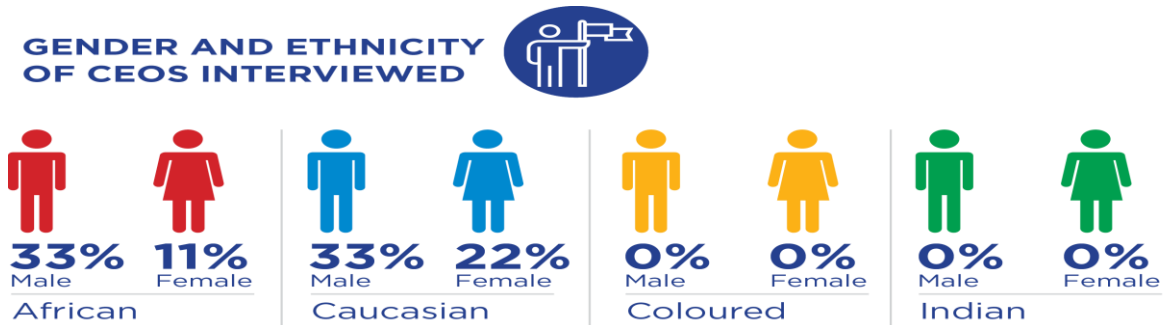


Figure 11: Gender of CEOs interviewed

Source: Compiled by the author.

It is worth highlighting that there was an absence of Coloured and Indian male or female CEOs among the participants in this study. This is significant as South Africa has a slew of legislation to advance equity and equality in the workplace. Key among them is the Employment Equity Amendment Bill of 2020 which was signed into law in 2023 as an amendment to the existing Employment Equity Act 55 of 1998 (The Presidency, Republic of South Africa, 2023). This Act obliges companies with more than 50 employees to comply. It can thus be assumed that all participating companies report on their employment equity status. This observation underscores the substantial gap that persists in the mining industry regarding diversity and inclusivity in leadership roles. It implies that there is significant progress yet to be made in achieving a more representative and inclusive leadership within the sector.

Furthermore, this finding emphasises the need for further research to delve into the perspectives of mining industry leaders from diverse backgrounds. Such research would provide a more comprehensive understanding of their viewpoints on sustainability and innovation, thereby contributing to a broader and more inclusive discourse within the mining industry.

6.1.2.6 Age range of CEOs interviewed

The age distribution of the 9 CEOs who participated in this study is depicted in Graph 11. The data indicates that 22% of the CEOs fall within the age range of 40 to 50.

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years, while 33% are between 50 to 60 of age. Additionally, 44% of the CEOs are between 60 to 70 years old. Notably, none of the CEOs interviewed are younger than 40 years old.



Figure 12: Age range of participating CEOs

Source: Compiled by the author.

The age distribution of the CEOs who took part in the study highlights that a majority of them are in the advanced stages of their professional journeys. This implies that they have amassed considerable industry experience and have progressed to prominent leadership roles. The absence of CEOs under the age of 40 suggests that younger individuals face challenges when it comes to securing leadership positions in the mining industry. This could be attributed to factors such as limited opportunities for career advancement for younger professionals or a perceived lack of requisite experience.

6.1.2.7 SUMMARY: PARTICIPATING MINING COMPANIES AND LEADERS

In summary, this study interviewed 31 mining leaders, the majority of whom were between the ages of 40 and 60 years of age and had spent a considerable number of years with their current companies. The gender distribution was heavily skewed towards males, with only 26% female participants. Notably the number of female participants in the study is significantly higher than the reported 17% of women in top management in the mining sector as discussed in Chapter 4 (section 4.6.3.).

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The participating leaders held diverse leadership positions within the mining companies. Out of the 9 CEOs who participated in the study, there was a notable lack of representation from Coloured and Indian male or female CEOs.

Moreover, there was a sample size of 11 mining companies, with the majority being headquartered in South Africa and operating both domestically and internationally. Collectively, these companies had been in existence for over 200 years and mined various materials such as Ore, Coal, Copper, Gold and PGMs.

The majority of these companies, around 91%, were listed on a public exchange and 64% had EBITDA in billions of Rands. The mining sector in South Africa is a significant employer, with these 11 companies alone creating 281,906 jobs, roughly 61% of the entire mining workforce in the country at the time of this study.

The above demographic overview of participating companies and participants provides insight into the profile and importance of the mining companies that were surveyed in this study.

6.2 DATA ANALYSIS

This section delves into the data collected through interviews with mining sector leaders to gain deeper insights into their perspectives on various aspects such as the SDGs, ESG practices and innovation. The primary data collected through interviews was corroborated by an examination of secondary data such as the annual reports and Integrated Reports of participating companies. Through rigorous analysis and examination of the interview data, this study aims to uncover patterns, trends and noteworthy findings that shed light on the attitudes and viewpoints of these senior leaders within the mining sector.

The interviews were conducted with a diverse group of mining leaders, representing a range of positions within their respective companies. This includes CEOs, senior executives and managers. By tapping into their wealth of knowledge and experience,

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this study sought to explore their perspectives on enabling leadership practices and processes for the exploration of innovation, navigating complex challenges, strategies for sustainable development, and their views on the shifts in the mining sector.

The data analysis process involved a systematic approach to organising, categorising, and interpreting the responses provided by the interviewees. Through this meticulous examination, the study aims to identify recurring themes, unique insights and notable perspectives that emerged from the interviews. By synthesising and presenting these findings, the study hopes to contribute to a comprehensive understanding of the mining sector's current landscape and the viewpoints of its influential leaders.

This chapter presents the results obtained through the initial, inductive analysis and explores the major recurring topics arising from the conducted interviews. The interviews yielded four primary themes, each with a number of sub-themes. These four main themes emerged due to the way questions were categorised and presented to the participants during the interview sessions.

The four central themes emerged from the responses to the interview questions:

- Theme 1: Mining leaders' views and their understanding of SDGs and ESG in the mining sector are not homogenous.
- Theme 2: Innovation positively impact sustainability in the mining sector.
- Theme 3: High levels of ambidextrous leadership practices enables innovation in the mining sector.
- Theme 4: Leadership behaviour and practices which should be strengthened in the mining sector

Table 22 presents a comprehensive summary of the study's findings, demonstrating the direct connections between the emergent themes and the interview schedule questions. Additionally, it enumerates the primary sub-themes that were identified

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during the interview process. The table offers a clear and concise overview of the research outcomes and their correlation with the interview data.

Table 22 : Themes and sub-themes emerging from Qualitative Data

THEMES	SUB-THEMES	INTERVIEW SCHEDULE QUESTIONS
<p>THEME 1: MINING LEADERS' VIEWS AND THEIR UNDERSTANDING OF SDGs AND ESG IN THE MINING SECTOR ARE NOT HOMOGENOUS</p>	<ul style="list-style-type: none"> • The mining sector's appetite for the SDGs and ESG is mixed. • Embracing the SDGs and ESG. • SDGs and ESG Alignment 	<p>Q1.1 What in your view is the appetite of the South African mining sector for the Sustainable Development Goals (SDGs)?</p> <p>Q1.2 How would you describe the extent to which your company has embraced the SDGs?</p> <p>Q1.6 Which of the SDGs do you feel are the most critical for your company?</p> <p>Q4.2: I am interested in the relationship between Enabling Leadership and the SDGs. In your view, how does leadership impact the integration of the SDGs in your company?</p>
<p>THEME 2: INNOVATION POSITIVELY IMPACT SUSTAINABILITY IN THE MINING SECTOR</p>	<ul style="list-style-type: none"> • Innovation integrated into strategy generates sustainable impacts • Intentionality and leadership commitment to innovation yields sustainable outcomes 	<p>Q1.3 At a company level, how is innovation for sustainability provided for in your strategic and organisational planning processes?</p> <p>Q1.4 How does your company's strategy formalise innovation, particularly innovations related to the SDGs?</p> <p>Q1.7 Can you provide an example of a ground-breaking innovation in the mining sector which your company has implemented?</p> <p>Q1.8 In your view, which mining companies are trendsetters with regard to the SDGs and associated innovation?</p> <p>Q2.4 What is your company's risk appetite in respect of encouraging your team to pursue innovation? (What are the strategic risk areas associated with innovation?).</p>

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THEMES	SUB-THEMES	INTERVIEW SCHEDULE QUESTIONS
<p>THEME 3: HIGH LEVELS OF AMBIDEXTROUS LEADERSHIP PRACTICES ENABLES INNOVATION IN THE MINING SECTOR.</p>	<ul style="list-style-type: none"> • Leadership practices that foster and facilitate the process of exploration. • Leadership practices that foster and facilitate the process of exploitation. 	<p>Q2.1 What is your role in the innovation process from the ideation phase to the implementation phase?</p> <p>Q2.2 Once new ideas are explored, stress-tested and found to be feasible, how is it integrated into the company structure and institutionalised?</p> <p>Q2.5 On an individual basis, how do (or would) you manage risks and errors in the innovation process?</p> <p>Q2.6 Does your CEO encourage innovation?</p> <p>Q2.7 If yes, can you provide an example of how your CEO facilitated innovation? If no, why do you think not?</p> <p>Q2.8 What do you think should the role of a CEO be in encouraging innovation?</p> <p>Q3.1 The implementation of new ideas is often resisted. As a leader, how do you obtain buy-in from key stakeholders such as your Board, staff, and the community/ties you operate in? (Ensure that a view is expressed on each of the stakeholders).</p> <p>Q3.2 As a leader in the organisation how do you encourage and support out-of-the box thinking and new ideas? Provide a practical example.</p> <p>Q4.1 What in your opinion are the critical leadership features or attributes which serve as a catalyst for successful innovation?</p> <p>Q4.3 Could you provide an example of, when your company was faced with a challenge or an opportunity, where flexibility and agility was</p>

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THEMES	SUB-THEMES	INTERVIEW SCHEDULE QUESTIONS
		required during the initiation of innovation to meet the SDGs?
THEME 4: LEADERSHIP BEHAVIOURS AND PRACTICES WHICH SHOULD BE STRENGTHENED IN THE MINING SECTOR	<ul style="list-style-type: none"> • Shifts in the mining sector • Sustaining a conducive environment for innovation • Leadership features to be strengthened 	<p>Q3.3 What shifts do you think should be made to develop a more conducive environment for exploring innovation in the mining sector?</p> <p>Q3.4 If a more conducive environment for exploring innovation is (or has been) developed, how would you ensure that such an environment is sustained?</p> <p>Q4.4 If you were to focus on the mining sector as a whole, which leadership features or attributes do you feel are lacking or need further development in order to encourage the exploration of innovation?</p>

Source: Compiled by the author.

The findings below are organised and presented based on identified themes in the following sections. The interviewees' perspectives are directly incorporated through verbatim quotations, without any modifications to their language, grammar, or expressions. To differentiate their comments from the quotes from existing literature, the participants' words are indicated in italics. In cases where a specific comment sheds light on multiple themes or sub-themes, the quote is reiterated for the reader's convenience.

In the following sections, the key themes resulting from the data analysis will be presented supported by relevant excerpts from the interviews. These themes will provide valuable insights into the leaders' perspectives on SDGs, ESG practices and innovation, shedding light on their vision for the future of the mining industry. Moreover, the unique perspectives and reflections arising from the data analysis will further enrich our understanding of the challenges and opportunities faced by mining industry leaders in driving sustainable growth and fostering innovation.

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Overall, this data analysis section offers a comprehensive exploration of the interview data, providing valuable insights on the views of mining industry leaders and their role in shaping the future of the sector. The analysis of the interviews is approached in three distinct sections: the participants' perspectives on the SDGs and ESG, the exploration of innovation and sustainability in South African mining companies, and finally, an examination of enabling leadership behaviour.

The subsequent sections delve into a more comprehensive analysis of these topics, structured around the data indexing/coding technique and pattern generation outlined in section 5.7 (Methods of Data Analysis).

Presented below are the three key themes of the research study each of which is supported by sub-themes.

6.3 THEME 1: MINING LEADERS' VIEWS AND THEIR UNDERSTANDING OF SDGS AND ESG IN THE MINING SECTORS ARE NOT HOMOGENOUS

In Chapter 3, the researcher underscored a report from the United Nations Global Compact that emphasises the significance of strong leadership in facilitating the successful integration of the SDGs and ESG principles in the attainment of sustainable outcomes for companies (United Nations Global Compact, 2017). Additionally, the chapter highlighted the necessity for leaders to prioritise sustainability, by motivating their teams to collaborate towards shared objectives and fostering innovative approaches to sustainable practices.

Moreover, as seen from the literature in Chapter 4, the mining sector is underpinned by significant complexities which leaders need to navigate while driving their companies towards prosperity. This prosperity can encompass various facets, such as financial well-being, community welfare, reduced environmental impact concerning energy and water consumption, and robust governance. Yet, the question

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remains: what type of leadership is essential for successfully managing these complexities and for ensuring a thriving sector? Furthermore, what forms of supportive practices and processes are leaders implementing, and how can these be understood?

Before delving into the question regarding how leaders are enacting enabling leadership to cultivate innovation for the transformation of the mining sector, it is imperative to gain an understanding of mining leaders' viewpoints regarding the SDGs and ESG. It is equally important to evaluate the sector's openness to these concepts.

Consequently, drawing from the input shared by the participants, the researcher discerned three fundamental sub-themes relating to the participants' viewpoints on the relevance of SDGs within the mining sector. Firstly, there exists a varied perspective within the mining sector regarding the extent of interest in the SDGs and ESG. Secondly, the adoption of the SDGs among mining companies is not uniform; rather, different companies exhibit distinct levels of integration. Lastly, while the approaches may differ, there is a degree of alignment among mining companies in relation to the SDGs. Table 23 below outlines the different themes and sub-themes related to the findings.

Table 23: Outline of Theme 1- Mining Leaders' views and understanding of the SDGs and ESG

THEME 1: MINING LEADERS' VIEWS AND THEIR UNDERSTANDING OF SDGs AND ESG IN THE MINING SECTOR ARE NOT HOMOGENOUS	
SUB-THEME	CODES
SUB-THEME 1: THE MINING SECTOR'S APPETITE FOR THE SDGs AND ESG IS MIXED	Aspirational
	Cognition, awareness, recognition and willingness to adopt
	Improving and increasing appetite
	High appetite
SUB-THEME 2: EMBRACING THE SDGs AND ESG BY PARTICIPATING MINING COMPANIES	Implementation
	Challenges
SUB-THEME 3: SDGs AND ESG ALIGNMENT	Higher SDG Alignment
	Lower SDG Alignment
	Commitment to decarbonisation

Source: Compiled by the author.

6.3.1 THE MINING SECTOR'S APPETITE FOR THE SDGS AND ESG IS MIXED

In order to grasp the perspectives of mining leaders concerning the SDGs and ESG, the initial stage of the interview process focused on eliciting participants' opinions regarding the extent to which the mining sector is inclined to embrace the adoption of SDGs.

Interestingly, according to participants, the sector's appetite is 'mixed.'

[CMC4] I think it's mixed. I think I would argue and this is going to be this is not scientific, but I would argue more than 50% of the industry is very committed.

Given the significant environmental footprint and social impact of the mining sector, the researcher expected the sector's appetite for the SDGs and ESG, as responsible corporate citizens, to be uniformly high. However, according to participants, the sector's appetite is varied. There is a general or broad appetite for the SDGs and the integration thereof is maturing. This is underpinned by the recognition that the mining sector has evolved and has to operate in a sustainable manner.

The statements provided by the majority of the interview participants indicate a noticeable understanding and acknowledgment of the significance of the SDGs and the ESG agenda for their respective companies and the mining sector as a whole. The growing prominence of this notion is supported by consistent themes found in the information shared by senior leaders and the data presented in their company's annual reports.

When interviewed about the South African mining sector's appetite for the SDGs, participants' views ranged from aspirational to a high appetite for the SDGs. Drawing upon the recurring patterns, the researcher constructed a continuum of responses (See Figure 13) that offer a comprehensive depiction of how mining leaders perceived the industry's stance regarding the SDGs. In the following section, the researcher presents participants' answers to amplify the concept within the corresponding sub-themes.

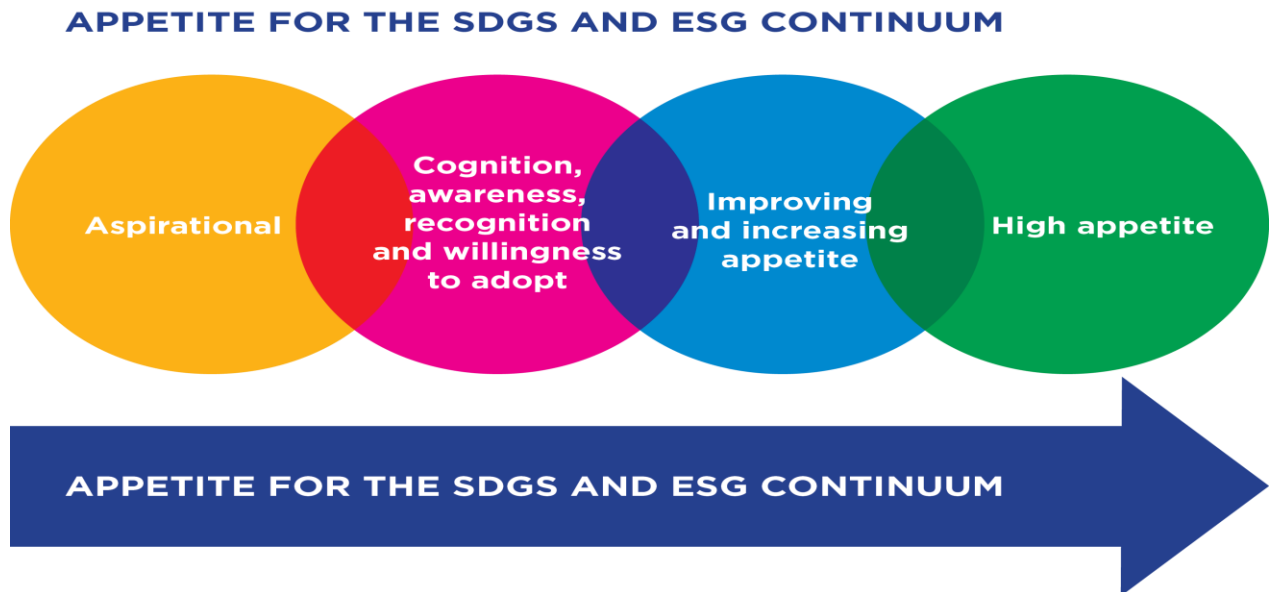


Figure 13: Mining Sector: Perceived Appetite for SDGs & ESG

Source: Compiled by the author.

6.3.1.1 Aspirational

The sub-theme of Aspirational emerged as a notable theme from some participants. For example, CDM3 stated:

[CDM3]: "I think it probably remains aspirational. I think the mining industry will probably be the first to demonstrate real commitment and demonstratable real action towards Sustainable Development Goals. And from [CO6] perspective, the way that I look at it, is that I mean, they seem quite vast and in depth and as a result, intimidating and overwhelming. But we are preparing to really make a, I think what I like to call, an intentional commitment towards SDGs and using the language of SDGs for communication of all our impact initiatives. I think it's probably easier for mining companies because even though we started from a regulatory and compliance perspective in terms of social environmental stewardship, we kind of have established that base and hence I say SDGs are aspirational in terms of how do we take things further. And from [CO6] perspective, it is aspiring towards SDGs as a reporting and communication language. Also, in the context of how we need to transition as a company."

The finding is not surprising. As the literature reviewed in Chapter 6 underscores the difficulties associated with the implementation of SDGs and ESG principles. The

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perception of the goal's aspirational quality is also based on the recognition of its ambitious and transformative nature, and on the need to align with broader, long-term societal and environmental ideals. Nevertheless, participants frequently expressed appreciation for the goal's overarching vision, acknowledging its potential to instigate positive change and foster a more sustainable future.

However, this sense of aspiration is counterbalanced by a recognised sense of challenge. Participants emphasised the intricacies inherent in achieving the SDGs, referring to their extensive scope and depth, which, in turn, can appear daunting and overwhelming. Moreover, participants underscored their recognition of the ongoing struggle with transitioning from aspirational ideals to the pragmatic execution of the SDGs.

6.3.1.2 Cognition, awareness, recognition and willingness to adopt

The subsequent sub-theme that surfaced during the interviews revolved around participants' comprehension, consciousness, acknowledgment, cognition, awareness, recognition and willingness to adopt the SDGs. While this sub-theme displayed considerable prominence overall, its strength varied among the participants interviewed by the researcher. Notably, it was most prevalent among leaders who occupied portfolios such as Chief Technology, Risk/ Sustainability and Community/Stakeholder Development/Corporate Affairs Officers, less so among the Chief Executive Officers' (CEO) portfolio.

A senior leader in the share a view on this matter:

[CMC5]: "So from a mining point of view, from an industry point of view, we are very, very cognisant, we are very cognisant of our responsibilities as a mining industry in terms of really subscribing to a lot of the SDG goals, and there's quite a lot that has been done in that respect."

In addition to acknowledging the SDGs, the following participant demonstrates awareness and offers insights into the incentives driving their commitment to contribute to the SDGs:

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[RSM3]: "So, I think that that's I think there's definitely an awareness, high level of awareness that we see around SDGs and the broader, not only country commitment to SDGs in terms of kind of the mining sector, but also, we the awareness, I think, and as I see it has really come from the mining sectors participation in global economies and what that means for an organisation such as such as If I look at where a lot of the interaction comes from, in particular for, for private sector mining companies, actually a lot of those conversations are driven external to South Africa. Less so about what government is or is not doing...far more interaction from the global agency to the extent that we do work outside South Africa, that means that the kind of global organisations United Nations Global Compact and all of the associated agencies start to play a role in what you're doing...we also get a lot of a lot of input from the providers of capital. And all of those are anchored around a theory of Sustainable Development Goals and what is it that we should be doing as private sector participants in order to be able to change and increase our contributions towards SDGs in terms of the mining sector itself..."

When asked to give his/her view on the appetite for SDGs, RSM5 promptly indicated the willingness to adopt the SDGs, However, the participant also emphasised the difficulty of translating SDGs into actionable measures and integrating them into the overarching strategy:

[RSM5]: "My view is that there is definitely an appetite for it and it's definitely a willingness to adopt the SDGs, but I don't necessarily think that everybody unpacks it to the level that it should be done, you know, that they dig deep into the sub targets and whatever. I do think that there's a risk of companies just saying, like, oh, we do gender equality and like, stick the little icon on and report on it. I don't necessarily think they drill it down into the sub targets and they embed it into their strategy. So, I would say the willingness is definitely there, but it's the how it translates and how, how they physically implement it and do they ultimately, embed it in the strategy and that's a journey that takes a long time."

The study's findings reveal a multi-dimensional perspective regarding the cognition, awareness, recognition, and willingness to adopt the Sustainable Development Goals (SDGs) among the surveyed participants.

Cognition and Awareness: The participants demonstrated varying levels of cognitive understanding and awareness of the SDGs. While some exhibited a deep

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comprehension of the goals' overarching objectives and targets, others displayed a more limited awareness. This discrepancy in cognition could be attributed to disparities in educational background, exposure to sustainable development discourse, and prior engagement with SDG-related initiatives. It is evident that enhancing cognitive clarity and raising awareness about the distinct nature of the SDGs remain imperative for fostering a more comprehensive understanding among stakeholders.

Recognition: The study identified a notable recognition of the significance of the SDGs in addressing global challenges and advancing sustainable development. Participants frequently acknowledged the goals' role in providing a comprehensive framework that spans economic, social, and environmental dimensions. Nonetheless, the degree of recognition varied, with some participants attributing more immediate relevance to certain goals that directly intersected with their professional or personal spheres.

Willingness to Adopt: Participants' willingness to adopt the SDGs appeared to be contingent on multiple factors, including organisational context, regulatory environment, and individual values. While some participants expressed a strong eagerness to align their actions with the SDGs, others exhibited a more cautious stance, primarily due to perceived challenges in implementation and measurement.

In conclusion, the study's themes underscore the intricate interplay of cognition, awareness, recognition and willingness to adopt the SDGs. The varying levels of understanding and commitment among participants highlight the need for targeted educational efforts, tailored communication strategies, and context-sensitive approaches to enhance the integration of the SDGs into diverse sectors and stakeholders.

6.3.1.3 Improving and increasing appetite

The subsequent sub-theme that emerged pertained to an improving and increasing appetite for the SDGs. Remarkably, this theme strongly resonated with participants

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who possess extensive experience within the mining sector and have witnessed its evolution over a considerable period.

[CMC8]: “So I think, I do think it's changed over time. I think there's an increasing appetite. I think if you're asked the same question 10 years ago, you probably would have heard a different answer. But the industry has really been changing. We, mining companies do realise that it's not just about the hardware. It's not just about the mining and getting the metals out of the ground, but it's also about the software around the mine. And if you do not have that holistic business model, it becomes increasingly difficult to operate your mine. And I think those are hard lessons learned over the past decade. And that's why I would say there's probably a good appetite, but it did come with a lot of change management. Over the years for people to get to this point where they would be accepting of Sustainable Development Goals.”

When asked to give his/her view on the appetite for SDGs, RSM5 instantly indicated the willingness to adopt the SDGs.

[CTM3]: “The appetite is improving rapidly and the main reason for that is that, ESG which the Sustainability Development Goals directly aligned to. In mind, I think it comes from, I think about 20 years ago, we were talking about the triple bottom line. Now we talk about ESG, and now every investor community talks about ESG, and as a mining sector wanting investment. And as a mining sector with a reputation of being a polluter, and I think that that's a given. You know, as the mining sector external, you've got this pollution that it's a heavy industry, highly polluting and ends up destroying the environment that ends up killing people. That's the perception that's in the public domain, I think mining houses are embracing it and embracing it on a rapid way. If you we look at mining conferences, including Mining Indaba. Now, February, the topic of ESG topic of addressing climate change topic of addressing social injustice, the topic of ensuring that we've got proper governance and you've seen that by several iterations...”

The research findings reveal a distinct sub-theme centred around the enhancement and augmentation of enthusiasm towards the SDGs within the context of the mining sector. This sub-theme is particularly intriguing as it is notably aligned with participants who boast substantial tenure in the mining sector, affording them a longitudinal perspective on its transformation.

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Participants who have accrued extensive experience within the mining sector displayed a palpable sense of engagement and interest in bolstering the adoption of SDGs. Their insights highlighted a dynamic shift in attitudes over time, where a growing realisation of the imperative for sustainable practices has stimulated a pronounced appetite for SDGs. These seasoned participants attributed this shift to a confluence of factors, including heightened societal awareness, evolving regulatory frameworks, an amplified emphasis on ethical and responsible business conduct and the investor community's interest in ESG.

Furthermore, participants who have observed the evolution of the mining sector first-hand were keenly attuned to the intrinsic interconnection between sustainable development and long-term profitability. They articulated a nuanced perspective, emphasising that a proactive commitment to SDGs not only contributes to environmental and social well-being but also serves as a strategic catalyst for corporate resilience and competitiveness. The convergence of experience and insight among these participants underscores the potential for a transformative trajectory within the mining sector. As mining sector veterans champion the cause of the SDGs, their nuanced understanding of the sector's intricacies could facilitate the articulation of targeted strategies, innovative approaches, and collaborative initiatives. Their resonance with the goal of improving and augmenting enthusiasm for the SDGs is indicative of a broader paradigm shift within the mining industry, one that acknowledges the symbiotic relationship between sustainability and enduring prosperity.

In conclusion, the identified sub-theme of improving and increasing appetite towards the SDGs provides a compelling narrative of how seasoned stakeholders are driving a burgeoning commitment to sustainable practices within the mining sector. The fusion of experiential wisdom with contemporary insights underscores the potential for this momentum to permeate throughout the industry, catalysing a profound shift towards responsible and forward-looking mining practices.

6.3.1.4 High appetite

The final sub-theme within the continuum of the mining sector's receptivity to SDGs was associated with a 'high appetite,' as conveyed by specific participants. The swift recognition of a substantial enthusiasm within the mining sector was heartening; nevertheless, participants also indicated that there could be diverse reasons contributing to this heightened appetite, as reflected in the following sentiments shared by the participants:

[CDM4]: "I think the appetite is high. Basically, as you know that, so much has evolved, the investors are no longer interested in how much profit are you making, but how you are basically contributing towards the environment and pivotal issues and obviously, of corporate governance. So that shift has really made the mining industries to also shift their interest of really ensuring that they should be addressing the SDGs."

[COM1]: I think the appetite is probably quite high. In my mind, what you need to look at or unpack a little bit is the Why, what's driving it. I think. I think for companies that still relies very dependently on international markets for capital, there is almost stick approach to looking at the Sustainable Development Goals. You know, if you aren't meeting certain criteria, if you aren't aligned with certain policies, you're going to battle getting capital internationally. So, listen in South Africa, there isn't a lot of capital. So, for any biggish company that requires capital from international markets, they almost have to be aligned. So I think that's one aspect to it. I think another aspect to it depending on the industry you're in, is a customer pull focus. So, you know where I, where I'm going with that is almost to say if you're in PGMS for example, platinum group metals, your end customers are going to be car companies' OEMs it's going to be the Volkswagen, the Mercedes of the world. And they have very stringent requirements in their supply chain. So again, you almost going to be forced into it if you if you want to be able to sell your product to those end users, which we all do....I think there's a third aspect which is probably in my mind, the more important one and the one where my focus really is, that starts becoming, which of those Sustainable Development Goals are almost critical in the context in which we operate, to be able for us to be sustainable in South Africa. And then, of course, a big drive there is on social issues...ESG is a little bit of a farce, because I think a lot of it's been put in place to tick capital boxes rather than to actually worry about what's really on the ground...I guess what I'm trying to say is I think that the appetite for it is there on some of those goals, because it has to be, if you're trying to access international markets or selling to international supply chain. And then I think there are some real pull factors where you want to be because it has a direct impact on our business and in South

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Africa for me, a lot of that is more on the let's call it the social and governance type of goals rather than the pure environmental sort of climate science, which is what gets a lot of the focus. And I think a lot of that is more because you have to rather than you want to.

The following participant articulates his perspective by associating the 'high appetite' with the necessity for the sector to undergo transformation and adopt a more inclusive approach to conducting business.

[CTM7]: "I think it's very high. I really think the mining industry is really accepting and realising that you need that we need to change you need to really change the way that we've done this type of business in the past and have a much more inclusive way of doing our business in cooperation with our immediate surrounding communities and areas we were operating in."

The research sub-themes underscore a noteworthy discovery concerning some mining leaders' views on the sector's pronounced uptake of the SDGs. This particular sub-theme is characterised by a high level of interest and commitment towards the integration of the SDGs within the mining sector. Many participants expressed a resounding acknowledgment of the pivotal role that the mining sector plays in contributing to sustainable development on a global scale. Their sentiments resonated with a palpable appetite to align their practices and operations with the comprehensive agenda set forth by the SDGs.

In addition, there are participants who also questioned the motives behind adopting the SDGs and ESG principles. In some responses, participants pointed out that the SDGs which they viewed as part of an ESG framework has a close association with attracting investment. In particular international investment where many of the sustainability debates are ensuing and regulations are enacted.

Although there are motivating factors driving the adoption of SDGs, the mining sector's engagement with these goals carries substantial weight. Participants recognised the interconnectedness of their sector with a range of sustainable development dimensions, including economic growth, social equity, and environmental stewardship. This recognition when translated into a collective commitment to exploring innovative strategies, forging partnerships, and effecting

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tangible changes that align with the SDGs' objectives can have a significant impact in the mining sector.

The evolution from aspirational to a high appetite for the SDGs signifies more than a mere shift in perception. It signifies a fundamental change in approach, one where lofty ideals can be translated into tangible actions, innovation and collaboration. This journey captures the essence of the broader global effort to achieve sustainable development, emphasising that the progression from aspiration to proactive engagement is an essential catalyst for realising the transformative potential of the SDGs. Furthermore, the leadership practices and processes crucial for attaining this transformation become pivotal in this journey.

While a number of the participants held the view that approximately half of the sector is actively dedicated to the SDGs (as cited above by CMC4), many other participants asserted that the sector is still in the early stages of grappling with SDGs and ESG. Conversely, a few participants strongly expressed the sentiment that the mining sector has been implementing many practices outlined in the SDGs, although they may not have been explicitly labelled as such or directly linked to the SDGs.

[CMC7]: "I believe it's in the infancy within South African mining industry, and the sort of level of attention that it's getting totally depends on the size of the mining company. You know, their sort of global presence, the larger global companies are sort of fairly well advanced in terms of addressing the goals and the objectives that have been stated. As you go to more mid-sized and smaller companies, probably not much. I think a lot of those smaller junior mining companies are just starting to think about these things now and if they're listed, then starting to think about it. If they're not listed, it's probably not even on their radar."

[RSM1]: "I'm going to give you contrarian views. So just to perhaps give a different spin on the whole story. I think mining companies have always understood the SDGs they've only you know over last couple of years really got a proper name or have been labelled as the SDGs."

[RSM4]: "My view is that it is probably not linked to, it's there, it's not linked to goals, like mining companies have been doing work on safety big time and health. Very big work has been done. I think the driver wasn't really necessarily what the sustainability goals were outlining it, like a specific goal. Because it was the right thing to do. There was a realisation

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that we cannot carry on injuring people. And also, an environment that was also a drive, maybe from legislation, local legislation in the country, and also the drive on the social aspects. The mining industry has done a lot of work there. My view this was a lot of pressure from government and society. It's only recent now that you see companies linking these initiatives to the goals. This has been my view, it's been like pressure points. Internally, management realising that we need to do something about this or externally pressure from external sources and management responding. This has been there but the Sustainable Development Goals are sort of like pulling it all together, and then companies have been starting to say that I linked that one to that one... Many people are now starting to hang what they are doing unto the goals again.”

[CMC1]: “...as a listed company on both the JSE in the New York Stock Exchange is a huge amount of listing requirements, complying with King 4 complying with all the things or the legislations that we exposed to itself ...so it's extremely important for us to get a improve on all of these areas because that actually keeps up a license to operate if you don't do it, society will close us down you know, if we keep on killing people and keep on doing damage to the environment, society will close us down”.

[CDM1]: “...I think, you know, specifically if you refer to the environmental reduction of carbon emissions, a greener, cleaner environment, I think there's an appetite. I think if you go back to your sustainable goals set by the United Nations, I think there's less of an appetite. You know, I think companies are driven, you know, by making money, you know, it's our businesses to make money to get a return to our shareholders and in the process, we've got these objectives. So, we are not going to put it as our primary objective, but we are going to keep that in mind in making money. With that let me say with going greener on all fronts, reducing carbon emissions, etc. that is something that I will say is more of a primary focus... So, if mining companies or manufacturing companies is not going to do that, people not going to buy from them. So again, it's pulling back into are you gonna make money, are you're still going to be profitable? “

These observations collectively demonstrate an awareness and acceptance of the SDGs, occasionally accompanied by references to ESG principles, within the mining industry. However, leaders within the industry hold diverse perspectives on the motivations behind adopting the SDGs and implementing related initiatives. Some of the challenges highlighted include the extensive nature of the SDGs and the mining companies' ability to move beyond mere compliance and make a significant impact.

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The size of mining companies also plays a role, with larger global companies demonstrating more advanced strategies in this regard. Furthermore, there is a recognition of the global influence of the SDGs and the ESG discourse in local contexts, with a greater emphasis on environmental goals compared to social ones. Chapter 3 examines the global conversation surrounding ESG and emphasises the importance of South African mining firms not disregarding global ESG standards.

In summary, the research findings indicate that mining leaders acknowledge the significance of the SDGs and understand the need to integrate them into their business practices. However, there are obstacles that must be overcome to fully unlock the potential of the mining sector in promoting sustainable development. It is significant that leaders hold different views on the mining sector's appetite for the SDGs and ESG, confirming the finding that mining leaders' views and their understanding of SDGs and ESG in the mining sector is not homogenous. This confirmation is not surprising given the observations on the demographics of the research participants.

The subsequent section will delve deeper into these challenges and present specific examples of how certain mining companies have successfully incorporated and embraced the SDGs within their companies. In the next section it becomes evident that in the more mature companies the SDGs are embedded in their company strategies and in subsequent section the study will reflect on the roles of business leaders in driving this integration.

6.3.2 VIEWS ON EMBRACING AND INTEGRATING SDGs AND ESG IN PARTICIPATING COMPANIES

Building upon the previous discussion on the mining sector's engagement with the SDGs, the researcher aimed to assess the extent to which these goals were embraced by the participating companies. A significant majority of the study participants demonstrated a comprehensive understanding and knowledge of the SDGs, allowing them to discuss these goals in considerable detail.

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Several participants went beyond discussing the SDGs conceptually and provided concrete examples of how their respective companies have aligned their work to specific SDGs. During the interviews, a few participants specifically mentioned their company's sustainability plans or organisational structures that support SDGs integration. However, it is worth noting that some participants acknowledged that while their work contributes to sustainable development, it has not been explicitly linked to the SDGs. Nevertheless, it should be clarified that the absence of explicit mention or connection to the SDGs does not imply that these companies have not been actively working towards the SDGs.

It is crucial to highlight that the objective of this research is not to assess the performance of companies in terms of their adherence to SDGs and ESG initiatives nor the motivations for adopting it. Instead, the primary aim is to gain an understanding of how mining industry leaders perceive these concepts, in order to comprehend their commitment to embracing them as catalysts for innovation and transformation within the sector.

Moreover, participants who were able to clearly identify and articulate the SDGs expressed that their companies are in alignment with these goals and consider them as valuable guidelines for their ESG efforts. This alignment was further supported by information obtained from the companies' annual reports, which will be explored in greater detail later in this section.

The following quotes capture the insights of a senior leader regarding the adoption of the SDGs and the accompanying questions that emerged during their organisation's journey towards integrating these goals into their strategic approach:

[RSM6] "Oh, we have, we've actually embraced them to a large extent, like I said, SDGs forms part of our sustainability framework. What we have done as well for our SDGs is we have reviewed the 17 SDGs. We looked at what is material for us in the organisation. What are our core initiatives? What are we trying to achieve? And which of these SDGs basically are aligned to what is key to us and so, we have unpacked the SDGs we have identified the

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key ones that we say they are our main focus, we have also identified the ones that directly contribute towards and those ones that are indirectly contribute and those also form part of our sustainability reporting to our stakeholders. So, we have definitely embedded those in our company.”

Another participant very confidently shared insight on embracing the SDGs below:

[CMC4] “We have absolutely embraced it. I think we have learned some really serious lessons over many years and we are not perfect by no stretch of the imagination. And we are learning every day on how we need to do it better. But I think it is moved from something that is aspirational, to I think a prerequisite for doing business.”

As mentioned earlier, mining industry leaders exhibit diverse perspectives regarding the level of interest in SDGs and ESG initiatives. These varying levels of interest are also evident in how SDGs and ESG principles are embraced within their respective companies. It becomes apparent that each company is at a different stage in their journey of integrating the SDGs and ESG into their strategy and operational framework.

Some companies have made significant progress and showcase tangible evidence of integration into their company strategies. In contrast, others are in the initial stages of exploring and understanding the SDG goals and their connection to the company's ESG initiatives and how that can be built into the strategy and operations. In the quotes below, leaders at the more advanced stage of SDGs and ESG integration in strategy share their experiences.

[CFM1] “I think we've really, we really have embraced the SDGs and we talk about it differently. We think about our sustainable mine plan and so and so for that It's just how do you build thriving communities? How do you become that trusted corporate leader? How do we then protect the environment? How do we ensure that you know does community communities around our host communities but also broader communities in Africa really benefit from what we do? And so, I think we've we started this journey quite some time ago, and it's becoming, it's embedded into our strategy as a company. So, we have in our strategy, we've got four pillars, one of that develop a demand for our market, for our products. One is to operate our assets as best we possibly can, grow our business responsibly, but we need to

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lead in ESG and that lead in ESG is obviously environmental, social and governance. And I think that talks to some of the Sustainable Development Goals...So, if we've got a programme around how we how we look to lead in ESG and particularly work through those Sustainable Development Goals because we believe that mining is a practice and that through their practice, we will help them achieve our strategy and actually just create a better life for people."

[CTM3] "We have embraced it fully and it forms part of our strategy. So, one of our four pillars of our strategy are a leader in ESG, elevating it to the highest level of the business and making sure that we keep and improve as sort of imperatives and projects to be able to close out on that key."

[EDM1] "Yes, I think it's in our company it is...We embraced SDG goals as well within the framework of our governance. And also, as mentioned, as a guideline to which we, you know, it's also filtered down in terms of how we work and how we set our goals and organisational goals. And the framework that we've set out on sustainability and we have an annual sustainability report with important various aspects which are linked to the SDG goals."

In addition to discussing the importance of embracing the SDGs, the leader in the following quote emphasises the significance of comprehending the underlying principles of the SDGs and going beyond a mere checklist approach:

[COM1] "...so I think very much so. I think there is sort of, if I could almost call it the strategic focus that how we look at it. We've got two aspects to it. So, the one is, we talk about building a business that needs to be climate resilient. So almost recognising what, what's coming in terms of changes what the goals are trying to achieve that and more than just being able to tick the boxes, how do we actually build a company that is fully aligned with that. Recognising the risks, as opposed to contributing towards goals, we actually talk about reversing climate change as an example. Taking that next step on, I think, I think in terms of, you know, the way we would look at it is less around sort of trying to say specifically, what is the goal saying and achieving that we've got to do, what's the principle behind what's trying to be achieved and how are we aligning ourselves with that principle? So that's, I think, very much embracing them but trying to get back to a slightly more fundamental level of why does this exist? And are we contributing to the greater cause and principle, rather trying to run a tick box exercise."

Expressing a similar viewpoint on moving beyond a mere checklist approach, the following leader places the SDGs within the broader context of sustainability

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discussions within their company. Interestingly, the leader remarks that the SDGs do not act as the driving force behind their work. Instead, they respond to the SDGs due to their strategic intent and alignment with the company's values and objectives:

[CTM3] “We have embraced it fully and it forms part of our strategy. So one of our four pillars of our strategy is a leader in ESG, elevating it to the highest level of the business and making sure that we keep an eye on any sort of imperatives and projects to be able to close out on that key strategy. On our part we fully embraced the purpose of reimagining mining is definitely that purpose with linked in to our purpose statement, and it's linked into our delivery on our goals and as I said, the strategic for our company one of our four pillars of strategy is a leader in ESG under the leader ESG on the environmental side is decarbonizing by 2030 scope one and two, 30% reduction 2040 to be 100%. And we say scope three by 2050, 50% of scope three. So, embracing all of that. We've also not just embraced it, but I've put a road map together of how we get there to our urbanization programme and look at sustainability of water we say 50% reduction in potable water by 2030 as well.”

Echoing a similar perspective on the SDGs not being the primary driving force for their work, the leader in the following quote acknowledges their company's longstanding contribution to social and environmental initiatives. Furthermore, the leader emphasises that although the SDGs have only been mentioned in their annual reports in recent years, it does not imply that the SDGs have been a central driving factor in their day-to-day operations:

[RSM4] “...It wasn't driven by the SDG. But when you look at the work we've done, we've done a lot of work on the social aspects supporting students, educational support, proud history on that. Proud history on safety and environment, and proud history on support to communities where we operate, however it was something that was driven by the needs that we had to do this. And obviously, it there has also been expectations from communities. It was never driven by the sustainability goals. I can tell you that straight, is only now that there is this awareness of the goals. And you saying, hey, which goals are we supporting here. And I've seen it with a number of companies when I write an annual report I read through a couple of companies' reports, it is only in the last two, three years when you go through company's annual reports, you see the sustainability goals. I promise you most of them, two years beyond two years, you never saw these things...Take one of these big companies and you look at their reports three years back no mention of SDGs. But recently, everyone is

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mentioning it. So that's why I am saying it hasn't been the driver. However, it has been identified as a need in organisations.

In the following quotes, several leaders made noteworthy remarks regarding their willingness to embrace the SDGs, indicating that their companies are in the earlier stages of the integration journey. On the other hand, other leaders emphasised the crucial role of SDG integration as a prerequisite for conducting business and securing a license to operate:

[RSM5] "There's definitely there was a willingness from our side... we recently had some workshops and we came together and we finally came up with our SDG pledge, which is in our sustainability report."

[CMC8] "...we've always embraced the opportunity to be different and to ensure that we get buy in and by embracing the sustainability goals, you ensure that you're basically buy your licence to operate, not buy, but you earn your license to operate by doing the right thing."

Further highlighting the diverse perspectives among mining leaders regarding the embrace of the SDGs, the following quote underscores this by a leader acknowledging that the SDGs are not intentionally connected to their ESG initiatives.

[CMC7] "I think we've got a fairly well-defined sustainability framework and to environmental safety and governance frameworks. I'm not so sure that we link our sort of ESG work to the UN SDGs and maybe that's something to consider. I don't think that we have sort of deliberately linked, but when you, if you analyse the objectives within our ESG framework that they do align with, with what the SDGs are wanting to achieve. It's just that I don't think that we have consciously or deliberately linked our goals or objectives to the SDGs."

Moreover, one leader openly acknowledged that while their company may align with the SDGs in their integrated reporting, they do not specifically measure their performance against the SDGs. This leader made an interesting observation, noting that the SDG framework is broad and encompasses numerous indicators. As a result, they expressed the need for external assistance to navigate this framework and develop an internal plan that aligns with the SDGs.

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[CDM4] "...if you have seen or have been following our [CO6] integrated reporting, we had tried to be so transparent in there in terms of really highlighting areas that are relevant and of which we know that it will be obviously have a greater impact. Although we haven't as yet, we're not measuring ourselves against the SDGs is there out there, but I can confirm that in most of our initiatives we can tick most of the SDGs. Out of the 17 I think 11 of them, we can confidently prove that we were definitely showcasing good progress in that regard... as you know that the framework it's broad got too many KPIs. We have been liaising with the University of Pretoria to really assist us. It's not something that you can internally build".

Reiterating the challenges associated with measurement, a leader expressed the difficulty of managing the multitude of sustainability reporting structures that lack standardisation. This lack of uniformity can be overwhelming and time-consuming for companies.

[CFM2] "You know, the one thing I'm pushing quite hard against is, you know, I'm talking about ESG and broader sense. There's just too many of these associations and, you know, industry bodies or whatever you want to call them, and I feel, you know, we should ultimately get to a standard, you know, what is what is the standard we want to subscribe to, because, I mean, we have Sustainalytics and you have the World Gold Council Responsible Principles and IRMA and Together for Sustainability and the ICM and its ..., and you can understand you can get into a tailspin quite easily, by trying to be everything to everybody. And I'm saying, give me that one picture, those two or three bodies you belong to that's going to 90% overlap. Because then I can turn to an investor and say, No, they're not going to do Sustainalytics because we've got this 90 to 95% overlap in this area. Because all of those, you know, it's time, it's money. And all of that's important and you know for us as being price takers, it is challenging. So, from that perspective, fully embrace and again, from a wider ESG perspective we actually put 30% from our long-term incentives is geared to achieving those goals."

The themes regarding embracing the SDGs in the mining sector highlight a range of perspectives among industry leaders. While there is a clear recognition of the importance of the SDGs and their alignment with ESG principles, the level of integration varies among companies. Some leaders demonstrate a deep understanding of the SDGs and have successfully aligned their strategies and operations with these goals. They view the SDGs as a valuable guide for driving innovation and change in the sector.

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However, there are also challenges and differing views regarding the adoption of the SDGs. Some leaders mention the extensive scope of the SDGs and the difficulty of going beyond mere compliance to create significant impacts. The size of mining companies also plays a role, with larger global companies being more advanced in their SDG integration strategies. Additionally, there is a recognition of the global influence of the SDGs and the ESG discourse, with a greater emphasis on environmental goals compared to social ones.

The research highlights that companies are at different stages in their SDG integration journey. Some have successfully integrated the SDGs into their strategies, while others are still in the early stages of understanding and exploring the goals' implications for their ESG initiatives. The importance of not treating the SDGs as a mere checklist exercise is emphasised, with a focus on understanding the principles behind the goals and incorporating them into the core values and DNA of the company. This section further confirms the finding that mining leaders' views and their understanding of SDGs and ESG in the mining sector is not homogenous. Moreover, the researcher found that understanding of the SDGs and ESG of business leaders at the same company were not homogenous.

Overall, the findings suggest a mixed landscape in terms of embracing the SDGs in participating mining companies. While there are companies making significant progress, there are also challenges related to measurement, lack of standardisation in reporting structures, and varying levels of awareness and integration. These findings provide valuable insights for understanding the commitment of mining leaders to drive sustainability and contribute to the broader agenda of sustainable development. The results suggest an opportunity for further research on models for integrating the SDGs and ESG principles.

The examination of participants' perspectives regarding the mining sector's 'appetite' towards the SDGs revealed an interesting interplay between their views on the

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sector's appetite for the SDGs and their attitudes towards embracing and integrating them.

On one hand, several participants voiced cautious optimism when discussing the mining sector's appetite for the SDGs. They acknowledged the sector's growing recognition of the significance of sustainable development and its role in global initiatives. However, this optimism was often tempered by reservations stemming from the sector's complexity, resource limitations, and the perceived challenges in translating high-level aspirations into actionable strategies. Participants highlighted the need for careful consideration of practical implications, indicating that while an appetite exists, it may require targeted efforts to bridge the gap between intent and execution.

Conversely, when delving into the views on embracing and integrating the SDGs, some participants demonstrated a remarkable proactiveness. Many participants expressed a strong willingness to adopt the SDGs into their operational frameworks and corporate strategies. They articulated an understanding of the transformative potential of the SDGs and highlighted the alignment between sustainable practices and long-term business success. Moreover, some participants underscored their intention to not merely pay lip service to the SDGs but to actively embed them within their companies through innovative approaches, partnerships, and stakeholder engagement.

This juxtaposition of perspectives underscores an intriguing dichotomy. While some participants cautiously ponder the sector's broader appetite for the SDGs, others exhibit a steadfast commitment to embracing and integrating these goals within their organisational fabric. It is evident that participants perceive the SDGs as both an aspirational beacon and a pragmatic roadmap. This variance in outlook suggests a nuanced evolution within the mining sector, with participants navigating a path that balances ambition with operational realities.

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In conclusion, the comparison of views on the mining sector's appetite for SDGs versus the perspectives on embracing and integrating them reveals a dynamic discourse. The sector's landscape is one of cautious optimism and proactive commitment, highlighting the need for strategic navigation to bridge the gap between aspiration and tangible impact. This juxtaposition ultimately underscores the mining sector's evolving journey towards harmonising sustainability aspirations with actionable strategies. It is essential to acknowledge this ongoing evolution, as it contributes to the intricate landscape that mining leaders must navigate while establishing a conducive environment to foster innovation and uphold the SDGs and ESG objectives. In the following section, we will examine which SDGs the mining companies are most in line with.

6.3.3 CRITICAL SDGS FOR THE MINING SECTOR

As previously mentioned, a significant majority of the mining leaders who participated in this study acknowledged the mining sector's interest in the SDGs and the varying degrees to which their companies have embraced them. However, there are disparities in how these SDGs are being executed and implemented among different companies. To delve deeper into the mining leaders' awareness and understanding of the SDGs that their companies align with, the researcher inquired about the SDGs they considered most critical for their respective companies.

The following quotes provide insights into the mining leaders' awareness and comprehension of the key SDGs that hold significant importance for the mining sector. In the provided quotes; the leaders demonstrate a clear ability to articulate the SDGs they perceive as crucial, and they can effectively contextualise the impact these goals have on their companies and the broader mining sector:

[RSM1] "The SDGs that we very specifically focus on. There are six SDGs that we in the mining sector, but specifically we at [C01] focusses on and that would be good health and wellbeing. So that's really ensuring the good health and wellbeing of all people that we deal with...Gender equality very important...So, a very important that there is equal opportunity for men and women throughout the industry. Decent work and economic growth, promoting sustained inclusive and sustainable economic growth. I do think that's possibly the most

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important bit that we contribute as the mining industry. And people often criticise the industry but forget how much the industry has contributed. So, it's not only are we well, we are assisting economic growth in the country, and we create employment and decent work with decent benefits and we contribute to the fiscus. Then the fourth SDG would be responsible consumption and production. And that's really just around ensuring sustainable responsible consumption and production patterns. Again, also relating to the economy, climate action, very important taking urgent action to combat climate change...on our website setting out exactly what our carbon transition programme is and what estimated targets are. We basically want to be at net zero in 2045. And then the 6th most important SDG for us, as [C01] but again for the industry at large, would be Life on land. So that's really about protecting, restoring and promoting the sustainable use of terrestrial ecosystems and halt and reverse land degradation and halt bio diversity loss. And this again, we just call it land rehabilitation...I would see those six is the most critical and we've also seen as such in advocates for."

In the following excerpt, another participant outlines key SDGs that their company aligns with:

[CMC7] "Yeah, so I think there's probably a couple of them. So, number three, Good health and wellbeing. I think it's a big focus for mining. Number four Quality education that's particularly in communities that that are close to the mine and so on. From that perspective, and in terms of developing the sort of skills that we require in mining. Number five, Gender equality is a big issue for mining. Number six, clean water and sanitation. I suppose number seven is becoming quite significant, significant as well, affordable and clean energy. So I think there is a number of ways that mining play a part there, obviously providing the minerals to enable that transition to renewable energies to clean energies, but also, I think, particularly in the South African context, investing in clean energy generation. I think many mining companies are now moving in that direction. So that they provide energy for themselves. But I'm sure as that gets going, they will start providing energy to surrounding communities as well. There's quite a big area to contribute there. Decent work and economic growth, definitely plays a part there. The mining industry is a big provider of work and the big driver of economic growth. Number nine, Industry innovation and infrastructure, particularly from our company's perspective, that is a very big important area for us. Reduced inequalities, definitely play a part there, especially related to decent work and investments in communities around mining operations, very often mining operations are in very rural areas, and areas that are underdeveloped. And hopefully, with a mining company, developing a mine in those areas, it should mean that the people around there have a better life and I know it hasn't always been that way. But that should certainly be the objective for providing companies is to improve the quality of life of people we really upgrade. Sustainable cities and communities, there's a big

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role to play. Again, as I say providing the commodities to enable that as well as investing in communities where we operate. Sustainable consumption and production again I think mining industry definitely has a role to play there. Climate action. So once again, in terms of minerals that are provided to enable the actions that need to take place to prevent climate deterioration and so on, as well as the carbon and carbon footprint if you need to reduce. I think those are the main ones that I can see.”

The insights above, shared by a CEO, on SDG alignment was intriguing. The individual not only listed the SDGs, such as promoting good health and well-being, but the CEO also managed to specify the corresponding numerical priorities assigned to each of these SDGs by their company.

Beyond simply articulating the SDGs, the leader in the following quote offers insight that exemplifies how these goals are integrated into their company's approach. This plan referred to as the Sustainable Mining Plan, serves as an illustrative example of outlining key themes, or pillars, such as healthier environments, thriving communities, and governance, within a strategy that aligns with the SDGs. The Sustainable Mining Plan effectively establishes targets for each area and provides guidance and a roadmap for their work, demonstrating a tangible and practical implementation of the SDGs within the company's operations.

[CMC3] “So we've met, virtually close to all the SDGs. So if I look at it, and I mean, I'm gonna align it to what it is that we look at when we talk about our Sustainable mining plan. So we start off with the first pillar of driving for healthier environments. And in here we are talking about climate change and what it is that we need to do to get to a reduction of carbon emissions. When for us, we've looked at it from a scope one and two perspective. But guess what, we've also looked at scope three because we're looking at the rest of the value chain and saying, what can we do to actually influence the rest of the value chain in order to for us to see a difference when it comes to scope three as well? The second one's around water and then the third one's around biodiversity because, you know, we don't want people to think that mines are there and they disturb the land and guess what, you know, when they finished mining, they do a little bit of rehab and walk away. So then the biodiversity goal looks at how we can actually get to a net positive impact when it comes to biodiversity. So that's the first pillar. The second pillar is more around thriving communities. And here, the first area that we've looked at is community health and, I mean, the reason for us is mines have always been good and we've always been good as an industry in terms of coming up with our own

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health problems. So whether you talk about HIV and AIDS, we've been meeting since 1990 for quite a few years, and if anything, we're working towards getting to a space where we shouldn't be talking about HIV and AIDS in the future. However, we've looked at the fact that we form part of the ecosystem when it comes to our communities. So we've elevated the whole aspect of community health. And we've looked at what it is that the SDG calls for, and we want to make a positive difference when it comes to our own communities, the communities that we work within. Simply because, I mean, I say to people, we are part of our communities. Another one within that space is the educational goal. We said to ourselves, that we want to adopt schools that are part of our communities, and this is in addition to the work that we've always done around, you know, bursaries, etc, etc. But we've adopted the schools that sit within our communities and we've said that we want those schools to get in the top 25% of the country by 2025. And then we want them to sit in the top 20% from a performance perspective, by 2030 and intentionally we've chosen the worst schools, because it wasn't about tweaking the schools that are really performing. It's around ensuring that from an educational perspective, that we uplift the schools. That's really the bottom line for us for example, at [C04] in the Northern Cape, if you look at the Northern Cape Province sits within the top or sorry, at the bottom three of the country comes to matric. So we need to make an impact when it comes to education. The other aspect that we've looked at is the whole element that looks at job creation. And eliminating poverty. So we understand that, as a business, we can only employ so many people. But we want to make sure that we work with others. And this is through understanding that we can't do it on our own. And to be fair for all our goals. We can't do it on our own. So we drive for what we call collaborative regional development where we want to work with others through means such as what we call the impact catalyst program where we work with others including government, other players within the private sector, and also looking at civil society as well. And we want to, we've got a goal that says that for each and every one job that we've got on site, and that includes our contractors. We want to facilitate the creation of three jobs off site by 2025. And 2030 that future goals up to five jobs for each and every job that we've got on site. And if you think about it, that requires us I mean, I mean, as I always say to people, I mean, I know that these are big goals. We can't do it on our own. but guess what, we will still continue driving schools and then the last pillar, so I've spoken about the Healthy Environment driving. The last pillar for us, essentially touches on the governance.”

Another intriguing perspective shared by a leader regarding the alignment of SDGs is the belief that these goals are interconnected, making it challenging to separate and choose specific ones in isolation. The following quote sheds light on this viewpoint, offering valuable insight into this perspective:

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[RSM3] “When I look at SDGs? I mean, because they are all so integrated. It's very difficult to be able to pick one outside the other. The ones that logically wouldn't kind of find themselves with us are those related to water to water in fisheries, fisheries, probably more than anything else. Sorry, not water. But you will find that we influence remember that. The industry itself, if you look at who the largest energy consumers are in South Africa, it us, so anything to do with energy. Anything to do with water, we're also the largest water consumers because it's what we use in respect of our extraction. So, energy, water we also I mean, we employ globally something like 84,000 people I think at the last at the last count. So, what it means is that by sheer volumes we are able to impact economics, you know, with the strong economic value that comes along from just through scale in through science. So, anything to do with economic impact in our near communities, because wherever we are we will definitely have an impact on that. So, communities it is how to build sustainable communities, it is about natural resources and to what extent we're able to minimise water use it is to what extent we're able to utilise energy. And if I just list those you'll see that those come across about what five or six of those SDGs in one form in one form or another. Anyone as I'm saying the one that we wouldn't probably do, is the sea, it just because we're nowhere near the sea. So very little that we can do in that regard.”

During the research, the researcher observed a diverse range of responses from the participants. When asked about the most crucial Sustainable Development Goals for their company, certain participants were promptly able to recollect the pertinent SDGs, whereas others required online resources to refresh their memory. Intriguingly, a few participants didn't directly cite the SDGs but instead offered instances of their connected initiatives.

Surprisingly, one participant even requested the researcher to provide an explanation of the SDGs, indicating a lack of familiarity with the goals among certain individuals within the mining sector.

[CDM1] “Okay, maybe you missed telling me what the Sustainable Development Goals Okay, what do you what do you mean by that?”

The findings regarding the critical SDGs for the mining sector indicate a varying level of awareness and understanding among mining leaders. When asked about the most important SDGs for their companies, leaders demonstrated diverse levels of familiarity and knowledge. Some leaders were able to articulate the specific SDGs

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that were relevant to their companies and provided insights into the impact these goals have in their operations and the sector as a whole. They were able to contextualise the SDGs within their strategies and highlight the alignment between their initiatives and the broader sustainable development agenda.

However, there were instances where some leaders struggled to identify the specific SDGs or needed external resources to refresh their memory. In some cases, participants mentioned related work without explicitly referring to the SDGs. This suggests a potential gap in understanding or a need for greater awareness and education regarding the SDGs among certain individuals within the mining sector.

Overall, the findings emphasise the importance of raising awareness and promoting a deeper understanding of the SDGs within the mining industry. It is crucial for mining companies to align their operations and strategies with the relevant SDGs to contribute positively to sustainable development and address key challenges in areas such as energy, responsible consumption, climate action, biodiversity, peace, justice, and partnerships.

Addressing these critical SDGs in the mining sector requires collaboration among stakeholders, including mining companies, governments, local communities, and other relevant actors. Establishing standardised reporting frameworks and fostering knowledge exchange can also contribute to better implementation and monitoring of SDG-related initiatives in the mining industry.

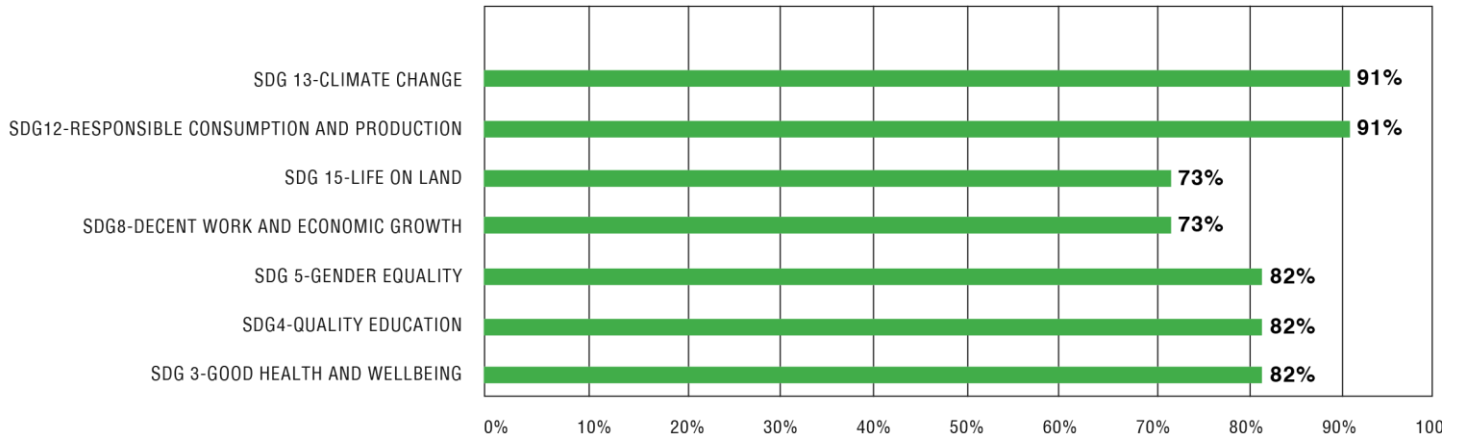
Nonetheless, to address the mixed and ambiguous responses from participants regarding their company's alignment with specific SDGs, it became essential to delve deeper into the reported SDG alignment within the integrated annual reports of these companies.

Graph 9 presented below illustrates the alignment of the top SDGs among the 11 participating companies. The findings indicate that 91% of the companies align with SDG 13 (Climate Change), 91% with SDG 12 (Responsible Consumption and

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Production), 82% with SDG 5 (Gender Equality), 82% with SDG 4 (Quality Education), 82% with SDG 3 (Good Health and Wellbeing), 73% with SDG 15 (Life on Land), and 73% with SDG 8 (Decent Work and Economic Growth).

Graph 9: High alignment of SDGs among companies



Source: Compiled by the author.

The SDGs serve as a widely utilised framework for structuring strategies pertaining to social and economic advancement, as well as environmental initiatives. Notably, the majority (91%) of the participating companies primarily align their ESG strategies with SDG 13 - Climate Change and SDG 12 - Responsible Consumption and Production. This aligns with expectations considering the mining sector's significant environmental impact and the stringent regulatory obligations it faces in order to operate.

Moreover, there is a notable correlation observed with specific Sustainable Development Goals (SDGs), particularly SDG 3 that aims to promote good health and wellbeing, SDG 4 that emphasises quality education, and SDG 5 that highlights the importance of gender equality. This correlation is not surprising considering the mining industry's inherent safety risks and the need for robust health and safety measures to protect workers. These particular SDGs (SDG 3, SDG 4, and SDG 5) were frequently cited by several leaders when asked about the SDGs they deemed important.

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Furthermore, as highlighted in Chapter 4 discussing the South African mining sector, existing literature recognises the persistent gender inequalities prevalent in the industry noting that historically, mining is a male dominated profession. Addressing this issue and promoting greater gender equality within the sector is acknowledged as crucial. Chapter 4 recognises the progress in the journey towards gender equality in the mining sector. This progress was boosted by the Minerals Council of South Africa's White Paper which is aimed at "streamlining industry strategies to advance women in mining," and which served as an action plan for member companies to address the challenges in the sector. Therefore, it is unsurprising to observe that many mining companies prioritise SDG 5 - Gender Equality - as a key objective.

Given the significant number of unskilled workers and the high unemployment rate in the country, the mining sector places a strong emphasis on SDG 4 - Quality Education, as explained in Chapter 4. Several participants articulated their company's commitment to reducing unemployment and to promoting sustainable livelihoods, beyond the gates of the mine:

[CFM1] "So we've, as a company, we've set a target in terms of what we want to do. So some of the key components of that target from a social perspective, is we want to create five jobs outside the gate and sustainable jobs outside the gate for every job that we have on our property. So that's the target, so now we're like okay, and that's in our Plans. Now we've got like, how do we get that into planning? What do we need to do? And so how do we how do we think innovatively around that and that you know, so therefore, we need to think through okay, what does that mean from a procurement perspective? Okay, how do I create businesses? How do I create the capacity? And it's all of those things that then lead us to work through innovatively around how we make those goals a reality, and we were quite clear and we say to ourselves, we've got to get five jobs for everyone inside the gate by 2025. Okay, What does that mean in 2021? What does it mean in 2022."

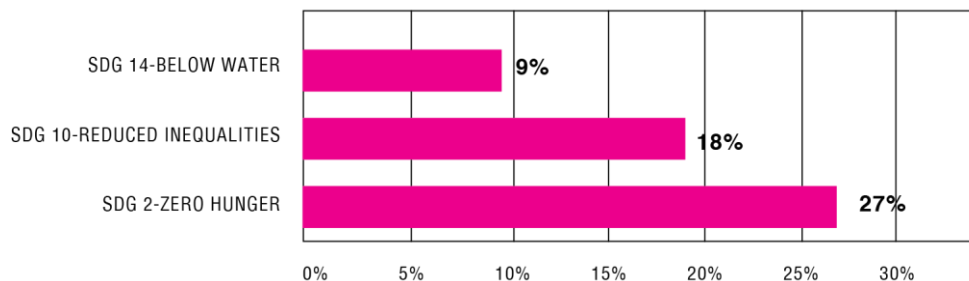
[CMC4] "So we generally have between 70 and 80% of our employees come from the local communities. And we have been actively working on creating capability in our community so that we can transact with community partners. We found that when we started with this principle, many years ago, the capability in the communities were really low. So we struggled to find to find people who can do some of the complex work that we have to do so over a period of time, we have developed that skills and we are actively transacting with people in

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the communities. As an example of how we follow that through, we have a programme, let me use a recent example to just show the integration. So we've just recently concluded a contract to the extent of its over 150 million Rand to transport our concentrates. That entire contract has been allocated to community members... but the one that's probably the best example is we have a project with (x). He has been involved in training is through (x) for entrepreneurship business management... supplying the seed funding and he still seem to get further funding from Absa and he's got three trucks now with I think 24 employees working for him."

In contrast to the SDGs that have high alignment within the mining industry with the six SDGs highlighted in Graph 9 above, it is interesting to note that there are SDGs which receive relatively less attention from the sector. Graph 10 below demonstrates the lowest SDG alignment among the 11 participating companies. Only 9% of the companies align with SDG 14 (Life Below Water), 18% with SDG 10 (Reduced Inequalities), and 27% with SDG 2 (Zero Hunger). These findings suggest that there is room for improvement and increased focus on addressing issues related to marine conservation, reducing inequalities and ensuring food security within the mining sector.

Graph 10: Lower alignment of SDGs



Source: Compiled by the author.

The research findings highlight that the participating mining companies exhibit relatively low rates of adoption in their ESG strategies when it comes to specific Sustainable Development Goals (SDGs). These goals include SDG 2 - Zero Hunger, SDG 10 - Reduced Inequalities, and SDG 14 - Life Below Water. Given South Africa's high levels of inequality and unemployment, it is surprising that these two goals are not given higher priority by the mining industry.

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However, it is understandable that SDG 14 - Life Below Water does not have prominent alignment in terms of SDG adoption within the mining sector. This is primarily due to the fact that mining activities for minerals are generally not conducted below sea level, making this particular goal less applicable to the industry's operations. Although one participant, who boasts a depth of experience the mining sector, drew sharp attention to and spoke with authority about mining beneath the ocean:

[CTM5] ...mining engineers are good innovators, and they've been criticised in the past for, for not being good innovators and for not embracing technology, but that is absolute crap. Take it from me. We are running the deepest mines safely in the world and we are developing tunnels 1000 meters below the sea level under the ocean to put pipelines from one continent to another..."

Furthermore, the study findings highlight that the mining companies surveyed exhibit the highest alignment (91%) with SDG 13 - Climate Change and SDG 12 - Responsible Consumption. Niestroy's (2016) framework and groupings for SDG analysis, as discussed in Chapter 3, associate SDG 13 - Climate Change with natural resources and ecosystems, while SDG 12 - Responsible Consumption is linked to the production, distribution and delivery of goods and services. On the other hand, the lowest alignment among the participating mining companies was observed with SDG 2 - Zero Hunger and SDG 10 - Reduced Inequalities, which are focused on people-centred goals and the equitable production, distribution and delivery of services. This indicates that environmental goals, such as SDG 13 - Climate Change, are prioritised over social goals, such as SDG 10 - Reduced Inequalities, within the mining sector.

Collectively, these findings validate the argument put forth by scholars Chew and Childe (2019:150) that the vast majority of companies do not intend to pursue and report on all impact areas of the SDGs. Moreover, companies that choose to adopt multiple SDG-related goals are likely doing so in a way that aligns strategically with their business model, operations, and the specific demands placed upon the mining sector.

Furthermore, as highlighted by Lashitew (2021:189) in Chapter 3, it is worth noting that only a limited number of companies provide reports on their progress towards specific targets. This issue was also raised by one of the leaders', who stated that:

To reinforce the viewpoints with regard to whether companies report their performance in relation to specific targets while aligning with SDG goals, an analysis of the integrated annual reports of the participating mining companies was conducted. The findings from this analysis provided further support to the aforementioned opinions, revealing that the majority of the reports primarily focuses on the alignment with the overall SDGs, with limited coverage of specific SDG sub-targets. This indicates that only a small number of companies actively integrate the SDGs into their core operations. There is also limited data in the integrated annual reports on the effectiveness of or monitoring of their efforts and investments, as discussed in Chapter 3.

Scholar Lashitew (2021:189) suggests that one of the reasons for the limited reporting on specific targets is the difficulty in conceptualising how to evaluate, track and establish a connection between sustainability outcomes and specific corporate activities. Among all the dimensions of sustainability, assessing social impact is arguably the most challenging using existing frameworks, as mentioned by Lashitew (2021:189).

When it comes to evaluating environmental impact, there are relatively well-established approaches, such as tracking carbon footprints and utilizing circular material flow indicators, as noted by Lashitew (2021:189). However, in comparison, assessing corporate contributions towards inclusive growth and development, often referred to as "social value creation," presents more challenges. These contributions are closely linked to several SDG objectives, including SDG Goals 1, 5, 8, 9, 10, and 12. Lashitew (2021:189) points out that objectively assessing these social impacts remains difficult. Even when there is apparent evidence of social impact, it is

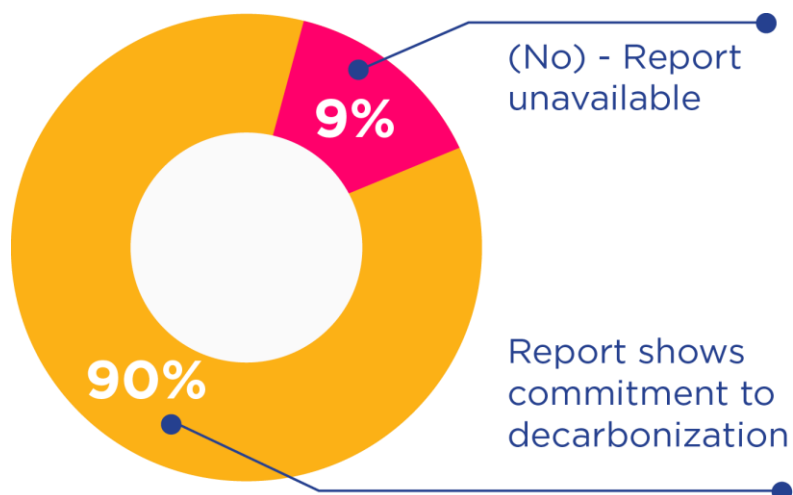
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challenging to attribute it directly to specific corporate strategies due to the inherent nature of social and environmental outcomes as public goods.

Building upon the previous finding, which highlighted that 91% of the mining companies were aligned with SDG 13 - Climate Change, it was of interest to examine how many of these companies had made explicit commitments to decarbonisation, directly addressing the issue of climate change. To explore this commitment further, a thorough analysis of the integrated annual reports of these companies was conducted.

The graph (Graph 11) presented below demonstrates the findings indicating that 90% of the 11 participating companies have showcased a commitment to decarbonisation within their integrated or sustainable reports. Decarbonisation is directly linked to SDG 13 – Climate Change. However, it is worth noting that 9% of the companies did not provide any information on this matter.

Graph 11: Commitment to decarbonisation



Source: Compiled by the author.

Once again, this finding reinforces the importance of SDG 13 - Climate Change, an environmental goal that has garnered global attention, as discussed in Chapter 3. It is noteworthy that the commitment to addressing climate change, as highlighted by the participant below, is increasingly linked to capital investment. This underscores

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the serious motivating factor for mining companies to adopt and prioritise environmental-related SDGs within the sector.

[CTM7] “So, one of the first things that we do is from a mine design aspect, we design our mines such as we have maximum extraction from underground with what we call the minimum minimalistic footprint and serve a minimum surface footprint...from an innovation point of view and trying to get our carbon footprint reduced. I believe we the first mine in the world actually, that started off using full battery electric equipment underground, you know...And we worked, I worked out that for every tonne of rock that you mined on a typical full mechanized mine like we have in the ...(x)... and in South Africa. You burn about one and a half litres of diesel. So if you mine if we can go maybe up to 5.2 million 6 million tonnes of ore produced per year. And if you multiply that by one and a half you will see that we can burn 9 million litres of diesel you know, and maybe every day a litre of diesel gives you...I can't remember the figures now, but I think it's about two point 2.8 kilograms of CO₂ per litre of diesel. You take the 9 million and you times that by 2.7 or three. And then you get to something like my maths is not too good now but it's 270,000 tonnes of CO₂ that you will be emitting into the atmosphere and we tried to cut that down as is because you know with ESG or the carbon reduction you've got your main sources electricity that you provide to the mine. The second one is your on mine consumption and the third is your off mine consumption... Unfortunately, we still reliant on power from Eskom and for every kilowatt hour you burn, I think seven grams of CO₂ but with a reduction but with a diesel that that we we've also been installing a five-megawatt solar panels at the mine to charge our diesel must occur our battery electric machines...So the mine is from an underground perspective is carbon neutral. And you know, I've been criticised a lot of people saying yeah, but it costs more it's because your battery electric equipment is about 30, 35 to 40% more expensive than your diesel equivalent, but your operating cost again is lower. And if you balance it over the life of mine, you actually save and the one thing that we do know for certain is that the sun is still going to shine for a couple of million years to come. And the other thing we know for certain is that diesel is going to get more and more expensive. And so that break-even point we very close to that that break-even point already and we made the conscious decision to go the new route and go with the full electric equipment underground. You know, both you know, it's not just from underground called a carbon emission point of view. It's also from a physical environmental condition underground. Because if you have a diesel machine underground 70% of the energy that you use there is heat. So it heats up the whole environment.”

6.3.4 SUMMARY OF THEME 1

In summary, the findings of the study reveal several key insights regarding the mining sector's embracing of and alignment to the SDGs. Firstly, with respect to the alignment with SDGs. The majority of mining companies surveyed demonstrate an awareness and recognition of the SDGs, with a significant level of alignment with goals such as SDG 13 - Climate Change and SDG 12 - Responsible Consumption and Production.

Secondly there is varying levels of adoption and integration of the SDGs among mining companies. Some companies have incorporated the SDGs into their core strategies and operations, while others are still in the early stages of engagement or have not explicitly connected their work to the SDGs.

Thirdly, the prioritisation of environmental goals. The mining sector places a strong emphasis on environmental goals, such as climate change mitigation and responsible consumption. These goals often receive higher priority compared to social goals, such as reducing inequalities or addressing hunger.

Fourthly, there are challenges in measuring impact. Evaluating and tracking the impact of SDGs, particularly in the social domain, poses challenges for mining companies. Existing frameworks and reporting structures focus more on environmental impact, while assessing social impact objectively remains complex due to the nature of social and environmental outcomes as public goods.

Lastly, there is a strong commitment to decarbonisation. The analysis of integrated annual reports reveals that a significant proportion of mining companies have made commitments to decarbonisation as part of their efforts to address climate change.

Overall, the findings highlight the importance of raising awareness and understanding of the SDGs within the mining sector. There is a need for greater integration of social goals alongside environmental goals, as well as the development of robust frameworks for measuring and reporting social impact. By aligning their

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strategies and operations with the SDGs, mining companies can contribute more effectively to sustainable development and address key challenges in the sector.

These findings provide valuable insights into the perspectives of mining leaders regarding the SDGs and ESG principles. While this study does not delve into the specific reasons and motivations for prioritising certain SDGs over others, it is important to recognise the necessity for innovation to bring about sustainable and transformative change in the mining sector.

The initial set of questions directed at the participants, leading to Theme 1, was designed to investigate the perspectives of leaders regarding the mining sector's engagement with the SDGs. The researcher sought to grasp the backdrop against which this notion operates, before delving into how leaders are actively implementing facilitating leadership to drive innovation for the achievement of the SDGs. Drawing from the responses by the mining leaders, the majority of the leaders demonstrated awareness and comprehension of the SDGs and ESG practices.

The following section seeks to transcend the mere recognition of the SDGs and explore whether the mining companies actively foster innovation within their companies. It aims to investigate how they leverage innovation to propel the advancement of the SDGs and ESG principles.

6.4 THEME 2: INNOVATION POSITIVELY IMPACTS SUSTAINABILITY IN THE MINING SECTOR

As discussed in Chapter 2, innovation has emerged as a powerful force driving positive change and transforming industries worldwide. Business leaders face significant pressure to guarantee that their companies remain competitive and at the cutting edge of identifying fresh avenues for expansion. Furthermore, as elaborated upon in Chapter 3 and evidenced by the conclusions drawn in Theme 1, leaders must also guarantee the sustainable operation of their companies, aligning with SDGs and ESG principles. However, the challenge pointed out by scholars such as

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Eisenhardt, Furr & Bingham (2010); Uhl-Bien & Arena (2018) Worley & Lawler (2010) revolves around “how to manage for innovation and adaptability in dynamic contexts”.

For leaders to tackle this task, they must acquire the ability to motivate their companies to embrace a higher level of creativity in all aspects of their operations, extending beyond just marketing or developing new products (Leavy, 2005:38). Furthermore, whether the innovation is ground-breaking or gradual, its significance lies not only in generating ideas but also in ensuring that the innovation enhances the business's value and the appeal of its products and services (Suroso & Azis, 2015).

Fostering innovation within the mining sector presents a complex dilemma. On the one hand, innovation is crucial to address significant challenges, as highlighted in Chapter 4, such as safety, health and environmental issues. However, due to the nature of the mining business, mine safety for example, is highly regulated thereby challenging companies' risk appetite when embarking on innovation pertaining to the mine health and safety domain. The challenge for mining leaders lies in manoeuvring through the intricacies of bureaucracy to push boundaries and to explore innovative solutions, despite the inherent risks involved.

Therefore, the selected leadership theories for this study are highly appropriate, as they offer a valuable perspective to comprehend leadership behaviours, practices, and processes that promote innovation. As explored in Chapter 2, Complexity Leadership Theory, with its three key elements - Administrative Leadership, Adaptive Leadership, and Enabling Leadership, serves as a framework to identify the processes and practices employed by senior leaders to create an adaptive environment for fostering innovation. In conjunction with Complexity Leadership Theory, Ambidexterity Leadership Theory proved valuable in enabling the researcher to focus on the specific actions and beliefs of leaders as they navigate innovation within their companies.

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In support of the theme that “Innovation positively impacts sustainability in the mining sector,” this section of the data analysis delves into the process of integrating innovation into the mining companies’ plans, analysing the perspectives of senior leaders who are actively reshaping the sector’s landscape through strategic incorporation of innovative practices.

The questions in this study were designed to establish how leadership practices and processes enable innovation in support of the SDGs and ESG principles. After elucidating the perspectives of mining leaders regarding SDGs and ESG, as unveiled in Theme 1, Theme 2 delineates the dynamic environment in which innovation flourishes. Table 24 below shows a summary of Theme 2 with accompanying sub-themes.

Table 24: Outline- Theme 2: Innovation positively impacts sustainability in the mining sector

THEME 2: INNOVATION POSITIVELY IMPACTS SUSTAINABILITY IN THE MINING SECTOR	
SUB-THEME	CODES
SUB-THEME 1: INNOVATION INTEGRATED INTO STRATEGY GENERATES SUSTAINABLE IMPACTS	Innovation integrated into strategy
	Innovation Alignment
	Challenges with Innovation
SUB-THEME 2: INTENTIONALITY AND LEADERSHIP COMMITMENT TO INNOVATION YIELDS SUSTAINABLE OUTCOMES	Purposeful innovation
	Ground-breaking innovation

Source: Compiled by the author.

6.4.1 INNOVATION INTEGRATED INTO STRATEGY GENERATES SUSTAINABLE IMPACTS

A strategic plan which can be viewed as a function of administrative leadership, serves as a statement of intent (Ogilvy, 2010) and roadmap for the company, providing a clear direction and aligning the efforts of various stakeholders towards common goals (Tregoe, 2019).

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This style of leadership is commonly associated with outlining the vision and establishing the order while aligning systems and processes to efficiently implement ideas and generate successful outcomes or products (Uhl-Bien & Arena, 2017:14; Bäcklander, 2018:43). Furthermore, this type of leadership emphasises the alignment of systems and processes to efficiently implement ideas and generate successful outcomes or products (Uhl-Bien & Arena, 2017:14). As discussed in Chapter 2, Complexity Leadership Theory acknowledges the significance of these practices in establishing stable companies (Mäkinen, 2018).

Yet, in a complex world, strategic planning is anything but simple. There are a multitude of challenges that demand careful consideration. Strategic planning for innovation and sustainability presents leadership with a myriad of challenges that must be effectively managed to ensure the long-term viability of a company. It is thus a skilful dance for leaders between administrative functions and creating a space for adaptation to drive innovation which are critical enabling leadership features.

6.4.1.1 Innovation integrated into Strategy

In the mining companies surveyed for this research, those that have achieved notable success in generating high-level innovation outcomes have shown a clear commitment to consciously integrating innovation into their strategic planning process and fostering a culture that embraces it. Additionally, in some cases, this integration of innovation into the strategic plan is aligned with ESG objectives. The following leader provides valuable insights on this subject:

[CDM3] "...strategically, we certainly have developed a strategy for innovation, and innovation and technology are something that we've always had and we've got an executive at ..., a senior executive who's dedicated to that. We have been developing a culture of embedding innovation in the use of technology into our culture. And we started that through a programme that we eventually call digital living Zara, which started off with the operations in terms of how we make our mining operations efficient and adapt to the latest, you know, technologies that were available to make those operations efficient from a cost perspective, largely, and also from an enhancement of how people work rather than a replacement of how people work... we approach the adoption of technology and innovation from a holistic and organisational

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perspective rather than from a single point solution. In other words, rather than finding a solution that can make our trucks work more effectively, whilst everything else stays the same, we said we want to find a solution that will make the whole value chain work more efficiently.”

[CDM2] “It's part of our strategy. So right through, so it's part of our strategy and secondly, it's one of our key values. So which is absolutely important because we have six values and innovation is part of it. So when we talk about values, the culture we create, if we have to use innovation as an example, we would think about how we embed it in our day to day decision making and the types of behaviour we want to inculcate in the organisation that will drive towards innovation. So that is on the on the value side. But then if we want to be really deliberate about it, because we need to have a sustainable business, we have driven innovation through our future smart mining strategy, which is all about technology and innovation, and doing that in a sustainable way. So future smart mining we call it future smart mining, embraces technology, innovation and the future of work. And that's leader lead, forms part of all of our decision making, and the values that drive the type of behaviour in terms of how we want to stretch ourselves.”

As evident from the insights shared by the aforementioned leaders, deliberately integrating innovation into the strategic planning process enables mining companies to cultivate a culture of continuous improvement and adaptability. One [CDM3] respondent emphasised not only having a strategy for innovation but also having a dedicated executive responsible for driving the innovation strategy. This demonstrates the level of seriousness given to innovation at a senior executive level.

Furthermore, this commitment to innovation cascades throughout the organisation by placing significant emphasis on fostering an innovative culture. To achieve this, the company has implemented a programme that focuses on integrating technology-driven innovation into the culture. This initiative considers essential imperatives for pursuing innovation, such as adapting mining operations to improve efficiency and cost-effectiveness.

These considerations are crucial for creating a sustainable and transformative company. The fact that both leaders stress the significance of culture is not unexpected, given that they are from the same company. This reinforces the notion

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that innovation is effectively ingrained within that company. As respondent [CDM2] pointed out, the importance lies not only in integrating innovation into the strategic plan but also in translating it into the fundamental values of the company. This entails concentrating on people, behaviours and daily actions that exemplify the commitment to innovation. Integrating innovation into the company culture promotes a mindset of creativity, collaboration and experimentation, encouraging employees to contribute fresh ideas and solutions.

6.4.1.2 Innovation Alignment

In the following quote, a different senior leader offers an alternative perspective on the significance of incorporating innovation into a strategic plan:

[CDM1] “The company strategic documents are referring to innovation, growth, innovation and growth is seen as one of the pillars of our strategy. And that’s how it’s brought about so there’s always that question of..., so it’s not only you know, these greenhouse gases and being subscribing to those objectives. But it’s the company objectives is to say that although we have a mining company, what are we going to do different than even if you say you’re a mining company and you mine with certain commodities but how are you going to exploit the true value of the product that you are producing? So I think this is part of that how can I say this is how we the kickstart of innovation, so the company has taken that from a strategic point set objectives. And then we’ve sort of, you know, allocated resources because strategy is, is the outcome of strategy is resource allocation. So the company’s resource, a growth department, and what I see myself as a new business development department, so although it’s small in our company, we’re not an (Company X), where there is quite a number, a 100 or more people working in the research and development department. We are only few people doing R&D work but we make use of external consultants mainly to assist us with our objectives.”

The insights shared by the mentioned respondent [CO10] reveal that strategic planning within their company is strongly intertwined with both innovation and growth. What becomes evident is that the company goes beyond merely focusing on sustainability targets within the scope of ESG frameworks; instead, they adopt a broader and long-term view of sustainability for the company. In this context, innovation serves as a crucial enabler of their sustainability efforts.

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Furthermore, the respondent emphasises that a critical outcome of their strategy is resource allocation, which plays a pivotal role in facilitating innovation. This aspect is particularly significant as the leader [CO10] points out that their company is smaller in comparison to larger mining companies, which might possess more extensive research and development (R&D) teams. In their case, they rely on a smaller R&D team and leverage the expertise of external consultants to achieve their goals.

The upcoming quote presents insights from a senior leader who discusses how innovation is strategically planned for in their company's multi-dimensional strategy:

[CTM5] "We've got a multi-dimensional strategy. We don't have a linear strategy which is typically a purpose and a vision strategy statement. We've got strategic differentiators and so on and those four are Diversity, Inclusion and Bionic. And that's really the innovation features in the big way. First of all, that's the one differentiator. The other differentiators to grow in the green metals mining space and green energy solutions. Another differentiator is pandemic resistant business ecosystem. And fourth differentiator is a force for good, now I know that, I know that all companies say they want to be a force for good but it has a specific meaning in our organisation. If you just look at those strategic differentiators, that is where we will 10 years from now be able to sit in the back and say that is what we have achieved in our life. So one, growth in green metals energy solutions, two, diversity inclusivity and become a bionic organisation, three, we've been a force for good and four, we've been able to weather bending, makes me believe there's gonna be a number of pandemics and not too distant future. See how important innovation is to all four of those strategic differentiators which we'd like to be able to look back at one day, and say that this is what made us successful, more than anyone else in the world. That's how critically important innovation is to our strategy.

The insights shared by this leader indicate a clear connection between their strategy and ESG principles, but with a focus on value creation for the company. Additionally, there is a notable forward-looking approach in building a resilient company that can withstand future pandemics. The leader recognises the significance of innovation and understands that decisions made today will play a crucial role in achieving their future goals. This demonstrates a strong appreciation for long-term sustainability.

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Strategically aligning innovation with ESG objectives reinforces the company's commitment to sustainable practices and responsible mining. This alignment ensures that innovative initiatives not only generate economic value but also prioritise environmental stewardship, social responsibility and ethical governance.

6.4.1.3 Challenges in Innovation Planning

In the following quote, a senior leader offers an alternative example that sheds light on the challenges faced when planning for innovation in a multinational company.

[RSM4] “Yeah, that's where I struggle with innovation. So, my organisation is as you know is a multinational organisation we are different from different jurisdictions, and our business is semi-autonomous with the head as the centre providing guidance and strategic guidance and monitoring. So why we have seen is that the needs differ, until now on the sustainability issues. Differ from country to country. Let's take for example, community initiatives like in Canada, we've got what is called First Nations, there is need to involve First Nations when you construct a project. And guys come with innovative ideas, getting engaged with the communities providing skills in mining, trim, how does how do we, what does mining contract mining entails and creating interest in helping organisation this is like now enterprise development to be able to participate in the value chain? So there's been a lot of good work in there. To an extent that we have companies now that are providing real engineering services, not referring stuff, like your supplies on small things, like toilet paper or... but the engineering stuff. Then you go to the US, you don't see that. The US they are not into like come build this in my communities. They just want to work, employees there they just want to work. So we have found these pockets of innovation within these businesses. What we've done at the centre is to get a forum, where these businesses share their approaches and that's how we cascade the initiatives across the group. Not, sure if that answers your question around innovation. It is not centred driven. The centre facilitates the best practice sharing across and this how we expand it in across the organisation, then that is my role.”

From the insights provided by senior leaders above, it becomes evident that incorporating innovation into the strategic plan is a considerably intricate and complex process. This complexity arises from the fact that the company's operational sites are dispersed across various countries worldwide. As emphasised by respondent [RSM4], the different operations vary in terms of jurisdiction, culture, and

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context. Therefore, providing guidance and monitoring becomes crucial rather than prescribing and hindering innovation.

However, the respondent highlights the significance of establishing a forum where diverse business operations can share innovative approaches. This forum allows for the dissemination of successful innovation practices across operations on a global scale.

It is crucial to recognise that mining companies do not uniformly incorporate innovation into their strategic planning. As evident from the perspective shared by a senior leader regarding how innovation planning takes place in their company:

[CTM1] "You know, it's more on an ad hoc basis. In our case our chief executive...is basically driving this. It is not a formal process, but I think he's taking ownership for that. And, you know, he's seeing it as very important terms of our future. So for that reason, he needs to motivate to the board, etc. In terms of that sort of development, so in terms of a typically mining company focuses on normally not on technology development at all. So the focus would be mining and using existing technology...so basically, it is not an automatic process. So it's basically our chief executive have an unusual process where he actually have to lobby the board and motivate to the board for us to do a number of developments. So he's then doing that on a continuous basis. So that has happened to the point where he convinced the board that it's important and that is very good potential for our future. And the board has now said that is part of hopefully, their plan, so it's a process, convincing the board and bringing the board on board and then getting the support from the board. And so that that's been done in our case."

The insights shared by the leader illustrate an instance where innovation is primarily driven by the CEO. This respondent also emphasises that innovation occurs on an ad-hoc basis rather than being strategically planned, and a significant amount depends on the approval and buy-in from the board. Interestingly, this leader echoes a similar point made by a previous respondent, suggesting that mining companies generally do not prioritise technological advancements and are more inclined to leverage existing technology.

The insights shared by senior leaders in this section underscore the diverse approaches and obstacles encountered while integrating innovation into strategic

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planning within mining companies. Relating this to Administrative leadership, which establishes the operational boundaries and processes for a company, strategic planning, as evident from the above insights, assumes a similar role. It not only sets the vision and parameters but also sets the tone for pursuing innovation within the organisation.

Interesting observations emerged, as some companies shared the importance of deliberately integrating innovation into the strategic planning process within mining companies. This suggests that innovation is not just an afterthought but a strategic priority taken seriously by most senior executives participating in this study. Some leaders recognise that fostering an innovative culture is crucial for sustainability and transformation.

Additionally, a recurrent observation is that mining companies tend to focus less on technological developments and prefer utilising existing technology. The views expressed by these leaders shed light on the complex nature of innovation implementation within the mining sector, indicating the need for more strategic planning and a better alignment of innovation with company goals.

Overall, the insights underscore the significance of a strategic and the organisational culture to innovation, which empowers mining companies to stay competitive, agile, and forward-thinking in a dynamic business environment.

This study has provided valuable insights into how some mining companies perceive and incorporate innovation into their strategic planning. It is evident that innovation is a significant consideration for most of the participating mining companies, with mining leaders strongly believing in the necessity to embrace new approaches and do things differently.

6.4.2 INTENTIONALITY AND LEADERSHIP COMMITMENT TO INNOVATION YIELDS SUSTAINABLE OUTCOMES

The crucial aspect of linking innovation and sustainability through relevant inquiries is essential in establishing a solid strategic plan and fostering a flexible environment for innovation. Mining company leaders are currently grappling with the challenge of imbuing sustainability with broader significance beyond just financial aspects.

6.4.2.1 Purposeful Innovation

This section examines the perspectives of senior leaders on how their companies are effectively aligning purposeful innovation with sustainable long-term objectives. In the following quote, a senior leader offers highly valuable perspectives on the connection between innovation and sustainability:

[CFM1] "I think innovation in our space is, is slightly different because as you can imagine mining extremely capital intensive. And when we think of innovation, sometimes I think we think of massive innovation in terms of how we process something or how we mine it or what have you, but I think broader innovation is the hype, and we say it, we call it reimagined. So our purpose is to reimagine mining, to improve people's lives. So everything we try to do is like you know, in the finance director, how do we reimagine how we prepare our financial statements? So all of those types of things really linked to they say innovation, how do we think about it differently? And so, the point around reimagine is how do we reimagine our relationship and what we do with communities with stakeholders? And, you know, how do we what do we do from a technology perspective in terms of how we mine so reduce our carbon footprint, reduce our water consumption, reduce our footprint, so a lot of those activities take place and that's all linked to innovation. It's very clear. So we've, you know, as a company, we've set a target in terms of what we want to do. So I'm, you know, some of the key components of that target. And from a social perspective, is we want to create five jobs outside the gate and sustainable jobs outside the gate for every job that we have on our property. So we so so to that target, so now we're going to like okay, and that's in our Plan. Now we've got like, how do we get that into planning? What do we need to do? And so how do we how do we think innovatively around that and that you know, so therefore, we need to think through okay, what does that mean from a procurement perspective? Okay, how do I create businesses? How do I create the capacity? And it's all of those things that did lead us to work through innovatively around how we make those goals a reality, and we were quite clear and we say to ourselves, we've got to get five jobs. For everyone inside the gate by

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2025. Okay, what does that mean in 2021? What does it mean in 2022? And what in how does it how do you go along the drain? Similarly, how do I reduce my fresh water utilization in my operations by 50%, by 2026, and you know, so therefore, it's integrated. So now you've got to take a lot of, you got to relook at our process and we got to take care where do we use water and how can we either use grey water or how do we not use water at all? And so really driving innovation and potentially dry stacking of tailings, for example. So I think it all does, it's having so how do we drive the innovation in our plans? Clearly setting what do we want to achieve? Okay, translating that into a, into a target, and then working back, okay, so this target, what are the steps to achieve that target or acting? What do we need to think through differently what we're currently doing to achieve it? And then, what we do in [CO5]...for example, so we spend around about 10 billion rand per year on capital, in our business, and just to keep the business going. And we went through a process last year of looking at each and every single project in their portfolio and evaluating it against them for critical threat. It was five critical items, in terms of our how we think we can lead in ESG. So each project was evaluated. What would it do to our energy intensity and ultimately, my carbon footprint? What will it do to my water? Water consumption? What does it create in terms of sustainable jobs? What does it do from a footprint perspective?

[RSM6] "So, sustainability being one of the core elements of our strategy right below operational strategy, we do have a sustainability framework right, where we highlighting a high level what is the objectives are we trying to reach as a business from a sustainability point of view? What are the key material issues, right? How are we going to monitor those material issues? That's where your innovation now comes in, addressed? Those so those are packaged on a sustainability framework. And then within that framework, then I got almost like your ministry teachers that addresses the key issues. For example, energy as a nation, energy management is critical to us. They've got an energy management strategy. Yeah, that tone, that energy issues, which talks back to your overall sustainability and framework, right. And then there's where we link so where technology comes in where innovation can see it will come on this new strategies in terms are the implementation plans that we need to put in place to address those issues. So that's how their connectivity comes in. And obviously from the innovation side as well and from the IT space. They also have their own one would call it technology innovation strategy as well. And is that intention, life support different functions."

According to the perspectives of these three distinct senior leaders representing different mining companies, it is evident that a shared awareness and mindset exist, aiming to integrate purposeful innovation with sustainable, long-term goals.

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Furthermore, their statements indicate that these mining companies have formulated strategies and set specific objectives to attain sustainability by employing technological innovation as a means to overcome various challenges encountered in their sector's business operations.

6.4.2.2 Ground-breaking innovation in the mining sector

As mentioned in Chapter 4, the mining sector inherently has a direct impact on society and the environment due to its extractive nature. Hence, the mining business can cause environmental degradation. To gain insights into how the mining industry is utilising innovation to transform their operations towards sustainability and in alignment with the SDGs and ESG principles, participants were asked to provide their perspectives on ground-breaking innovations implemented within their companies to address these challenges.

The participants shared a diverse range of examples and viewpoints on innovation projects occurring within their companies. These projects encompassed technological advancements as well as process innovations within their business operations. However, an exceptionally notable illustration of disruptive innovation for sustainability is the development of the first hydrogen truck for the South African mining industry. The following section provides detailed information shared by participants of that particular company, which has been packaged as Case Study 1.

CASE STUDY 1:**THE HYDROGEN-POWERED HAUL TRUCK REVOLUTION: A CASE STUDY ON INNOVATIVE MINING VEHICLES**

The need for solutions to mitigate greenhouse gas (GHG) emissions, which directly contributes to global warming and which exacerbates climate change, is pressing. The mining sector is responsible for producing an estimated 1.9 to 5.1 gigatons of carbon dioxide (CO₂ equivalent (CO₂e) of GHG emissions each year (Delevingne, Glazener, Grégoir & Henderson, 2020). These emissions have significant and detrimental effects on our planet. GHG, such as those mentioned in the context, have a worldwide distribution, remaining in the atmosphere for extended periods ranging from decades to centuries (Tong & Azevedo, 2020). Regardless of where they originate, their effects are consistent and have a uniform impact across different locations (Tong & Azevedo, 2020)

Activities such as mining, processing and transportation necessitate the use of fuel and electricity (Azadi, Northey, Ali, *et al.*). Diesel-powered equipment is extensively employed in mining operations due to its versatility, ability to handle heavy loads, and adaptability to diverse terrain conditions (Figueiredo, da Silva & Ortiz, 2023). Nevertheless, this reliance on diesel leads to substantial consumption of diesel oil and results in a significant emission of GHG, particularly carbon monoxide (Figueiredo, da Silva & Ortiz, 2023). Collectively, calculations indicate that the GHG emissions linked to primary mineral and metal production accounted for roughly 10% of the global energy-related GHG emissions in 2018 (Azadi, Northey, Ali, *et al.*).

Hence, the extensive reliance on diesel oil has spurred the quest for alternative renewable energy options that align with the objective of mitigating the environmental impact associated with petroleum-based fuels (Varma, Mal, Pahurkar, & Swain, 2020; Figueiredo, da Silva & Ortiz, 2023). One such possibility is Green Hydrogen, a concept involving the production of hydrogen from renewable energy sources like solar, wind, or hydroelectric power (Figueiredo, da Silva & Ortiz, 2023). This hydrogen can be stored, transported and utilised in fuel cells or combustion engines (Shahabuddin *et al.*, 2023). Hydrogen is considered an ideal candidate as an additive to diesel because it is a renewable resource that fulfils the necessary engine requirements, enhances performance, and reduces carbon emissions (Benbellil *et al.*, 2022).

The mining sector in particular, has been seeking innovative solutions to reduce its GHG and mitigate the environmental impact of heavy-duty vehicles. Among the emerging technologies, hydrogen-powered trucks have emerged as a promising alternative to conventional diesel trucks. This case study delves into the exploration of hydrogen truck technology in the South African mining sector.

Hydrogen as a solution

Hydrogen stands out as a leading contender to meet future energy demands and holds a pivotal role in governmental strategic plans (Hosseini & Butler, 2020; Elnashaie, Chen, & Prasad, 2007; Hosseini, Wahid, & Ganjehkaviri, 2015b). In terms of mass, hydrogen possesses a heating value three times higher than petroleum and exhibits significantly lower emissions at the tailpipe in both internal combustion engines and fuel cells, addressing a major drawback of fossil fuels (Fayaz *et al.*, 2012; Muradov & Vezirolu, 2005). The advantages of utilising hydrogen over fossil fuels are numerous (Hosseini & Butler, 2020). One of the most prominent benefits is its classification as an environmentally friendly fuel since it solely emits water (H₂O) when employed in a fuel cell (Hosseini & Butler, 2020; Zeng and Zhang, 2010).

Sustainable Mining Strategy

Company CO5, a leading multinational mining company, embarked on a pilot project to evaluate the feasibility of hydrogen trucks in their operations. To fulfil their mission of revolutionising mining for the betterment of people's lives, Company CO5 underwent a transformative journey within the business. Central to this transformation is the Sustainable Mining Plan, which serves as Company CO5's blueprint for how they extract and process our resources, with the aim of fostering a more sustainable business throughout our entire value chain.

Company CO5's Sustainable Mining Plan includes three fundamental pillars that align with the SDGs and ESG principles. For the purposes of this case study, one of the key pillars is preserving a healthy environment and addresses the important area of climate change—a critical challenge.

To tackle this challenge, Company CO5 actively engaged in initiatives aimed at making a substantial impact on the decarbonisation of the sector and to fulfil their aim of carbon neutrality across operations by 2040. A key aspect of their strategy revolves around fostering the development of the hydrogen economy, recognising its potential to serve as a pivotal player in the transition towards sustainable energy.

Company CO5 have been actively working towards establishing a conducive ecosystem for the successful development, scaling, and implementation of hydrogen-based solutions. As part of these efforts, Company CO5 explored the potential for a hydrogen valley in South Africa, which aims to bring together various industrial and research initiatives and conduct a series of pilot projects covering the entire hydrogen value chain.

More importantly, Company CO5 is pursuing independent initiatives to implement hydrogen-powered solutions within their mining operations. A notable demonstration of this commitment is Company CO5 investment in renewable hydrogen production technology and the development and deployment of hydrogen-powered fuel cell mine haul trucks at one of their mines.

The hydrogen-powered haul truck solution

The hydrogen pilot project conducted by Company CO5 involves the use of a hydrogen-powered ultra-class mine haul truck. This ambitious endeavour represents a ground-breaking milestone as it is the first instance of converting a truck of such magnitude and carrying capacity (a 220-ton truck with a load capacity of 290 tons, resulting in a total laden weight of 510 tons) to operate using hydrogen produced on-site in a hybrid configuration with a battery.

Derived from a previously diesel-powered vehicle, the truck has undergone retrofitting to incorporate a hybrid hydrogen fuel cell system. Approximately half of the power is supplied by the hydrogen fuel cell, while the remaining half is derived from a battery pack that also facilitates energy recuperation during braking. Within the fuel cell, hydrogen from the tank combines with oxygen, facilitated by platinum catalysts, resulting in a chemical reaction that produces water. The electricity generated from this process powers the motors responsible for propelling the wheels. Notably, the sole emission produced by this vehicle is water vapor.

The 2-megawatt hybrid battery/hydrogen fuel cell powerplant serves as a replacement for the previously installed diesel engine. The truck's power management and battery systems have been meticulously engineered to enhance overall efficiency by harnessing energy during downhill travel through regenerative braking. This innovative design enables the truck to recover and store energy, optimising its performance and reducing energy wastage.

The energy stored in the battery system not only enhances the range of the truck but also reduces the time spent on out-of-cycle activities, as refuelling with hydrogen is

considerably faster than recharging batteries. This advancement decreases the reliance on external energy sources and contributes to a more self-sufficient operation.

As an integral component of the comprehensive hydrogen truck solution, Company CO5 constructed a hydrogen production, storage, and refuelling facility for vehicles, ensuring zero emissions. This facility includes the largest electrolyser in Africa and a solar photovoltaic (PV) field to provide sustainable power for the operation of the haul truck.

Moreover, Company CO5 revealed that haul trucks account for a significant portion of diesel emissions, up to 80%, at their mining sites. Therefore, a key focus in Company CO5s strategy is retrofitting 40 diesel-powered ultra-class haul trucks to run on hydrogen, with the intention of subsequently implementing this technology across their global fleet, comprising approximately 400 trucks. The introduction of the hydrogen truck serves as a tangible demonstration of the potential for broader adoption and utilisation of hydrogen in the most demanding forms of transportation.

Company CO5 and partners pioneer global ground-breaking innovation

Company CO5 collaborated with renowned international engineering and technology companies. This collaboration firstly enables CO5 to create, construct, and evaluate a battery pack with a capacity of 1.2MWh, while employing multiple fuel cells within the haul truck system capable of delivering a combined power of up to 800kW, resulting in a total power output of 2MW. Secondly, to devise and implement a software solution to effectively manage power and energy distribution between the fuel cells, batteries, and vehicle drivetrain, ensuring safety and efficiency. Thirdly, to develop the power management and battery systems from scratch, allowing for customisation according to each mining site's requirements, while enhancing overall efficiency through the integration of energy recovery via regenerative braking during downhill haul truck travel to construct a comprehensive hydrogen production, storage. And fourthly, a refuelling facility, featuring the largest electrolyser in Africa, along with a solar plant that supports the haul truck operations.

Enabling leadership is critical for innovation

The CEO at Company CO5, CMC4, reflects on the process of driving ground-breaking innovation within the company:

[CMC4] "In starting to think about decarbonisation, we looked at Photovoltaics for (our one site), which is our biggest operation and it is our longest life, so

we were targeting that. When we looked at Photovoltaics, we realised well, on its own, it actually didn't meet our legal loads... We realised that our normal way of thinking is not adequate for what we want to achieve. So, we said well, let's forget that for a moment... We then designed the plant and realise oh, now the plants too big. And we aren't able to put energy back into the grid. So, what do we do with extra energy? So why don't we use it to generate hydrogen as an as a way of storage? So, I got what do we do with the hydrogen?

And then maybe it was okay, well, why don't we then consider our biggest GHG generation and develop a hydrogen truck? Now all of this thinking just to as a showcase of how innovation other than the thinking in the story, how the innovation is just integrated in the way that we do business. All of this work, the thinking was done in 2018. So, we started the development in 2019, now consider the level of innovation and we had the truck running. I think it was and I wish I could say I was an integrated part of the team but it is an absolutely the team has done such great work. It is really it is ground-breaking work.

In addition to this, this significant community opportunity again because now we are going to build the Photovoltaic we've entered into agreement with EDF. There's a free carry for the communities. We're going to lease land from them to put it to build our Photovoltaic plant that is under underway at the moment will be finished by the end of next year. And there is an energy supply into the communities...And now there's a real opportunity to drive broader mining. So ultimately, I've got a fleet of 14 that mine but broad (Company CO5) fleet is over 400 trucks.

We also now targeting education because it's a very different skill set. Because we talking fuel cells which have very different kinds of maintenance around the trucks. So, we started to develop education materials, how do we make sure that we've got we've developed our in-house skills. So again, just a very interesting example, the moment you start to think differently around innovation or then it opens up a whole world of opportunity.”

Summary

The Case Study demonstrated the potential of hydrogen trucks in transforming the mining sector. The adoption of this technology will play a substantial role in Company CO5s pursuit of operational carbon neutrality by 2040 as it significantly

reduces the emissions generated by their haul truck fleet, which contribute approximately 10-15% to our overall Scope 1 emissions. This is directly linked to SDG 13 - Climate Change.

The introduction of the hydrogen truck serves as a concrete illustration of the technological advancements required to facilitate a global transition towards sustainable and cost-effective hydrogen power. Furthermore, it exemplifies how investments in infrastructure and innovation can translate into a clear vision for the future, where environmentally-friendly solutions are prioritised.

Company CO5 has registered several benefits from this innovation such as environmental sustainability, enhanced public image, and reduced dependence on fossil fuels. As the hydrogen infrastructure continues to expand and technology advances, the future outlook for hydrogen trucks appears promising. The adoption of hydrogen truck technology offers a sustainable solution to the environmental and operational challenges faced by the mining sector. Although certain challenges remain, ongoing developments and pilot projects provide valuable insights for scaling up hydrogen truck deployments. Importantly, as articulated by the CEO of CO5 above, the innovation not only aligns with a number of SDGs but is a demonstration of the integration thereof into the company's strategy and its core business operations.

With continued support from governments, industry stakeholders, and technological advancements, hydrogen trucks are poised to revolutionise the transportation of goods and drive us toward a greener future. Lastly, mining companies such as Company CO5 is actively contributing to global decarbonisation efforts, not only by addressing their own emissions' impact but also by supplying essential metals and minerals necessary for low-carbon energy and transportation systems.

The Case Study further demonstrates complexity of the mining sector and complexity of the process from ideation, planning, and the pilot project. The project was started in 2018, the development in 2019 and implementation planning in 2020. Thus, the complexity included having to find creative ways to retain project momentum with the onset of the COVID-19 pandemic and months of Level 5 Lockdown in South Africa. This illustrates the level of adaptive leadership practices undertaken to successfully deliver on this project.

This Case Study is an excellent example of visionary and enabling leadership in driving ground-breaking innovation towards the sustainability of the particular company and potentially for the entire mining sector.

Furthermore, the research sample included three relatively new mining companies. The data led the researcher to conclude that it is easier for the relatively new mining companies to be innovation trendsetters as they are not encumbered by legacy issues. The latter adds more layers of complexity which has to be navigated during the innovation process. It can be assumed that the same 'ease of innovation' is possible at the newer mines introduced by the more established companies.

The next Case Study pertains to the first digital mine in South Africa. This digital mine was initiated by CO6, a relatively new mining company established in 2006. The establishment of CO6 followed the unbundling of an established company who merged its coal operations with another entity.

According to the data collected from and on CO6, the digital mine, with its 3-D digital twin, is largely attributed to the vision of the CEO who, with the support of the Board, decided to grow a team to conceptualise, develop and implement the first digital mine.

CASE STUDY 2

THE DIGITAL MINE: TRANSFORMING MINING OPERATIONS THROUGH DIGITALIZATION

This Case Study highlights the deployment and influence of digital mine technologies, which have transformed mining operations through the open innovation management approach.

Traditional mining operations are often characterised by labour-intensive manual processes, outdated equipment, and a lack of real-time information (Xie, J., Li, S., Wang, X., 2022). These factors contribute to productivity limitations, safety hazards, and negative environmental impacts. Digital technology has the potential to systematically and profoundly alter the strategy, structure, operations, management, production, and design of businesses and individuals (Xie, J., Li, S., Wang, X., 2022).

It has the ability to reshape entire organisations, offering more than just a straightforward means to reduce costs and improve efficiency (Xie, J., Li, S., Wang, X., 2022). It serves as a fundamental catalyst for innovation and enables significant advancements in business practices (Xie, J., Li, S., Wang, X., 2022). Moreover, the digital mine concept seeks to integrate cutting-edge technologies to enhance operational efficiency, optimise resource utilisation, and improve safety and sustainability (El Bazi, Mabrouki, Laayati, Ouhabi, El Hadraoui, Hammouch & Chebak, 2023).

Nonetheless, the emerging concept of a digitalisation in the mining sector offers an innovative answer to tackle these challenges by harnessing cutting-edge technologies and data analytics (Löow, Abrahamsson & Johansson, 2019).

The Digital Mine Solution

In the mining industry, digitalisation pertains to the utilisation of computerised or digital devices, along with digitised data, with the aim of cost reduction, enhanced business productivity, and the transformation of mining operations (Barnewold & Lottermoser, 2020).

Company CO6, a leading mining company, that recognised and embraced the need for innovation, took a proactive approach. They initiated a digital mine project to enhance the efficiency of their operations and built the first-ever digital

mine in Mpumalanga, one of the nine provinces in South Africa setting a new precedent in the sector. The digital mine encompasses a range of technologies and systems that work together to enable smarter, safer, and more sustainable mining operations (Novus Group, 2022).

Company CO6, through the establishment of a digitally connected mine, demonstrated the advancement of digitalisation within the mining sector. The mine exemplified the drive towards real-time decision-making and enhanced productivity by leveraging remote monitoring and tracking of devices and performance data (Novus Group, 2022). This initiative pushed the boundaries of technological capabilities in the industry (Novus Group, 2022).

Internet of Things (IoT):

Deploying sensors, devices and wearables throughout the mine allows for real-time data collection and monitoring of equipment, personnel and environmental conditions (Novus Group, 2022).

The company underwent a digital transformation process, which involved implementing various initiatives across different areas of the business (Novus Group, 2022). One such initiative was the introduction of intelligent automation to enhance specific business processes. An instance of its successful implementation was observed in operator equipment licensing, where a Bot was employed to enhance process efficiency. Following its initial success, the solution has been expanded, and a new version is currently under development (Novus Group, 2022).

After successfully integrating digital transformation into Company CO6, the innovation team shifted their focus towards purpose-driven innovation. Initially, they extensively researched successful innovation practices in various organisations, both within and outside the mining industry, on a global and local level (Novus Group, 2022).

During this study, the team identified Open Innovation (OI) as a valuable approach for solving business problems and overcoming challenges. It was crucial to align OI with Company CO6's broader organisational strategy, prompting the development of a plan to implement OI to address different business challenges (Novus Group, 2022). However, one of the major hurdles

encountered in this process was garnering support from key stakeholders and familiarising them with the concept of OI (Novus Group, 2022).

Benefits of digital mine and Open Innovation (OI)

There are a number of benefits of a digital mine and using the Open Innovation (OI) approach, namely, 1) Operational Efficiency: Company CO6's digital mine implementation improved operational efficiency by automating certain tasks, optimising equipment utilisation, and streamlining processes; 2) Sustainability Improvements: Company CO6's digital strategy highlighted the pivotal role of technology and innovation, recognising innovation as a critical factor in the company's success. In the process identifying the benefit of innovation as a means to aid Company CO6 in achieving its decarbonisation goals. The collaboration between the Decarbonization Project Management Office and the Innovation Management Team involved researching and exploring innovative technologies aimed at reducing the carbon footprint of Company CO6's operations (Novus Group, 2022).

In addition, sustainability improvements through the digital mine technologies enabled Company CO6 to monitor and manage their environmental impact more effectively. Real-time data on energy consumption, water usage, and emissions facilitated the implementation of sustainable practices and compliance with environmental regulations (Novus Group, 2022); 3).

Another advantage was gaining access to a network of digital disruptors. In order to access ground-breaking and inventive solutions to aid Company CO6's decarbonisation efforts, the company has formed partnerships with various stakeholders within the global innovation ecosystem (Novus Group, 2022). This collaboration allows them to tap into disruptive and innovative resources (Novus Group, 2022).

As per Company CO6, there are three possible clusters, each providing access to distinct ecosystems, for Open Innovation (OI). The first cluster comprises institutions such as universities, the South African Council for Scientific and Industrial Research (CSIR) and innovation hubs. The second cluster consists of publicly open ecosystems where challenges can be openly posted on innovation platforms and shared on social media to invite potential solutions from anyone (Novus Group, 2022). Lastly, there is the privately open ecosystem, which is a

curated network of companies possessing specialised knowledge, skills, and expertise.

Reflecting on Company CO6's experience with Open Innovation (OI) thus far, an employee remarked, "In a world where knowledge is disrupted and decentralised, large corporations like us can no longer depend solely on internal expertise. Instead, we should recognise the value that participants from outside our industry can bring in helping us achieve our strategic objectives" (Novus Group, 2022).

Enabling leadership critical for innovation

One crucial aspect to consider is the role of leadership in driving sustainable innovation. As discussed in Chapter 2, leaders within bureaucratic organisations have the power to shape the organisational culture, set strategic goals and allocate resources. The CEO at the time of Company CO6, CMC5, reflects on the process of driving innovation within the company:

[CMC5] "Well, you know, one of the things that we especially at the time when I came in as CEO, I'm actually very fascinated in just understanding and looking at and just reading about companies that have really become what have become considered global leaders. But how many of them and even in our lifetime, either don't no longer work, exist or they have been decimated because of they are the victims of their own success. Like Kodak I will name Nokia. I'll name Blockbusters I'll name a lot of them. So, in that, and maybe that's why if you look at my own career, I've been in various industries because I like change, okay, because I know that I can't fight change, change is inevitable.

Change will either be a threat to me or it can be an opportunity. And so, in trying to understand what was it about these companies, why did they fail? I mean, why did Nokia when they were at the top of the game having also transitioned from being a company that was in the, in the forestry industry made a huge transition into technology. Okay. I mean, that's a huge momentous shift, but yet in that, they still missed the boat. And part of what I saw was that if we are not conscious of disruptors that can come and take us out and be proactive in actually understanding what are the things that could disrupt us. So, I went and, you know, we engaged in Just, at the time I was CEO designate... so we engaged a company called Future World to come and work with us to try and get a lens, heavy lens, about what are the things that are happening out there that could be huge disruptors.

And the analogy I make of this when I talk to my organisation, as you know, if you grew up in a village, and you've never been out of the village the whole world, you see it with the lens of your paradigm of the village. But the day you walk out of the village to the town, you will be surprised that wow, I didn't even know this thing existed beyond my village.

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And if you come from a little town, like I come from Khulu you know, having been a rural boy myself. When you get to Johannesburg, you say, Oh my God, there is even something bigger than this. I've never seen any then you go across this. So, in other words, what I'm trying to say is that you don't know what you don't know until you get out of the village. So, the problem is and once you become very successful, you create you think that you are at the top and you create your own village now you know, you start saying when we are the best thing, forgetting that outside of the village, there are others who are creating other things. Okay, and those things may come in be a threat to or may be an opportunity. So, we are always in a village in one way or the other. Because things are always changing. And therefore, we came I came up with this concept of you don't know what you don't know. So, you always have to consciously push yourself out of your village. Don't become comfortable. And so, with that, we had the... and all of these guys coming in you know, Singularity University...I went to Singularity I went and did a programme. It's in San Francisco. What is out there What is busy shaping the future. And how do we take advantage of that? And to the point whereby you know, we had this whole strategy session. Now I said, if we're gonna have to bring this into the organization, this whole new way of thinking and mindset. I have to also do what I would call a business transformation, not just from a technological point. But from a cultural point of view, whereby we're saying that part of our culture is about pursuing this change. We are about reinventing ourselves all the time. We have to reinvent ourselves all the time. And in that process of six months, I had my Exco, I had the various levels of management. And then the last third with the millennials. We worked on the strategy together with the millennial for 25-year olds with the Exco, because they understand and they are comfortable in this world, technological world, and they have a different lens to issues and of how things are done and can be done.

We think that because I've got 30 years of experience that is going to be relevant for the future. My goodness, you're going to die. Because we think of robotics, the things of AI with all of that they could render you useless. And therefore, if you don't yourself, reskill yourself for the future, about becoming the work creating a workforce of the future and these other things that we went through in terms of this whole process... But what I can say to you today is we even had a mine that had been approved 3.8 billion rand building a new mine, but it was built in the same old way that it was been built in the past. So I challenged the projects and technology team I said guys why in the days of the Internet of Things, in the days of data analytics, in the days of AI, you got to build a mine is like in the days of Elon Musk wanting to go to Mars. You're telling me that you want to build an ox wagon, or a horse in potty train as a way of transport. I mean, this this, yes, it's transport but hey, the world has changed. You better be if you're not, if you're gonna be doing what Musk is trying to do. We don't have a business if our business is gonna be centred about the way we do things like in the old way so I challenged him I said do I put a decree throughout the whole organisation to all the various heads of departments. I said, you don't know what you don't know. Go in and tell me how you reinvent how finance can be done into the future. What do those guys were reinventing? things within finance within

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supply chain costs and all of that project to go to Rio Tinto, Rio Tinto has got autonomous trucks, they've got autonomous trains being remotely controlled from 1500 kilometres away, go and see what they doing. But HR, reinvent yourself. What are the new HR practices? How does HR in a world where Google all these dynamic companies, how does how do they manage HR? How do they manage their people? How do they manage their work environment? What are the new practices? What are the new policy goals and so all of them there to go? But once they went out there to say, how are they gonna implement? So, there was that deliberate problem of getting out of the village? Getting out of the village, by the way, that that, that that project team created the first digital mine Belfast, mine is digitally connected, fully connected. We are totally digitally. We even moved it off this from our old office...They are just opposite the Centurion Gautrain, fully digital, fully connected, fully embracing an environment of teamwork and I love that they are no offices. I don't have an office, I mean an open area, so it's about re-imagining a whole new work environment."

Summary

The Case Study demonstrated the transformative power of digital mine technologies in enhancing mining operations. However, more importantly it illustrated the role of enabling leadership in jump starting the space for innovation in a traditional conservative sector. Open innovation (OI) empowers mining companies to expedite their digital transformation journey by granting them access to innovative ideas beyond their traditional scope. Through this approach, mines can swiftly adopt and implement the latest advancements and innovations which could have a significant impact on enhancing SDGs and ESG targets.

The Case Study above is also an example of Adaptive Leadership as the input of CO6s CEO confirmed. This company created adaptive spaces, with some of these spaces being abroad, for their teams to grow and evolve around this vision. As discussed in Chapter 2, Adaptive Leadership is fluid and not an individual role but rather a complex dynamic which is a "distributed, collective process" (Bäcklander, 2018:44) (Mäkinen 2018).

Scholars such as Arena, Cross, Sims and Uhl-Bien (2017) define adaptive space as "the network and organisational context that allows people, ideas, information and resources to flow across the organisation and spur successful emergent innovation." Furthermore, adaptive spaces are when ideas are enabled to move into the operations of the organisation (Arena, Cross, Sims & Uhl-Bien 2017: 40).

6.4.3 SUMMARY OF THEME 2

In summary, Theme 2 uncovered the effects of incorporating innovation into strategy and highlighted that intentional innovation can lead to long-lasting results. The study demonstrated this by presenting two examples from the mining industry that showcased significant advancements in innovation.

6.5 THEME 3: HIGH LEVELS OF AMBIDEXTROUS LEADERSHIP PRACTICES ENABLE INNOVATION IN THE MINING SECTOR.

The concept of Complexity Leadership Theory (CLT) involves harmonising both formal and informal organisational aspects to harness the dynamics of Complex Adaptive Systems (CAS), leading to organisational learning, creativity, and adaptation (Bäcklander, 2018). This study investigates the practical implementation of enabling leadership by mining leaders in South Africa, drawing insights from interviews with thirty-one such leaders. Enabling leadership is a pivotal factor in maintaining equilibrium within complexity leadership (Bäcklander, 2018).

Table 25 below shows Theme 3 and the two sub-themes that emerged regarding leadership practices enable innovation in the mining sector.

Table 25 : Outline of Theme 3 - High Levels of Ambidextrous Leadership practices enable innovation in the mining sector

THEME 3: HIGH LEVELS OF AMBIDEXTROUS LEADERSHIP PRACTICES ENABLE INNOVATION IN THE MINING SECTOR.		
SUB-THEME	CODES	SUB-CODES
SUB-THEME 1: LEADERSHIP PRACTICES THAT FOSTER AND FACILITATE THE PROCESS OF EXPLORATION.	Stimulating higher complexity of beliefs	1. establishing expectations and a forward-looking vision 2. deliberate intent and determination 3. transforming paradigms and mindsets 4. open-mindedness 5. culture of encouragement 6. active listening 7. being supportive

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THEME 3: HIGH LEVELS OF AMBIDEXTROUS LEADERSHIP PRACTICES ENABLE INNOVATION IN THE MINING SECTOR.		
SUB-THEME	CODES	SUB-CODES
		8. appreciating diversity in teams attract the right talent
	Stimulating higher complexity of actions	1. create the urgency for innovation 2. encourage the emergence of fresh ideas 3. nurture a collaborative environment 4. appoint dedicated innovation teams 5. take courageous action 6. making decisive decisions 7. embrace mistakes
SUB-THEME 2: LEADERSHIP PRACTICES THAT FOSTER AND FACILITATE THE PROCESS OF EXPLOITATION.	Stimulating lower complexity of beliefs	1. responsible innovation 2. calculated risks caution delivery and performance.
	Stimulating lower complexity of actions	1. setting boundaries and controls 2. research and restricted resources 3. actively monitoring the risks incorporating innovation measurements into KPIs

Source: Adapted from Havermans, Den Hartog, Keegan, & Uhl-Bien (2015)

Balancing the conflicting requirements of exploration and exploitation poses a fundamental dilemma for senior leadership teams (Zhu & Huang, 2023) which is well-documented by researchers exploring Ambidextrous Leadership Theory (Havermans, Den Hartog, Keegan, & Uhl-Bien, 2015).

Leaders hold the responsibility of making strategic decisions within an organisation (Zhu & Huang, 2023). Senior managers are actively involved in the formulation of organisational strategies and hold crucial roles in areas such as control, coordination and leadership during the strategy implementation process (Zhu & Huang, 2023). The top leaders, vested with decision-making authority, wield significant influence over the establishment and adaptation of corporate behaviour (Lv, Cao, & Yao, 2020). Thus, effective leadership becomes paramount in crafting visionary corporate strategies and facilitating essential organisational transformations (Thomas, & Thomas, 2011).

As outlined in Chapter 2, opening leadership behaviours involve encouraging followers to challenge the existing norms, generate new ideas and apply creativity (Rosing *et al.*, 2011; Zacher & Rosing, 2015:54). By fostering a culture of experimentation and promoting different approaches, these behaviours facilitate exploration activities (Zacher & Rosing, 2015:55). On the other hand, closing behaviours aim to minimise variability in follower behaviour through corrective actions, specific guidelines, and monitoring goal attainment (Rosing *et al.*, 2011). These behaviours align with exploitation activities, as described by the Ambidexterity Leadership Theory (Zacher & Rosing, 2015:55).

The Ambidextrous Leadership Theory encompasses interventions that stimulate both exploratory and exploitative behaviours in employees (Rosing *et al.*, 2011:957). Within this paradigm, opening and closing behaviours play a crucial role in team innovation.

Achieving ambidexterity in organisations requires maintaining high levels of both exploration and exploitation, with the emphasis on each continuously shifting in response to environmental stimuli, as perceived by leaders and other organisational members (Havermans, Den Hartog, Keegan, & Uhl-Bien, 2015).

The ongoing pursuit or restoration of concurrent high levels of exploration and exploitation is paramount (Havermans, Den Hartog, Keegan & Uhl-Bien, 2015). While previous theorists argued that organisations face difficulties in balancing the demands of exploration and exploitation (Hannan & Freeman, 1984), recent approaches focus on delineating various ways in which organisations can achieve the necessary balance between these two dimensions (Lavie, Stettner, & Tushman, 2010).

Ambidexterity has been explored as separate processes of balancing exploration and exploitation, either structurally or temporally (Jansen, Tempelaar, Van den Bosch, & Volberda, 2009; Tushman & O'Reilly, 1996), with the challenge of balance set at the

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organisational level (Lavie *et al.*, 2010). Additionally, ambidexterity has been associated with managing simultaneous exploration and exploitation within a subsystem (Gibson & Birkinshaw, 2004).

Drawing on Ambidexterity Leadership Theory, this study seeks to explore the behaviour of senior business leaders which stimulates innovation in the mining sector. Furthermore, this study seeks to build upon the research conducted by Havermans, Den Hartog, Keegan and Uhl-Bien (2015), which delved into the realms of Complexity Leadership Theory and Ambidexterity Leadership Theory. The aim is to gain deeper insights into how contextual ambidexterity develops within a dynamic environment.

The study aims to contribute to the existing literature on leadership and innovation within mining companies by identifying instances where leaders demonstrate high levels of both exploratory (opening) and exploitative (closing) behaviours.

In the section below, the researcher highlights the everyday actions of leaders aimed at promoting exploration and exploitation while effectively transitioning between these approaches to achieve contextual ambidexterity. The study involves qualitative examinations of leadership within mining companies, where the demand for contextual ambidexterity is significant.

The findings demonstrated below reveal that leaders within mining companies employed a variety of leadership practices to foster contextual ambidexterity. The majority of interviewed leaders implemented strategies to promote both exploration and exploitation, with the objective of stimulating high levels of both activities at the same time. Furthermore, the analysis revealed that the need for change underpinned by the complexity associated with matters such as ESG principles served as a stimulus for greater efforts to facilitate exploration put forth by leaders.

Supporting this notion, a senior executive provides insights signalling how the mining sector had changed over the years:

[CTM7] *“I really think the mining industry is really accepting and realising that you need that we need to change, you need to really change. The way that we've done this type of business in the past and have a much more inclusive way of doing our business in cooperation with our immediate surrounding communities and area we were operating in. I remember in my good old days when I started on the mines, you know, you were just mining. The outside world was the outside world and you didn't care about it and they mustn't come and bother you. You just focused on getting the job done. I really truly believe that, in today's world, and the times that we live in now that you just cannot operate like that. The mining industry is really, I believe, taking that concept by heart and trying to do it in the best way possible to make sure that we are the most inclusive, entity and area of operation.”*

6.5.2 LEADERSHIP PRACTICES THAT FOSTER AND FACILITATE THE PROCESS OF EXPLORATION.

The findings indicate a diverse range of leadership practices are employed within mining companies to facilitate exploration. Especially the aspect of exploration, as elaborated in Chapter 2, which is linked to the pursuit of innovation. This holds significance in comprehending leadership methods and procedures that establish a conducive atmosphere for fostering innovation. These practices primarily targeted the complexity of responses and can be categorised into two distinct pathways: one focused on stimulating complexity of beliefs, while the other emphasised complexity of actions. For a comprehensive overview, please refer to Table 3.

6.5.2.1 Stimulating higher complexity of beliefs

Leadership practices aimed at fostering a greater complexity of beliefs facilitated the exploration and incorporation of diverse contextual representations, as well as a wide range of perspectives and ideas regarding addressing the perceived complexity from the environment. On the other hand, leadership practices focused on promoting a higher complexity of actions encouraged the experimentation with various behavioural responses to tackle the perceived complexity from the environment.

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One approach that leaders took to encourage the growth of more complex beliefs is by **establishing expectations and a forward-looking vision** for innovation and the mining industry. By outlining these expectations and vision, employees within the mining company gained an understanding of the company's long-term goals and the desired direction it aimed to pursue. The leaders of the mining industry emphasised the significance of leaders setting expectations and a vision for innovation and the future of mining, expressing their shared beliefs on this matter.

The leaders interviewed clearly acknowledged the need for a different approach in the upcoming era of mining, with a realisation that the decisions made now will have long-lasting effects. This demonstrated a tacit understanding and drive for sustainable development. It is evident from the findings that innovation will play a crucial role in transforming the mining sector. The study also reveals that mining leaders accept their responsibility in shaping the vision for the future of mining and outlining the roadmap to achieve it. Additionally, leaders assert that by establishing expectations for the future, they create an environment that fosters excitement, guidance, commitment and parameters for innovation. This belief is articulated by senior leaders who provide context for the value of having a vision for a future mine, as demonstrated in the following two quotes.

[CTM2] *“So my role is setting the expectations and the vision and it really is the long term to say in the next 20 years, you know, I want to be here or as an industry we need to be here, and creating that excitement. Can you imagine a world where the next mine we open, doesn't use Eskom. The next mine we open doesn't use any water. The next mine we open doesn't have a tailings dam. You know, so it's painting that picture. I mean, getting the guys excited to go figure it out. Because that's what engineers and scientists want to do, they want to figure things out. So for me, it's about it's about setting the vision, and then letting the troops loose to go figure things out, which is great.”*

[CTM7] *“...we really doing what we signed in terms of that. We truly believe that we building the mine of the future in a way digitalisation is part and parcel of what we're doing. Transparency is a big thing. That everybody can see what everybody's doing. So in terms of the electric equipment that we putting underground, it was something that I physically said that, what I call a roadmap, the roadmap to the mine of the future, and put that down on paper write down what we want to do and what you need to do and then start making sure that we,*

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we do, do those things and get the job done...So that is really part and parcel of my responsibility.”

Another method employed by leaders to foster the growth of more complex beliefs was through their deliberate intent and determination to explore innovation and sustainability in the mining industry. By demonstrating their intention and eagerness to embrace change and highlighting the significance of sustainability for their company and its impact on society, leaders facilitated open discussions and encouraged collaboration among employees. For instance, a senior leader emphasises the importance of having the intention to pursue alternative and improved approaches by stating:

[CTM2] “If you look back now, the industry has come from, you know, having 500 fatalities a year in 1994, to having 70, which is 70 to many, but no one would ever thought we could do that. And I think if you apply the same advice because people put energy and focus into it. If you look at mining, its productivity has doubled over the last 30 years, which is good. But if you apply that same focus to the SDGs we've demonstrated we can do it if we apply our minds. It must just be a core value and focus and then we'll do the same in SDGs. So you know, safety. Again, it says safety, productivity, SDGs I think we've not haven't arrived on safety. We haven't arrived on productivity. But I think we're probably 20 years behind where we want to be on SDG 15 goal. But if we focus on it, we've demonstrated we can do it. So it's just it's all mindset...And then intention, intention, intention. And that's the invitation that comes back to, you know, set those ambitions, get them in your business expectations. Get them into long term plans, plan them and then then then it will happen.”

Leaders additionally fostered the growth of more complex beliefs by deliberately transforming paradigms and mindsets. By motivating and pushing employees to adopt alternative perspectives, they created an environment conducive to critical thinking and stepping outside of comfort zones. This created space for innovative thinking, the generation of new ideas, and the discovery of solutions to sustainability challenges faced by mining companies. As an illustration, the following quotes from leaders explicitly convey their perspectives on the importance of shifting paradigms and mindsets.

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[CMC5] *“Well, my role is very, very simple. My role is to get us out of our comfort zone. My role is about creating an environment that enables these things to happen my role is about inspiring. My role is about challenging. My role is about helping people and actually get them to get out of the village.”*

[CMC4] *“Driving paradigms is something I love to do personally. So despite the fact that I'm in a very different role at the moment, what I can do is to continue to be sceptical about what we do, how we do it, and that being part of that critical thinking, to change the way we work. And I think it is also in that critical thinking, being never happy with the way that we do stuff today, continuously then saying, Oh, this is not good enough. How did we do it?”*

[CMC8] *“So, for me, I would say my biggest role is to encourage people to think about doing things differently, and bringing the brand-new ideas...”*

[CMC7] *“...I think challenging people, challenging them to think differently and think about more innovative ways of doing things...”*

Building upon the transformation of paradigms and mindsets, leaders fostered the development of beliefs by promoting open-mindedness among employees. By displaying their own open-mindedness and encouraging others to do the same, leaders create a safe environment for employees to generate new ideas. This is particularly significant in the mining sector, which has traditionally adhered to long-standing mining practices and being cautious about taking risks. However, with the rapid advancement of technology, mining leaders recognise the importance of embracing innovation and maintaining an open mindset. Two senior mining leaders further reinforce this perspective by providing valuable insights and context on the subject.

[[CMC8] *“I think it's critical that the CEO embraces innovation. If you have a CEO that's not open to innovation, people will not be innovative and people will not approach the organisation with new ideas. It's always a little bit of time at the top and it's not really just the CEO, it's the board, it's the culture of the organisation that we're either encouraging or deterred.”*

[CTM2] *“I think it's also a mindset. Money is high risk, because if you think about a new opening mine, you're sinking billions of dollars. And you're wanting that return over 30 years, and there's no guarantee, right? The other interesting number is so from when you first*

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discover in the ore body, so you drill a hole, you think, for example in the Northern Cape, and I drill a hole that I find something from that time of trying to drill that first hole to when you build the mine globally is 16 years. So you're investing for 16 years, and you build it and then you're gonna mine it for 30 years. So you're talking about a half a century, you're invested in this in this thing. And, and the problem we have is because technology is moving so fast, we can't apply that old thinking. And that's where we need to think modular, think small scale and scale it up. Because if you're going to wait for the big bang, you're never going to open the mine and you're never going to implement technology because it's never ready yet because he's never ready by the time you've sorted this one out this new one. So how can you start small scale and scale it up? Modular wise, and at least then you're generating revenue? You're doing all of that the next this module can fund the next module component module, and then eventually we get to that scale... and technology is forcing us to do it. Because, you know, we've been mining the same way for probably 100 years. The equipment's just got bigger. That's reality. We just got bigger and better machines. but now we're getting new technologies, which is actually fundamentally changing that. So start small scale, small amounts and risk money, not billions of time, but millions at a time and then ramp it up. So that's a mindset change. And that's what some of the other bigger companies around the world we're not so capital tends to be think about Apple. You think about Google, it's small things that build up into bigger sets. It's a mindset change."

Expanding on the aforementioned perspectives, leaders promote the development of more complex beliefs by fostering a culture of encouragement, active listening, and support within teams. This cultivates an environment where employees feel at ease sharing their ideas and challenges with their leaders. Consequently, these interactions provide opportunities for gaining fresh insights, fostering trust and nurturing an atmosphere of open communication.

[CTM4] "...my job, I guess, as well is to just encourage people. Is to really keep ideas flowing and in my interactions with people to encourage, not only encourage but for me to also display a level of openness to alternative ideas and that in itself has a role and function..., it's the concept of enabling those ideas to come. So when I talk about innovation, I'm not just talking about you know, the technological side of innovation, I'm talking about generally innovation throughout the organisation, whether it's the improving of a process or whether it's just doing something differently in that regard."

[CMC4] "...one of three culture principles that we drive, it is to listen. I do that and then the way we make the structure is also to listen to the quiet voices in the room and listening to

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everybody...if you want to see inspiration, it is about engaging with the people in the business...”

[COM1] “...supporting the teams that drive it [innovation]. And I always want to say, you know, where there isn't some sort of innovative idea or whether it's a new technology or process or whatever. I would say almost my role would be championing to make sure what happens. So often, these ideas come from outside. If it's not strongly supported by senior roles, it just never truly gets out. So here we have an innovation that we really, I suppose listening to myself, what it really is and is on is driving the change management to make it work.”

A further approach employed by leaders to foster a greater complexity of beliefs involved appreciating diversity in teams. By including individuals from different backgrounds, gender, age, disciplines and beliefs allows for broader viewpoints to be considered. Moreover, diversity provides the opportunity for challenging one another's thinking, ideas and creating the tension for innovation. As mentioned in Chapter 4, there is a strong requirement for diversity within the South African mining sector due to its historical legacy of apartheid and its traditional male-dominated nature. However, mining leaders recognise the importance of diversity in operating a sustainable company in South Africa. For instance, beliefs shared by one CEO with respect to diversity indicated the benefits of having a diverse team and its impact on innovation.

[CMC2] “In my executive team also, diversity is very important. And you know what it does? It broadens the talent pool five-fold. In the old days it was white males. Now its white females, black males, black females, coloureds. It almost ten-fold that you broaden your talent pool with and there is amazing talent out there. And also the different way of thinking, you know that you're not stereotyping, and everybody is singing ja baas, ja baas drie sake vol. And then no, there's no innovation. There's no challenging, and that's other thing. You must also allow people to challenge your own thinking.”

Lastly, leaders recognise that teams in the mining sector not only require diversity in terms of race and gender but also in a range of disciplines and experiences to foster innovation and sustainability in the sector.

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Leaders further contributed to the cultivation of more complex beliefs by recognising and appreciating that mining companies should attract the right talent with different skills sets which are required not only for present employment but for the future of work it is critical in shifting the paradigm for the sector and ensuring the sustainability of a company and surrounding communities.

[CMC 4] "I think it's important that we recognise that there are significant learnings we need to make. So we have made some serious mistakes. If we think about culture and heritage, for instance, and I'm talking things like an open pit mine dumping on graves as an example. And I think some of that came with a history of arrogance in the mining industry, and also not having an appreciation for culture and heritage. Now let me tell you, try and find culture and heritage experts in this country. Very hard to find, go and find HR skills and corporate and social skills and the skills that we need to really go to the community. So understanding of conflict management. There's very little in our education system that actually helps us develop that skill. So as we continue to think about as we move the paradigm to think differently around how we do business. I think there's an important aspect of not only the appreciation for the broader context of what we're doing, but also how do we educate people...So when we talk about work, are we talking about the work of the future we tend to always get into, what are digital skills and what is technology skills, but that we don't include our ability to work with human beings. And at the end of the day, robots are never gonna replace human beings in that kind of way. There's always going to be an element and the need, and so how do we develop that to meet what we are looking for?"

It is important to note, however, that these leadership practices alone do not guarantee successful exploration.

The research study highlights leadership practices that foster a high complexity of beliefs associated with exploration. These practices include recognising the value of establishing expectations and a forward-looking vision, deliberate intent and determination, transforming paradigms and mindsets, open-mindedness, creating a culture of encouragement, active listening, being supportive, appreciating diversity in teams and attract the right talent.

Leaders who embody and prioritise these beliefs create a more favourable environment for their teams and companies to pursue innovation and sustainability,

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particularly in the mining sector characterised by traditional operating methods and a conservative approach to risk-taking and innovation.

6.5.2.2 Stimulating higher complexity of actions

A second element employed by leaders to promote exploration was by fostering a greater complexity of actions. One leadership practice utilised to achieve this was to create the urgency for innovation. This enables teams to recognise the immediate necessity and timeliness of implementing alternative approaches. The significance of instilling a sense of urgency for change is crucial, especially within mining companies that have set goals and made commitments to reduce their carbon footprint within a specific timeframe. Leaders recognise their responsibility to generate a compelling sense of urgency for change within mining companies. In addition, linking the sense of urgency to goals is vital in driving meaningful change. Moreover, understanding that their role as senior leaders is not only to set ambitious goals but also to cultivate a sense of urgency that fuels the determination to meet those goals. The following quotes from senior leaders highlight their role in creating this urgency and connecting it to the established goals:

[CMC1] "...I think my biggest role is really to create the right tension to change not in a bad sense I'm talking about create you know, the urgency to change..."

[CMC3] "...we've got huge goals, and I mean, all those goals...the is the longer term one, 2030 reduce water consumption by 50%, 2030 get to carbon neutrality, certainly linked to our scope two emissions. You don't get to those things without driving innovation, because we need the solutions that will enable us to achieve those goals...To get to carbon neutrality from a scope one perspective now, and then our goal is to get there by 2040. So for us it has been around understanding what are the goals and understanding that if we utilise the knowledge that we have today, we won't get there. So we need to drive innovation, to get to the things that will enable us to realise our goals. And there's clearly a time factor linked to that because it's an understanding that if we don't drive that innovation, and work on those technologies which may not exist today, then guess what, we won't get to our goals."

Expanding upon the role of leaders in establishing a sense of urgency for innovation, it is crucial for them to lead by example and set the precedent for fostering an innovative culture within the organisation. A senior leader emphasises the

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significance of setting the tone and generating the necessary momentum for innovation within the company as a top priority, while also connecting it to the concept of achieving growth through continuous learning and improvement:

[EDM1] "...as a leader, right, it is to really set the tone in respect of you know, life is about continuous learning, continuous improvement, right.

Leaders recognise the importance of cultivating an environment that encourages the emergence of fresh ideas and promotes innovation across the entire organisation. In mining companies that actively pursued increased exploration, their leaders were dedicated to deliberately create spaces and opportunities for the discussion and presentation of new ideas. A senior leader emphasises one of their initiatives that fosters the generation and sharing of novel ideas.

[EDM1] "You need to always keep growing and as a CEO, one of the primary tasks is to grow the company, and you grow the company through traditional means and you grow it through ideas and new ideas, new ways of doing things, and if you don't allow space for that, and for people to come forward with those new ways of creating value. A CEO should always be encouraging and I think there's a lot of programmes for that. Within [C02] there's an emerging leaders programmes that come and go present to our executives and exco and the likes of the CEO of emerging students' guys, students that actually present these ideas as the breakthrough ideas to them. And some of those ideas are taken on board. I know those, the last cohort came up with some couple of good ideas that were obviously taken on board by the business. So, it's providing those types of platforms when in fact, even anybody within the organization does a thing they get to go pitch these ideas to the CEO. And then they get to be listened to say, look, Yes, that sounds like an excellent idea. Or it's an idea that could work actually, or they prompted us to think that maybe we can combine it with this kind of idea. I am not just talking about myself there are other people as well, my colleagues, that's...I mean, the other one that brings in some of this breakthrough technologies you know, I mean, he's just also another guy who's on another level in terms of innovation. I mean, he brings in the kind of technologies and expertise that he brings in terms of our processing and bringing his metallurgical Insights, for me and the CEO has given us space to do those things and, and they get approved at the highest level and they get implemented and realise billions worth of investment."

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Leaders recognise the importance of nurturing a collaborative environment within the company. In mining companies characterised by extensive innovation efforts, there is a strong emphasis on appreciating the value of sharing ideas and collaborating with team members or stakeholders at every stage of the innovation process. In the following quotes, senior leaders contextualise the significance of a collaborative environment:

[CMC8] “We are quite open. So we all collaborate and we all share and I firmly believe in a collaborative style. I think the days of, you know, the technical guys deciding on one facet of the business, that social team dealing with one facet of the business, the environmental team dealing with another facet, that days are over. Everything interacts and what the one team does has a direct impact on what the following team does. So I think breaking those silos within an organisation and the cross pollination of ideas, does foster a culture of innovation and out of the box thinking because people are challenged...A lot of it, is about collaboration, and I'm a big believer in letting people believe it's their idea. If you get buy in and people believe that they are part of what's being drafted as the solution, people will have a vested interest in letting it succeed. If you force things on people, then people usually are more oppose to it. Again, we're in a bit of an advantageous position compared to some of the older mining companies with legacy projects. We implementing new projects. We basically have a clean slate, how we want to do things, if we want to run it slightly differently. And we do we have a very flat structure, high bureaucracy, good governance, but not multiple layered of decision making. People should feel empowered to make decisions. People should feel empowered to have ideas. People should feel empowered, to get involved in different aspects of the business. Even if you're the geologist, if you've got a passion for communities, it shouldn't deter you from being part of community outreach projects that the company is doing. So we embrace that cross function, collaboration, and that usually also creates interaction. It creates people thinking differently because you know, if you put a lot of social people in a box, sometimes a lot of them are similarly geared because of what they study, that's their passion. But now you bring in a technical guy who is now part of the group and all of a sudden, he brings a technical solution to a social problem. And sometimes it's a great solution. So if you allow your organisation to interact and allow people to do have flat structures and share ideas, you you'll find that people would embrace change a lot easier. And people will buy into it because they are coming up with these ideas. Even if it's my idea, I try and not take credit for the idea, I try and plant the seed with somebody else and make them believe it's their idea so that we can get buy in from the bottom up.”

In addition to a significant number of leaders embracing the idea of a collaborative and open environment for idea sharing, there were also those who advocated for dedicated innovation teams to handle special projects, separate from employees burdened with operational responsibilities. This approach enables dedicated teams

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to concentrate their efforts on exploring and implementing innovative ideas, ensuring that innovation receives the necessary attention it deserves.

Furthermore, it allows for the concentration of expertise and resources in one central location, thereby enhancing the company's capacity to drive significant breakthrough innovations. As a result, leaders acknowledged the importance of finding a balance that valued collaboration while also recognising the unique value that dedicated innovation teams bring, including fresh perspectives and undivided attention. This approach ultimately enabled mining companies to optimise both operational efficiencies, achieve excellence in innovation and impact in communities. The following quote reflects the perspectives of a leader on this matter:

[CMC2] "If you now get together and collaborate, then you can properly end with a community, you can properly define what the real needs of the community are. Is it water, is it infrastructure, and if it's mega projects, you can collaborate on those things because sometimes the mines also have budgetary constraints, we don't have endless pits of money. Now, the one guy can put in one rand and other one can do two to three rand, the next one can do five rand and that can build the final project. Where not one of them on their own, could afford to support a project like that, you know, so and that is coming more and more to the fore. And where that collaboration is done between the mines but it even now goes to the next level where that collaboration happens between the mines, government, provincial authorities and the community. So if you think of everybody that can pull together, you can actually deliver quite sustainable projects with a significant impact and because we haven't done that in the past, the general perception was we are not doing enough because you can't see the impact."

Furthermore, leaders demonstrated courage by challenging the status quo in various aspects, such as pursuing innovation, sustainability and engaging with stakeholders. Overcoming the apprehension of failure, especially within the mining sector that involves intricate layers of risk in terms of safety, environment, labour and community issues, necessitate bold and fearless leadership. This often necessitates taking bold steps and exhibiting acts of courage to drive transformative change. An experienced leader expresses his perspective on embracing courageous measures:

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[CMC2] “...it took quite a few brave steps from the leadership to actually go out there and I did that...then engage with the union to engage with the communities and workshops to design, the process. You know, it was always a huge secret designed by some of the leadership or members of our organisation, where they said, [CMC2] you're stepping into a world is too dangerous now, you can just set yourself up for it...So what I'm also saying to you it doesn't happen. Just because you think it's a good idea. You got to put energy into the you're going to put meat into the you're going to put skin into it. And ultimately some money into this as well because guess what, this option was more expensive than the previous way that we did things but ultimately, you know, there's more ownership towards the mine...”

In conjunction with courageous actions, leaders also expressed their perspectives on taking a resolute stance and decisive decision making that supports their team. By doing so, leaders foster a sense of confidence that empowers the team to explore new frontiers. Instead of passively accepting the existing norms and conditions, making crucial decisions at pivotal moments can unlock greater opportunities for innovation, growth, and strategic advantages for the company. A senior leader in the management team of a mining company, where pioneering innovation has been nurtured (as discussed in case study 2), discusses their CEO's display of courageous leadership through their actions:

[CFM1] “I think it's going to back to the culture and your values, it's around caring and respecting a particular sort of, you know, group of people that are working on this, encouraging it, but also been quite determined around some of the things and so the hydrogen truck, initially was going to be sort of progress at our Chilean operation. And when the CEO heard that she was like, rubbish, it's coming here. And it's going to be done here because actually, this is linked to mine market development, this is linked to PGM is so it has to be done here. And she pursued that and so it's a passion in that linkage all the way back to strategy. And what that actually means. It's that care and that respect, in terms of actually encouraging people to push the boundary and to make failures. And, then similarly you know, celebrating the success, but also being quite focused around again, what's the next step? How do we take this forward? How do we embed it into the business, how do I make sure that this is a success? So I think is probably, I think it's based, come down to just leadership. And I don't know whether it's just, it's not just because it's innovation. I think innovation is just a component of what we do every day, but it's leadership. That is the most important thing.”

[CTM5] “...and if we can afford to, you can never afford to from a safety perspective but from a cost perspective, if you can afford, you know, we encourage it. Buying the Rustenburg

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operations was a calculated risk, it was a measured risk and... I'm telling you it was not a business risk, turning the Rustenburg operations around was an innovation risk. It was a new way of doing things. It was finding solutions to problems which [Company X] couldn't do. That's how we turned it around. So it's you know we look at it we looked at our business model, we look at our structures, we look at our mining methods, we look at it efficiencies, we look at our technology, we look at our people and all those things feature into the risk we are prepare to take whether that's innovation risk or business risk. You know, we look at what we've got it and we think we can do something with it we do."

Lastly, the significance of embracing mistakes was recognised as a vital leadership practice in promoting exploration, as acknowledged by all participating leaders. They understood that if failure is not accepted as a natural part of the innovation process, the fear of trying new and different approaches would hinder progress. While many leaders acknowledged that mistakes are inherent to being human and that not all innovations will succeed, there was a clear caution from leaders that innovation should never compromise safety and human life. This is crucial for effectively navigating and managing the risks associated with innovation in the mining sector. The following quotes from senior leaders reflect their views on accepting mistakes:

[CMC2] "...And of course you're going to allow people to make mistakes, but based on sound fundamentals and to learn from those mistakes, and also to make a mistake is nothing but to make the same mistake three times that's and you can get upset. So and they do allow that. people's brains incredible if they are allowed to think you know, and allowed to make a mistake. And that mistake was not be made that at the expense of somebody's life or something... And then also going through the mindset to understand what failed, to move to mindset is to say what must we do to prevent the failure and that also worked through in your safety and your operational side of things... And to move to a process where then don't apportion blame... the problems will always be there. There will always be failures. But moving on the mindset that we resolve those failures, we don't just report the failures we learn from it..."

[CMC1] "... you must divorce the problem from the individual. Most important thing is never attack the individual attack the problem. Something I feel very strongly about, and this has always been my management style. So let's understand the facts, not the emotion, the facts."

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The research study highlights leadership practices that foster a high complexity of action associated with exploration. These practices include creating the urgency for innovation, encouraging the emergence of fresh ideas, nurturing a collaborative environment, appointing dedicated innovation teams for high impact projects, taking courageous action, making decisive decisions and embracing mistakes.

Leaders who embody and prioritise these actions create a more conducive environment for their teams and companies to actively pursue innovation. By embracing these actions, leaders can unlock the potential for transformation within the mining sector, offering significant value and driving positive change.

6.5.3 LEADERSHIP PRACTICES TO ENABLE EXPLOITATION

The examination of the data also uncovered several leadership practices employed to facilitate exploitation in the mining sector. Comparable to the leadership practices used to enable exploration, these practices for enabling exploitation can be classified into two separate pathways: those focused on beliefs and those focused on actions (Havermans, Den Hartog, Keegan & Uhl-Bien, 2015). Leadership practices aimed at promoting a lower complexity of beliefs facilitated the development and incorporation of a unified representation of the context, as well as a shared perspective and approach to addressing the perceived challenges complexity of the environment (Havermans, Den Hartog, Keegan & Uhl-Bien, 2015).

Leadership practices aimed at promoting a lower complexity of actions facilitated a shift towards a response to address the perceived complexity of the environment. The initial pathway through which leaders enabled exploitation involved stimulating a decrease in complexity of beliefs.

The research findings suggest that leaders frequently accomplished this by embracing and promoting certain values that reduce complexity in beliefs. Within the sample, we observed senior leaders frequently expressing their perspectives on the ***importance of responsible innovation***. Due to the significant risks associated with the mining industry, leaders are highly aware of their responsibilities to shareholders

and stakeholders. Therefore, they emphasise that innovation must bring tangible benefits and should not be pursued solely for the sake of innovating.

[CMC8] "And we embrace it. You know, it's a lot of you will find in the mining industry. Because it's large capital projects. And it's difficult to have that mindset change to go to new technologies, because you're spending a lot of money. So you're putting a lot of money at risk to try something new. but if it works, there's a lot of benefits that you could potentially going to get from it. So, we are doing and this is confidential, but we are doing work on..., but it would require us to technique and to be the first people to implement a specific technology. So that comes with proper risks, risk assessments, because you also need to be responsible for shareholders. Just be innovative for the sake of being innovative and trying to be cool. And as a contractor, you have to be responsible while being innovative, and they must be of benefit to the innovation. Yeah, we shouldn't just innovate for the sake of innovation. Sometimes the old stuff or down the way they'll die because it works."

Within the research sample, the interviewed leaders emphasised the significance of **taking calculated risks and approaching significant innovations cautiously**. It is widely acknowledged that leaders should carefully assess the risks associated with major innovations. While calculated risks are crucial for driving progress, it is equally important to exercise caution when implementing significant innovations. This involves considering potential consequences and implementing appropriate measures to mitigate any potential negative impacts. Senior leaders share their perspective on this matter:

[[CMC8] "I think we probably have a bit more of an open mindset willing to, to try new things. But that being said, you also have that responsibility towards your shareholders. So you need to balance your, your risk appetite, with delivery, as long as you deliver. You can probably afford to have a bit of a bigger risk...So it's about it's about assessing whether you've made a mistake and then moving on. And then it's also you know, with within, the bigger the risk is, the more cautious you would be about approaching different innovation. It's a risky area of the business. It's high value. You know, there would be a lot of process going into a specific risk or specific innovation that you would implement in a certain area. If that's the case, you know, you would you would approach it cautiously. We would study extensively and it would be well thought through before implemented. And then if you during that process, if you see your mind, you don't think it's going to work. Don't be afraid to own it."

The study revealed that leaders expressed a strong belief in connecting innovations to tangible deliverables and ensuring that they provide value to the company. Recognising that innovation can be a costly endeavour, leaders emphasised the importance of **evaluating and measuring innovation initiatives**. This strategic decision-making process enables the identification of innovations that can offer significant value and benefits for the company and also eliminate innovation that may not be viable to pursue at the time. A senior leader shares views on this matter:

[CFM2] "...I'm quite crude when it comes to the scoring of technology and innovation. I mean, at the end of the day, why are you doing it? You know, firstly, you have to answer those questions. So there's a whole range of outcomes. I mean, one is to save costs, which so if you invest in innovation, you either have to take an old costly piece of equipment out and put a new one in that's cheaper to run, or I mean, secondary to that is if you invest in innovation hopefully, you know, it reduces headcount."

The second pathway through which leaders enabled exploitation involved stimulating a decrease in complexity of actions. One strategy for reducing the complexity of actions involved leaders establishing limits and regulations to guide innovation. The research findings indicate that leaders **set boundaries and controls** to prevent innovation from becoming unmanageable within the organisation and to avoid employees going off in conflicting directions. Senior leaders further elaborated on the significance of implementing boundaries and controls, as expressed in the following quotations.

[[COM1] "You know, safety is such a big issue in in a big labour-intensive operation. There are certain things where you cannot allow a cost to go off and try something different than this, has been done in a in a proper controlled manner. So would you set those boundaries between saying, absolutely push the boundaries, try new things and really embrace failure. There are going to be parts where we can do that and the other parts will reverse it over these are lines we cannot cross because of a normally a safety issue more than anything else. How do we get that sort of thinking embedded into our, into our workforce that for us, I think is the real light and thinking we're doing at the moment."

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[CFM2] “...you also don't want everybody to run in 100 different directions. So, yeah, I think I think it's a difficult one. It's finding that balance between allowing people to do things, to fail, but also, you know, how do we bring them back to the center when we see it's going too far to the left or too far to the right.”

[RSM1] “...we're sort of forced into a new system, also ensuring that you've got segregation of duties, which leads back to your governance again...I mean, it becomes quite complicated. You know, there's a lot of you have to have proper governance structures, you have to have proper policies and procedures, you have to, you have to keep people accountable. You have to have proper project managers. You have to check in with people on a regular basis. I mean, fatigue management, I think is one of the most important elements of introducing new technology. And then you have to manage perceptions.”

Alongside implementing boundaries and controls, leaders also emphasised the significance of **research and allocating a restricted amount of resources** for innovation. For mining companies to take risks and invest in innovation, it is essential that thorough research supports the process. Due to limited resources, careful planning and allocation of resources for innovation must be balanced with immediate priorities and the unpredictability of a volatile market. As a result, setting aside dedicated budgets for innovation enables companies to pursue innovative endeavours within defined boundaries. A senior executive expressed his perspective on this issue:

[CTM7] “...you do go and look at it from a proper perspective and we do engage with the best people in the world to make sure that the technologies that we do implement are backed up by proper systems and people. And if you think about it, what we're doing now in the South African context, it looks like you jumping up there and you being innovative and everything, but if you really go back and see what other people have done, elsewhere, we actually followers we maybe early adopters of new technology. But in the South African context, there is always somebody that tells you why it won't work. But so from a risk point of view, we not we're not scared to take risks, but the risks are being supported by proper research and backup, you know, and we make sure that the people that we do engage with are proper...”

Leaders also employed an approach of **actively monitoring the risks** as a means to reduce complexity. Utilising tools such as risk registers, dashboards, and reporting

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structures, they were able to effectively manage and minimise potential issues. The following quote exemplifies this concept.

[[COM2] “And so, one has to have a very good understanding of this and I think our risk side of our business and the way we manage risk, we have a dedicated within my jurisdiction so we have a quite a strong process we follow in risk. Within the business, we have a monthly risk dashboard we develop our business can meet all our reporting structures, my monthly reporting side of the business, all the way up to board quarterly. So it's quite a involved process. And I think it works very well first. So it's managing risk of operations in detail, the bigger risks of the business so project risk management is a big processor. They focus on that to try and mitigate potential issues which will be negative to the organisation.”

During the research study, one leader discussed the idea **of incorporating innovation measurements** into the key performance indicators (KPIs) of employees and making it a part of the incentive strategy. While this perspective was not shared by the majority of leaders interviewed, the researcher believed that this action could aid in reducing complexity and integrating innovation in a managed manner within the company. The following quote reflects the views of the leader on this matter:

[CTM7] “I think you could, you know, we spoke about it as well in our company that it could become part and parcel of, you know, we talk about KPAs and KPIs and it's very, you know, so many tons and so many Rands for this and that constructed by that date and so forth. But we hardly ever try and measure innovation and make that a part and parcel of your incentive scheme”

Leaders simplified the complexity of actions by setting boundaries and controls, by ensuring innovative ideas are supported by proper research. Moreover, making sure that innovation takes place within restricted resources while actively monitoring the risks and incorporating innovation measurements into KPIs. These provided guidance for individuals' behaviours and the framework within which innovation can be exploited in the mining companies. In enforcing these actions contributed to reducing the complexity of permissible actions while still adhering to established boundaries.

6.5.4 SUMMARY OF THEME 3

To summarise, the study revealed that leaders in mining companies employ various leadership practices to stimulate both exploration and exploitation, fostering contextual ambidexterity. These practices either facilitate exploitation by reducing the complexity of responses or enable exploration by increasing the complexity of responses. By engaging in both sets of practices, leaders in mining companies have the potential to enable contextual ambidexterity. The identified leadership practices impact two dimensions of response complexity: the complexity of beliefs and the complexity of actions.

Leadership practices promoting exploration by stimulating a higher complexity of beliefs involve establishing expectations and a forward-looking vision, valuing deliberate intent and determination, transforming paradigms and mindsets, being open-minded, nurturing a culture of encouragement, practising active listening, being supportive, appreciating diversity in teams and attracting the right talent. Thus, through these values leaders are able to foster diversity of perspectives and ideas, and instil courage and confidence to explore innovation.

Stimulating exploration through a higher complexity of actions primarily entails creating the urgency for innovation, encouraging the emergence of fresh ideas, nurturing a collaborative environment, appointing dedicated innovation teams, taking courageous action, making decisive decisions and embracing mistakes.

In contrast, stimulating exploitation by reducing the complexity of beliefs involves emphasising values related to exploitation, such as the importance of responsible innovation, taking calculated risks and approaching significant innovations cautiously while ensuring that innovation is strongly associated with delivery and performance.

Leaders generally reduce the complexity of actions by imposing tighter constraints on work methods by setting boundaries and controls, by ensuring innovative ideas are supported by proper research and limiting innovation to available resources while actively monitoring the risks and incorporating innovation measurements into KPIs.

While examining the interviews related to Theme 3, the analysis focused on identifying leadership practices that effectively promote both exploration and exploitation for contextual ambidexterity. Nevertheless, the findings also brought to light inquiries regarding the long-term combination of these practices. It is important to note that the data related to Theme 3 did not extensively explore these specific issues, warranting further research and investigation in this area.

Nevertheless, to delve into the leadership strategies that foster sustained contextual ambidexterity within the mining sector, the researcher explored insights from leaders regarding the necessary shifts and changes needed within the mining sector to foster innovation.

6.6 THEME 4: LEADERSHIP BEHAVIOURS AND PRACTICES FEATURES WHICH SHOULD BE STRENGTHENED IN THE MINING SECTOR

In order for the mining sector to navigate complexities, pursue strategies that foster support for innovation and ensure sustainable practices, it is imperative to identify and strengthen key features within the mining sector. This study delves into the explored insights from leaders regarding the necessary shifts and changes needed within the mining sector to foster innovation.

By focusing on these features, the study can pave the way for a more robust and responsible mining sector that aligns with evolving economic, environmental and social dynamics. In this study, the researcher explores the key features that demand reinforcement in the mining sector, shedding light on potential strategies to achieve this goal and foster a more sustainable future for the sector. Table 27 below shows Theme 4 and the one sub-theme that emerged.

Table 27 : Outline of Theme 4 - Missing features which should be strengthened in the mining sector

THEME 4: MISSING FEATURES WHICH SHOULD BE STRENGTHENED IN THE MINING SECTOR		
SUB-THEME	CODES	SUB-CODES
SUB-THEME 1: FEATURES LACKING FOR EXPLORATION OF INNOVATION	Shifts in the mining sector	1. allocate time and foster an environment conducive to fostering innovation. 2. embrace greater agility. 3. incorporate novel perspectives and individuals with a variety of skill sets. 4. cultivate a change in mindset. 5. transition away from the traditional hierarchical structure often characterized as an old boys' club.
	Sustaining a conducive environment for innovation	1. leadership alignment to steer and uphold a culture of innovation 2. involvement of stakeholders in the process of innovation 3. acknowledgment and incentivisation of innovative efforts
	Leadership features lacking	1. perseverance and courage 2. accessibility 3. less arrogance and more collaboration

Source: Compiled by the Author

6.6.1 SHIFTS IN THE MINING SECTOR

The researcher also sought the participants' viewpoints on the changes they believed the mining sector should make to foster a more favourable environment for exploring innovation. The ensuing quotes capture the viewpoints of some senior leaders as they express their thoughts on the necessary shifts and changes that should be implemented.

[CMC8] "... it's a high-pressure environment and I think a lot of time there's simply not time to try new things because you're also driven by the targets that you need to achieve. And that's why it's important for your board and your senior management to allow for a culture of innovation to get the necessary time dedication within an organisation, so that you give your teams enough bandwidth to be able to, to think of new ideas and new technologies and try new things. Not just trying to put out the fires that's in front of them in terms of reaching the

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objectives. And it should be, it should be built into the incentive programme and into the KPIs to come up with new ideas.”

As seen from the above perspective shared by a leader [CMC8] while acknowledging the highly pressured environment to deliver a multiplicity of targets linked to business objectives, there is a need to allocate time to create an environment conducive to fostering innovation. Dedicating specific time and resources for innovation activities within a company can lead to a higher rate of successful innovation outcomes. An environment that encourages experimentation, risk-taking, and creative thinking has been shown to positively influence the generation of novel ideas and the implementation of innovative solutions. This allocation of time and fostering of an innovation-friendly environment significantly contribute to a company’s overall innovative capacity. Moreover, the respondent suggests that the time to think, create and experiment should be incentivised.

Below is another view shared by a participant on the shifts required in the mining sector:

[CTM3] “Shift on agility...If you take the mining sector, the mining sector has got the cycle of seven years of product development, the cycle of commodity cycle that spans about five years upside down and you tend to want to develop in that timeframe, you know. So, if I take a direct example or processing technology, to get to these quick timelines in the FMCG space, you will develop more partnerships. You will share more openly. You will embrace your OEMs, you will buy in technology that is off the shelf rather than design that yourself and you will be able to pull it together and you will create a unit of operations that you replicate. The mining sector has got this and probably true that if I take my mineral resource, there's a definite geology. There's a definite processing capability, and there's a definite design that maximize value. If you swing that around and say well, if the maximize value from your process technology is in the final tweak of the plan is 3 to 4%, but 95% of the value is given by standard plan, then why not embrace the standard plan, effectively execute quicker and then course correct and tweak during execution? So I think that's what the mining sector has got to embrace. The mining sector has got to embrace agility and adaptability.”

The above excerpt reveals that there is a need for the mining sector to embrace greater agility and adaptability. Organisational agility, characterised by the ability to swiftly adapt to changing circumstances, is directly linked to improved responsiveness, enhanced problem-solving, and increased competitiveness.

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Embracing agility allows companies to anticipate market shifts, adjust strategies promptly, and seize emerging opportunities, ultimately leading to better performance and sustained growth.

A Chief Operating Officer [COM2] also noted shifts that need to occur, focusing on incorporating diverse skills sets to foster innovation:

[COM2] "I think it's bringing new people in, new thinking processes, highly more highly skilled individuals more educated. Many years ago, no level of education were needed to be in underground mining operations. Today that are mechanized operations, the standard is minimum matric, levels of education because of the more high-tech. So, I think we need to rotate people, people who rotate more get better thinking from other areas, not necessarily mining. I think there's industries that we can learn a lot from. We have been a bit stuck in our ways and haven't looked outside."

As revealed by the above quote, highlights the importance of diverse teams in fostering creativity and innovation. Teams composed of individuals with varied backgrounds, skills and perspectives tend to generate more innovative ideas and approach challenges from multiple angles. In addition, the respondent proposes job rotation so that employees are not stuck in a specific operation and so that the 'new' people can share fresh perspectives. Such diversity enhances the potential for breakthrough innovations and enables companies to tap into a wider range of expertise.

The perspectives offered by the Chief Executive Officer below underscores the need for a shift in mindset:

[CMC5] "First one is a mindset because without the mindset shift, none of this can happen. Because you have to help the people to change the paradigm, change the lens..."

Cultivate the mindset for innovation is critical. Innovation requires a growth-oriented mindset, as opposed to a fixed mindset which significantly influences an individual's willingness to explore new ideas, take risks, and persist in the face of challenges.

As one senior leader, who has spent his entire working career in the mining sector, indicated that the mining sector has remained untransformed for the past 30 years.

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[[CTM7] “And so how do you bring people with you. And in the mining industry has been quite slow to change. You know, I jokingly said the other day as well that, you know, I’ve been in this game now for longer than 40 years. In the first 30 years was the same it is really the last five into five years things have really started to change and so how do you bring people with you. And in the mining industry has been quite slow to change.”

The mining sector has a longstanding history in South Africa and is anticipated to endure for another century. To ensure relevance in this ever-evolving landscape, the key inquiry should shift from past practices to innovative approaches. Mining companies must prioritise the establishment of a culture that values and nurtures a growth-oriented mindset within their workforce. This shift is pivotal in fostering an environment conducive to innovation and ultimately realising heightened achievements through the implementation of inventive endeavours.

The senior leader below provided significant observations about the structural changes necessary for the sector's transformation:

[[CTM2] “Tapping into our generation, but the mining is a very hierarchical, old boys club type of environment. And I think giving our young talents, the opportunity to challenge and ask those questions...I think that the next generation coming through are looking at things fundamentally differently with a social responsibility lens, which we didn't have when I when I started mining 35 years ago. Of that, and we need to tap into it. And they and if you think about changing the face of mining, that's next generation, but I'm going to sit in my position in 20 years'.”

There is clearly a need for the mining sector to transition away from the traditional hierarchical structure often characterised as an old boys' club. This sentiment has been felt by a number of the participating leaders in the sample. Examination of company structures indicates that moving away from traditional hierarchical models towards more inclusive and diverse structures has a profound impact on innovation. Hierarchies can stifle open communication and limit access to decision-making for certain groups, whereas more inclusive structures empower a broader range of voices, leading to a higher likelihood of disruptive innovations and a more equitable distribution of opportunities within the company.

6.6.2 SUSTAINING A CONDUCTIVE ENVIRONMENT FOR INNOVATION

The researcher investigated the participants' opinions on how a conducive environment for innovation can be maintained in the long term. The following quotes encapsulate the perspectives of senior leaders on this matter:

[CMC3] "One, it's alignment from a leadership perspective, because, you know, when it comes to culture, unfortunately, and sustaining a particular culture, leadership plays a key role. When it comes to that and, so if I, for example, engage my team every day, just on the how much iron ore have you produced today, you know, etc., that would be terrible for the entire organisation. But if I engage my team, on all the various elements that we need to focus on, then I guess, there's a higher chance that we'll be driving the right culture. So for me, I think one of the key things is from a leadership perspective, it's leadership alignment around the kind of culture that we need to drive. I'm talking about leadership at the various levels."

The research highlights that a clear alignment from leadership is pivotal in fostering an innovation-oriented culture within a company. When leaders consistently emphasise the importance of innovation and demonstrate their commitment through actions and policies, it significantly influences employees' attitudes and behaviours towards innovation. Companies with strong leadership alignment tend to exhibit higher levels of employee engagement, idea generation, and experimentation. Moreover, this alignment plays a critical role in sustaining an innovation culture over time, ensuring that innovative practices become ingrained in the fabric of a company's culture.

A senior leader [RSM1] within the Risk/Sustainability portfolio expresses:

[RSM1] "I think, again, just with including a number of stakeholders, you know, to get some buy in from various areas as opposed to just you being the one driving a particular matter. So just making sure that there are more owners in the company because we've often seen this, we introduce software and you know, the person leaves and it falls flat and then you introduce something new again. But I must say in [CO1] we very, on the back of sustainability, introducing sustainable innovation and technology."

The study underscores the significance of involving stakeholders throughout the innovation process. Engaging stakeholders, including employees, customers, suppliers, and partners, leads to a more holistic and comprehensive approach to innovation. By incorporating diverse perspectives and insights, companies are better

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equipped to identify emerging opportunities, address market needs, and develop innovative solutions. Furthermore, stakeholder involvement enhances the likelihood of successful innovation adoption, as stakeholders become advocates and champions of new initiatives. Effective mechanisms for stakeholder collaboration, such as co-creation and open innovation, contribute to a robust innovation ecosystem.

Yet another experienced leader highlighted that giving recognition and providing incentives for innovative endeavours is essential to maintaining a favourable atmosphere for fostering innovation:

[RSM4] "I think you need to recognise - recognition is one big thing. If they have been successful ideas we need to recognize people who have come up with those ideas. And then you also need to have some latest sharing, sharing of those innovations across the organization. And it needs to be also by leadership this needs to be constantly there should interest because embrace the owners respond to what leaders show interest in..."

The findings indicate that recognising and providing incentives for innovative contributions significantly impact the innovation culture within a company. When employees' innovative efforts are acknowledged and rewarded, it not only motivates them to contribute more ideas but also fosters a sense of ownership and pride in their work. Incentivisation mechanisms, such as reward and recognition programmes, and career advancement opportunities, serve as catalysts for encouraging employees to actively engage in innovation-related activities. Companies that effectively acknowledge and incentivise innovation create an environment where employees are more willing to take risks, experiment, and drive creative solutions that contribute to the company's overall growth and success.

These findings collectively underscore the critical role of leadership alignment, stakeholder involvement, and acknowledgment in cultivating a thriving culture of innovation within companies. Implementing strategies to enhance these aspects can lead to a more dynamic and sustainable innovation ecosystem, enabling companies to adapt, evolve and excel in today's rapidly changing business landscape.

6.6.3 LEADERSHIP BEHAVIOURS AND PRACTICES WHICH SHOULD BE STRENGTHENED

Finally, in an attempt to understand the fundamental transformation necessary to create a more conducive environment for promoting innovation in the mining sector, the researcher asked senior leaders which leadership attributes or characteristics, from their perspective, were currently lacking and required further development. The subsequent quotes represent the views of these senior leaders as they express their thoughts on this matter:

[CTM7] "I think the fear of making a mistake. I think that and also the long-term vision of where you want to go to needs to be crystallised. Because very often, you know, the CEOs and the leaders are being held almost ransom by the investors for the short term, what your results gonna be next month or next week or this quarter or this half of this year, you know. And you need to step out of that and say so where is my ultimate goal, we do I want to go to and then you mustn't be scared to implement and make changes and follow up on those. And, as I said before, perseverance, pushing, not giving up, taking people along with you on that on that roadmap."

The first area that has to be worked on is the fear of failure. Business leaders have to overcome this fear as according to the data failure is an inherent risk in innovation. Not all innovations work. Failure to overcome this risk will make leaders' risk averse

[CTM7]: "They have many, many challenges to deal but when it comes to innovation. I think the fear of getting it wrong is still there, the sort of overarching drive. So especially when I say courage having the courage to overcome that. That fear symptoms, they just disappear. And it's been I think, that's borne out of money. Being very conservative, So it's basically being able to break that mould and create an environment where innovation can thrive."

As seen above, the role of perseverance, which the participant above also called tenacity, is a critical driver of innovation. Perseverance, characterised by persistent efforts and determination in the face of challenges and setbacks, emerges as a key factor in the innovation process. Individuals and teams that exhibit perseverance are more likely to navigate obstacles, iterate on ideas, and overcome failures, ultimately leading to the successful implementation of innovative solutions. Moreover,

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perseverance contributes to a culture of continuous improvement, where setbacks are viewed as opportunities for learning and growth rather than deterrents. Companies that encourage and recognise perseverance among their members foster an environment conducive to sustained innovation.

Furthermore, a significant portion of the study's respondents highlighted the substantial risk associated with safety within the mining sector. Mine safety is subject to stringent regulatory frameworks, including Occupational Health and Safety regulations, which are undoubtedly essential. Companies are obliged to report every health and safety accident to the Department of Employment and Labour. Consequently, there appears to be limited enthusiasm for innovation in this particular realm. Nonetheless, an opportunity exists to consider innovation as a means to enhance safety performance and prevent fatalities.

As emphasised by the participant mentioned earlier, the attribute of courage emerges as a fundamental requirement in the pursuit of innovative endeavours. The willingness to take calculated risks, challenge the status quo, and explore unconventional ideas is a hallmark of innovative individuals and companies. Courageous individuals are more inclined to voice dissenting opinions, experiment with new approaches, and embrace uncertainty, all of which are crucial for generating breakthrough innovations. Furthermore, a culture of courage encourages open dialogue, fosters creativity, and empowers employees to contribute innovative solutions without fear of criticism. Companies that nurture and reward courage create a climate where innovation thrives and new possibilities are explored.

[CMC7] "I think the way mining organisations are traditionally structured is a problem within the hierarchy. So maybe the structure itself is not, but it's really communication within that structure. So I suppose the accessibility of leaders is one of the things that is common. What I'm trying to get to is the infrastructure owners inhibits the need. Being accessible to the data organised to the broader organisation. And if you want to innovate that leaders must be accessible...That's a big issue and how we leaders engage with organisation in mining organisations. There's an issue, I think it is in most mining companies.

Accessibility, in terms of providing equal opportunities for participation and contribution, emerges as a pivotal factor in promoting innovation. The study reveals

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that when companies ensure leaders accessibility, resources and information accessibility along with accessibility to decision-making processes, a broader range of individuals can engage in innovation efforts. Accessible innovation ecosystems empower diverse talent to collaborate, share insights, and contribute to problem-solving, resulting in a richer pool of ideas and perspectives. Moreover, accessibility supports inclusivity, enabling individuals from different backgrounds and roles to play a part in shaping innovative outcomes. Companies that prioritise accessibility foster an environment where innovation is democratised, and the potential for transformative ideas is maximised.

[CTM5] "I'm gonna fall back on structure. I don't think that's a leadership attribute. But I do think it's something that the industry hasn't done extremely well... there's not many mining companies that got structures dedicated to innovation in your product. There something we can really do differently. We need to structure for a structure costs money. And, you know, mining companies do this. They got to put up the money. And we said the first things that tend to disappear more times. But I think we need to persevere. We need to put that culture we need to put that strategy in place, no matter how much it costs in order to come up with new ways of doing things and new technology. That is the one big difference that can be made."

The research underscores the critical role of effectively allocating both organisational structure and resources in driving successful innovation initiatives. A well-defined structure provides the framework within which innovation efforts can flourish. Clear roles, responsibilities and communication channels facilitate the coordination of diverse talents and expertise, ensuring that innovative ideas are efficiently channelled and transformed into tangible outcomes.

Moreover, allocating appropriate resources is essential to fuel innovation. Adequate financial, human and technological resources empower teams to experiment, iterate and bring innovative concepts to fruition. Companies that strategically allocate resources to innovation endeavours create an environment where employees are empowered to explore new avenues and take calculated risks. Conversely, a lack of resources can stifle innovation, hindering the development and implementation of ground-breaking ideas.

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Furthermore, the findings highlight the importance of flexibility in resource allocation. Innovation is inherently unpredictable, and rigid resource allocation models may impede the company's ability to seize emerging opportunities. A dynamic approach to resourcing, which allows for reallocation and adjustments based on evolving project needs and market dynamics, enhances the company's agility and responsiveness in pursuing innovative initiatives.

Effective resourcing of innovation also involves striking a balance between short-term goals and long-term innovation objectives. While companies often prioritise immediate revenue generation and cost-cutting, neglecting long-term innovation efforts can lead to stagnation and missed opportunities for growth. Allocating resources with a forward-looking perspective encourages a culture of continuous exploration and adaptation, ensuring the company's ability to remain competitive in evolving markets.

[CMC4] "I think arrogance was the first one that comes to mind but I must say we've come a long way and it's interesting. I mean, if I consider my colleagues in the PGM industry and on the Minerals Council, I think the fact that we all, I mean, if you just think the leader leading the Minerals Council, that diversity has definitely brought in a different term... Which links into collaboration. I think collaboration was originally something that was unheard of, because people it's really, its mine is bigger, it's better kind of thing. So collaboration is definitely one of those that we need to do more often, but I think we are not where we used to be. I think vulnerability is probably the other one. Vulnerability. Acknowledging that, you know, other people are doing stuff better than we do and we can learn from each other and through collaboration we can achieve more. So, I think vulnerability is to a large extent, probably the opposite to arrogance. And it is required to drive to drive collaboration."

As seen from the above excerpt, the research highlights a significant shift required in leadership attributes that positively impact innovation and company dynamics. Traditional notions of leadership characterised by arrogance and top-down decision-making are being replaced by a more effective approach that emphasises vulnerability and collaboration.

Leaders who exhibit humility and vulnerability create an environment where team members feel comfortable sharing diverse perspectives, taking calculated risks, and experimenting with new ideas. By acknowledging their own limitations and being

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open to feedback, these leaders establish a foundation of trust and psychological safety that encourages creativity and innovation. This shift in leadership style fosters a culture where employees are more willing to voice innovative solutions and collaborate across hierarchies.

Collaboration is a central tenet of this new leadership paradigm. Leaders who prioritise collaboration over competition recognise that innovation often arises from cross-functional teamwork and diverse expertise. Such leaders actively break down silos, facilitate knowledge sharing, and encourage interdisciplinary collaboration. This collaborative approach leads to the convergence of different insights and experiences, resulting in more holistic and innovative solutions.

Moreover, this finding underscores that leaders who prioritise collaboration are not only open to diverse viewpoints but also actively seek input from various stakeholders, including employees, customers, and partners. By involving a wide range of perspectives, leaders enhance their decision-making processes and contribute to a culture of inclusive innovation.

The transition from arrogance to vulnerability and from isolation to collaboration signals a transformative change in leadership philosophy. It aligns with the evolving demands of dynamic business environments, where innovation thrives when leaders promote open dialogue, foster teamwork, and create a sense of shared purpose. Leaders who embrace humility, vulnerability, and collaboration position their companies to navigate uncertainty and drive innovation, ultimately achieving sustained growth and competitive advantage.

6.6.4 SUMMARY OF THEME 4

In the effort to promote innovation within companies, a number of key themes have emerged from research. One primary theme suggests that there are certain elements lacking in the mining sector that require reinforcement. An important sub-theme delves into the specific aspects that are absent when it comes to fostering innovative

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practices. The latter points to necessary shifts within the mining sector to encourage innovation, including establishing an environment conducive to foster innovation; embrace greater agility; incorporate novel perspectives and individuals with a variety of skill sets and cultivate a change in mindset and transitioning away from the traditional hierarchical structure often characterised as an old boys' club behaviours and attitudes.

Another sub-theme focuses on maintaining an environment favourable for innovation. To achieve this goal, participants emphasised the importance of leadership alignment to guide and uphold an innovative culture, increased engagement of stakeholders in the innovation process, and recognition and incentivisation of creative endeavours. The final sub-theme sheds the spotlight on the leadership attributes which are crucial for driving innovation. Participants highlighted the need to strengthen certain attributes for a more supportive innovative environment within the mining sector, including perseverance and courage; accessibility, reduced arrogance and more collaboration.

In summary, these findings collectively underscore the intricate nature of a culture of innovation. A culture of innovation flourishes when leaders exhibit qualities of humility, collaboration and openness to diverse viewpoints. Companies that strategically allocate resources, involve stakeholders, and acknowledge innovative contributions create an atmosphere where new ideas can thrive. This, in turn, leads to sustained growth, adaptability and a competitive edge in today's dynamic business landscape.

6.7 SUMMARY OF CHAPTER 6

This chapter introduced the participating companies and participants involved in the study, offering insights into their companies' roles, demographics and backgrounds within the mining sector. Additionally, it summarised the outcomes derived from interviews and the examination of company documents. These findings encompassed several focal points: the participants' understanding of SDGs and ESG principles, their perspectives on adopting these principles, the integration of SDGs

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and ESG into the business operations, the demonstration of innovative practices in support of SDGs and ESG, and an exploration of enabling leadership practices that facilitate innovation within the South Africa's mining sector. The ensuing chapter will synthesise and elucidate these findings through discussion and interpretation.

CHAPTER 7

7. DISCUSSION AND INTERPRETATION

7.1 INTRODUCTION

Chapter 2 of this study provided an overview of the existing body of knowledge, focusing on the central concept that enabling leadership plays a pivotal role in driving business success (Yahaya & Ebrahim, 2016). The author also underscored the importance of adapting leadership approaches to address the rising complexities and unique challenges in today's business landscape, as advocated by Edward and Mbohwa (2013:125-130), in order to effectively guide organisational transformations.

Hence the study endeavoured to explore the influence of leaders on the processes and practices that foster adaptable environments for innovation, with the ultimate aim of advancing progress towards the 2030 SDGs and associated ESG principles. In Chapter 2, the evolution of leadership theory was considered with specific emphasis on the importance of Complexity Leadership Theory and Ambidexterity Leadership Theory to enhance the understanding of leadership. In Chapter 3, the UN SDGs and ESG was considered and in Chapter 4, the South African mining sector was contextualised while Chapter 5 considered the research design and methods applied to achieve the study's research objectives.

The purpose of this chapter is to analyse and interpret the results of the qualitative research conducted in Chapter 6. The focus of this chapter is to discuss and interpret the outcomes obtained from the interviews, directly relating them with each of the secondary research objectives as presented in Chapter 1, (Section 1.3, Table 1). Subsequently, an overall interpretation of the findings is presented, relating them to the primary objective of the study, which is to explore enabling leadership practices and processes in the mining sector.

The research gap as discussed in Chapter 1, calling for fresh perspectives that account for adaptive practices and enabling leadership practices (Lichtenstein, Uhl-Bien, Marion, Seers, Orton & Schreiber, 2006:2) is meticulously explored and deliberated on. Lastly, a conceptual framework, derived from Havermans, Den Hartog, Keegan, and Uhl-Bien's (2015) model for ambidextrous leadership, is put forward, incorporating essential modifications informed by the comprehensive research outcomes.

7.2 ANALYSIS AND EXPLANATION BASED ON RESEARCH OBJECTIVES

Research abounds with calls for a shift in leadership paradigms and the exploration of new perspectives that encompass adaptable approaches (Lichtenstein, Uhl-Bien, Marion, Seers, Orton & Schreiber, 2006:2). This 'necessary shift' is discussed extensively in Chapter 1, It is the context within which is a research gap to examine leadership practices that foster sustainable development and innovative strategies for tackling the SDGs and ESG principles (discussed in Chapter 3) was crafted. It is also the frame from which the key research question emerged, namely, **'How do business leaders engage in enabling leadership to drive innovation and adaptation towards the 2030 Sustainable Development Goals (SDGs) and Environmental, Social and Governance (ESG) principles?'**

In this Chapter, the Discussion and Interpretation of the data analysis endeavours to answer key research questions.

By drawing on Complexity Leadership Theory and Ambidextrous Leadership Theory, the study aims to expand on the literature by contextualising leadership adaptability and innovation when implementing the SDGs and ESG principles. Secondly, it also aims to add to the advancement of knowledge amongst business leaders through narrowing the gap between a theoretical and a practical understanding of the SDGs

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and ESG principles, within South African based mining companies. (See figure 5 below as presented and discussed in Chapter 2)

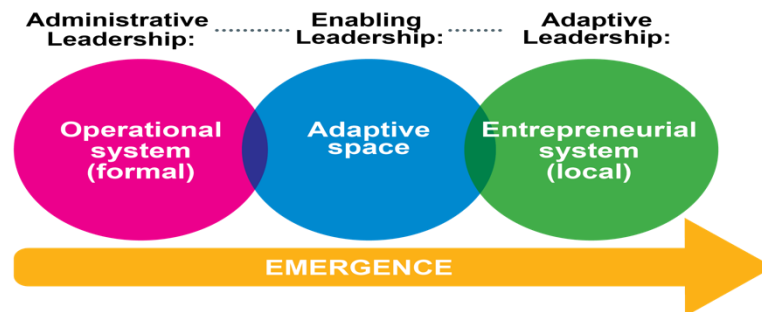


Figure 5 : Complexity **Leadership Model**

Source: Compiled by the Author

As demonstrated in Figure 5 above, Enabling Leadership is characterised by finding a balance between Administrative and Adaptive Leadership (Uhl-Bien & Marion, 2009 and Uhl-Bien *et al.*, 2007). It involves adopting leadership approaches that create environments conducive to problem-solving, adaptability and continuous learning (Mäkinen, 2018:137). Encouraging exploration and exploitation of new ideas is a crucial aspect of promoting innovation. Enabling Leadership operates at various hierarchical levels and includes the capacity to navigate the tension between exploring and exploiting ideas (Schulze & Pinkow, 2020), which aligns with Ambidexterity Theory.

As mentioned in Chapter 2, the term ambidexterity refers to "the ability to use both hands equally" (Zacher & Rosing, 2015:54). In the context of organisations, Ambidexterity Leadership Theory highlights an organisation's capability to effectively balance between exploiting its current organisational capabilities and exploring future opportunities (Rosing *et al.*, 2011). This study incorporates Ambidexterity Leadership Theory as a part of its leadership framework to explore leadership practices and processes that encourage innovation in the mining sector. This theory plays a crucial role in Chapter 6, where leadership practices and

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processes are analysed and also in Chapter 7: Discussion and Interpretation, which considers the subsequent work of Havermans, Den Hartog, Keegan, and Uhl-Bien (2015). Their research focuses on the ambidexterity that requires maintaining high levels of both exploration and exploitation simultaneously (Havermans, Den Hartog, Keegan, & Uhl-Bien, 2015).

The scholars emphasise that the levels of exploration or exploitation continually adapt in response to the complexity of environmental stimuli, as perceived by the organisation's leaders, among other factors. The ultimate goal remains consistently achieving or restoring high levels of both exploration and exploitation simultaneously (Havermans, Den Hartog, Keegan, & Uhl-Bien, 2015).

To identify leadership practices and processes that foster innovation in alignment with the SDGs and ESG principles, the researcher formulated research objectives based on the concepts of Complexity Leadership and Ambidexterity Leadership frameworks.

The interview questions were designed to correspond with these research objectives. To keep the discussion focused on the primary purpose of the study, which is to explore enabling leadership practices and processes to foster innovation, the empirical findings from the qualitative survey (Chapter 6) are linked to each of the Secondary Research Objectives. Table 28 provides a summary of the Secondary Research Objectives and the related interview questions, as previously presented in Chapter 6.

Table 28 : Secondary Research Objectives and corresponding Interview Questions

SECONDARY RESEARCH OBJECTIVE	INTERVIEW QUESTIONS LINKED TO THE SECONDARY RESEARCH OBJECTIVES
SECONDARY RESEARCH OBJECTIVE 1: To determine the aspects of leadership processes and practices that enable innovation towards the fulfilment of SDGs and ESG principles.	Q1.3 At a company level, how is innovation for sustainability provided for in your strategic and organisational planning processes? Q1.4 How does your company's strategy formalise innovation, particularly innovations related to the SDGs? Q1.7 Can you provide an example of a ground-breaking innovation in the mining sector which your company has implemented?

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SECONDARY RESEARCH OBJECTIVE	INTERVIEW QUESTIONS LINKED TO THE SECONDARY RESEARCH OBJECTIVES
	<p>Q1.8 In your view, which mining companies are trendsetters with regard to the SDGs and associated innovation?</p> <p>Q2.4 What is your company's risk appetite in respect of encouraging your team to pursue innovation? (What are the strategic risk areas associated with innovation?).</p> <p>Q2.1 What is your role in the innovation process from the ideation phase to the implementation phase?</p> <p>Q2.2 Once new ideas are explored, stress-tested and found to be feasible, how is it integrated into the company structure and institutionalised?</p> <p>Q2.5 On an individual basis, how do (or would) you manage risks and errors in the innovation process?</p> <p>Q2.6 Does your CEO encourage innovation?</p> <p>Q2.7 If yes, can you provide an example of how your CEO facilitated innovation? If no, why do you think not?</p> <p>Q2.8 What do you think should the role of a CEO be in encouraging innovation?</p> <p>Q3.1 The implementation of new ideas is often resisted. As a leader, how do you obtain buy-in from key stakeholders such as your Board, staff, and the community/ties you operate in? (Ensure that a view is expressed on each of the stakeholders).</p> <p>Q3.2 As a leader in the organisation how do you encourage and support out-of-the box thinking and new ideas? Provide a practical example.</p> <p>Q4.1 What in your opinion are the critical leadership features or attributes which serve as a catalyst for successful innovation?</p> <p>Q4.3 Could you provide an example of, when your company was faced with a challenge or an opportunity, where flexibility and agility was required during the initiation of innovation to meet the SDGs?</p>
<p>Secondary Research OBJECTIVE 2: To explore the perceptions of business leaders in the mining companies about creating an enabling environment for innovation, SDGs and ESG principles.</p> <p>SECONDARY RESEARCH OBJECTIVE 3: To explore the relationship between enabling leadership, innovation, SDGs, ESG principles and related challenges.</p>	<p>Q1.1 What in your view is the appetite of the South African mining sector for the Sustainable Development Goals (SDGs) and associated innovation?</p> <p>Q1.2 How would you describe the extent to which your company has embraced the SDGs?</p> <p>Q1.6 Which of the SDGs do you feel are the most critical for your company?</p> <p>Q4.2 I am interested in the relationship between Enabling Leadership and the SDGs. In your view, how does leadership impact the integration of the SDGs in your company?</p>
<p>SECONDARY RESEARCH OBJECTIVE 4: To propose</p>	<p>Q3.3 What shifts do you think should be made to develop a more conducive environment for exploring innovation in the mining sector?</p>

SECONDARY RESEARCH OBJECTIVE	INTERVIEW QUESTIONS LINKED TO THE SECONDARY RESEARCH OBJECTIVES
recommendations which could provide insights to serve as enabling leadership guidelines for an innovation ecosystem towards the attainment of SDGs and ESG principles in the mining sector.	Q3.4: If a more conducive environment for exploring innovation is (or has been) developed, how would you ensure that such an environment is sustained? Q4.4: If you were to focus on the mining sector as a whole, which leadership features or attributes do you feel are lacking or need further development in order to encourage the exploration of innovation?

Source: Compiled by the Author

Table 28 visually represents the connection between the interview inquiries and the Secondary Research Objectives. It is evident that certain questions are relevant to more than one of these objectives. For instance, Question 4.2 explores the relationship between Enabling Leadership and the SDGs and their perspectives on how leadership impacts the integration of the SDGs in their company. This question aligns with Secondary Research Objectives 2 and 3 due to the collective focus of these objectives which explore whether the participating mining leaders understand the connection between leadership and the SDGs. To delve into the mining leaders' perceptions of the SDGs, a series of questions were posed at the start of the interview process. It was only after responding to these queries that participants were prompted to articulate their perceptions of innovation and leadership practices.

7.2.1 FINDING 1: SECONDARY RESEARCH OBJECTIVE 1

The Secondary Research Objective is “To determine the aspects of leadership processes and practices that enable innovation towards the fulfilment of SDGs and ESG principles.”

Questions 1.3, 1.4, 1.7, 1.8, 2.1, 2.2, 2.4, 2.5, 2.6, 2.7, 2.8, 3.1, 3.2, 4.1. and 4.3, in the interview schedule would assist in addressing Secondary Research Objective 1:

Q1.3: At a company level, how is innovation for sustainability provided for in your strategic and organisational planning processes?

Q1.4: How does your company's strategy formalise innovation, particularly innovations related to the SDGs?

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Q1.7: Can you provide an example of a ground-breaking innovation in the mining sector which your company has implemented?

Q1.8: In your view, which mining companies are trendsetters with regard to the SDGs and associated innovation?

Q2.1: What is your role in the innovation process from the ideation phase to the implementation phase?

Q2.2: Once new ideas are explored, stress-tested and found to be feasible, how is it integrated into the company structure and institutionalised?

Q2.4: What is your company's risk appetite in respect of encouraging your team to pursue innovation? (What are the strategic risk areas associated with innovation?).

Q2.5: On an individual basis, how do (or would) you manage risks and errors in the innovation process?

Q2.6: Does your CEO encourage innovation?

Q2.7: If yes, can you provide an example of how your CEO facilitated innovation? If no, why do you think not?

Q2.8: What do you think should the role of a CEO be in encouraging innovation?

Q3.1: The implementation of new ideas is often resisted. As a leader, how do you obtain buy-in from key stakeholders such as your Board, staff, and the community/ties you operate in? (Ensure that a view is expressed on each of the stakeholders).

Q3.2: As a leader in the organisation how do you encourage and support out-of-the box thinking and new ideas? Provide a practical example.

Q4.1: What in your opinion are the critical leadership features or attributes which serve as a catalyst for successful innovation?

Q4.3: Could you provide an example of, when your company was faced with a challenge or an opportunity, where flexibility and agility was required during the initiation of innovation to meet the SDGs?

The responses to the above questions led to findings highlighted in Chapter 6 and articulated as:

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- Theme 2: Innovation positively impact sustainability in the mining sector; and
- Theme 3: High levels of ambidextrous leadership practices enable innovation in the mining sector.

7.2.1.1 **THEME 2: Innovation positively impacts sustainability in the mining sector**

Chapter 2 explores the concept of innovation as a potent catalyst for positive change and transformation across global industries. In this context, business leaders find themselves under immense pressure to ensure that their companies maintain competitiveness and continuously explore new avenues for growth. To meet this demand, these leaders must not only focus on inspiring innovation in marketing or product development but also instil a culture of inventiveness throughout their companies (Leavy, 2005:38).

Chapter 3 further emphasises the importance of sustainable business practices aligned to the SDGs and ESG principles. As evidenced by the conclusions drawn in Theme 1, leaders are required to ensure that their companies operate sustainably while pursuing innovation. However, scholars like Eisenhardt, Furr, and Bingham (2010); Uhl-Bien and Arena (2018); Worley and Lawler (2010) highlight a critical challenge faced by leaders, namely, managing innovation and adaptability effectively in dynamic and ever-changing environments.

Hence, this research aimed to investigate leadership practices and processes that enable innovation in alignment with achieving the SDGs and ESG principles. The focus of the study was particularly on the mining sector, which is of substantial economic importance for South Africa and entails various complexities as outlined in Chapter 4. However, the mining sector also presents significant opportunities for innovation to tackle the challenges highlighted by the SDGs and ESG frameworks.

The research revealed that innovation is indeed taking place within the South African mining sector. Chapter 6, focusing on Theme 2, highlights the positive impact of innovation on sustainability in the mining industry. Several findings provided context

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for Theme 2, and one notable sub-theme that emerged from the data was the significance of 'innovation integrated into strategy generates sustainable impacts.'

A key discovery in the study was that two of the surveyed companies, which demonstrated notable success in achieving high-level innovation outcomes, **displayed a clear commitment to deliberately integrating innovation into their strategic planning process and are actively cultivating a culture that embraces innovation.**

This finding aligns with Complexity Leadership Theory, which emphasises the importance of both Administrative Leadership and Adaptive Leadership in navigating complexities and promoting innovation. It underscores the need for formalising innovation as a part of the company structure while also creating an adaptive space that fosters a culture of innovation.

In line with Uhl-Bien and Arena's (2017) notion of a "complex adaptive system" being capable of adapting and evolving with changing environments, these mining companies exemplify how they have been able to transform and evolve within a sector that requires significant change. The study's findings are further reinforced by two case studies discussed in Chapter 6, which provide additional evidence of how these mining companies have successfully implemented innovation.

Another significant discovery emerged from the insights shared by some participants, indicating **a strong interconnection between strategic planning, innovation and growth.** It becomes evident that the focus extends beyond mere sustainability targets within the boundaries of ESG frameworks, urging companies to adopt a broader and long-term perspective on sustainability. Within this context, innovation plays a pivotal role as a critical facilitator of their sustainability endeavours. This finding aligns with the Global Sustainable Investment Review 2018, as discussed in Chapter 3, which also establishes a correlation between a robust ESG strategy and "higher equity returns, from both a tilt and momentum perspective" (Henisz, Koller, & Nuttall, 2019:2). The research further reinforces the results of earlier studies,

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indicating that companies focusing on environmental, social and governance concerns do not impede their capacity to generate value. Instead, these businesses may even experience a favourable effect on value creation (Henisz, Koller, & Nuttall, 2019:2).

Another important discovery emphasised **the crucial role of resource allocation in enabling innovation**, as mentioned by several leaders interviewed. The allocation of resources for innovation holds significant importance and is closely linked to how innovation management is carried out within mining companies. For instance, smaller mining companies, in contrast to larger companies with more extensive in-house R&D teams, rely on smaller R&D teams (if at all), and leverage the expertise of external consultants to achieve their objectives.

As explored in Chapter 2, this could potentially influence the value derived from innovation. Suroso & Azis (2015) highlight that value may arise from radical innovation, resulting in entirely new products, as well as from incremental innovation, leading to improvements in existing products. However, as discussed in Chapter 2, it is crucial to ensure that innovation aligns with the company's strategic direction and to establish indicators for measuring success and evaluating opportunities (Gaynor, 2002, as cited in Lin & Chen 2007).

Nonetheless, the study also uncovered challenges in the planning of innovation. Insights provided by senior **leaders highlight that integrating innovation into the strategic plan is a highly intricate and complex process**. This complexity is particularly pronounced in larger multinational companies where operational sites are dispersed across various countries worldwide. The diverse operations vary in terms of jurisdiction, culture and context, making it crucial to provide guidance and monitoring rather than enforcing rigid prescriptions that might hinder innovation.

Another significant finding highlighted the **crucial link between innovation and sustainability, emphasising the importance of questions looking at establishing a robust strategic plan and creating a flexible environment for**

fostering innovation. Mining company leaders are currently facing the challenge of imbuing sustainability with broader significance beyond merely focusing on financial aspects.

This notion is reinforced by increasing demands from international organisations and stakeholders, like the United Nations Global Compact, which emphasise that the achievement of the SDGs necessitates a transformative change in business operations. This entails integrating sustainability into their fundamental business models and decision-making procedures (United Nations Global Compact and Accenture, 2018), as discussed in Chapter 3. It involves dealing with ESG risks and opportunities, such as lowering greenhouse gas emissions, enhancing working conditions and fostering diversity and inclusion.

Upon analysing the viewpoints of senior leaders representing various mining companies regarding the alignment of purposeful innovation with sustainable long-term objectives, a common awareness and mindset are apparent. These **leaders are dedicated to integrating purposeful innovation with enduring sustainable goals.** Their statements further indicate that mining companies have devised strategies and established specific objectives to attain sustainability, utilising technological innovation as a tool to address diverse challenges faced in their industry's business operations.

To bolster this argument, the study participants were asked to offer their insights on pioneering innovations adopted within their respective companies to tackle these challenges. The majority of participants shared a wide array of examples and perspectives on innovation projects underway in their companies. These projects encompassed both technological advancements and process innovations implemented within their business operations.

Furthermore, Chapter 6 features two Case Studies that delve into ground-breaking innovations in two South African mining companies. These Case Studies serve to illustrate how the mining sector is employing innovation to drive transformative

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changes in their operations, aligning with sustainability goals and adhering to the principles of the SDGs and ESG.

The first Case Study presents a remarkable example of disruptive innovation with sustainability implications: the creation of the first hydrogen truck for the South African mining sector. This Case Study showcased the potential of hydrogen trucks in revolutionising the mining sector. By adopting this technology, Company CO5 aims to achieve operational carbon neutrality by 2040, as it substantially reduces emissions from their haul truck fleet, which currently accounts for approximately 10-15% of their overall Scope 1 emissions. This initiative directly aligns with SDG 13 - Climate Change.

The implementation of the hydrogen truck serves as a tangible example of the technological progress necessary to enable a worldwide shift toward sustainable and economically viable hydrogen power. Moreover, it demonstrates how investments in infrastructure and innovation can lead to a distinct vision for the future, where environmentally-friendly solutions take precedence.

The second Case Study centres around the first digital mine in South Africa, which was spearheaded by CO6, a relatively new mining company established in 2006. Data collected from and about CO6 indicate that the digital mine, with its 3-D digital twin, owes its existence largely to the vision of the CEO. With the support of the Board, the CEO decided to assemble a team to conceptualise, develop and implement the ground-breaking digital mine. The case study showcased the transformative impact of digital mine technologies on enhancing mining operations. More importantly, it highlighted the pivotal role of enabling leadership in driving innovation in a traditional and conservative sector.

Additionally, the research sample comprised three relatively new mining companies. The data gathered from these companies **led the researcher to conclude that new mines have a comparative advantage in being trendsetters in innovation**

because they are not encumbered by legacy issues. Legacy issues introduce additional layers of complexity that must be navigated during the innovation process.

The **Case Study presented above also exemplifies Adaptive Leadership**, as indicated by the input from CO6's CEO. The company fostered adaptive spaces, including some overseas, to facilitate the growth and evolution of their teams aligned with this vision. As discussed in Chapter 2, Adaptive Leadership is not confined to an individual role but rather a fluid and complex dynamic that involves a "distributed, collective process" (Bäcklander, 2018:44) (Mäkinen, 2018). According to scholars like Arena, Cross, Sims and Uhl-Bien (2017), adaptive space is characterised as "the network and organizational context that facilitates the flow of people, ideas, information, and resources throughout the organization, fostering successful emergent innovation." Additionally, adaptive spaces occur when ideas are enabled to transition into the actual operations of the organization (Arena, Cross, Sims & Uhl-Bien, 2017: 40).

As explained in Chapter 2, Complexity Leadership Theory revolves around the integration of formal and informal organisational elements to leverage the dynamics of Complex Adaptive Systems, fostering organisational learning, creativity, and adaptability (Bäcklander, 2018). Addressing research objective 1, this study examined how mining leaders in South Africa practically implemented enabling leadership, drawing insights from interviews with thirty-one such leaders.

Enabling leadership plays a crucial role in maintaining balance within complexity leadership (Bäcklander, 2018). Senior leadership teams encounter a fundamental challenge in balancing the contradictory demands of exploration and exploitation (Zhu & Huang, 2023), a dilemma well-documented by researchers investigating Ambidextrous Leadership Theory (Havermans, Den Hartog, Keegan & Uhl-Bien, 2015).

The results indicated **that leaders in mining companies adopted diverse leadership practices to encourage contextual ambidexterity.** Most of the

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interviewed leaders implemented strategies aimed at promoting both exploration and exploitation simultaneously, striving to stimulate high levels of both activities. Moreover, the analysis revealed that the demand for change, driven by the complexity surrounding factors like ESG principles, acted as a catalyst for leaders to put forth greater efforts in facilitating exploration within their companies.

Expanding on the research by Havermans, Den Hartog, Keegan & Uhl-Bien, (2015), this study's data revealed the sub-theme of "leadership practices that foster and facilitate the process of exploration." Under this sub-theme a number of findings indicate a diverse range of leadership practices are employed within mining companies to facilitate exploration, especially the aspect of exploration, as elaborated in Chapter 2, which is linked to the pursuit of innovation. This holds significance in comprehending leadership methods and procedures that establish a conducive atmosphere for fostering innovation. These practices primarily targeted the complexity of responses and can be categorised into two distinct pathways: one focused on stimulating complexity of beliefs, while the other emphasised complexity of actions.

The research revealed **that leaders adopted a strategy to promote the development of more sophisticated beliefs by setting clear expectations and a forward-looking vision for innovation and for the mining sector.** By articulating these expectations and vision, employees within the mining company gained a comprehensive understanding of the company's long-term objectives and the intended direction it aimed to pursue. Leaders in the mining sector emphasised the importance of establishing expectations and a vision for innovation and the future of mining, reflecting their shared convictions on this subject.

As explained in Chapter 2, establishing the necessary measures to encourage a Complex Adaptive System is typically linked to Administrative Leadership methods. This involves tasks and procedures like formulating a guiding vision and specifying anticipated outcomes. These methods commonly rely on authority and hierarchical position, granting the capability to make organisational decisions in a top-down

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manner (Havermans, Den Hartog, Keegan & Uhl-Bien, 2015). This approach embodies the structured and organised aspects of the organisation (Havermans, Den Hartog, Keegan & Uhl-Bien, 2015).

Another discovery indicated **leaders' intentionality to cultivate more sophisticated beliefs by expressing their deliberate intent and commitment to explore innovation and sustainability within the mining sector.** By demonstrating their willingness to embrace change and emphasise the importance of sustainability for both their company and its impact on society, leaders facilitated open discussions and encouraged collaboration among employees. This approach created an environment that fostered the growth of more complex beliefs and encouraged innovative thinking within the company.

As outlined in Chapter 2, this aligns with the concept of establishing an adaptive environment, essentially constructing frameworks and procedures that adeptly navigate contradictions and forge connections. This engagement serves to stimulate and enhance the emergence of novel adaptive arrangements within the organisation, as described by Uhl-Bien and Arena in 2018.

The study also uncovered that certain **leaders were intentional in cultivating more sophisticated beliefs by actively changing paradigms and mindsets.** They motivated and encouraged employees to adopt alternative perspectives, creating an environment that fostered critical thinking and encouraged individuals to step outside of their comfort zones. This approach provided space for innovative thinking, the generation of new ideas and the discovery of solutions to the sustainability challenges encountered by mining companies.

This corresponds with the literature discussed in Chapter 2 regarding Transformational Leadership. Burns (1978) argued that Transformational Leadership involves leaders and followers mutually aiding one another's growth, fostering increased confidence and motivation (Cameron & Green, 2017). This approach was favoured by those individuals who aimed to extend positive cultural change beyond

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themselves and who were committed to generating advantages for their teams, organisations, or communities (Cameron & Green, 2017). This discovery aligns with prior research that recognised Transformational Leadership as a pivotal element for fostering innovation (Rosing *et al.*, 2011; Jia *et al.*, 2018; Zuraik & Kelly, 2019). For instance, Transformational Leadership is closely linked to enhancing "employees' capacity for innovation by cultivating a supportive culture" (Jung *et al.*, 2003).

Another significant finding that emerged, building on the transformation of paradigms and mindsets, was that some **leaders encouraged the development of beliefs by promoting open-mindedness among employees**. By demonstrating their own open-mindedness and encouraging others to adopt a similar approach, leaders fostered a safe and supportive environment for employees to generate new ideas. This is especially important in the mining sector, which has historically adhered to longstanding mining practices and been cautious about taking risks. However, with the rapid advancement of technology, mining leaders recognise the importance of embracing innovation and maintaining an open mindset to stay competitive and relevant in the evolving industry landscape.

Additionally, the research revealed that **leaders facilitate the growth of more sophisticated beliefs by cultivating a culture of encouragement, active listening and support within their teams**. This creates an environment where employees feel comfortable sharing their ideas and challenges with their leaders. As a result, these interactions present opportunities for gaining fresh insights, building trust, and fostering an atmosphere of open communication. Once more, echoing the ideas previously explored and those presented in Chapter 2 regarding Transformational Leadership and Adaptive Leadership. These two notions harmonise with each other and cultivate a feeling of motivation and interconnected engagement, enabling the emergence of fresh concepts.

A crucial discovery from the study was that several **leaders emphasised the significance of fostering a greater complexity of beliefs by appreciating diversity within teams**. Including individuals from various backgrounds, genders,

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ages, disciplines, and beliefs enables a broader range of perspectives to be taken into consideration. Moreover, diversity presents the opportunity for challenging each other's thinking and ideas, thereby creating the necessary tension for innovation. As highlighted in Chapter 4, the South African mining sector has a strong requirement for diversity due to its historical legacy of apartheid and its traditional male-dominated nature. Nonetheless, mining leaders recognise the importance of embracing diversity to operate a sustainable company in South Africa.

Further, the study revealed that **leaders in the mining sector acknowledged the importance of diversity in teams not only in terms of race and gender, but also in a variety of disciplines and experiences to foster innovation and sustainability.** Leaders actively contribute to the development of more sophisticated beliefs by recognising the importance of attracting the right talent with diverse skill sets, not only for the present employment but also for future needs. This recognition is critical in shifting the paradigm for the sector and ensuring the long-term sustainability of the company and the well-being of surrounding communities.

Leaders who embody and prioritise these beliefs foster a more conducive environment for their teams and companies to pursue innovation and sustainability, particularly in the mining sector, which is often characterised by traditional operating methods and a cautious approach to risk-taking and innovation.

Leaders utilised another approach to encourage exploration by fostering a higher complexity of actions. The research revealed that **certain participants adopted the practice of creating urgency for innovation, enabling teams to comprehend the immediate necessity and timeliness of implementing alternative approaches. Instilling a sense of urgency for change** is of utmost importance, particularly within mining companies that have set goals and made commitments to reduce their carbon footprint within a specific timeframe. Many of the participating leaders recognise their responsibility to cultivate a compelling sense of urgency for change within mining companies.

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Another noteworthy finding was that some **participants acknowledged the significance of creating an environment that fosters the emergence of new ideas and encourages innovation throughout the entire company.** The research indicated that in mining companies that actively pursued increased exploration, their leaders were committed to deliberately establishing spaces and opportunities for the discussion and presentation of innovative concepts. Therefore, this discovery reinforces the perspective shared by researchers like Hansen (2014), Damanpour *et al.* (2009), Gunday *et al.* (2011), Lin *et al.* (2007), and Abidin *et al.* (2013), which emphasises that innovation within a business context stands as a vital means to attain and uphold a competitive edge in various industries or sectors.

The research findings indicate that certain **leaders acknowledge the significance of cultivating a collaborative environment within their companies.** The study revealed that in mining companies known for their extensive innovation efforts, there is a notable emphasis on recognising the value of sharing ideas and collaborating with team members or stakeholders at every stage of the innovation process.

The study further unveiled that, in addition to a considerable number of leaders embracing the concept of a collaborative and open environment for sharing ideas, **there were also advocates for dedicated innovation teams to handle special projects, separate from employees burdened with operational responsibilities.** This approach allows these dedicated teams to focus their efforts on exploring and implementing innovative ideas, ensuring that innovation receives the necessary attention and priority it deserves.

Additionally, the research exposed that some **leaders exhibited courage by challenging the existing norms in different areas, including pursuing innovation, sustainability and engaging with stakeholders. Overcoming the fear of failure,** especially within the mining sector that entails complex layers of risk in terms of safety, environmental, labour and community concerns, requires bold and fearless leadership. This often entails taking daring measures and demonstrating acts of courage to foster transformative change.

Another significant discovery of the study is that, in addition to demonstrating courage, many **leaders also emphasised the importance of taking a firm and decisive stance that supports their team**. By doing so, leaders instil a sense of confidence that empowers the team to explore new frontiers. Instead of passively accepting the existing norms and conditions, making crucial decisions at pivotal moments can unlock greater opportunities for innovation, growth and strategic advantages for the company.

Lastly, a crucial finding of the **study highlights the importance of embracing mistakes as a vital leadership practice in promoting exploration, a perspective shared by all participating leaders**. They recognised that if failure is not accepted as a natural part of the innovation process, the fear of trying new and different approaches would impede progress. While many leaders acknowledged that mistakes are inherent to being human and that not all innovations will succeed, they also emphasised the need for caution, ensuring that innovation never compromises safety and human life. This is crucial for effectively navigating and managing the risks associated with innovation in the mining sector.

The analysis of the data also revealed several leadership practices utilised to promote exploitation in the mining sector. Similar to the leadership practices aimed at enabling exploration, these practices for fostering exploitation can be categorised into two distinct pathways: those focused on beliefs and those focused on actions (Havermans, Den Hartog, Keegan & Uhl-Bien, 2015).

According to the research findings, some leaders often achieved this **by embracing and advocating specific values that reduce complexity in beliefs**. In the sample, many senior leaders frequently emphasised the significance of responsible innovation. As the mining industry entails substantial risks, these leaders are acutely aware of their responsibilities to shareholders and stakeholders. Therefore, they stress that innovation must yield tangible benefits and should not be pursued solely for the sake of innovation.

In the research sample, the majority of interviewed **leaders highlighted the importance of taking calculated risks and approaching significant innovations with caution**. It is widely recognised that leaders should thoroughly assess the risks associated with major innovations. While calculated risks are essential for driving progress, it is equally vital to exercise caution during the implementation of significant innovations. This involves considering potential consequences and implementing appropriate measures to mitigate any potential negative impacts.

The study revealed that certain **leaders strongly believed in linking innovations to concrete deliverables and ensuring their value to the company**. Recognising that innovation can be a costly undertaking, these leaders stressed the importance of evaluating and measuring innovation initiatives. This strategic decision-making process enables the identification of innovations that can provide substantial value and benefits for the company while also eliminating those that may not be viable to pursue at the moment.

The second approach through which **leaders facilitated exploitation was by promoting a decrease in the complexity of actions**. One strategy for achieving this involved some leaders setting limits and regulations to guide innovation. The research findings suggest that leaders established boundaries and controls to ensure that innovation remains manageable within the organisation and to prevent employees from pursuing conflicting directions.

In addition to setting boundaries and controls, some **leaders also highlighted the importance of conducting research and allocating limited resources for innovation**. For mining companies to take risks and invest in innovation, thorough research is essential to support the process. However, due to resource constraints, careful planning and allocation of resources for innovation must be balanced with immediate priorities and the uncertainties of a volatile market. Consequently, dedicating specific budgets for innovation allows companies to pursue innovative endeavours within well-defined boundaries. In addition, the study also revealed that

some **leaders adopted an approach of actively monitoring risks as a means to decrease complexity**. By utilising tools such as risk registers, dashboards, and reporting structures, they effectively managed and minimised potential issues.

Throughout the interviews, some leaders discussed the concept of integrating innovation measurements into the key performance indicators (KPIs) of employees and incorporating it into the incentive strategy. Although this viewpoint was not shared by the majority of leaders interviewed, the researcher considered that such an approach could potentially assist in reducing complexity and integrating innovation in a controlled manner within the company.

7.2.2 SECONDARY RESEARCH OBJECTIVES 2 AND 3:

Objective 2: To explore the perceptions of business leaders in the mining companies about creating an enabling environment for innovation, SDGs and ESG principles.

Objective 3: To explore the relationship between enabling leadership, innovation, SDGs, ESG principles and related challenges.

The responses to Questions 1.1, 1.2, 1.6 and 4.2 in the interview schedule strived to address Secondary Research Objective 2 and 3.

Q1.1: What in your view is the appetite of the South African mining sector for the Sustainable Development Goals (SDGs) and associated innovation?

Q1.2: How would you describe the extent to which your company has embraced the SDGs?

Q1.6: Which of the SDGs do you feel are the most critical for your company?

Q4.2: I am interested in the relationship between Enabling Leadership and the SDGs. In your view, how does leadership impact the integration of the SDGs in your company?

The responses to the above question led to the next Finding.

7.2.2.1 **FINDING 2: THEME 1: MINING LEADERS' VIEWS AND THEIR UNDERSTANDING OF SDGS AND ESG IN THE MINING SECTOR ARE NOT HOMOGENOUS**

As outlined in Chapter 3, the 2019 United Nations' Sustainable Development Goals Report underscores that "global business organisations, including the World Business Council on Sustainable Development, adopt the concept of SDG transformation" (Sachs, Schmidt-Traub, Kroll, Lafortune, Fuller, 2019:viii). Additionally, this report highlights that the world is lagging behind in progress, with no country making substantial headway toward achieving all the goals (Sachs, Schmidt-Traub, Kroll, Lafortune & Fuller, 2019:viii).

Furthermore, the integration of the SDGs into business strategies, as indicated by the GlobeScan and Sustainability Survey (2019), demonstrates that the private sector's contribution to global sustainable development is notably lacking. As elaborated upon in both Chapter 3 and Chapter 4, the mining sector possesses a direct influence on both the environment and the societal circumstances of the areas in which they conduct their operations. The ecological consequences of extractive industries encompass a spectrum of issues such as "soil deterioration, water contamination, and carbon dioxide emissions," among others (Pesmatzoglou *et al.*, 2014:195). Furthermore, the mining sector bears an obligation to the local communities, given their significant employment of residents within the mining locales. Therefore, to ascertain the South African mining sector's role as a significant contributor to SDG attainment, it became imperative to investigate the mining sector's perceptions of the SDGs and its approach to their implementation.

The results of this study revealed a noticeable variability in responses from participants when discussing SDGs and ESG during the initial interview phase. This phase aimed to capture participants' viewpoints on the mining sector's willingness to adopt SDGs. As a result of this, the researcher formulated a continuum to gauge the level of interest in SDGs and ESG. This continuum consisted of themes such as aspiration, understanding, awareness, acknowledgment and willingness to adopt the SDGs, progressing from enhancement to strong enthusiasm.

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A majority of participants expressed a general or broad interest in SDGs, indicating a growing integration of these principles. This trend is rooted in the acknowledgment that the mining sector's practices must align with sustainability requirements. Nonetheless, the SDGs and ESG has increasingly become critical compliance and imperative frameworks for mining companies to consider. The outcomes suggest that, according to the senior leaders interviewed, the South African mining sector's stance on the SDGs and ESG is varied, aligning with their approach to adopting and integrating these principles into their business operations.

Expanding on the prior conversation about the mining sector's inclination towards SDGs, thus it was important to investigate specifically to which degree participating companies had embraced the SDG goals. A significant majority of the participants in the study exhibited a comprehensive comprehension and familiarity with the SDGs, enabling them to delve into these goals with a significant level of detail. Several respondents surpassed mere conceptual discussions and provided tangible instances of how their individual companies had aligned their endeavours with specific SDGs.

Within these conversations, a subset of participants explicitly referenced their company's sustainability strategies or organisational frameworks designed to facilitate the integration of SDGs. However, it is important to acknowledge that a few participants recognised that even though their work contributes to sustainable development, it had not been explicitly linked to the SDGs. Nonetheless, it's essential to clarify that the non-explicit reference or association with the SDGs doesn't imply an absence of active efforts by these companies towards their attainment.

Furthermore, those participants who could distinctly recognise and effectively communicate the SDGs conveyed that their respective companies are in accord with these objectives, regarding them as significant principles guiding their ESG endeavours. Nonetheless, it was also discovered that while there exists a definite

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acknowledgment of the significance of the SDGs and their harmonisation with ESG principles, the extent of incorporation differs among different companies.

When questioned about the most crucial SDGs for their respective companies, **leaders exhibited varying degrees of acquaintance and understanding.** Certain leaders managed to elucidate the particular SDGs pertinent to their companies, offering perspectives on the influence these goals exert on their activities and the sector at large. They adeptly situated the SDGs within their strategic frameworks, underscoring the congruence between their undertakings and the wider sustainable development mission.

Nevertheless, there were situations in which a few leaders encountered difficulty pinpointing the exact SDGs or required external references to jog their memory. In certain instances, participants discussed relevant initiatives without directly citing the SDGs. This implies a possible deficiency in comprehension or a necessity for heightened awareness and education concerning the SDGs among specific individuals within the mining sector.

Additionally, it was observed that one participant exhibited complete unfamiliarity with the SDGs, which was striking as the participant holds a senior portfolio in the mining company.

However, the results **indicated that with regard to alignment with the SDGs, most of the surveyed mining firms displayed notable compatibility with objectives like SDG 13 - Climate Change and SDG 12 - Responsible Consumption and Production.** Conversely, there was a relatively lower integration rate in their ESG strategies concerning certain Sustainable Development Goals, including SDG 2 - Zero Hunger, SDG 10 - Reduced Inequalities, and SDG 14 - Life Below Water.

Furthermore, the **research also unveiled a robust dedication to decarbonisation.** Examination of integrated annual reports demonstrated that a substantial number of

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mining companies have pledged to decarbonise as a component of their endeavours to tackle climate change. Furthermore, the **mining industry places notable emphasis on environmental objectives, including climate change mitigation and responsible consumption**. These objectives **frequently hold greater importance in comparison to social targets such as diminishing inequalities or addressing hunger**.

7.2.3 SECONDARY RESEARCH OBJECTIVE 4:

Secondary Research Objective 4 is “To propose recommendations which could provide insights to serve as enabling leadership guidelines for an innovation ecosystem towards the attainment of the SDGs and ESG principles in the mining sector.”

The responses to Questions 3.3, 3.4, and 4.4 in the interview schedule were designed to address Secondary Research Objective 4:

Q3.3 What shifts do you think should be made to develop a more conducive environment for exploring innovation in the mining sector?

Q3.4: If a more conducive environment for exploring innovation is (or has been) developed, how would you ensure that such an environment is sustained?

Q4.4: If you were to focus on the mining sector as a whole, which leadership features or attributes do you feel are lacking or need further development in order to encourage the exploration of innovation?

The responses to the questions above led to the Finding 3, presented as Theme: 4 in Chapter 6, namely, Leadership behaviours and practices which should be strengthened in the mining sector.

As discussed in Chapter 3, the United Nations Global Compact and Accenture report highlighted that achieving the SDGs requires a transformational shift in how businesses operate, including integrating sustainability into their core business models and decision-making processes (United Nations Global Compact and

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Accenture, 2018). These shifts will also require innovative approaches to tackling complex challenges that are discussed in Chapters 3 and 4.

In order to assess how a more conducive environment for an innovation ecosystem towards the attainment of the SDGs and ESG principles in the mining sector can be obtained, the participants were asked what shifts they think should be made to develop a more conducive environment for exploring innovation in the mining sector. In the pursuit of stimulating innovation within companies, several participants suggested the need for a more favourable environment to nurture inventive ideas. They emphasised that the mining sector should adopt increased flexibility, welcome fresh viewpoints, engage individuals possessing diverse skill sets, and promote a shift in perspective away from the conventional hierarchical framework often associated with a traditional, exclusive circle.

When questioned about the means to maintain a more favourable environment for fostering innovation, certain participants underscored the significance of leadership alignment as a guiding force to preserve an innovative culture. Others highlighted the importance of enhanced involvement of stakeholders in the innovation journey, along with offering acknowledgment and incentives to encourage inventive initiatives. Providing incentives also aligns with the literature concerning Transactional Leadership covered in Chapter 2. As noted by Cameron & Green (2017), Transactional Leadership revolves around trading rewards for effort and accomplishment.

In conclusion, when inquired about leadership qualities or characteristics that were deficient or required additional enhancement to stimulate the pursuit of innovation, participants pointed out the necessity to fortify attributes such as overcoming the fear of failure or the fear of making mistakes; persistence (or tenacity); courage and bravery, enhanced accessibility and communication; diminished arrogance; vulnerability and greater collaboration; and, balancing short term goals with long-term objectives and resisting the push or temptation to lean into short-termism.

7.3 OVERALL INTERPRETATION OF FINDINGS IN RELATION TO THE EXPLORATION OF ENABLING INNOVATION TOWARDS THE FULFILMENT OF SDGS AND ESG PRINCIPLES.

The intention of this segment is to offer a comprehensive understanding of the research outcomes concerning the primary goal of investigating **how enabling leadership practices and processes are being enacted towards the fulfilment of the SDGs and ESG principles in the South African mining sector.**

The findings in this research indicate that instances of innovation aligned to the SDGs and ESG principles are observable within the South African mining sector. Furthermore, the data implies that a significant portion of senior executives in the mining sector possesses a level of familiarity with the SDGs and ESG principles. Nevertheless, the depth of their knowledge is varied. Similarly, the degree to which these concepts are embraced and integrated into the company strategies and activities exhibits variability. This is an important part of the study in order to establish whether there is a connection between the SDGs and ESG and innovation.

In certain instances where significant ground-breaking advancements were aligned to the SDGs and ESG objectives, it appears that senior leaders employed a notable degree of ambidextrous leadership strategies. These practices were aimed at effectively managing the balance between exploration and exploitation in the context of innovation. Within these contexts, senior leaders assumed the role of cultivating dynamic adaptive spaces. This approach can be accurately described as enabling leadership, as it involves shaping the framework and procedures that encompass both conflicting and connecting elements, thereby catalysing and enhancing emergent phenomena (Uhl-Bien & Arena, 2018).

The research underscores that despite the inherent conservatism and the strict regulatory landscape of the mining sector, harmonious equilibrium can be achieved

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between bureaucratic processes and the establishment of adaptable spaces conducive to innovation. Consequently, by adopting an enabling leadership approach, which involves creating favourable conditions for fostering adaptive spaces (Havermans, Den Hartog, Keegan, & Uhl-Bien, 2015), certain leaders were observed to cultivate behaviours that encouraged the development of attitudes and actions that facilitated an environment conducive to innovative efforts. The identified leadership practices impact two dimensions of response complexity: the complexity of beliefs and the complexity of actions.

In conclusion, while certain companies have achieved notable strides in innovation, the research also unveiled various changes and elements within the mining industry that are necessary to enhance innovation and create a more favourable atmosphere for it to thrive. These changes might indirectly influence the progress towards achieving the SDGs and ESG objectives.

7.4 SUMMARY OF CHAPTER

This section has examined and elucidated the outcomes of the qualitative survey (Chapter 6) in connection with every secondary research objective of the investigation. These interpretations led to the observation that there is a broad awareness of the SDGs and ESG in the mining sector with various appetite levels of integration and operationalising thereof.

The study also revealed that there are pockets of excellence with some mining companies showing clear signs of enabling leadership practices that drive innovation towards the fulfilment of some the SDGs and ESG goals. Subsequently, potential rationales for ambidextrous leadership were examined. The study's outcomes align with Havermans, Den Hartog, Keegan and Uhl-Bien's (2015) framework for contextual ambidexterity. However, the data collected in this research identified additional factors that contribute to the implementation of enabling practices.

CHAPTER 8

8. CONCLUSIONS

8.1 INTRODUCTION

This study has provided a well-supported investigation into leadership processes and practices that foster innovation aligned with the SDGs and ESG principles in the mining sector. The research delved into how senior mining leaders comprehend, implement and enable the SDGs and ESG principles. The key aspects covered were the participants' perspectives on the SDGs and ESG, the exploration of innovation and sustainability, the leadership behaviours and practices which should be strengthened for the exploration of innovation in the South African mining sector, and an examination of the leadership behaviour that facilitates these efforts.

The study has made an empirical contribution to the field by enriching the leadership discourse, contemporary managerial discourse and knowledge related to the SDGs and ESG in the mining sector. Additionally, it has advanced the content for education and training of business leaders, aimed at bridging the gap between theoretical and practical understanding of leadership, the SDGs, ESG and innovation in the South African mining industry.

The following sections of the study summarise the key findings and contributions to knowledge in this area. They also discuss the significance, implications and limitations of the research and provide suggestions for future studies.

8.2 SUMMARY OF STUDY

The significance of this research is premised on the understanding that enabling leadership is central to solving complex challenges as outlined in the SDGs and ESG principles. The researcher investigated South African mining companies who are well placed to drive sustainability practices, especially since 90% of the listed participating mining companies declared their support for the SDGs and ESG principles.

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Although numerous companies have expressed their backing for the SDGs and ESG principles, and there is a growing academic interest in this subject, it is important to note that this widespread interest may not necessarily reflect a comprehensive understanding and holistic approach towards embracing the SDGs and ESG principles.

There are four main justifications for conducting a qualitative investigation into how leadership processes and practices facilitate innovation to align with the SDGs and ESG principles within the mining sector.

First, while leadership is acknowledged as a driving force for achieving business success (Yahaya & Ebrahim, 2016), the understanding of the specific leadership processes and practices that foster innovation towards aligning with the SDGs and ESG principles in the mining sector remains deficient.

Secondly, available evidence indicates that the notion of enabling leadership, which facilitates innovation, has predominantly remained at a theoretical level, lacking in-depth explanations regarding the practical establishment of enabling leadership and adaptive environments (Schulze & Pinkow, 2020).

Thirdly, there is a considerable lack of knowledge regarding how senior leaders in the mining sector are adopting and incorporating SDGs and ESG principles into their decision-making and business practices.

Fourthly, despite the widespread recognition of the significance of SDGs and ESG principles, there is a scarcity of evidence illustrating how these principles and goals are truly driving transformative innovation in the mining sector. In addition, the company reports examined reveal limited evidence of monitoring, evaluation and reporting on the impact of the investments in innovation.

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This indicates a broader issue where certain actors might not be effectively translating their words into action. Another possible explanation is the presence of bottlenecks within business operations, such as short-term thinking, a limited understanding of sustainability responsibilities, or a lack of adequate education on the subject.

In conducting this investigation, the researcher established specific boundaries, beginning by focusing solely on one country, South Africa. The decision to select South Africa as the research focus was primarily driven by the country's extensive expertise in the mining sector. Equally important, the mining industry plays a vital role in fostering economic growth and generating employment opportunities for the country. Moreover, the mining sector has been identified as a sector which has a significant environmental footprint and a huge social impact on surrounding communities. This reality thus enhances the relevance of selecting the South African mining sector as a unit of analysis for investigating leadership behaviour and practices in pursuing the SDGs and ESG.

The selected mining companies participating in the study represent a combination of well-established and more recently established entities with substantial operations in South Africa. These companies comply with the registration guidelines of the South African Companies Act, No. 71 of 2008, and maintain a staff size exceeding fifty individuals while operating in multiple geographic locations in the country. The sample of companies encompasses a diverse range of entities, including both multi-national corporations and domestically-focused companies, as well as publicly listed and private enterprises, each with intricate business operations that vary in size, impact and reach. Consequently, smaller and medium-sized enterprises, which may not encounter the same level of complexity as larger corporations, are excluded from the study.

Additionally, a significant number of these companies are publicly listed, which means they are obliged to report on ESG matters. Consequently, the reporting

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practices do not significantly vary to the extent that it would cause substantial variation within the sample.

Finally, the individuals taking part in this research are business leaders who play a direct role in establishing a conducive atmosphere for implementing the SDGs and ESG principles, as well as promoting innovation within South African mining companies. Specifically, targeted, these participants represent the top executive management structures within their respective companies. The participants' roles encompass a range of key positions, including Chief Executive Officer (CEO), Chief Financial Officer (CFO), Chief Operations Officer (COO), Chief of Technology and Technical Projects and Heads of Risk and Sustainability, Stakeholder Management, and Corporate Affairs.

Having established these specific boundaries, the researcher proceeded to conduct interviews with 31 participants from South African mining companies. As a result of the research, it was determined that the perspectives and comprehension of SDGs and ESG within the mining sector are not uniform among mining leaders.

The majority of the surveyed mining companies exhibit awareness and acknowledgment of the SDGs, although the extent of their adoption and integration varies significantly. Some companies have successfully incorporated the SDGs into their core strategies and day-to-day operations, while others are still in the early stages of engagement or have not explicitly linked their activities to the SDGs. Notably, the mining sector places a strong emphasis on environmental objectives, such as addressing climate change and promoting responsible consumption. These environmental goals often take precedence over social objectives, such as reducing inequalities or addressing hunger. This phenomenon could also be influenced by the capital investment incentives available for innovation and integration of the SDGs and ESG.

Another notable finding is that innovation has a positive impact on sustainability within the mining sector. Although the mining industry is commonly known for its

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conservative approach towards risk-taking mainly due to stringent compliance regulations, particularly in relation to mine safety, it is increasingly facing a complex and ever-changing business environment. This necessitates a shift towards innovation to transform business operations and effectively address environmental and social concerns.

The research findings highlight that by leveraging technological advancements, process enhancements and innovative approaches, the mining sector can effectively mitigate its environmental impact, bolster its social responsibility and align with the SDGs and ESG principles. During the survey, the majority of mining companies exhibited some degree or form of innovation aimed at addressing SDGs and ESG challenges within their operations.

In Chapter 6 of the study, two specific Case Studies were presented as exemplary instances of ground-breaking innovation by two different participating mining companies. These Case Studies focused on the hydrogen-powered haul truck and the digital mine solution, demonstrating how innovation can significantly impact SDGs and ESG objectives.

The final finding indicates that a strong emphasis on Ambidextrous Leadership practices facilitates innovation within the mining sector. Balancing the conflicting requirements of exploration and exploitation poses a fundamental dilemma for senior leadership teams (Zhu & Huang, 2023) which is well documented by researchers exploring ambidexterity theory (Havermans, Den Hartog, Keegan, & Uhl-Bien, 2015).

When examining the way senior leaders in the mining sector embrace enabling leadership to drive innovation, it was essential to comprehend how these leaders employed diverse leadership practices to foster contextual ambidexterity. The majority of leaders interviewed implemented strategies to encourage both exploration and exploitation, aiming to stimulate high levels of both activities simultaneously.

These practices can either support exploitation by simplifying the complexity of responses or foster exploration by increasing the complexity of responses. The leadership practices identified in the study have an impact on two dimensions of response complexity: the complexity of beliefs and the complexity of actions. These findings were presented in Chapter 6. Additionally, the analysis highlighted that in some instances the demand for change, particularly in response to complexities related to ESG principles, acted as a catalyst for leaders to place greater emphasis on facilitating exploration efforts.

8.3 REVISITING PREVIOUS CHAPTERS

Concluding the research journey, this study has led to numerous significant milestones in understanding, contributing valuable insights to the field of knowledge in this domain. While it is challenging to encapsulate all the gained knowledge, the researcher endeavours to systematically emphasise the key findings and knowledge in each of the chapters of this thesis.

Chapter 1 introduces and provides an overview of the study, and is thus excluded from this section.

8.3.1 CHAPTER 2

The first puzzle piece delves into the realm of leadership literature, which, combined with research on innovation, SDGs, and ESG, forms a crucial basis for this study. The research findings emphasised the pivotal role of senior leaders as decision-makers, wielding significant influence in shaping a mining company's strategy and operations.

These leaders hold the key to addressing critical challenges through the promotion of innovation, which could potentially reshape the future of mining in South Africa. On a day-to-day basis, mining industry leaders grapple with a multitude of complex challenges, encompassing volatile markets, environmental concerns, social issues, governance matters, technological advancements, and labour-related issues.

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Simultaneously, they must strike a delicate balance between short-term gains and long-term sustainability, all while navigating the diverse landscape of multi-cultural stakeholders. Thus, the complexities business leaders are confronted with presented an opportunity for the researcher to review leadership literature and its link to innovation to address SDGs and ESG.

In deep diving into the literature on leadership, the researcher discovered the absence of a single definitive definition on leadership; and, that leadership varies in meaning from person to person. Nevertheless, amidst the multitude of interpretations, there are fundamental aspects upon which the concept of leadership is constructed. These key elements include the notion of influence, the process of achieving shared objectives and the interdependent relationship between leaders and followers.

Understanding and analysing leadership as a concept in this study necessitated grasping these fundamental ideas. Therefore, to establish the framework for this research, the study adopted the view of leadership as a dynamic process where leaders inspire and mobilise others to accomplish exceptional achievements. This holds enormous significance because fostering innovation and revolutionising business operations to align with the SDGs and ESG principles requires exceptional leadership that can inspire and accomplish extraordinary achievements.

The researcher observed that leadership has evolved significantly from the outdated "Great Man Theory," which propagated the belief that leadership is innate and limited only to men with specific characteristics. These early theories, including the Traits Theory, were rooted in patriarchal and gender-based biases, assuming that leadership skills could not be acquired through learning. These views were a product of their time and failed to provide a universally applicable list of leadership qualities.

However, this study's research sample demonstrates a clear contradiction to these antiquated beliefs. The data collected includes a diverse representation of leaders, with 50% of the participants being female leaders. Remarkably, within this group,

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30% hold the position of CEOs in some of South Africa's largest mining companies. This disproves the notion that leadership is exclusive to men and highlights the shift away from outdated stereotypes on leadership roles. Nevertheless, there is still significant room for improvement in promoting gender equality within the mining sector.

As the discussion around leadership advanced, the researcher observed that Behavioural Leadership gained prominence, shifting the focus from psychological and emotional traits to the actions and behaviours of effective leaders. However, this approach faced criticism for neglecting situational factors that can influence leadership outcomes. In response to this, Contingency Leadership Theories emerged, emphasising the importance of aligning leadership style with the specific circumstances at hand. This move, away from a "one size fits all" approach recognised the significance of adapting leadership practices to suit different contexts. Moreover, recognising that behaviour can be controlled and amended based on the context.

The research findings resonated with these theories, particularly its relationship with the concept of Contextual Ambidexterity. Similar to Contingency Theories, the concept of leadership practices has the potential to either decrease or amplify the variability of responses. It is crucial to recognise this connection while delving into the exploration of innovation, as extensively discussed in Chapter 6 of the study's analysis.

As the study is built on past leadership literature, the study exposed the importance of some of the more modern leadership theories namely Transformational and Transactional Leadership Theories. Transformational Leadership theory is focused on positively impacting follower satisfaction and productivity. Transformational leaders employ essential constructs such as idealised influence, intellectual stimulation, inspirational motivation and individualised consideration in their leadership approach.

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Transformational leaders motivate followers by providing them with a vision and mission instilling pride, respect and trust. This is a fundamental shift from earlier theories such as Trait Theories which failed to take emotional needs, values and yearning into consideration. Building upon the Transformational Theory, the researcher established significant synergies between Adaptive and Enabling leadership under Complexity Leadership Theory and opening behaviour under Ambidexterity Leadership Theory.

These theories share common principles in motivating followers to achieve exceptional results and fostering innovation. Chapter 6 of the study's analysis delves into these practices, presenting evidence and establishing connections between these principles and practices. While prior studies (Rosing *et al.*, 2011; Jia *et al.*, 2018; Zuraik & Kelly, 2019) have already established the importance of Transformational Leadership in driving innovation, this current research not only reaffirms this idea but also takes it a step further.

The study contributes to the discourse by establishing connections between Transformational Leadership and Complexity Leadership Theory, as well as Ambidexterity Leadership Theory. By doing so, it sheds light on how these different leadership approaches contribute to fostering innovation and supports the notion of their significance in the context of innovation-promoting leadership practices and processes.

Similar to Transformational Leadership, the researcher also found synergies between Transactional Leadership and Complexity Leadership Theory and Ambidexterity Leadership Theory. Transactional Leadership is premised on rewards and rules and leads more towards maintaining the status quo instead of stimulating change. Similar sentiments are shared under Administrative Leadership under Complexity Leadership Theory and under closing behaviour under Ambidexterity Theory. These similarities are demonstrated in Chapter 6 in the analysis of the research.

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In Chapter 2, the researcher emphasised that there is no definitive formula for achieving successful innovation. However, this study went beyond that by delving into the realm of leadership practices that facilitated innovation within the mining sector. Furthermore, the research contributed to the analysis by using Complexity Leadership Theory and Ambidexterity Leadership Theory as a research lens, building upon the connections established between leadership and innovation in Chapter 2. These theories provided valuable insights for examining the role of leadership in fostering innovation throughout the study.

Responding to the call from scholars (Elkington & Booyesen, 2015; Bäcklander, 2019) to shift from traditional leadership approaches to modern models, the researcher explored Complexity and Ambidexterity Leadership Theories. This exploration revealed that these theories offer valuable insights into understanding leadership practices that promote innovation within complex adaptive systems like mining companies. Chapter 6 of the analysis illustrates how these perspectives are demonstrated. Nevertheless, it is important to acknowledge that these theories also have their limitations, which are discussed in a latter section of the same chapter.

This chapter contributes by practically applying leadership theories and therefore enhancing understanding of the leadership discourse through empirical evidence in the mining sector. This overview proves invaluable in recognising constraints of various leadership theories and provides a research perspective for investigating more contemporary theories like Complexity Leadership Theory and Ambidextrous Leadership Theory. Furthermore, it aids in establishing connections between fundamental concepts, such as leadership and innovation, as well as leadership and the integration of SDGs and ESG principles.

The valuable insights presented in this chapter serve to raise awareness among academics, business leaders, and practitioners regarding leadership practices and processes that can effectively navigate complexities, particularly in the pursuit of innovation to achieve the SDGs and ESG objectives. Furthermore, this chapter offers perspectives by contextualising Complexity Leadership Theory and Ambidextrous

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Leadership Theory as theoretical frameworks to comprehend how leadership can effectively navigate complexity and foster adaptability. Moreover, mining leaders can utilise this knowledge to enhance their understanding of how leadership practices and processes can stimulate innovation while simultaneously striking a balance between bureaucratic structures and the imperative for exploration.

8.3.2 CHAPTER 3

The second component of the study explores the SDGs and ESG principles as a foundation for comprehending the sustainability development discourse and practices within the business context. To gain a thorough understanding of the expectations from businesses and business leaders, this chapter conducted a comprehensive review and summary of the literature pertaining to the SDGs and ESG principles.

Similarly, this chapter offered an overview of the SDGs and ESG, including relevant trends and debates surrounding these concepts within the mining sector. It further analysed the factors influencing the practical implementation and integration of the SDGs and ESG while delving into a detailed discussion of these concepts. Additionally, the chapter explored the interconnections between the SDGs, ESG, innovation and leadership, creating a bridge between these crucial constructs that are often discussed in isolation.

The researcher found that SDGs and ESG reporting have become intertwined in recent years. While the SDGs were not initially designed to serve as a framework for ESG reporting, they are increasingly being used for this purpose. The SDGs highlight the power of investors and businesses to bring about positive change and promote sustainable development. Integrating ESG factors into business operations can not only contribute to achieving the SDGs but also have positive impacts on the environment, society, and financial performance. Therefore, it is important for businesses to embrace the SDGs and ESG reporting to play their part in creating a sustainable future.

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This chapter further brings attention to the global debates surrounding ESG and explains why it is of particular importance for South African mining companies to be mindful of these considerations. Additionally, it delves into the topic of ESG disclosure and reporting, closely examining the concept of "greenwashing," which pertains to companies making false or misleading claims about their environmental practices to project a more positive and sustainable image than what pertains in reality.

Furthermore, the chapter uncovers the significance of business adopting transparent and accountable sustainability practices, while highlighting the necessity for regulatory frameworks to combat greenwashing and promote genuine sustainability efforts. It also introduces the SDGs and ESG frameworks that can serve as useful tools for measuring progress and provides guidance on integrating the SDGs and ESG principles into corporate strategies.

The chapter also discusses the significance of innovation and leadership in effectively driving the implementation of the SDGs and ESG principles within corporate environments.

Finally, the research revealed that the adoption of the SDG and ESG frameworks can provide valuable assistance to the mining sector in tackling social issues, such as human rights abuses and community relations. Moreover, ESG considerations can aid mining companies in enhancing their governance practices, encompassing aspects like board composition, executive compensation, and risk management. Implementing such practices can lead to overall improvements in company performance and accountability, mitigate risks, increase shareholder value and attract investment.

However, a significant challenge lies in whether business leaders can effectively strike a balance between pursuing short-term financial gains and addressing long-term sustainable challenges.

8.3.3 CHAPTER 4

The third component of the study examines the South African mining sector and the challenges it faces. The chapter is firmly rooted in the relevant debates influenced by the SDGs and ESG perspective. It sheds light on socio-political challenges while exploring potential avenues for innovation and leadership within the mining industry. As one of the oldest and economically significant sectors in South Africa, mining possesses substantial potential to directly influence various aspects of several of the 17 SDGs.

Nevertheless, despite the considerable economic value that mining holds for the country, the sector is entangled in controversies, conflicts and contentious issues. These complexities subject the sector to heightened and intense scrutiny, particularly concerning its environmental impact and social impact. The researcher found that the mining industry constantly faces the challenge of fulfilling a broader social mandate, especially in the context of a struggling state. Furthermore, the sector bears a significant and visible environmental footprint. The research revealed that the SDG and ESG frameworks provide a useful framework for driving change and positive impact on society.

In this chapter, the key challenges in the mining sector related to environmental, social and governance aspects were extensively discussed. Of utmost importance were the concerns regarding water usage and management, the complexities of post-mine clean-up, soil and land degradation, air pollution, climate action, the just transition and the energy and electricity crisis prevailing in the country.

Additionally, the chapter explored the implications of Social Labour Plans, which are a legal requirement for South African mining companies, as well as the issues of labour unrest, gender equality and safety and health challenges faced within the mining sector. Furthermore, a detailed examination of governance, particularly corporate governance, integrated reporting and leadership in the sector, was also presented in this chapter.

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Lastly, the chapter delved into the topic of innovation within the mining sector, which the researcher highlighted as having the potential to address some of the significant ESG challenges outlined in the SDG framework. The study emphasised the importance for business leaders overseeing mining companies to act responsibly and fulfil their role as good corporate citizens by finding a balance between profits, people and the planet. Taking a proactive approach in this regard not only enhances the attractiveness of the mining sector as an investment destination but also ensures sustained financial returns.

The combination of technological advancements and ESG compliance presents an opportunity for South Africa to lead in global mining innovation, positioning the sector for a promising future. However, accomplishing this delicate balancing act in practice might prove more challenging than merely stating the intention. Hence, the process by which this balancing act is achieved becomes of utmost importance for the mining sector and serves as the central focus of this research.

8.3.4 CHAPTER 5

Chapter 5 elucidated the research's design and methodologies employed to fulfil its objectives. The study aimed to investigate critical elements such as leadership, innovation, SDGs and ESG principles within South Africa's mining sector. To accomplish this aim, data was gathered through semi-structured interviews conducted with senior executives holding pivotal roles within their respective companies. The selected participants occupied various key positions, including Chief Executive Officer (CEO), Chief Financial Officer (CFO), Chief Operations Officer (COO), Chief of Technology and Technical Projects, as well as Heads of Risk and Sustainability, Stakeholder Management, and Corporate Affairs. This selection was deemed the most appropriate research approach to adopt. In addition, the researcher examined the Integrated Reports and Annual Reports of the participating companies which provided pivotal secondary data.

8.3.5 CHAPTER 6

In Chapter 6 of this study, the researcher deeply explored the central aspects of the research. This phase involved a comprehensive examination of the gathered data and the presentation of the main themes of the study. The investigation uncovered four main themes, each with several sub-themes. These four themes indicated that the perspectives and comprehension of mining leaders regarding SDGs and ESG in the mining industry are not homogenous. Moreover, it was found that innovation has a positive influence on sustainability within the mining sector. Additionally, the practice of ambidextrous leadership at high levels promotes innovation in mining. Lastly, certain leadership behaviours and practices in the mining sector need strengthening. This research enhances comprehension of the role of leadership in facilitating innovation to achieve the objectives of the SDGs and ESG principles.

8.3.6 CHAPTER 7

In Chapter 7, the research findings were comprehensively analysed and interpreted. This analysis was grounded in both the Complexity Leadership Theory and the Ambidexterity Leadership Theory, in addition to addressing the Secondary Research Objectives. The discussion delved into the outcomes pertinent to each of the secondary research objectives. Chapter 7 offers a nuanced interpretation of the results.

The chapters of the study offer insights into various facets or elements concerning leadership, the SDGs, ESG, and innovation within the mining sector. These interconnected layers are linked through organisational structure, mandates, and business imperatives. By examining the holistic perspective of how these diverse components coalesce, and subsequently delving into each component individually, the research explores how leadership processes and practices facilitate innovation to align with the SDGs and ESG principles in the mining industry.

The researcher investigates the different facets and elements, both individually and collectively, recognising that obstacles may exist at various levels or even in the interactions between them. By thoroughly examining specific elements and

establishing their interconnections, the researcher gains valuable insights into the various links that contribute to or stem from different components in the SDG and ESG process within the mining sector. This approach allows for a comprehensive understanding of how the puzzle pieces of SDGs, ESG, and innovation fit together in the mining industry.

8.4 RECAPPING THE RESEARCH FINDINGS IN RELATION TO THE RESEARCH OBJECTIVES

The aim of this section is to offer a condensed overview of how the research findings were interpreted concerning the key research objective. This interpretation is grounded in the understanding of the findings in connection to the Secondary Research Objectives, as presented in Chapter 7.

8.4.1 SECONDARY RESEARCH OBJECTIVE 1:

Secondary Research Objective 1: “To determine the aspects of leadership processes and practices that enable innovation towards the fulfilment of SDGs and ESG principles.”

The results indicated that leaders in mining companies adopted diverse leadership practices to encourage contextual ambidexterity. Most of the interviewed leaders implemented strategies aimed at promoting both exploration and exploitation simultaneously, striving to stimulate high levels of both activities. Moreover, the analysis revealed that the demand for change, driven by the complexity surrounding factors like ESG principles, acted as a catalyst for leaders to put forth greater efforts in facilitating exploration within their companies.

In the context of exploration, the study revealed that these practices primarily targeted the complexity of responses and can be categorised into two distinct pathways: one focused on stimulating complexity of beliefs, while the other emphasised complexity of actions. The study concludes that these practices support an enabling environment for innovation in the mining sector.

8.4.2 SECONDARY RESEARCH OBJECTIVES 2 AND 3:

Objective 2: To explore the perceptions of business leaders in the mining companies about creating an enabling environment for innovation, SDGs and ESG principles.

The study explored the viewpoints of mining sector business leaders regarding SDGs and ESG principles, with the aim of investigating any potential influence on innovation. Chapters 6 and 7 revealed that a majority of the participants exhibited an awareness and acknowledgment of SDGs and ESG principles. Nonetheless, it was determined that the extent of adoption and integration of SDGs varied among mining companies. While some companies had seamlessly integrated the SDGs into their fundamental strategies and operations, others were in the preliminary stages of engagement or had not explicitly linked their activities to the SDGs. Moreover, a subset of mining companies demonstrated notable alignment with specific objectives, such as SDG 13 - Climate Change and SDG 12 - Responsible Consumption and Production.

Based on the data collected from the surveyed mining companies, a reasonable deduction can be made that the mining sector places notable emphasis on environmental objectives, particularly those related to addressing climate change and promoting responsible consumption. These environmental goals often take precedence over social objectives, such as reducing inequalities or combating hunger.

Additionally, the study identified challenges in effectively measuring the impact of these goals. Mining companies encounter difficulties when attempting to assess and monitor the effects of SDGs, especially in the social realm. The existing frameworks and reporting systems primarily concentrate on evaluating environmental outcomes, while objectively gauging social outcomes remains intricate due to their public good nature and its being intertwined with environmental factors. Furthermore, the research highlighted a strong dedication to decarbonisation in the mining sector. Analysis of Integrated and Annual Reports indicates that a significant portion of

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mining companies have committed to decarbonisation as a crucial component of their strategies to tackle climate change.

Hence, it was determined that based on the insights garnered from interviews with senior leaders, there exists a lack of uniformity in mining leaders' perspectives and comprehension of the SDGs and ESG principles within the mining sector. This underscores the necessity for enhancing awareness and understanding of the SDGs within the mining industry. Furthermore, it is imperative to enhance the integration of social objectives alongside environmental goals, and to establish robust frameworks for gauging and disclosing social impact. By comprehending the viewpoints of the participants regarding SDGs and ESG, it becomes possible to establish the link between their willingness to innovate for the advancement of SDGs and ESG objectives. As discussed, this research uncovered that there is indeed an eagerness to embrace SDGs and ESG principles; nevertheless, the challenge lies in the practical implementation of these ideals across most companies.

Objective 3: To explore the relationship between enabling leadership, innovation, SDGs, ESG principles and related challenges.

The study's findings demonstrated the existence of innovation within the South African mining sector. Through interviews with participants, the research underscored the positive influence of innovation on sustainability within the mining sector. Additionally, a significant sub-theme that emerged from the collected data emphasised the importance of 'integrating innovation into strategy to generate lasting sustainable effects.'

A key revelation in the study was that two of the surveyed companies, which displayed remarkable success in achieving advanced innovation outcomes, demonstrate a clear dedication to intentionally embedding innovation within their strategic planning processes and fostering a culture that embraces it. Another noteworthy insight arose from participants' contributions, revealing a strong correlation among strategic planning, innovation and growth.

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Upon exploring the perspectives of senior leaders representing diverse mining companies regarding the alignment of purpose-driven innovation with sustainable long-term objectives, a shared awareness and mindset were evident. These leaders were committed to intertwining purpose-driven innovation with enduring sustainable aspirations. Their statements also indicated that mining companies have formulated strategies and defined specific goals to achieve sustainability, utilising technological innovation as a means to address various challenges inherent in their sector's business operations.

The study's conclusions are further supported by two Case Studies elaborated upon in Chapter 6, which offer additional evidence of how these mining companies effectively implemented innovation strategies.

8.4.3 SECONDARY RESEARCH OBJECTIVE 4:

Secondary Research Objective 4: To propose recommendations which could provide insights to serve as enabling leadership guidelines for an innovation ecosystem towards the attainment of SDGs and ESG principles in the mining sector.

To evaluate the possibilities of creating a more conducive environment for an innovation ecosystem aligned to the attainment of the SDGs and ESG principles in the mining sector, participants were questioned about their views on necessary shifts for cultivating innovation within this domain. In the quest to invigorate innovation within companies, a number of participants suggested the importance of establishing a more favourable atmosphere to foster innovative ideas.

A majority of participants emphasised that the mining sector should embrace increased flexibility, welcome novel perspectives, involve individuals possessing diverse skill sets, and encourage a departure from the conventional hierarchical structure often linked with traditional, exclusive circles.

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Furthermore, when asked about leadership qualities or attributes that were lacking or demanded enhancement to foster a culture of innovation, participants indicated the need to reinforce traits such as perseverance and courage, amplify accessibility, reduce hubris, and cultivate increased collaboration.

Consequently, it can be inferred that despite instances of ground-breaking innovation occurring, as discussed under Secondary Research Objective I, there are still crucial leadership and organisational elements that require strengthening to effectively pursue innovation within the mining sector.

8.5 IMPORTANCE OF THE STUDY

The existing literature highlights a lack of emphasis on empirical research concerning effective approaches to leading adaptable organisations (Uhl-Bien & Arena, 2017:1). As a result, the understanding of leadership's role in steering complex companies towards innovation and adaptability, which align with the SDGs and ESG principles, remains limited. Consequently, it is evident that there is a necessity for additional empirical studies focused on nurturing leadership practices and procedures that promote innovation within complex organisational settings.

Furthermore, the pressing requirement to address the SDGs and ESG expectations compels companies to consider radical innovations in their business methods. Attaining these sustainable objectives holds significance for the well-being of humanity, and corporate leaders bear a responsibility in contributing to their achievement. However, prior to this investigation, the link between enabling leadership, innovation and SDGs and ESG had been largely unexplored. Thus, the exploration of leadership practices and processes in the context of achieving the SDGs and ESG is deemed as a valuable research endeavour. Particularly, since the seventeen SDGs as set out by the UN agenda for sustainable development (which in this thesis is referred to as the 2030 SDGs) has the ambitious deadline of 2030.

The study's participant pool encompassed a diverse array of senior management roles within mining companies. The distinct contexts of these mining enterprises and

the varying degrees of decision-making authority held by the leaders played a crucial role in shaping perspectives on the SDGs, ESG and demonstrating enabling leadership practices. Given the study's focus on mining sector leaders, it also captured insightful self-perceptions regarding the SDGs, ESG and innovation in the mining sector. Moreover, the study also assisted in clarifying the relationship between SDGs and ESG as discussed in Chapter 3.

The investigation into fostering innovation for the realisation of the SDGs and ESG principles through enabling leadership practices and processes proved to be worthwhile. The study adds to the existing body of knowledge by reaffirming the significance of enabling leadership in driving innovation and fulfilling SDGs and ESG objectives. Additionally, it contributes to the Complexity Leadership Theory and Ambidexterity Leadership Theory by providing tangible evidence of how enabling leadership can be effectively enacted. Moreover, the study contributes to Complexity Leadership Theory and Ambidextrous Leadership Theory by demonstrating the correlation between enabling leadership (a key component of Complexity leadership Theory) and opening and closing behaviour (key pillars of Ambidextrous Leadership Theory). In addition, the study amplified the view that Complexity Leadership Theory and Ambidextrous Leadership Theory are critical enablers for the advancement of innovation.

Lastly, the study enriches the understanding of enabling leadership by identifying the leadership factors that require strengthening to cultivate an environment conducive to innovation within the mining sector.

8.6 RESEARCH LIMITATIONS

Like all studies, this research is not exempt from limitations. One of the limitations that has been highlighted is the relatively small sample size (11 mining companies), particularly when considering the large number of mining companies in South Africa, which exceeds 700 (Mindat, 2023). This limitation was somewhat unavoidable, given that qualitative in-depth interviews with 31 business leaders is a time-consuming research method. It can be argued that the sample used in this study may impact the

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research's validity. Nevertheless, considering the data saturation effect and the necessary balance between sample size and the depth of analysis, the researcher maintains that this study offers a substantial advancement in the understanding of enabling leadership processes and practices among business leaders in the mining sector.

Despite the restricted sample, it is worth noting that the respondents hold significant positions as senior leaders within major mining companies, providing valuable and insightful perspectives. In addition, these senior leaders have a depth of experience in the mining sector. Another limitation lies in the exclusion of a substantial number of potential respondents, as the research approach solely targets larger mining companies with active operations in South Africa.

As previously mentioned, despite the omission of some mining companies, the research still provides a broad spectrum of approaches to the SDGs and ESG, ensuring a comprehensive view. It is noteworthy that while the majority of mining companies support the SDGs and ESG principles, their progress may differ significantly. The crucial aspect is that they have initiated a journey, allowing for meaningful discussions and progress in the right direction.

As explored in Chapter 5, the research methods also have their limitations. The novelty and depth of insights in this study rely on the responses of the interviewed participants. It is possible that some respondents may be more forthcoming in their responses compared to others, which can complicate direct comparisons across the sample. To address this concern, the researcher ensured that the participants were offered anonymity, thereby mitigating potential biases and encouraging candid input.

However, the researcher acknowledges that the depth of insights is contingent on the honesty and openness of the respondents during the interviews. Additionally, the qualitative nature of the analysis further complicates matters. As previously discussed, researchers can introduce bias both in their interviewing techniques and in the interpretation of the results. The researcher acknowledges that her

professional experience aided in establishing rapport, conducting, and interpreting the interviews. However, she is aware that the interpretation of the results may still be subjective.

As previously proposed, future research endeavours could utilise the findings of this thesis to design a survey and explore the ideas among a larger group of respondents. This approach would be particularly insightful for delving deeper into some of the issues that emerged during the study.

To pursue this approach, a series of open-ended interviews could be conducted with major mining companies. The insights gained from these interviews could then be used to design surveys aimed at a larger sample size.

8.7 SUGGESTIONS FOR FUTURE RESEARCH

Despite adopting a multi-faceted approach, this study has surfaced some additional issues that can serve as a foundation for future research endeavours. Expanding the sample to include a comparison of international mining companies could have potentially enhanced the understanding of enabling leadership practices driving innovation towards achieving SDGs and ESG in the mining sector.

As previously demonstrated, the evolving nature of the SDG and ESG context can serve as a foundation for a longitudinal study, which would examine the constructs of the SDGs and ESG, potential changes in the hierarchy of factors influencing decision-makers in this context, and the incremental attitudes of participants towards the implementation and institutionalisation of these principles.

Moreover, additional research efforts could focus on a longitudinal study to explore the specific internal implementation of the SDGs and ESG. In-depth case studies could provide valuable insights from diverse perspectives within mining companies, shedding light on leadership processes and practices over time as they relate to SDGs and ESG integration. Furthermore, these studies could uncover more nuanced challenges, including those stemming from internal politics.

Such an approach would also enable a deeper investigation into the complexities of driving innovation for achieving SDGs and ESG goals at various levels within mining companies. Given the limited existing research in this area, it presents an intriguing opportunity to bridge the gap between verbal commitments and practical actions taken by companies.

Additional areas for future research can encompass the following suggestions: conducting an investigation into the institutionalisation of SDGs and ESG in multinational mining companies, considering the complexities of reconciling business leaders' personal understanding with their parent organisations' perspectives on SDGs and ESG; determining the innovative traits of corporate SDGs and ESG formulation and implementation; establishing further links between transactional or transformational leadership styles and decision-making processes concerning SDGs and ESG; empirically exploring the relationships between cost-benefit analysis and organisational, personal and societal ethics in the implementation of SDGs and ESG; investigating government's role with respect to appropriate regulation in the alignment of the national objectives and understanding how to integrate SDG and ESG with leadership styles in creating a viable mining industry meeting the international concerns; and lastly a framework to monitor and evaluate the impact of innovation in advancing the SDGs and ESG.

8.8 SUMMARY AND CONCLUSION

The contributions of this study to knowledge have been derived not only from empirical findings but also from their correlations with and discussions in connection to previously published theories and concepts. This has led to an improved overall understanding of enabling leadership practices that drive innovation in the pursuit of SDGs and ESG in the South African mining sector.

9. LIST OF REFERENCES

- Abeyssekera, I. 2013. A template for integrated reporting. *Journal of Intellectual Capital*, 14:227-245.
- Abidin, S.Z., Mohtar, S.S. & Yusoff, R.Z. 2013. Innovation process from the perspective of measurement. *International Journal of Innovation and Applied Studies*, 3(1):255-261.
- Abrunhosa, A. & Sá, M.E. 2008. Are TQM Principles Supporting Innovation in the Portuguese Footwear Industry? *Technovation* (28):208-221.
<http://dx.doi.org/10.1016/j.technovation.2007.08.001>
- Adami, C. 2002. What is complexity? *BioEssays* 24:1085-1094.
- Adams, R., Bessant, J. & Phelps, R. 2006. Innovation management measurement: A review. *International Journal of Management Reviews* 8(1).
- Adler, P.S., Goldoftas, B. & Levine, D.I. 1999. Flexibility versus efficiency? A case study of model changeovers in the Toyota production system. *Organization Science*, 10(1):43-68.
- Adler, R.A., Claassen, M., Godfrey, L. Turton, A.R. 2007. Water, mining, and waste: an historical and economic perspective on conflict management in South Africa. *The Economics of Peace and Security Journal* 2:2.
- African National Congress (ANC). 2012. State Intervention in the Mining Sector (SIMS) Summary Report
- Agboola, O., Babatunde, D.E., Fayomi, O.S.I., Sadiku, E.R., Popoola, P., Moropeng, L., Yahaya, A. & Mamudu, O.A. 2020. A review on the impact of mining operations: Monitoring, assessment and management. *Results in Engineering*, 8:100181.
- Ahmed Haji, A. & Anifowose, M. 2016. The trend of integrated reporting practice in South Africa: ceremonial or substantive? *Sustainability Accounting, Management and Policy Journal*, 7:190-224.
- Ahmed, A.K., Ata, A.A. & Abd-Elhamid, Z.N. 2019. Relationship between the leadership behaviors, organizational climate, and innovative work behavior among nurses. *American Journal of Nursing Research*, 7:870-878.
- Akcil, A., & Koldas, S. 2018. Acid Mine Drainage (AMD): Causes, Treatment and Case Studies. *Journal of Cleaner Production*, 207:1084-109

- Akinlabi, S.A., Mashinini, M.P., Lewandja, A.M.M., Mbohwa, C., Adedeji, P.A., Fatoba, O.S. & Akinlabi, E. T. 2019. *Evaluating impacts of coal mining in South African environment: A step to actualizing society 4.0*. In: Proceedings of the International Conference on Industrial Engineering and Operations Management, 812-818.
- Allport, G.W. 1937. *Personality: a psychological interpretation*, Oxford, England, Holt.
- Al-Shammari, B. & Al-Sultan, W. 2010. Corporate governance and voluntary disclosure in Kuwait. *International Journal of Disclosure and Governance*, 7:262-280.
- Amabile, T.M., Schatzel, E.A., Moneta, G.B. & Kramer, S.J. 2004. Leader behaviors and the work environment for creativity: Perceived leader support. *The Leadership Quarterly*, 15:5-32.
- Amel-Zadeh, A. & Serafeim, G. 2018. Why and how investors use ESG information: Evidence from a global survey. *Financial Analysts Journal*, 74(3):87-103.
- Analysis Report*. Centre for Applied Legal Studies (CALS), Johannesburg
- Antin, D. 2013. The South African mining sector: An industry at a crossroads. *Economy Report South Africa*, 1-22.
- Antonakis, J., Cianciolo, A.T. & Sternberg, R.J. 2004. Leadership: Past, present and future. *The Nature of Leadership*, 3-15.
- Aragón-Correa, J.A., García-Morales, V.J. & Cordon-Pozo, E. 2007. Leadership and organizational learning's role on innovation and performance: Lessons from Spain. *Industrial Marketing Management*, 36(3):349-359.
- Arena, M., Cross, R., Sims, J. & Uhl-Bien, M. 2017. How to catalyze innovation in your organization. *MIT Sloan Management Review*.
- Armstrong, A. 2020. Ethics and ESG. *Australasian Accounting, Business and Finance Journal*, 14(3):6-17
- Armstrong, M., Petter, R. & Petter, C. 2019. Why have so many tailings dams failed in recent years? *Resources Policy*, 63:101412.
- Arzubiaga, U., Iturralde, T., Maseda, A. & Kotlar, J. 2018. Entrepreneurial orientation and firm performance in family SMEs: the moderating effects of family, women, and strategic involvement in the board of directors. *International Entrepreneurship and Management Journal*, 14:217-244.

Enabling leadership of and innovation in SA mining companies in pursuing ESG and the SDGs

- Ashman, S., Fine, B. & Newman, S. 2011. Amnesty International? The nature, scale and impact of capital flight from South Africa. *Journal of Southern African Studies*, 37(01):7-25
- Auty, R. 2002. *Sustaining development in mineral economies: the resource curse thesis*. Routledge.
- Avolio, B.J. & Bass, B.M. 1991. *The Full Range Leadership Development Programs: Basic and Advanced Manuals*. New York: Bass, Avolio Associates.
- Avolio, B.J., Bass, B.M. & Jung, D.I. 1999. Re-examining the components of transformational and transactional leadership using the Multifactor Leadership. *Journal of Occupational and Organizational Psychology*, 72:441-462.
- Avolio, B.J., Bass, B.M., Walumbwa, F.O. & Zhu, W. 2004. *Multifactor leadership questionnaire: manual and sample set*, Mind Garden, Inc. Menlo Park, CA.
- Azadi, M., Northey, S.A., Ali, S.H. & Edraki, M. 2020. Transparency on greenhouse gas emissions from mining to enable climate change mitigation. *Nature Geoscience*, 13:100-104.
- Azis, Y. & Osada, H. 2010. Innovation in management system by Six Sigma: an empirical study of world-class companies. *International Journal of Lean Six Sigma*, 1(3):172-190.
- Azis, Y., Azis, Y. & Osada, H. 2013. Managing innovation using design for six sigma (DFSS) approach in healthcare service organizations. *International Journal of Innovation and Technology Management*, 10:1-21.
- Bäcklander, G., 2019. Doing complexity leadership theory: How agile coaches at Spotify practise enabling leadership. *Creativity and Innovation Management*, 28(1): 42–60.
- Badshah, S. 2012. Historical study of leadership theories. *Journal of Strategic Human Resource Management*, (1):49-59.
- Banerjee, S.B., 2002. Corporate environmentalism: The construct and its measurement. *Journal of Business Research*, 55(3):177-191.
- Bannon, I. & Collier, P. eds., 2003. *Natural resources and violent conflict: Options and actions*. World Bank Publications.
- Barker, V. & Mueller, G. 2002. CEO characteristics and firm R&D spending. *Management Science*, 48:782-801.

Enabling leadership of and innovation in SA mining companies in pursuing ESG and the SDGs

- Barnewold. L., Lottermoser. B.G. 2020, Identification of digital technologies and digitalisation trends in the mining industry, *International Journal of Mining Science and Technology*, 30 (6): 747-757.
- Basit, T. 2003. Manual or electronic? The role of coding in qualitative data analysis. *Educational Research*, 45:143-154.
- Bass, B.M. & Avolio, B.J. 1996. Multifactor leadership questionnaire. *Western Journal of Nursing Research*.
- Bass, B.M. & Bass Bernard, M. 1985. *Leadership and performance beyond expectations*. The Free Press, New York. 191.
- Bass, B.M. & Riggio, R.E. 2006. *Transformational leadership*. Psychology Press. New York. 296
- Bass, B.M. 1985. *Leadership and performance beyond expectations*, New York, Free Press.
- Bass, B.M. 1990. From transactional to transformational leadership: Learning to share the vision. *Organizational Dynamics*, 18:19-31.
- Bass, B.M., Avolio, B.J., Jung, D.I. & Berson, Y. 2003. Predicting unit performance by assessing transformational and transactional leadership. *The Journal of Applied Psychology*, 88:207-18.
- Baum, L. 2012. It's Not Easy Being Green ... Or Is It? A content analysis of environmental claims in magazine advertisements from the United States and United Kingdom. *Environmental Community* 6(4):423–440.
<https://doi.org/10.1080/17524032.2012.724022>
- Baumgartner, R.J. & Rauter, R. 2017. Strategic perspectives of corporate sustainability management to develop a sustainable organization. *Journal of Cleaner Production*, 140:81-92.
- Baxter, R. 2009. The global economic crisis and its impact on South Africa and the country's mining industry. *Challenges for monetary policy-makers in emerging markets* :105-116.
- Baxter, R. 2013. *Role of the South African Mining Industry in South Africa's Growth and Development Plans*. Presentation given at: Harmony Sponsored Investor Forum, 03.25.2013. Chamber of Mines of South Africa.

- British Broadcasting Corporation, 2021. *Vale dam disaster: \$7bn compensation for disaster victims*. BBC News. Available at: <https://www.bbc.com/news/business-55924743> (Accessed: 09 July 2023).
- Beaulieu, C. 2004. Intercultural Study of Personal Space: A Case Study. *Journal of Applied Social Psychology*, 34:794-805.
- Becheikh, N., Landry, R. & Amara, N. 2006. Lessons from innovation empirical studies in the manufacturing sector: A systematic review of the literature from 1993-2003. *Technovation*, 26:644-664.
- Beckerman, W., 1994. 'Sustainable Development': Is it a Useful Concept? *Environmental Values* (3)391-209(19).
- Bell, P.A., Greene, T.C., Fisher, J.D. & Baum, A. 2001. *Environmental Psychology*. 5th ed., Harcourt College Publishers, New York.
- Bennis, W. 2007. The challenges of leadership in the modern world: Introduction to the special issue. *American Psychologist* 62:2.
- Berenberg, J. 2018. *Understanding the SDGs in sustainable investing*.
- Billio, M., Costola, M., Hristova, I., Latino, C., & Pelizzon, L. 2021. Inside the ESG ratings: (Dis)agreement and performance. *Corporate Social Responsibility and Environmental Management*, 28(5):1426–1445.
- Bini, C. 2011. *Environmental Impact of Abandoned Mine Waste: A Review*. Nova Science Publishers, Inc., New York.
- Blaikie, N. 2000. *Designing social research: The logic of anticipation*, Cambridge: Polity Press.
- Blaikie, N. 2007. *Approaches to social enquiry: Advancing knowledge*, Polity.
- Blake, R.R., Mouton, J.S., Barnes, L. B. & Greiner, L.E. 1964. *Breakthrough in organization development*, Graduate School of Business Administration, Harvard University New York, NY.
- Bliss, J., Monk, M., Ogborn, J. & Black, P. J. 1983. *Qualitative data analysis for educational research: A guide to uses of systemic networks*.
- Blowes, D., Ptacek, C., Jambor, J. & Weisener, C. 2003. The Geochemistry of Acid Mine Drainage. *Treatise on Geochemistry*, 9:149-204.

- Bluteau, J. 2019. Legitimising digital anthropology through immersive cohabitation: Becoming an observing participant in a blended digital landscape. *Ethnography*, 22, 146613811988116.
- Boddy, C.R. The Corporate Psychopaths Theory of the Global Financial Crisis. *Journal of Business Ethics* 2011, (102):255–259.
- Boisot, M. & McKelvey, B. 2010. Integrating modernist and postmodernist perspectives on organizations: A complexity science bridge. *Academy of Management Review*, 35(3):415-433.
- Bon, A.T. & Mustafa, E.M.A. 2013. Impact of Total Quality Management on Innovation in Service Organizations: Literature Review and New Conceptual Framework. *Procedia Engineering*, 53:516-529.
- Bonsu, S. & Twum-Danso, E. 2018. Leadership style in the global economy: A focus on cross-cultural and transformational leadership. *Journal of Marketing and Management*, (9):37-52.
- Borgmann L., Rowold, J., & Bormann, K. C. 2016. Integrating leadership research: A meta-analytical test of Yukl's meta-categories of leadership. *Personnel Review*, 45(6):1340-1366.
- Boumgarden, P., Nickerson, J. & Zenger, T.R. 2012. Sailing into the wind: Exploring the relationships among ambidexterity, vacillation, and organizational performance. *Strategic Management Journal*, 33(6):587-610.
- Boyne, G.A., Gould-Williams, J.S., Law, J. & Walker, R.M. 2005. Explaining the adoption of innovation: An empirical analysis of public management reform. *Environment and Planning: Government and Policy*, 23(3):419-435.
- Brand South Africa (2018) *SA's key economic sectors*, Brand South Africa. Available at: <https://brandsouthafrica.com/78205/economic-sectors-agricultural/>.
- Brown, M.E. & Gioia, D.A. 2002. Making things click: Distributive leadership in an online division of an offline organization. *The Leadership Quarterly*, 13(4):397-419.
- Brunnschweiler, Ch.N. & Bulte, E.H. 2008. The resource curse revisited and revised: a tale of paradoxes and red herrings. *Journal for Environment Economic Management*. 55:248–26.
- Bryman, A. 2011. *The Sage handbook of leadership*. London: Sage.
- Bryman, A. 2016. *Social research methods*, Oxford University Press.

Enabling leadership of and innovation in SA mining companies in pursuing ESG and the SDGs

- Burn, J. M. 1978. *Leadership*. New York: Harper & Row.
- Busch, T. & Lewandowski, S. 2018. Corporate carbon and financial performance: A meta-analysis. *Journal of Industrial Ecology*, 22(4):745-759.
- Cairns, E. & Tilbury, C. 2019. Dopamine and Sleep: Implications for Psychiatric Disorders. *Frontiers in Psychiatry* (10):802.
- Centre for Applied Legal Studies, 2016. *The Social and Labour Plan Series Phase 1: System Design Trends*
- Cambridge Institute for Sustainability Leadership (CISL). 2017. *Towards a sustainable economy: The commercial imperative for business to deliver the UN Sustainable Development Goals*
- Cameron, E. & Green, M. 2017. *Essential leadership: develop your leadership qualities through theory and practice*. London: KoganPage.
- Cao, Q., Simsek, Z. & Zhang, H. 2010. Modelling the joint impact of the CEO and the TMT on organizational ambidexterity. *Journal of Management Studies*, 47(7):1272-1296.
- Carayannis, E.G. & Provan, M. 2008. Measuring firm innovativeness: towards a composite innovation index built on firm innovative posture, propensity and performance attributes. *International Journal of Innovation and Regional Development* (1):90.
- Carels, C., Maroun, W., Padia, N. 2013. Integrated reporting in the South African mining sector. *Corp. Ownership Control*, (11):947–961.
- Carlyle, T. 1993. *On heroes, hero-worship, and the heroic in history*, Univ. of California Press.
- Carmeli, A. & Halevi, M.Y. 2009. How top management team behavioral integration and behavioral complexity enable organizational ambidexterity: The moderating role of contextual ambidexterity. *The Leadership Quarterly*, 20(2):207-218.
- Carpinetti, L.C.R., Gerolamo, M.C. & Galdámez, E.V.C., 2007. Continuous innovation and performance management of SME clusters. *Creativity and Innovation Management*, 16(4):376-385.
- Carroll, A.B. 1979. A three-dimensional conceptual model of corporate performance. *Academy of Management Review*, 4(4):497-505.

- Carroll, A.B. 1999. Corporate social responsibility—evolution of a definitional construct, *Business and Society* (38):268–295.
- Carroll, A.B. 2009. A history of corporate social responsibility: concepts and practices in: A. Crane, D. Matten, A. McWilliams, J. Moon, and D. S. Siegel, eds, *The Oxford Handbook of Corporate Social Responsibility* (Oxford University Press, Oxford), 19–46.
- Casimir, G. 2001. Combinative aspects of leadership style: The ordering and temporal spacing of leadership behaviors. *The Leadership Quarterly*, (12):245-278.
- Cater, J.K. 2011. Skype a cost-effective method for qualitative research. *Rehabilitation Counselors & Educators Journal*, (4):3.
- Chaffee, E.C. 2017. *The origins of corporate social responsibility*. U. Cin. L. Rev., (85):353.
- Chalmers, A.F. 2013. *What Is This Thing Called Science*, 4th ed. Chicago: University of Queensland Press.
- Chamber of Mines of South Africa. 2012. *Facts and Figures 2012*, Chamber of Mines of South Africa. Available at: <https://www.mineralscouncil.org.za/component/jdownloads/?task=download.send&id=143&catid=17&m=0&Itemid=119>.
- Chamber of Mines of South Africa. Mine SA. *Facts and figures pocketbook, 2018*. Available from: <http://www.mineralscouncil.org.za/industrynews/publications/facts-and-figures/send/17-facts-and-figures/532-factsand-figures-2018>.
- Chambers, J. 2016. *Cisco's John Chambers on the digital era*. McKinsey & Company.
- Chell, E. 1998. *Critical incident technique*.
- Chemers, M.M. 1997. *Leadership, change, and organizational effectiveness*. University of California, Santa Cruz, 1-5.
- Chen Y., Lin C., Chang C. 2013. The influence of greenwash on green word-of-mouth (green WOM): the mediation effects of green perceived quality and green satisfaction. *Qual Quant* 48(5):2411–2425. <https://doi.org/10.1007/s11135-013-9898-1>

- Chen, Y.S. and Chang, C.H. 2012. Enhance green purchase intentions: The roles of green perceived value, green perceived risk, and green trust. *Management Decision*, 50(3):502-520.
- Chigbu. B, Nekhwevha. F. 2021. The future of work and uncertain labour alternatives as we live through the industrial age of possible singularity: Evidence from South Africa, *Technology in Society* (Volume 67).
- Cho, C.H., & Patten, D.M. 2007. The Role of Environmental Disclosures as Tools of Legitimacy: A Research Note. *Accounting, Organizations and Society*, 32(7-8): 639-647.
- Clark, G., Feiner, A., & Viehs, M. 2015. *From the Stockholder to the Stakeholder: How Sustainability Can Drive Financial Outperformance*. Oxford: University of Oxford.
- Clarkson, M.E., 1995. A stakeholder framework for analyzing and evaluating corporate social performance. *Academy of Management Review*, 20(1):92-117.
- Code for Responsible Investing in South Africa (CRISA). 2023. Home. <https://www.crisa2.co.za/#>
- Cohen, D. & Crabtree, B. 2006. *Qualitative research guidelines project*.
- Cohen, L., Manion, L. & Morrison, K. 2017. *Research methods in education*, Routledge.
- Cole, M., Broadhurst. J. 2021. Measuring the sustainable development goals (SDGs) in mining host communities: A South African case study, *The Extractive Industries and Society*, (8):1:233-243.
- Cole, M.J., Chicksen, B., Jennifer, B., Herman, M., Edson, C., Adele, H., & David, V. 2018. *Embedding the Sustainable Development Goals into Business Strategy and Action*.
- Coleman, E.G. 2010. Ethnographic approaches to digital media. *Annual Review of Anthropology*, 39:487-505.
- Coleman, N. 2012. 'More Questions than Answers', *Mail and Guardian*, 26 October - 1 November.
- Collier, J. 2019. Exchange-rate pass-through, monetary policy and the pricing of risk. *Journal of International Money and Finance*, 92: 194-217.

- Cop, S., Olorunsola, V.O., & Alola, U.V. 2021. Achieving environmental sustainability through green transformational leadership policy: Can green team resilience help? *Business Strategy and the Environment*, 30(1):671-682.
- Cortes, A. F. & Herrmann, P. 2021. Strategic leadership of innovation: a framework for future research. *International Journal of Management Reviews*, 23:224-243.
- Corvino, A., Doni, F. & Bianchi Martini, S. 2020. Corporate governance, integrated reporting and environmental disclosure: *Evidence from the South African context. Sustainability*, 12(12):4820.
- Courtois, S. 2019, The Integration of SDGs through Intra-Sector Collaboration: the case of the Chemical Sector SDG Roadmap.
- Creswell, J. W. & Creswell, J. D. 2017. *Research design: Qualitative, quantitative, and mixed methods approaches*. Sage publications.
- Creswell, J.W., Cheryl N. Poth, C.N. 2016. Qualitative Inquiry and Research Design: Choosing Among Five Approaches, *SAGE Publications - Social Science* (December)
- Cronje, F. & Chenga, C.S. 2009. Sustainable social development in the South African mining sector. *Development Southern Africa*, 26(3):413-427.
- Curtin, M. & Fossey, E. 2007. Appraising the trustworthiness of qualitative studies: Guidelines for occupational therapists. *Australian Occupational Therapy Journal*, 54: 88-94.
- Damanpour, F., Walker, R. M. & Avellaneda, C. N. 2009. Combinative Effects of Innovation Types and Organizational Performance: A Longitudinal Study of Service Organizations. *Journal of Management Studies*, 46: 650-675.
- Dangelico, R. M. 2016. Green Product Innovation: Where We Are and Where We Are Going: Green Product Innovation. *Business Strategy and the Environment*, 25(8):560-576.
- Dasgupta, M. & Gupta, R. 2009. Innovation in Organizations: A Review of the Role of Organizational Learning and Knowledge Management. *Global Business Review - Global Bus Rev*, 10:203-224.
- Daugaard, D. 2020. Emerging new themes in environmental, social and governance investing: a systematic literature review. *Account Finance*, 60: 1501-1530. <https://doi.org/10.1111/acfi.12479>.

- Davenport, J. 2013. *Digging deep: A history of mining in South Africa*. Jonathan Ball Publishers.
- Davies, C.F., Berman, E. and Pillay, D. 2018. *Mining in South Africa: Overview, Practical Law*. Available at: <https://uk.practicallaw.thomsonreuters.com/w-017-7378?transitionType=Default&contextData=%28sc.Default%29&firstPage=true> (Accessed: 09 July 2023).
- De Bono, E. 1971. *The Use of Lateral Thinking: break the stranglehold of logical thinking*. Harmondsworth, Penguin.
- De Freitas Netto, S.V., Sobral, M.F.F., Ribeiro, A.R.B. da Luz Soares, G.R. 2020. Concepts and forms of greenwashing: a systematic review. *Environ Sci Eur* 32, 19 <https://doi.org/10.1186/s12302-020-0300-3>
- De Klerk, R. 2019. *The social construction of leadership: a follower-centric investigation into integrated reporting* (PhD thesis). University of Pretoria, Pretoria, South Africa.
- De Seta, G. 2020. *Three lies of digital ethnography*.
- Deakin, H. & Wakefield, K. 2014. Skype interviewing: Reflections of two PhD researchers. *Qualitative research*, 14:603-616.
- Dei, F. 2014. 'A new evaluation of school feeding program: Case study of Magog Primary School', University of South Africa, Pretoria.
- Delmas M., Burbano V. 2011. The drivers of greenwashing. *Calif Management Review* 54(1):64–87. <https://doi.org/10.1525/cm.2011.54.1.64>
- Deloitte. *The future of mining in South Africa: innovation imperative*. 2014. Available from: https://www2.deloitte.com/content/dam/Deloitte/za/Documents/energy-resources/ZA_Mine_of_the_Future_06022015.pdf.
- Denzin, N.K. & Lincoln, Y.S. 1998. *The Landscape of Qualitative Research: Theories and*.
- Denzin, N.K. & Lincoln, Y.S. 2008. *Introduction: The discipline and practice of qualitative research*.
- Department of Mineral Resources (DMR), 2010a. Guidelines for the Submission of a Social and Labour Plan As Required in Terms of Regulation 46 of the Mineral and Petroleum Resources Development Act (Act 28 of 2002). Department of Mineral Resources, Government of South Africa, Pretoria.

Enabling leadership of and innovation in SA mining companies in pursuing ESG and the SDGs

Department of Mineral Resources (DMR), 2018b. South African Mineral Industry 2016/2017 SAMI, 34th Ed., Department of Mineral Resources, Government of South Africa, Pretoria, South Africa.

Department of Mineral Resources (DMR). 2018a. Broad-based socio-economic empowerment charter for the mining

Department of Mineral Resources (DMR). 2019. Housing and living conditions standard for the minerals industry, 2019. Government Gazette No. 42899. Department of Mineral Resources, Republic of South Africa, 11 December 2019.

Department of Mineral Resources (DMR). 2023. *Guideline for the submission of a Social and Labour Plan as required in terms of Regulation 46 of the Mineral and Petroleum Resources Development Act (Act 28 of 2002)* retrieved from https://www.dmr.gov.za/Portals/0/social%20and%20labour%20plan_guideline.pdf (Accessed: 25 January 2023).

Department of Water and Sanitation. 2016. Benchmarks for Water Conservation and Water Demand Management (WC/WDM) in the Mining Sector.

Derue, D.S., Nahrgang, J.D., Wellman, N.E., & Humphrey, S.E. 2011. Trait and behavioral theories of leadership: An integration and meta-analytic test of their relative validity. *Personnel Psychology*, 64(1):7-52.

Deshwal, V. & Ashraf Ali, M. 2020. A Systematic Review of Various Leadership Theories. *Shanlax International Journal of Commerce*, 8:38-43.

DesJardine, M.R., Marti, E., & Durand, R. 2020. Why activist hedge funds target socially responsible firms: The reaction costs of signaling corporate social responsibility. *Academy of Management Journal*. <https://doi.org/10.5465/amj.2019>.

Dietler, D., Farnham, A., Loss, G., Fink, G. & Winkler, M.S. 2021. Impact of mining projects on water and sanitation infrastructures and associated child health outcomes: a multi-country analysis of Demographic and Health Surveys (DHS) in sub-Saharan Africa. *Globalization and Health*, 17:70.

Dinh, J.E., Lord, R.G., Gardner, W.L., Meuser, J.D., Liden, R.C., & Hu, J. 2014. Leadership theory and research in the new millennium: Current theoretical trends and changing perspectives. *The Leadership Quarterly*, 25(1):36-62.

Dixon, F. 2019. System change investing and the sustainable development goals. *Cadmus*, 3(6):98-117.

Enabling leadership of and innovation in SA mining companies in pursuing ESG and the SDGs

- Dludla, N. 2022. *South Africa mine dam wall collapses, killing 1 and injuring 40*, Reuters, retrieved from <https://www.reuters.com/world/africa/south-africa-mine-dam-wall-collapses-killing-three-injuring-40-2022-09-11/> (Accessed: 17 January 2023).
- Doane, D. 2005. The myth of CSR. *Stanford Social Innovation Review*, 3:22-29.
- Dobbins, G.H. & Platz, S.J. 1986. Sex differences in leadership: How real are they? *Academy of Management Review*, 11:118-127.
- Doni, F. & Fortuna, F. 2018. Corporate Governance code in South Africa after the adoption of Integrated Reporting. Evidence from the mining industry. *International Business Management*, 12(1):68-81.
- Doni, F., Corvino, A., Bianchi Martini, S. *King Codes on Corporate Governance and ESG performance*. Evidence from FTSE/JSE All-Share Index. In *Integrated Reporting*.
- Dunbar, W.S., Fraser, J., Reynolds, A. & Kunz, N.C. 2020. Mining needs new business models. *The Extractive Industries and Society*, 7(2):263-266.
- Dunham, R.B. & Pierce, J.L. 1989. *Management, Glenview, Ill.*, Scott, Foresman.
- Dunmade, I., Madushele, N., Adedeji, P.A. & Akinlabi, E.T. 2019. A streamlined life cycle assessment of a coal-fired power plant: the South African case study. *Environmental Science and Pollution Research*, 26:18484-18492.
- Dye, J., McKinnon, M. & Van der Byl, C. 2021. Green gaps: Firm ESG disclosure and financial institutions' reporting Requirements. *Journal of Sustainability Research*, 3(1).
- Easterby-Smith, M., Thorpe, R. & Jackson, P.R. 2012. *Management research*, Sage.
- Ebrahim, F. & Yahaya, R. 2016. Leadership styles and organizational commitment: literature review. *Journal of Management Development*, 35(2):190-216.
- Eccles, R.G., & Serafeim, G. 2013. The Performance Frontier: Innovating for a Sustainable Strategy. *Harvard Business Review*, 91(5):50-60.
- Eccles, R.G., Ioannou, I., & Serafeim, G. 2014. The Impact of Corporate Sustainability on Organizational Processes and Performance. *Management Science*, 60(11):2835–2857.
- Eccles, R.G., Krzus, M.P. & Ribot, S. 2014. *The Integrated Reporting Movement, Meaning, Momentum, Motives and Materiality*, John Wiley and Sons Inc.: New York, NY, USA.

- Eccles, R.G.; Kruz, M.P. 2010. *One Report—Integrated Reporting for a Sustainable Society*. John Wiley and Sons Inc.: Hoboken, NJ, USA.
- Edvardsson, B. & Roos, I. 2001. Critical incident techniques: Towards a framework for analysing the criticality of critical incidents. *International Journal of Service Industry Management*, 12:251-268.
- Edward, L.N., & Mbohwa, C. 2013. *The Role of leadership in business process reengineering: “Leaders, do you want to change?”*.
- Edwards, A.L. 1953. The relationship between the judged desirability of a trait and the probability that the trait will be endorsed. *Journal of Applied Psychology*, 37:90.
- Eisenbeiss, S.A., van Knippenberg, D. & Boerner, S. 2008, Transformational leadership and team innovation: integrating team climate principles”, *Journal of Applied Psychology*, (93)6:1438-1446.
- Eisenhardt, K.M., Furr, N.R. & Bingham, C.B. 2010. Microfoundations of Performance: Balancing Efficiency and Flexibility in Dynamic Environments. *Organization Science*, 21:1263-1273.
- Ekvall, G. 1991. Change-centred Leaders: Empirical Evidence of a Third Dimension of Leadership. *Leadership & Organization Development Journal*, 12:18-23.
- El Amari, K., Valera, P., Hibti, M., Pretti, S., Marcello, A. & Essarraj, S. 2014. Impact of mine tailings on surrounding soils and ground water: Case of Kettara old mine, Morocco. *Journal of African Earth Sciences*, 100:437-449.
- Elenkov, D.S. & Manev, I.M. 2005. Top management leadership and influence on innovation: The role of sociocultural context. *Journal of Management*, 31(3):381-402.
- Elkington, R. & Booyesen, L. 2015. Innovative leadership as enabling function within organizations: A complex adaptive system approach. *Journal of Leadership Studies*, 9, 78-80.
- Elo, S., Kääriäinen, M., Kanste, O., Pölkki, T., Utriainen, K. & Kyngäs, H. 2014. *Qualitative content analysis: A focus on trustworthiness*. SAGE open, 4, 2158244014522633.
- Elshkaki, A., Graedel, T.E., Ciacci, L. & Reck, B.K. 2016. Copper demand, supply, and associated energy use to 2050. *Global environmental change*, 39:305-315.

Enabling leadership of and innovation in SA mining companies in pursuing ESG and the SDGs

- Erasmus. D. 2022. *Regulator delays decision on Eskom tariff increase*, retrieved from <https://www.businesslive.co.za/bd/national/2022-12-14-breaking-news-regulator-delays-decision-on-eskom-tariff-increase/> (Accessed: 18 January 2023).
- Erickson, F. 1977. Some approaches to inquiry in school-community ethnography. *Anthropology & Education Quarterly*, 8:58-69.
- Ericson, R.V., Baranek, P.M. & Chan, J.B. 1991. *Representing order: Crime, law, and justice in the news media*, Open University Press Milton Keynes.
- European Commission. 2019. *Guidelines on the Use of Environmental Claims*. Retrieved from <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32019H0190>.
- European Commission., 2014. *Non-Financial Reporting Directive (2014/95/EU)*.
- European Union.. 2002. *Corporate Social Responsibility Main issues*. Available at: https://ec.europa.eu/commission/presscorner/detail/en/MEMO_02_153.
- Evaluations*, U. S. G. A. O. C. S. 1990. US General Accounting Office: Program Evaluation and Methodology Division. Washington: The Office.
- Evans, G., & Mlambo, A. 2017. The Mining Industry and Corporate Social Responsibility. In: M. Tolba & O. Saab (Eds.), *The Arab World Competitiveness Report 2017:98-111*. Springer International Publishing.
- Eyewitness Ne.s, 2022. AMCU accuses Sibanye of arrogance in wage talks after CEO receives R300m bonus, *Eyewitness News*. Available at: <https://ewn.co.za/2022/04/28/amcu-accuses-sibanye-stillwater-of-arrogance-after-ceo-receives-r300-payout>.
- Falk, J.H., & Smith, R.F. 2019. Social Determinants of Health and Health Inequities. *Annual Review of Public Health*, 40, 163-187.
- Fashola, M.O., Ngole-Jeme, V.M. and Babalola, O.O. 2016. Heavy metal pollution from gold mines: environmental effects and bacterial strategies for resistance. *International Journal of Environmental Research and Public Health*, 13(11):1047.
- Federal Trade Commission. 2012. *Green Guides*. Retrieved from <https://www.ftc.gov/news-events/media-resources/truth-advertising/green-guides>.
- Feinstein N. 2012. *Learning from past mistakes: future regulation to prevent greenwashing*. SSRN Electron J. <https://doi.org/10.2139/ssrn.2137234>.

- Fiedler, F.E. & House, R.J. 1988. *Leadership theory and research: A report of progress*.
- Finkelstein, S. & Hambrick, D.C. 1996. *Strategic leadership: Top executives and their effects on organizations*, Citeseer.
- Fiscor, S. 2023. Debate Highlights ESG Complexities: Engineering, Geology, Mineralogy, Metallurgy, Chemistry, etc, *Engineering and Mining Journal*, 224(3):2.
- Fisher, R.J. 1993 Social desirability bias and the validity of indirect questioning. *Journal of Consumer Research*, (20):303-315.
- Flanagan, J.C. 1954. The critical incident technique. *Psychological Bulletin*, (51): 327.
- Florini, A., & Pauli, M. 2018. Collaborative governance for the sustainable development goals. *Asia & the Pacific Policy Studies*, 5(3):583–598.
- Font, X., Walmsley, A., Cogotti, S., McCombes, L. and Häusler, N. 2012. Corporate social responsibility: The disclosure–performance gap. *Tourism Management*, 33(6):1544-1553.
- Forcadell, F.J. and Aracil, E. 2017. European banks' reputation for corporate social responsibility. *Corporate Social Responsibility and Environmental Management*, 24(1):1-14.
- Forsman, H. & Temel, S. 2011. Innovation and Business Performance in Small Enterprises: An Enterprise-Level Analysis. *International Journal of Innovation Management (ijim)*, (15):641-665.
- Fraser, J. 2019. Creating shared value as a business strategy for mining to advance the United Nations Sustainable Development Goals. *The Extractive Industries and Society*, (6):788-791.
- Friede, G., Busch, T., & Bassen, A. 2015. ESG and financial performance: aggregated evidence from more than 2000 empirical studies. *Journal of Sustainable Finance & Investment*, 5(4):210-233.
- Friedrichs, J., Inderwildi, O.R. 2013. The carbon curse: are fuel rich countries doomed to high CO₂ intensities? *Energy Policy* 62:1356–1365.
- Fukuda-Parr, S. & Muchhala, B. 2020. The Southern origins of sustainable development goals: Ideas, actors, aspirations. *World Development*, 126:104706.

- Gady, F.S., 2014. EU/US approaches to data privacy and the "Brussels Effect": a comparative analysis. *Georgetown Journal of International Affairs*:12-23.
- Gans, J., & Moeller, S. 2011. Best practices and policies for public private partnerships in infrastructure projects. *International Economic Review*, 52(4):823–855.
- García-Morales, V.J., Matías-Reche, F., & Hurtado-Torres, N. 2008. Influence of transformational leadership on organizational innovation and performance depending on the level of organizational learning in the pharmaceutical sector. *Journal of Organizational Change Management*, 21(2):188-212.
- Gartzia, L. & Baniandrés, J. 2016. Are people-oriented leaders perceived as less effective in task performance? Surprising results from two experimental studies. *Journal of Business Research*, (69):508-516.
- Gay, L.R, IIs, G.E. & Airasian, P.W. 2014. *Educational research: competencies for analysis and applications*, Harlow, Essex, Pearson Education Limited.
- Gaynor, G. 2002. *Innovation by Design*. New York: American Management Association.
- Geertz, C. 1973. *Thick description towards an interpretive theory of culture*, The Interpretation of Cultures. C.
- Gell-Mann, M. 2002. *What is complexity? Complexity and industrial clusters: Dynamics and models in theory and practice*. Springer.
- Gerstner, W.-C., König, A., Enders, A. & Hambrick, D.C. 2013. CEO narcissism, audience engagement and organizational adoption of technological discontinuities. *Administrative Science Quarterly*, (58):257-291.
- Gillan, S.L., Koch, A. & Starks, L.T. 2021. Firms and social responsibility: A review of ESG and CSR research in corporate finance. *Journal of Corporate Finance*, (66):101889.
- Gladwin, T.N., Kennelly, J.J. & Krause, T.S. 1995. Shifting paradigms for sustainable development: Implications for management theory and research. *Academy of Management Review*, 20(4):874-907.
- Glaser, B. 1978. *Theoretical Sensitivity: Advances in the Methodology of Grounded Theory Procedures and Techniques*. Sage Publications, CA, USA.

Enabling leadership of and innovation in SA mining companies in pursuing ESG and the SDGs

Glaser, B.G. & Strauss, A.L. 2017. *Discovery of grounded theory: Strategies for qualitative research*, Routledge.

Global Mining Guidelines Group. 2021. *The Global Mining Guidelines Group's ESG framework*.

Global Reporting Initiative (GRI). 2017. *Linking GRI Standards and the Sustainable Development Goals*.

Global Reporting Initiative. 2016. *Sustainability Reporting Standards*. Retrieved from <https://www.globalreporting.org/standards/>

Global Reporting Initiative. 2021. *SDGs and the GRI Standards*. Retrieved from <https://www.globalreporting.org/standards/sustainable-development-goals/>

Global Sustainable Investment Alliance. 2018. *Global Sustainable Investment Review 2018*. Retrieved from https://www.gsi-alliance.org/wp-content/uploads/2019/03/GSIR_Review2018.3.28.pdf

Global Sustainable Investment Alliance. 2020. *Global Sustainable Investment Review 2020*, retrieved from <https://www.gsi-alliance.org/wp-content/uploads/2021/08/GSIR-20201.pdf> accessed 25-06-2022

Global Sustainable Investment Alliance. 2021. *Global Sustainable Investment Review 2020*.

Golla, E. J. 2012. *The relationship between transformational and transactional leadership styles and innovation commitment and output at commercial software companies*. University of Phoenix.

Government Communications and Information Systems (GCIS). 2012. *South Africa yearbook 2012/13, Government Communications and Information Systems*. Available at: https://www.gcis.gov.za/sites/default/files/docs/resourcecentre/yearbook/2012/16%20Mineral%20Resources_0.pdf

Green, J.E. 2014. Toxic Leadership in Educational Organizations. *Education Leadership Review*, (15):18-33.

Griffiths, P. 2008. CSR: *Window dressing, smoke-screen or route to legitimacy*, Proceedings of the British Academy of Management Conference 2008 (BAM2008), The Majestic Hotel, Harrogate.

- Grim, D.M. & Berkowitz, D.B. 2020. ESG, SRI, and impact investing: A primer for decision-making. *The Journal of Impact and ESG Investing*, 1(1):47-65.
- Grimmer M., Bingham T. 2013. Company environmental performance and consumer purchase intentions. *Journal Business Research* 66(10):1945–1953. <https://doi.org/10.1016/j.jbusres.2013.02.017>
- Gronn, P. 2002. Distributed leadership as a unit of analysis. *The Leadership Quarterly*, 13(4): 423-451.
- Grünwald, U. 2001. Water resources management in river catchments influenced by lignite mining. *Ecological Engineering*, 17(2-3):143-152.
- GSIA (Global Sustainable Investment Alliance). 2021. *Global Sustainable Investment Review 2020*, Global Sustainable Investment Alliance. Available at: <http://www.gsi-alliance.org/wp-content/uploads/2021/08/GSIR-20201.pdf>.
- Guenther, E., Guenther, T., Schiemann, F., & Weber, G. 2016. Stakeholder relevance for reporting: Explanatory factors of carbon disclosure. *Business & Society*, 55(3):361–397
- Gummesson, E. 2000. *Qualitative methods in management research*, Sage.
- Gunday, G., Ulusoy, G., Kilic, K. & Alpkan, L. 2011. Effects of innovation types on firm performance. *International Journal of production economics*, 133:662-676.
- Gunnar Friede *et al.* 2015. “ESG and Financial performance: Aggregated evidence from more than 2000 empirical studies,” *Journal of Sustainable Finance & Investment*, (5):4(October):210–33; Deutsche Asset & Wealth Management Investment; McKinsey analysis.
- Guo R., Tao L. & Gao P. 2014. The research on greenwashing brands’ rebuilding strategies and mechanism of brand trust after biochemical and other pollutions. *Biotechnology* 10(9):3270–3279.
- Gusmão Caiado, R.G., Leal Filho, W., Quelhas, O.L.G., Luiz de Mattos Nascimento, D., & Ávila, L.V. 2018. A literature-based review on potentials and constraints in the implementation of the sustainable development goals. *Journal of Cleaner Production*, 198:1276-1288.

Enabling leadership of and innovation in SA mining companies in pursuing ESG and the SDGs

- Hagan, A.J., Tost, M., Inderwildi, O.R., Hitch, M. & Moser, P. 2021. The license to mine: Making resource wealth work for those who need it most. *Resources Policy*, (74):101418.
- Hahn, R., Reimsbach, D. & Schiemann, F. 2015. Organizations, climate change, and transparency: *Reviewing the literature on carbon disclosure. Organization & Environment*, 28(1):80-102.
- Hammond, M.M., Neff, N.L., Farr, J.L., Schwall, A.R. & Zhao, X. 2011. Predictors of Individual-Level Innovation at Work: A Meta-Analysis. *Psychology of Aesthetics, Creativity, and the Arts*, (5):90-105.
- Harrison, C. 2017. *Leadership theory and research: A critical approach to new and existing paradigms*, Springer.
- Harvey, W.R. 2017. *Principles of leadership: The Harvey leadership model*. Hampton University Press.
- Hatje, V., Pedreira, R.M., de Rezende, C.E., Schettini, C.A.F., de Souza, G.C., Marin, D.C. & Hackspacher, P.C. 2017. The environmental impacts of one of the largest tailing dam failures worldwide. *Scientific reports*, (7):10706.
- Havermans, L.A., Den Hartog, D.N., Keegan, A., & Uhl-Bien, M. 2015. Exploring the role of leadership in enabling contextual ambidexterity. *Human Resource Management*, 54:(Suppl 1) S179-S200.
- Hawn, O., & Ioannou, I. 2019. The Performance Frontier: Innovating for a Sustainable Strategy. *Harvard Business Review*.
- Hayes, E. 2022 Spotlight: Mining law in South Africa, *Lexology*. Available at: <https://www.lexology.com/library/detail.aspx?g=d6227301-0bfa-49cd-aeb2-3578f3c59820> (Accessed: 09 July 2023).
- Haywood, L.K. & Boihang, M. 2021. Business and the SDGs: Examining the early disclosure of the SDGs in annual reports. *Development Southern Africa* (38):175-188.
- He, H. & Harris, L. 2020. The impact of Covid-19 pandemic on corporate social responsibility and marketing philosophy. *Journal of Business Research*:116.

Enabling leadership of and innovation in SA mining companies in pursuing ESG and the SDGs

Helmig, B., Spraul, K. & Ingenhoff, D. 2016. Under positive pressure: How stakeholder pressure affects corporate social responsibility implementation. *Business & Society*, 55(2):51-187.

Hempel, C.G. 1966. *Philosophy of Natural Science*, Prentice-Hall.

Henisz, W., Koller, T. & Nuttall, R. 2019. *Five ways that ESG creates value*.

Hine, C. 2005. *Virtual methods: Issues in social research on the Internet*.

Hine, C. 2008. Virtual ethnography: Modes, varieties, affordances. *The SAGE Handbook of Online Research Methods*, 257-270.

Hoang, D.T., Igel, B., & Laosirihongthong, T. 2006. The Impact of Total Quality Management on Innovation: Findings from a Developing Country. *International Journal of Quality & Reliability Management*, 23:1092-1117. doi:10.1108/02656710610704230

Hoffman, M. 2012. *Integrated reporting in practice: the South African story*. KPMG. RRD-268931. [Online] Available: www.kpmg.com/integrated-reporting. (Accessed 09 July 2023).

Holloway, I. 1997. *Basic concepts for qualitative research*, Wiley-Blackwell.

Hopwood, B., Mellor, M. & O'Brien, G. 2005. Sustainable development: mapping different approaches. *Sustainable Development*, 13(1):38-52.

Horowitz, R. & Gerson, K. 2002. Observation and interviewing: options and choices in qualitative research. *Qualitative research: An international guide to issues in practice*. Sage.

Howell, J.M. & Avolio, B.J. 1993. Transformational leadership, transactional leadership, locus of control and support for innovation: Key predictors of consolidated-business-unit performance. *Journal of Applied Psychology*, (78):891.

Howell, J.M. & Hall-Merenda, K.E. 1999. The ties that bind: The impact of leader-member exchange, transformational and transactional leadership, and distance on predicting follower performance. *Journal of Applied Psychology*, (84):680.

Howlett, M. 2022. Looking at the 'field' R through a Zoom lens: Methodological reflections on conducting online research during a global pandemic, *Qualitative Research*, 22(3):387-402.

Hsu, T. 2011. Scepticism grows over products touted as eco-friendly. <https://www.latimes.com/business/la-xpm-2011-may-21-la-f-greenwash-20110521-story.html>.

Huang, D.Z.X. 2021. Environmental, social and governance (ESG) activity and firm performance: a review and consolidation. *Account Finance*, 61:335-360 <https://doi.org/10.1111/acfi.12569>.

Hunt, T. & Fedynich, L. 2019. Leadership: Past, present and future: An evolution of an idea. *Journal of Arts and Humanities*, (8):22-26.

Idowu, S.O., Del Baldo, M., Eds. 2019. *Antecedents and Perspectives for Organizations and Stakeholders*; Springer: Berlin/Heidelberg, Germany.

Immink, H., Louw, R.T., & Brent, A.C. 2018. Tracking decarbonisation in the mining sector. *Journal of Energy in Southern Africa*, 29(1): 14-23. <https://dx.doi.org/10.17159/2413-3051/2018/v29i1a3437>.

Institute of Directors in Southern Africa, (IoDSA). *King Report on Corporate Governance for South Africa (King IV Report)*. 2016. Available online: https://ecgi.global/sites/default/files/codes/documents/King_Report_On_Corporate_Governance_For_South_Africa_2016.pdf (accessed on 14 January 2020).

International Council on Mining and Metals (ICMM), Not dated. *Supporting the Sustainable Development Goals*. Available at: <https://www.icmm.com/en-gb/our-work/supporting-the-sustainable-development-goals> (Accessed: 08 July 2023).

International Council on Mining and Metals (ICMM). 2018. Making a positive contribution to the SDGs. www.icmm.com/sd

International Council on Mining and Metals (ICMM). 2019. *Sustainable Development Framework*. Retrieved from <https://www.icmm.com/en-gb/sustainability/sustainable-development-framework>.

Enabling leadership of and innovation in SA mining companies in pursuing ESG and the SDGs

International Council on Mining and Metals (ICMM). 2021. *Our commitment to a goal of net zero by 2050 or sooner*, ICMM. Available at: <https://www.icmm.com/en-gb/our-work/environmental-resilience/climate-change/net-zero-commitment>. Available at: <https://www.icmm.com/en-gb/our-work/supporting-the-sustainable-development-goals> (Accessed: 08 July 2023).

International Council on Mining and Metals (ICMM). 2023. Our work, retrieved from <https://www.icmm.com/en-gb/our-work/environmental-resilience> accessed on 27-07-2023.

International Institute for Environment and Development (IIED). 2002. *Breaking New Ground: Mining, Minerals, and Sustainable Development*. Earthscan, London.

International Integrated Reporting Council. 2016. *SDGs and Integrated Reporting*. Retrieved from <https://integratedreporting.org/wp-content/uploads/2016/09/SDGs-and-Integrated-Reporting.pdf>

International Labor Organization (ILO), no date. C176 - Safety and Health in Mines Convention, 1995 (no. 176), Convention C176 - Safety and Health in Mines Convention, 1995 (No. 176). Available at: https://www.ilo.org/dyn/normlex/en/f?p=NORMLEXPUB%3A12100%3A0%3A%3AN O%3A%3AP12100_ILO_CODE%3AC176.

International Labour Organization (ILO), no date. C176 - safety and Health in Mines Convention, 1995 (no. 176), Convention C176 - Safety and Health in Mines Convention, 1995 (No. 176). Available at: https://www.ilo.org/dyn/normlex/en/f?p=NORMLEXPUB%3A12100%3A0%3A%3AN O%3A%3AP12100_ILO_CODE%3AC176.

Jan, A.T., Azam, M., Siddiqui, K., Ali, A., Choi, I. & Haq, Q.M.R. 2015. Heavy metals and human health: mechanistic insight into toxicity and counter defense system of antioxidants. *International Journal of Molecular Sciences*, 16(12):29592-29630.

Jansen, J.J., George, G., Van den Bosch, F.A & Volberda, H.W. 2008. Senior team attributes and organizational ambidexterity: The moderating role of transformational leadership. *Journal of Management Studies*, 45(5):982-1007.

Enabling leadership of and innovation in SA mining companies in pursuing ESG and the SDGs

Jansen, J.J., Vera, D. & Crossan, M. 2009. Strategic leadership for exploration and exploitation: The moderating role of environmental dynamism. *The Leadership Quarterly*, 20(1):5-18.

Jayaraman, N V, & Y Chai. 2020. Podcasting: An Effective Tool for Science Communication. *Science Communication*:1-14.

Jenkins, H. 2004. Corporate Social Responsibility: Engaging Small and Medium Sized Enterprises in the Debate (*Working Paper Series No. 18, Centre for Business Relationships, Accountability, Sustainability & Society*).

Jenner, B.M. & Myers, K.C. 2019. Intimacy, rapport, and exceptional disclosure: A comparison of in-person and mediated interview contexts. *International Journal of Social Research Methodology*, (22):165-177.

Jia, X., Chen, J., Mei, L. & Wu, Q. 2018. How leadership matters in organizational innovation: a perspective of openness. *Management Decision*, (56):6-25.

Johnson, D.R., Scheitle, C.P. & Ecklund, E.H. 2021. Beyond the in-person interview? How interview quality varies across in-person, telephone and Skype interviews. *Social Science Computer Review*, (39): 1142-1158.

Johnston, A., Amaeshi, K., Adegbite, E. & Osuji, O. 2021. Corporate social responsibility as obligated internalisation of social costs. *Journal of Business Ethics*, (170):39-52.

Jones, P. & Comfort, D. 2020. A commentary on the COVID-19 crisis, sustainability and the service industries. *Journal of Public Affairs*, 20(4):2164.

JSE (Johannesburg Stock Exchange), 2022. Leading the way for a better tomorrow: JSE Sustainability Disclosure Guidance, JSE. Available at: <https://www.jse.co.za/sites/default/files/media/documents/JSE%20Sustainability%20Disclosure%20Guidance%20June%202022.pdf>.

JSE (Johannesburg Stock Exchange). 2023. FTSE/JSE Responsible Investment Index. <https://www.jse.co.za/services/indices/ftsejse-responsible-investment-index#:~:text=This%20is%20a%20market%2Dcap,time%20to%20time%E2%80%8B%E2%80>.

Enabling leadership of and innovation in SA mining companies in pursuing ESG and the SDGs

Judge, T.A., Bono, J.E., Ilies, R. & Gerhardt, M.W. 2002. Personality and leadership: a qualitative and quantitative review. *Journal of Applied Psychology* (87):765.

Jung, D.I., Chow, C. & Wu, A. 2003. The role of transformational leadership in enhancing organizational innovation: Hypotheses and some preliminary findings. *The Leadership Quarterly* 14:525-544.

Kaggwa, M. 2020. Interventions to promote gender equality in the mining sector of South Africa. *The Extractive Industries and Society*, 7(2):398-404.

Kam Sing Wong, S. 2013. The role of management involvement in innovation. *Management Decisions*, (51):709-729.

Kaplan, A. 1964. *The conduct of inquiry: Methodology for Behavioral Science*, San Francisco, Chandler Pub. Co.

Kavadias, S. & Chao, R. 2008. *Resource Allocation and New Product Development Portfolio Management*.

Khan, M., Serafeim, G. & Yoon, A. 2016. Corporate sustainability: First evidence on materiality. *The Accounting Review*, 91(6):1697-1724.

Kim E., Lyon T, 2015. Greenwash vs. Brownwash: exaggeration and undue modesty in corporate sustainability disclosure. *Organ Sci* 26(3):705–723.
<https://doi.org/10.1287/orsc.2014.0949>.

King, N. 1998. *Template analysis*.

Kirkpatrick, S.A. & Locke, E.A. 1991. Leadership: do traits matter? *Academy Of Management Perspectives* (5):48-60.

Klare, M.T. 2002. Resource wars: the new landscape of global conflict. *Journal of Catholic Social Thought*, 2(1):221-233.

Klewitz, J. & Hansen, E.G. 2014. Sustainability-oriented innovation of SMEs: a systematic review. *Journal of Cleaner Production* (65):57-75.

Koivurova, T., Buanes, A., Riabova, L., Didyk, V. Ejdemo, T., Poelzer, G., Taavo, P. & Lesser, P. 2015, 'Social license to operate': a relevant term in Northern European mining? *Polar Geography*, 38(3):194-227.

Enabling leadership of and innovation in SA mining companies in pursuing ESG and the SDGs

- Kolko, J. 2010. Abductive thinking and sensemaking: The drivers of design synthesis. *Design Issues*, 26(1):15-28.
- Kørnøv, L., Lyhne, I., & Davila, J.G. 2020. Linking the Un SDGS and Environmental Assessment: Towards a Conceptual Framework. *Environmental Impact Assessment Review*, 85.
- Kostopoulos, K., Papalexandris, A., Papachroni, M. & Ioannou, G. 2011. Absorptive capacity, innovation, and financial performance. *Journal of Business Research* (64): 1335-1343.
- Kotsantonis, S., Pinney, C. & Serafeim, G. 2016. ESG integration in investment management: Myths and realities. *Journal of Applied Corporate Finance*, 28(2):10-16.
- Kotter, J.P. 1990. *A Force for Change: How Leadership Differs from Management*. The Free Press, New York.
- Kotterman, J. 2006. Leadership versus management: what's the difference? *The Journal for Quality and Participation*, (29):13.
- Kouzes, J.M. & Posner, B.Z. 2006. *The Leadership Challenge*, John Wiley & Sons.
- KPMG. 2017. *Sustainable Insight: The Five Pitfalls of Greenwashing*. Retrieved from <https://assets.kpmg/content/dam/kpmg/xx/pdf/2017/02/sustainable-insight-the-five-pitfalls-of-greenwashing.pdf>.
- Kramer, M.R. & Porter, M. 2011. *Creating shared value*, FSG Boston, MA, USA.
- Lai, F.Y., Tang, H.C., Lu, S.C., Lee, Y.C. & Lin, C.C. 2020. *Transformational leadership and job performance: The mediating role of work engagement*. Sage Open, 10, 2158244019899085.
- Lamnek, S. 1989. *Qualitative Sozialforschung Bd. 2. Methoden und Techniken*, Weinheim, Beltz, Psychologie Verlags Union.
- Landis, E.A., Hill, D., & Harvey, M.R. 2014. A synthesis of leadership theories and styles. *Journal of Management Policy and Practice*, 15(2):97-100.

Enabling leadership of and innovation in SA mining companies in pursuing ESG and the SDGs

Landrigan, P.J., Fuller, R., Acosta, N.J., Adeyi, O., Arnold, R., Baldé, A.B., Bertollini, R., Bose-O'Reilly, S., Boufford, J.I., Breyse, P.N. & Chiles, T. 2018. The Lancet Commission on pollution and health. *The Lancet*, 391(10119):462-512.

Lantos, G.P. 2001. The boundaries of strategic corporate social responsibility. *Journal of Consumer Marketing*, 18(7):595-632.

Lashitew, A.A. 2021. Corporate Uptake of the Sustainable Development Goals: Mere Greenwashing or an Advent of Institutional Change? *Journal of International Business Policy*, 4(1):184–200. doi: 10.1057/s42214-020-00092-4.

Lashitew, A.A., Branzei, O. & van Tulder, R. 2023. Community Inclusion under Systemic Inequality: How For-Profit Businesses Pursue Social Purpose. *Journal of Management Studies*.

Lavenex, S. 2014. The Power of Functionalist Extension: How Eu Rules Travel. *Journal of European Public Policy*, 21(6):885–903. doi: 10.1080/13501763.2014.910818.

Le, P.B. & Lei, H. 2019. Determinants of innovation capability: the roles of transformational leadership, knowledge sharing and perceived organizational support. *Journal of Knowledge Management*, (23):527-547.

Leavy, B. 2005. A leader's guide to creating an innovation culture. *Strategy & Leadership*, (33):38-45.

Lee, S.M. & Olson, D.L. 2010. *Convergenomics: Strategic Innovation in the Convergence Era*, Farnham, United Kingdom, Taylor & Francis Group.

Leedy, P. D. & Ormrod, J. E. 2010. *Practical Research: Planning and Design* (9th ed.). Boston, MA: Pearson.

Leedy, P.D., Ormrod, J.E. & Johnson, L.R. 2021. *Practical research: planning and design*, Harlow, England, Pearson.

Leon, Leyden & Burnell. 2019. *South African: Mining 2020*, Herbert Smith Freehills, <https://hsfnotes.com/africa/2019/10/17/south-africa-mining-2020/>.

Enabling leadership of and innovation in SA mining companies in pursuing ESG and the SDGs

Lewin, K., Lippitt, R. & White, R.K. 1939. Patterns of aggressive behavior in experimentally created “social climates”. *The Journal of Social Psychology*, (10): 269-299.

Li, N., Chiaburu, D.S., Kirkman, B.L. & Xie, Z. 2013. Spotlight on the followers: An examination of moderators of relationships between transformational leadership and subordinates' citizenship and taking charge. *Personnel Psychology*, (66):225-260.

Li, T.T., Wang, K., Sueyoshi, T. & Wang, D.D. 2021. ESG: Research progress and future prospects. *Sustainability*, 13(21):11663.

Lichtenstein, B. B., Uhl-Bien, M., Marion, R., Seers, A., Orton, J. D., & Schreiber, C. 2006. *Complexity leadership theory: An interactive perspective on leading in complex adaptive systems*.

Lichtenstein, U.B., Schreiber, O., Lichtenstein, B., Uhl-Bien, M., Marion, R., Seers, A., Orton, J.D. & Schreiber, C. 2006. Complexity Leadership Theory: An Interactive Perspective on Leading in Complex Adaptive Systems. *Emergence*, (8):2-12.

Lietz, C.A. & Zayas, L.E. 2010. Evaluating qualitative research for social work practitioners. *Advances in Social Work*, (11):188-202.

Light, A., Kasper, E. & Hielscher, S. 2020. *Wicked solutions: SDGs, research design and the “Unfinishedness” of sustainability*.

Limpitlaw, D., Aken, M., Lodewijks, H. & Viljoen, J. 2005 Post-mining rehabilitation, land use and pollution at collieries in South Africa. In: *Colloquium: Sustainable Development in the Life of Coal Mining*, South African Institute of Mining and Metallurgy, Boksburg (13).

Lin, C.Y.Y. & Chen, M.Y.C. 2007. Does innovation lead to performance? An empirical study of SMEs in Taiwan. *Management Research News*, (30):115-132.

Lincoln, Y.S. & Guba, E G. 1985. *Naturalistic Inquiry*, Sage.

Lin-Hi, N., Schreuder, H., & Veldman, J. 2014. The Greenwashing Machine: Is CSR More Than Communication? *Critical Perspectives on Accounting*, 25:(4-5):311-318.

Enabling leadership of and innovation in SA mining companies in pursuing ESG and the SDGs

- Llewellyn, L. 2023. "Climate change, mining development and residential water security in the uMkhanyakude District Municipality, KwaZulu-Natal, South Africa: a double catastrophe for local communities", *Local Environment*, 28(3), 331-346.
- Lo, S., & Shevlin, T. 2020. ESG Integration in Investment Decision Making: A Survey of Asset Owners and Asset Managers. *Journal of Accounting Research*, 58(5):1183-1220.
- Loane, S., Bell, J., & McNaughton, R. 2006. 'Employing information communication technologies to enhance qualitative international marketing enquiry', *International Marketing Review*, (23):4:438 – 455.
- Logsdon, J.M. & Wood, D.J. 2018. Business citizenship: From domestic to global level of analysis. In: *Business Ethics and Strategy*, (I& II): 175-207. Routledge.
- Lowe, K.B., Kroeck, K.G. & Sivasubramaniam, N. 1996. Effectiveness correlates of transformational and transactional leadership: A meta-analytic review of the MLQ literature. *The Leadership Quarterly* (7):385-425.
- Lubatkin, M.H., Simsek, Z., Ling, Y. & Veiga, J.F. 2006. Ambidexterity and performance in small to medium-sized firms: The pivotal role of top management team behavioral integration. *Journal of Management*, 32(5):646-672.
- Lucci, P. 2012. Post-2015 *Millennium Development Goals: What role for business?*
- Majláth M. 2017. The effect of greenwashing information on ad evaluation. *Eur J Sustain Dev.* <https://doi.org/10.14207/ejsd.2017.v6n3p92>.
- Major. P, Mining Investment in South Africa: It Can Still Be Attractive, *The Assay*, accessed <https://www.theassay.com/african-edition-content/mining-investment-in-south-africa-it-can-still-be-attractive/> retrieved on (Accessed: 12 January 2023).
- Mäkinen, E. 2018. Complexity leadership theory and the leaders of transdisciplinary science.
- Malherbe, S. 2000. *A Perspective on the South African Mining Industry in the 21st Century*. Graduate School of Business of the University of Cape Town.

Enabling leadership of and innovation in SA mining companies in pursuing ESG and the SDGs

Mallen Broch, F.F., Dominguez Escrig, E., Chiva Gomez, R. & Lapiedra Alcami, R., 2020. Promoting firm innovativeness through servant leadership and corporate social responsibility to employees. *Leadership & Organization Development Journal*, 41(4):615-633.

Mangaroo-Pillay, S. & Botha, D. 2020. An exploration of women's workplace experiences in the South African mining industry. *Journal of the Southern African Institute of Mining and Metallurgy*, 120:475-483.

Marion, R. & Uhl-Bien, M. 2001. Leadership in complex organizations. *The Leadership Quarterly*, 12(4):389-418.

Marion, R. & Uhl-Bien, M. 2002. December. Complexity v. transformation: The new leadership revisited. In: *Managing the Complex IV-Conference on Complex Systems and the Management of Organizations*, Ft. Meyers, Florida, USA.

Marquis C., Tofel M., Zhou Y. 2016. Scrutiny, norms, and selective disclosure: a global study of greenwashing. *Organ Sci* 27(2):483–504 <https://doi.org/10.1287/orsc.2016.272483>

Marquis, C., & Qiao, E. 2019. Corporate Social Responsibility Reporting in China: Symbol or Substance? *Journal of Business Ethics*, 155(2):307–324.

Marsh, G.P. & Lowenthal, D. 1965. *Man and Nature*. Cambridge, Mass.: Belknap Press of Harvard University Press (The John Harvard library).

Matebesi. S. & Marais. L. 2018. Social licensing and mining in South Africa: Reflections from community protests at a mining site, *Resources Policy* (59):371-378.

Matos, P. 2020. *ESG and Responsible Institutional Investing Around the World: A Critical Review*, CFI Institute Research Foundation.

Matshoba-Ramuedzisi, M.T. 2021. *Followership constructs and behaviours in a complex organisation: A South African perspective* (PhD thesis). University of Pretoria, Pretoria, South Africa.

May, T. 2001. *Social Research. Issues, Methods and Process* (3rd Ed.), Buckingham, Philadelphia: Open University Press.

Enabling leadership of and innovation in SA mining companies in pursuing ESG and the SDGs

- Mayer, A.L., Thurston, H.W. & Pawlowski, C.W. 2004. The multidisciplinary influence of common sustainability indices. *Frontiers in Ecology and the Environment*, 2(8):419-426.
- McClanahan, K.J. 2020. Viva la evolution: Using dual-strategies theory to explain leadership in modern organizations. *The Leadership Quarterly*, 31:101315.
- McCleskey, J.A. 2014. Situational, transformational, and transactional leadership and leadership development. *Journal of Business Studies Quarterly*, (5:117).
- McGregor, D. 1960. *Human side of enterprise*, London, McGraw-Hill.
- McKay, T.J. & Milaras, M. 2017. *Public lies, private looting and the forced closure of Grootvlei Gold Mine, South Africa*.
- McMillan, J.H. & Schumacher, S. 2010. *Research in education: Evidence-based inquiry*, Pearson.
- Meadows, D.H., Meadows, D.L., Randers, J., & Behrens, W.W. 1972. *The Limits to Growth: A Report for the Club of Rome's Project on the Predicament of Mankind*. New York, NY: Universe Books. Available at: <https://doi.org/10.1349/ddlp.1>.
- Mehta, M. 2021. *How ESG Investing Is Reshaping Capitalism*. Harvard Business Review.
- Meindl, J.R. & Ehrlich, S. B. 1987. The romance of leadership and the evaluation of organizational performance. *Academy of Management Journal*, (30):91-109.
- Meuser, M. & Nagel, U. 2009. *The expert interview and changes in knowledge production. Interviewing experts*. Springer.
- Mhatre, K., Riggio, R. & Handbooks, O. 2014. *Charismatic and Transformational Leadership: Past, Present, and Future*.
- Mhlongo, S.E. & Sigxashe, S. 2021. The criteria for ranking and prioritization of rehabilitation of abandoned mines. *Journal of Degraded and Mining Lands Management*, 8(4):2947.

Enabling leadership of and innovation in SA mining companies in pursuing ESG and the SDGs

Michaelis, B., Stegmaier, R. & Sonntag, K. 2009. Affective commitment to change and innovation implementation behavior: The role of charismatic leadership and employees' trust in top management. *Journal of Change Management*, (9):399-417.

Miles, M.B. & Huberman, A.M. 1994. *Qualitative data analysis: An expanded sourcebook*, Sage.

Milne, J. & Oberle, K. 2005. Enhancing rigor in qualitative description. *Journal of Wound Ostomy & Continence Nursing*, (32):413-420.

Mindat. 2023. retrieved from https://www.mindat.org/mining_companies/in/South_Africa/#:~:text=The%20mindat.org%20mining%20company,With%20789%20mining%20companies%20listed. Accessed on 27-07-2023

Minerals Council of South Africa (MCSA). 2020. Media Statement: Minerals Council Publishes White Paper Focused on Streamlining Industry Strategies to Advance Women in Mining

Minerals Council South Africa (MCSA). 2018. Fact and figures. Pocketbook 2018. <https://www.mineralscouncil.org.za/downloads/send/18.../682-facts-and-figures-2018> [accessed 11 May 2019]

Minerals Council South Africa (MCSA). 2018. *Facts and Figures 2017*. Minerals Council South Africa, Johannesburg, South Africa.

Minerals Council South Africa (MCSA). 2019. Making Mining Matter, Integrated Annual Review 2019, retrieved from file:///C:/Users/U04985274/Downloads/minerals-council-iar-2019.pdf accessed 25-05-2023

Minerals Council South Africa (MCSA). 2020. *Women in mining in South Africa: Fact Sheet*, Mineral Council South Africa. Available at: <https://www.mineralscouncil.org.za/industry-news/publications/fact-sheets/send/3-fact-sheets/738-women-in-mining>.

Minerals Council South Africa (MCSA). 2023. Retrieved from <https://www.mineralscouncil.org.za/work/environment> accessed on 27-07-2023.

Enabling leadership of and innovation in SA mining companies in pursuing ESG and the SDGs

Minerals Council South Africa (MCSA). 2023. Safety and Health in Mining, <https://www.safetyandhealthinmining.co.za/statistics>

Minerals Council South Africa (MCSA). 2023. *Safety and Health in Mining*, <https://www.safetyandhealthinmining.co.za/statistics> (Accessed: 09 July 2023).

minerals industry, 2018. South Africa.

Mining Association of Canada. 2020. *Towards Sustainable Mining*. Retrieved from <https://mining.ca/towards-sustainable-mining>.

Mining Review Africa. 2020. Anglo American's Sustainable Mining Plan. Retrieved from <https://www.miningreview.com/sustainability/anglo-americans-sustainable-mining-plan/>

Mining Technology. 2020. The Benefits of ESG in the Mining Industry. Retrieved from <https://www.mining-technology.com/features/the-benefits-of-esg-in-the-mining-industry/>

Mining Weekly. 2021. Gold Fields sets ambitious ESG targets for 2025. Retrieved from https://www.miningweekly.com/article/gold-fields-sets-ambitious-esg-targets-for-2025-2021-03-11/rep_id:3650.

Ministry for Culture and Heritage. 2018. retrieved from <https://nzhistory.govt.nz/war/south-african-boer-war/the-boers>, (Accessed: 05 April 2023).

Miron-Spektor, E., Erez, M. & Naveh, E. 2004. Do Personal Characteristics and Cultural Values That Promote Innovation, Quality, and Efficiency Compete or Complement Each Other? *Journal of Organizational Behavior*, (25):175-199.

Miron-Spektor, E., Erez, M. & Naveh, E. 2011. The Effect of Conformist and Attentive-To-Detail Members on Team Innovation: Reconciling the Innovation Paradox. *The Academy of Management Journal*: (54).

Montiel, I., & J. Delgado-Ceballos. 2014. Defining and measuring corporate sustainability: are we there yet? *Organization and Environment* (27):113–139.

Enabling leadership of and innovation in SA mining companies in pursuing ESG and the SDGs

Mooij, S. 2018. Company's ESG Efforts; Catalysts and Inhibitors. *Catalysts and Inhibitors* (May 2, 2018).

Morena, E., Krause, D. & Stevis, D. 2020. *Just Transitions. Social Justice in a Low-Carbon World*.

Morgeson, F. P., DeRue, D. S. & Karam, E. P. 2010. Leadership in teams: A functional approach to understanding leadership structures and processes. *Journal of Management*, (36):5-39.

Morrissey, C. T. 2002. *On oral history interviewing. The oral history reader*. Routledge.

Morrow, J., & Mowatt, S. 2020. The freedom within framework: A multilevel perspective on developing green capabilities through routines in service organisations. *Business Strategy and the Environment*, 29(7):2895-2907.

MSCI ESG Research. 2021. *SDG Mapping: Aligning Business Strategies with the Global Goals*. Retrieved from <https://www.msci.com/documents/10199/ff7f8bde-8965-7b1d-f435-fc7f8c89d13e>

MSCI. 2015. *The ESG Performance of Mining Companies: Results from the MSCI ESG Fundamentals Industry Benchmarking Report*.

Muff, K., Kapalka, A. & Dyllick, T. 2017. The Gap Frame - Translating the SDGs into relevant national grand challenges for strategic business opportunities. *The International Journal of Management Education*, (15):363-383.

Mujuru, M. & Mutanga, S. 2016. *Management and Mitigation of Acid Mine Drainage in South Africa*.

Mumford, M. D., Scott, G. M., Gaddis, B., & Strange, J. M. 2002. Leading creative people: Orchestrating expertise and relationships. *The Leadership Quarterly*, 13:(6), 705–750.

Mumford, M., Scott, G., Gaddis, B. & Strange, J. 2002. Leading Creative People: Orchestrating Expertise and Relationships. *The Leadership Quarterly* (13):705-750.

- Murwirapache, G. & Sibanda K. 2014. Exploring the Incidents of Strikes In Post-Apartheid South Africa, *International Business & Economics Research Journal* 13:(3).
- Myers, M. D. & Newman, M. 2007. The qualitative interview in IS research: Examining the craft. *Information and organization*, (17):2-26.
- Nadkarni, S. & Chen, J. 2014. Bridging yesterday, today and tomorrow: CEO temporal focus, environmental dynamism, and rate of new product introduction. *Academy of Management Journal*, 57(6):1810-1833.
- Nawaz, Z. & Khan, I. 2016. Leadership theories and styles: A literature review. *Leadership*, 16:1-7.
- Nelson, M. 2015. *Aristotle and Leadership*.
- Nemanich, L. A., & Vera, D. 2009. Transformational leadership and ambidexterity in the context of an acquisition. *The Leadership Quarterly*, 20(1):19–33.
- Netshitenzhe, J. 2019. Towards Mining Vision 2030. *The Future of Mining in South Africa: Sunset or Sunrise*, 1-65.
- Neuman, W.L. 2014. *Social research methods: qualitative and quantitative approaches*, Harlow, Essex, Pearson.
- Ng, A.C., & Rezaee, Z. 2015. Business Sustainability Performance and Cost of Equity Capital. *Journal of Corporate Finance*, (34):128-149.
- Ngole-Jeme, V.M. & Fantke, P. 2017. Ecological and human health risks associated with abandoned gold mine tailings contaminated soil. *PloS one*, 12(2), p.e0172517.
- Nicolson, G. 2013. South Africa, a strike nation, *Daily Maverick*. Available at: <https://www.dailymaverick.co.za/article/2013-08-28-south-africa-a-strike-nation/>.
- Niestroy, I. 2016. How are we getting ready? *The 2030 agenda for sustainable development in the EU and its member states: analysis and action so far (No. 9/2016)*. Discussion Paper.

Enabling leadership of and innovation in SA mining companies in pursuing ESG and the SDGs

Niestroy, I., Hege, E., Dirth, E., & Zondervan, R. 2019. Europe's approach to implementing the Sustainable Development Goals: good practices and the way forward: study. Brussels: European Parliament.

Njini, F. 2022. *South Africa's Sibanye Gold Mine Workers Plan to End Strike as Wage Deal Reached*, Bloomberg, retrieved from <https://www.bloomberg.com/news/articles/2022-06-03/sibanye-gold-mine-workers-to-end-strike-as-wage-deal-reached> (Accessed: 13 September 2022).

Northouse, P.G. 2004. *Leadership: theory and practice*, Thousand Oaks, Calif., Sage
Thousand Oaks, California.

Novus Group. 2022. Open Innovation in Mining, Inside Mining

Nyilasy G., Gangadharbatla H., Paladino A. 2014. Perceived greenwashing: the interactive effects of green advertising and corporate environmental performance on consumer reactions. *Journal of Business Ethics* 125(4):693–707 <https://doi.org/10>

Nylund, P., Brem, A. & Agarwal, N. 2021. Innovation ecosystems for meeting sustainable development goals: The evolving roles of multinational enterprises. *Journal of Cleaner Production*, 281:125329.

O'Connor, H. & Madge, C. 2017. *Online interviewing. The SAGE handbook of online research methods*, (2):416-434.

O'Reilly Iii, C.A. & Tushman, M.L. 2008. Ambidexterity as a dynamic capability: Resolving the innovator's dilemma. *Research in Organizational Behavior*,(28):185-206.

Ochieng, G.M., Seanego, E.S. & Nkwonta, O.I. 2010. Impacts of mining on water resources in South Africa: A review. *Scientific Research and Essays*, (5):3351-3357.

Odendahl, T. & Shaw, A. M. 2002. *Interviewing elites. Handbook of interview research: Context and method*: 299-316.

Oldham, G.R. & Cummings, A. 1996. Employee Creativity: Personal and Contextual Factors at Work. *The Academy of Management Journal*, (39):607-634.

- Opdam, P., Steingrover, E., & Van Rooij, S. 2006. Ecological Networks: A Spatial Concept for Multi-Actor Planning of Sustainable Landscapes. *Landscape and Urban Planning*, 75, 322-332 <https://doi.org/10>
- Orlitzky, M., Schmidt, F.L. & Rynes, S.L. 2003. Corporate social and financial performance: A meta-analysis. *Organization studies*, 24(3):403-441.
- Ott, C., Schiemann, F., & Günther, T. 2017. Disentangling the determinants of the response and the publication decisions: The case of the carbon disclosure project. *Journal of Accounting and Public Policy*, 36(1):14–33.
- Owen, J, Kemp D. 2013. Social licence and mining: A critical perspective, *Resources Policy*, (38)1:29-35.
- Owen, J, Kemp. D. 2014. Mining and community relations: Mapping the internal dimensions of practice, *The Extractive Industries and Society* (1):12-19.
- Palmer, C., Niemand, T., Stöckmann, C., Kraus, S., & Kailer, N. 2019. The interplay of entrepreneurial orientation and psychological traits in explaining firm performance. *Journal of Business Research*, 94:183-194.
- Patten, D.M. 2019. Corporate Responsibility and Environmental Management: A Review of Empirical Studies. *Journal of Cleaner Production*, 207:953-962.
- Patton, M. Q. 1990. *Qualitative evaluation and research methods*, SAGE Publications, Inc.
- Paul, J. 1996. Between-method triangulation in organizational diagnosis. *The International Journal of Organizational Analysis*, 4:135-153.
- Pearce, T.D., Ford, J.D., Prno, J., Duerden, F., Pittman, J., Beaumier, M., Berrang-Ford, L. & Smit, B. 2011. *Climate change and mining in Canada. Mitigation and adaptation strategies for global change*, 16:347-368.
- Pearson, J. 2010. Turning point. Are we doing the right thing? Leadership and prioritisation for public benefit. *Journal of Corporate Citizenship* 2010 (37):37–40.
- Peattie, K. & Peattie, S. 2009. Social marketing: a pathway to consumption reduction? *Journal of Business Research*, 62:(2).

Pedersen, C.S. 2018. The UN sustainable development goals (SDGs) are a great gift to business! *Procedia CIRP*, 69:21-24.

Pelders J, Nelson G. Living conditions of mine workers from eight mines in South Africa. *Development Southern Africa* 2018:1e18.

Pelders. J, & Nelson, G. 2019. Socio-demographic contributors to health and safety of mine workers in South Africa. *Work* 64(1):67-76.

Pesmatzoglou, D., Nikolaou, I.E., Evangelinos, K.I. & Allan, S. 2014. Extractive multinationals and corporate social responsibility: a commitment towards achieving the goals of sustainable development or only a management strategy? *Journal of International Development*, 26(2):187-206.

Pieterse, A.N., Van Knippenberg, D., Schippers, M. & Stam, D. 2010. Transformational and transactional leadership and innovative behavior: The moderating role of psychological empowerment. *Journal of Organizational Behavior*, 31:609-623.

Pingeot, L. 2015. In whose interest? The UN's strategic rapprochement with business in the sustainable development agenda. *Globalization*, 13(2):188-202.

Polit, D.F. & Beck, C.T. 2002. Nursing research: *Principles and methods*, Lippincott Williams & Wilkins.

Popa, M. & Salanță, I. 2014. Corporate social responsibility versus corporate social irresponsibility. *Management & Marketing*, 9(2).

Prajogo, D I. & Sohal, A.S. 2006. The relationship between organization strategy, total quality management (TQM), and organization performance—the mediating role of TQM. *European Journal of Operational Research*, (168)35-50.

Prasad, B. & Junni, P. 2016. CEO transformational and transactional leadership and organizational innovation: The moderating role of environmental dynamism. *Management Decisions*, (54):1542-1568.

Enabling leadership of and innovation in SA mining companies in pursuing ESG and the SDGs

Prasad, B. & Martens, R. 2015. Top management team advice-seeking and environmental competitiveness impacts on technological innovation. *International Journal of Technology Management*, 69(1):77-92.

Preis, E.P. & Webber-Youngman, R.C.W. 2021. Identification of cost factors relating to mining incidents. *Journal of the Southern African Institute of Mining and Metallurgy*, 121.

PricewaterhouseCoopers (PWC). 2019. *Creating a strategy for a better world: How the Sustainable Development Goals can provide the framework for business to deliver progress on our global challenges*.
<https://www.pwc.com/gx/en/sustainability/SDG/sdg-2019.pdf>.

PricewaterhouseCoopers (PWC). 2020. *ESG: How companies can navigate the pathway to long-term value creation*.

PricewaterhouseCoopers (PWC). 2021. *What a 'just transition' means for jobs in South Africa: Considering employment in a lower-carbon economy*. Available at:
<https://www.pwc.com/gx/en/sustainability/SDG/sdg-2019.pdf>.

PricewaterhouseCoopers (PWC). 2023. *Africa Business Agenda: ESG Perspective 2023 Purpose-driven companies leverage ESG strategies to create value and build trust*. Available from https://www.pwc.co.za/en/publications/good-growth-from-compliance-to-value-with-esg.html?gclid=Cj0KCQjww4-hBhCtARIsAC9gR3as6rutL1d6Yc5-PbdcJTtV-Vj5Dggl6-ihpQplwXEfARQnJoBkZZIaAo8HEALw_wcB retrieved on 29/03/2023

Principles for Responsible Investment. 2021. About PRI. Retrieved from <https://www.unpri.org/pri/about-the-pri>.

Prno, J. & Slocombe, S. 2012. Exploring the origins of 'social license to operate in the mining sector: Perspectives from governance and sustainability theories, *Resources Policy*, 37(3):346-357.

Qian, C., Cao, Q. & Takeuchi, R. 2013. Top management team functional diversity and organizational innovation in China: The moderating effects of environment. *Strategic Management Journal*, (34):110-120.

Enabling leadership of and innovation in SA mining companies in pursuing ESG and the SDGs

- Railoun, Z. 2021. Innovative water reuse technologies benefit the South African mining industry in the 4IR, *Smart Water Magazine* retrieved from <https://smartwatermagazine.com/blogs/zaid-railoun/innovative-water-reuse-technologies-benefit-south-african-mining-industry-4ir#:~:text=The%20South%20Africa%20mining%20sector,and%20processing%20of%20various%20minerals.> (Accessed: 30 September 2022).
- Rajasekar, S., Philominathan, P. & Chinnathambi, V. 2013. *Research methodology. eprint.* arXiv preprint physics/0601009, 1-53.
- Ralph, H. 2003. Mining companies' role in sustainable development: The 'why' and 'how' of corporate social responsibility from a business perspective, *Development Southern Africa*, 20(2):237-254
- Ramadhani, J. 2014. 'An assessment of the effects of school feeding programmes on school enrolment, attendance and academic performance in primary school in Singida District Dodoma: Open University of Tanzania, Tanzania.
- Ramlogan, R. 2010. *Sustainable development: Towards a judicial interpretation* (Vol. 9). BRILL.
- Ramutsindela, M. & Mickler, D. eds. 2020. *Africa and the sustainable development goals*. Springer International Publishing. Switzerland.
- Ranangen, H., Coster, M., Isaksson, R., & Garvare, R. 2018. From global goals and planetary boundaries to public governance—a framework for prioritizing organizational sustainability activities. *Sustainability*, 10(8):2741.
- Rapp, T. L., Gilson, L. L., Mathieu, J. E., & Ruddy, T. 2016. Leading empowered teams: An examination of the role of external team leaders and team coaches. *The Leadership Quarterly*, 27(1):109–123.
- Rasche, A., & Esser, D.E. 2016. Global company-community partnerships: *Partnering for sustainability*. Routledge.
- Redondo Alamillos, R., & Mariz, R. 2022. "How Can European Regulation on ESG Impact Business Globally?" *Journal of Risk and Financial Management* 15(7): 291 <https://doi.org/10>

Rees, W.E. 1995. Achieving Sustainability: Reform or Transformation? *Journal of Planning Literature*, (9):343.

Republic of South Africa. Codes of good practice for the South African minerals industry. Government Gazette, 29 April 2009, No. 32167. Department of Minerals and Energy

Republic of South Africa. Codes of good practice for the South African minerals industry. Government Gazette, 29 April 2009, No. 32167. Department of Minerals and Energy.

Republic of South Africa. Housing and living conditions standard for the minerals industry. Government Gazette, 29 April 2009, No. 32166. Department of Minerals and Energy.

Republic of South Africa. Mineral and petroleum resources development Amendment Act. Act No. 49 of 2008. Department of Minerals and Energy.

Responsible Mining Foundation. 2020. *Responsible Mining Index 2020: Mining and Communities*.

Reuters. 2012a. *South Africa wildcat strikes spread to more mines*. Published on: 03.10.2012. Online at: <http://www.reuters.com/article/2012/10/03/us-safrica-mines-idUSBRE8920F820121003>

Reuters. 2019. *South Africa's Steinhoff raises \$332 million from Kap Industrial Stake Sale*, Reuters. Available at: <https://www.reuters.com/article/us-steinhoff-intln-accounts-kap-idUSKCN1R80JD> (Accessed: 03 August 2023).

Rickett, M. 2020. *How to Use the Hero's Journey to Craft the Perfect Screenplay*. StudioBinder. Available: <https://www.studiobinder.com/blog/joseph-campbells-heros-journey/> [Accessed 2022/08/20 2022].

Ritchie, J., Lewis, J., Nicholls, C. M. & Ormston, R. 2013. *Qualitative research practice: A guide for social science students and researchers*, Sage.

Robbins, S. P. 2003. *Organizational Behavior*, Upper Saddle River, NJ, Prentice Hall.

Enabling leadership of and innovation in SA mining companies in pursuing ESG and the SDGs

Rocío Redondo Alamillos and Frédéric de Mariz. 2022. “How Can European Regulation on ESG Impact Business Globally?” (15):291–291 <https://doi.org/10>

Rodríguez-Carvajal, R., Herrero, M., van Dierendonck, D., de Rivas, S. and Moreno-Jiménez, B. 2019. Servant leadership and goal attainment through meaningful life and vitality: A diary study. *Journal of Happiness Studies*, (20):499-521.

Rogers, P., Statler, M., Imbrogiano, J., Mori Junior, R., & Ezeigbo, C. 2018. Monitoring impact of mineral sustainability standards to align with the Sustainable Development Goals. *Centre for Social Responsibility in Mining (CSRMI)*, The University of Queensland: Brisbane.

Rosati, F. Faria, L.G.D. 2019. Business contribution to the Sustainable Development Agenda: Organizational factors related to early adoption of SDG reporting. *Corporate Social Responsibility and Environmental Management*, 26(3):588-597.

Rose, M. 2005. Do rising levels of qualification alter work ethic, work orientation and organizational commitment for the worse? Evidence from the UK, 1985–2001. *Journal of Education and Work* 18:131-164.

Rosenbusch, N., Brinckmann, J. & Bausch, A. 2011. Is innovation always beneficial? A meta-analysis of the relationship between innovation and performance in SMEs. *Journal of Business Venturing*, 26:441-457.

Rosing, K., Frese, M. & Bausch, A. 2011. Explaining the heterogeneity of the leadership-innovation relationship: Ambidextrous leadership. *The Leadership Quarterly*, 22:956-974.

Rosing, K., Frese, M., & Bausch, A. 2011. Explaining the heterogeneity of the leadership-innovation relationship: Ambidextrous leadership. *The Leadership Quarterly*, 22(5):956-974.

Rosing, K., Rosenbusch, N. & Frese, M. 2010. Ambidextrous leadership in the innovation process. *Innovation and International Corporate Growth*:191-204.

Rost, J.C. 1991. *Leadership for the Twenty-First Century*. Greenwood Publishing Group.

Enabling leadership of and innovation in SA mining companies in pursuing ESG and the SDGs

Rudestam, K.E. & Newton, R.R. 2014. *Surviving your dissertation: A comprehensive guide to content and process*, Sage Publications.

Russell, E. & Underwood, C. 2016. Exploring the role of purpose in leadership. *HR Magazine*, 46-48.

Russell, E. O. 2010. CEO and CSR: business leaders and corporate social responsibility. Available from OpenAIR@RGU. [online]. Available from: <http://openair.rgu.ac.uk>

Russell, J. 2011. *Local Agricultural Preservation: Making the Food System Connection*, Joel Russel. Available at: http://www.joelrussell.com/articles/11_03_04_Russell_%20PASMemo_Natural_Resource_Protection_Zoning.pdf.

S&P Dow Jones Indices. 2021. *Dow Jones Sustainability Indices*. Retrieved from <https://www.spglobal.com/spdji/en/indices/equity/dow-jones-sustainability-indices/>

Sachs, J., Schmidt-Traub, G., Kroll, C.& Lafortune, G. 2019. *Sustainable Development Report 2019: Transformations to Achieve the Sustainable Development Goals: Includes the SDG Index and Dashboards: [G20 and Large Countries Edition]*. Bertelsmann Stiftung.

Sachs, J.D. & Warner, A. 1995. *Natural resource abundance and economic growth*. Oxford University Press

Sætra, H.S. 2021. A Framework for Evaluating and Disclosing the ESG Related Impacts of AI with the SDGs. *Sustainability*, 13(15):8503.

Sanlam ESG Barometer Report, 2023 available from <https://sanlamesgbarometer.co.za/report/> retrieved on 29/03/2023.

Sapsford, R. & Jupp, V. 1996. *Data collection and analysis*, Sage. London.

Sarantakos, S. 2017. *Social research*, Bloomsbury Publishing.

SASB standards and other ESG frameworks (*Sustainability Accounting Standard Board*), 2023. Available at: <https://sasb.org/about/sasb-and-other-esg-frameworks/> (Accessed: 07 August 2023).

Sätra, H. S. 2021. A Framework for Evaluating and Disclosing the ESG Related Impacts of AI with the SDGs. *Sustainability*, (13): 8503. <https://doi.org/10.3390/su13158503>

Sattayaraksa, T. & Boon-itt, S. 2018. The roles of CEO transformational leadership and organizational factors on product innovation performance. *European Journal of Innovation Management*, (21): 227-249.

Saunders, M., Lewis, P. & Thornbill, A. 2000. *Research Methods for Business Studies*.

Scheyvens, R., Banks, G. & Hughes, E. 2016. The Private Sector and the SDGs: The Need to Move Beyond 'Business as Usual'. *Sustainable Development*, 24:371-382.

Schiemann, F., & Sakhel, A. 2019. Carbon disclosure, contextual factors, and information asymmetry: The case of physical risk reporting. *European Accounting Review*, 28(4):791–818.

Schneider, P. & Wolkersdorfer, C. 2021. Dimensions of water management in the extractive industries. *Sustainable Industrial Water Use Perspectives, Incentives, and Tools*, 73-87.

Schönherr, N., Findler, F., & Martinuzzi, A. 2017. Exploring the interface of CSR and the Sustainable Development Goals. *Transnational Corporations*, 24(3):33–47.

Schulze, J. H., & Pinkow, F. 2020. Leadership for organisational adaptability: How enabling leaders create adaptive space. *Administrative Sciences*, 10(3):37.

Schumpeter, J. A. 1961. The theory of economic development: an inquiry into profits, capital, credit, interest and the business cycle. Translated by R. Opie. Cambridge, Mass: Harvard University Press *Harvard Economic Studies*:46.

Seabrook, V. 2022. KLM faces court over 'greenwashing' adverts and offsetting scheme in first major challenge to aviation industry. Retrieved from <https://news.sky.com/story/klm-faces-court-over-greenwashing-adverts-and-offsetting-scheme-in-first-major-challenge-to-aviation-industry-12620380> accessed 10/04/2023

Enabling leadership of and innovation in SA mining companies in pursuing ESG and the SDGs

Segal, M. 2023a. Biden Announces \$6 Billion Funding to Scale Industrial Decarbonization Projects. Retrieved from <https://www.esgtoday.com/biden-announces-6-billion-funding-to-scale-industrial-decarbonization-projects/>

Segal, M. 2023b. BNP Paribas Sued over Fossil Fuel Financing. Retrieved from <https://www.esgtoday.com/bnp-paribas-sued-over-fossil-fuel-financing/>

Segal, M. 2023c. EU Launches Green Claims Rules to Protect Consumers from Greenwashing. Retrieved from <https://www.esgtoday.com/eu-launches-green-claim-rules-to-protect-consumers-from-greenwashing/>

Segal, M. 2023d. Texas Anti-ESG Investing Bill Faces Pushback Over \$6 Billion Cost to Pensions. Retrieved from <https://www.esgtoday.com/texas-anti-esg-investing-bill-faces-pushback-over-6-billion-cost-to-pensions/>

Sekaran, U. 2005. *Research Methods for Business with SPSS 13.0 Set*. New York: John Wiley and Sons.

Shalley, C.E., Zhou, J. & Oldham, G.R. 2004. The effects of personal and contextual characteristics on creativity: Where should we go from here? *Journal Of Management*, 30(6):933-958.

Sheehy, B. 2014. Defining CSR: problems and solutions. *Journal of Business Ethics* (131):625–648.

Shenton, A.K. 2004. Strategies for ensuring trustworthiness in qualitative research projects. *Education for Information*, 22:63-75.

Shocker, A.D., & Sethi, S.P. 1973. An Approach to Incorporating Societal Preferences in Developing Corporate Action Strategies. *California Management Review*, 15(4):97–105.

Shonhiwa, D.C. *An Examination of the Situational Leadership Approach: Strengths and Weaknesses*. 2016.

Siguaw, J.A., Simpson, P.M. & Enz, C.A. 2006. Conceptualizing innovation orientation: A framework for study and integration of innovation research. *Journal of Product Innovation Management*, 23(6)

Enabling leadership of and innovation in SA mining companies in pursuing ESG and the SDGs

Silverman, D. 2000. Doing Qualitative Research. A Handbook.

Simon, M. 2011. Validity and reliability in qualitative research. *Curationis*, 16:35-38.

Simón, M., Dorronsoro, C., Ortiz, I., Martín, F. & Aguilar, J. 2002. Pollution of carbonate soils in a Mediterranean climate due to a tailings spill. *European Journal of Soil Science*, 53(2):321-330.

Sing, S K., Del Giudice, M., Chierici, R., & Graziano, D. 2020. Green innovation and environmental performance: The role of green transformational leadership and green human resource management. *Technological Forecasting and Social Change*, 150: 119762.

Smith, K. 2004. Measuring Innovation, Chapter 6 in: J. Fagerberg, DC Mowery and RR Nelson.

Social and Labour Mining Community Toolkit. 2017. Wits, retrieved from <https://www.wits.ac.za/media/wits-university/faculties-and-schools/commerce-law-and-management/research-entities/cals/documents/programmes/environment/resources/SLP%20Community%20Toolkit%202%20March%202017.pdf> (Accessed: 25 January 2023).

Social and Labour Plan Mining Community Toolkit. 2017. retrieved from <https://www.wits.ac.za/media/wits-university/faculties-and-schools/commerce-law-and-management/research-entities/cals/documents/programmes/environment/resources/SLP%20Community%20Toolkit%202%20March%202017.pdf> accessed on 25 -06 -2023

Solomon, J. & Maroun, W. 2012. Integrated reporting: The new face of social, ethical and environmental reporting in South Africa? ACCA. The Association of Chartered Certified Accountants London.

South Africa. 1991. The Minerals Act 50 of 1991. Government Printer, Pretoria

South African Company Law (no date) South African company law, Law Guide. Available at: <https://lawguide.co.za/south-african-company-law/>.

Enabling leadership of and innovation in SA mining companies in pursuing ESG and the SDGs

Spector, B. A. 2016. Carlyle, Freud, and the great man theory more fully considered. *Leadership*, 12:250-260.

Spoelstra, S. 2013. Is leadership a visible phenomenon? On the (im) possibility of studying leadership. *International Journal of Management Concepts and Philosophy*, 7(3-4):174-188.

Sprout Social. 2019. *#BrandsGetReal: Brands Creating Change in the Conscious Consumer Era*. Chicago: Sprout Social.

Stacey, R.D. 2010. *Complexity and organizational reality: Uncertainty and the need to rethink management after the collapse of investment capitalism*. Routledge.

Starik, M. & Kanashiro, P. 2013. Toward a theory of sustainability management: Uncovering and integrating the nearly obvious. *Organization & Environment*, 26(1):7-30.

Statement: *South Africa's climate commitment much more ambitious than before* (2021) World Resources Institute. Available at: [https://www.wri.org/news/statement-south-africas-climate-commitment-much-more-ambitious#:~:text=WASHINGTON%20\(September%2027%2C%202021\),than%20tar gets%20communicated%20in%202016](https://www.wri.org/news/statement-south-africas-climate-commitment-much-more-ambitious#:~:text=WASHINGTON%20(September%2027%2C%202021),than%20tar gets%20communicated%20in%202016) (Accessed: 28 October 2022).

Statistics South Africa (Stats SA). 2019. 'Mid-year population estimates 2019', viewed, 14 August 2019 from <http://www.statssa.gov.za/publications/P0302/P03022019.pdf>.

Statistics South Africa (Stats SA). 2021. *Four facts about the mining industry* (2019) retrieved from <https://www.statssa.gov.za/?p=14682> (Accessed: 12 September 2022).

Statistics South Africa (Stats SA). 2021. *Four facts about the mining industry* (2019) retrieved from <https://www.statssa.gov.za/?p=14682> (Accessed: 12 September 2022).

Statistics South Africa (Stats SA). 2021. *Quarterly Labour Force Survey (QLFS) – Q3:2021*, retrieved from <https://www.statssa.gov.za/?p=14957> (Accessed: 12 September 2022)

Enabling leadership of and innovation in SA mining companies in pursuing ESG and the SDGs

Statistics South Africa (Stats SA). 2022, *Economic, social and political empowerment are critical for achieving gender equality in SA*, <https://www.statssa.gov.za/?p=15833#:~:text=equality%20in%20SA-Economic%2C%20social%20and%20political%20empowerment%20are%20critical%20for%20achieving%20gender,households%20are%20headed%20by%20females>. (Accessed: 09 July 2023)

Statistics South Africa (Stats SA). 2022. *Economic, social and political empowerment are critical for achieving gender equality in SA*, <https://www.statssa.gov.za/?p=15833#:~:text=equality%20in%20SA-,Economic%2C%20social%20and%20political%20empowerment%20are%20critical%20for%20achieving%20gender,households%20are%20headed%20by%20females>. (Accessed: 09 July 2023)

Statistics South Africa (Stats SA). 2023. *Beyond unemployment – Time-Related Underemployment in the SA labour market*, STATS SA. Available at: <https://www.statssa.gov.za/?p=16312>.

Statistics South Africa (Stats SA). *Quarterly Labour Force Survey (QLFS) – Q3:2021*, retrieved from <https://www.statssa.gov.za/?p=14957> (Accessed: 12 September 2022)

Steele-Schober, Teresa. 2021. The Importance of ESG for Mineral Reporting. *Journal of the Southern African Institute of Mining and Metallurgy*, 121(6), viii-xi. Retrieved July 30, 2023.

Stephens, N.M., Markus, H.R. & Townsend, S.S. 2007. Choice as an act of meaning: the case of social class. *Journal of Personality and Social Psychology*, 93:814.

Sternberg, R J., Kaufman, J.C. & Pretz, J.E. 2004. A Propulsion Model of Creative Leadership. *Creativity and Innovation Management*, 13:145-153.

Stewart, F. & Mann, C. 2000. Internet communication and qualitative research: A handbook for researching online. *Internet Communication and Qualitative Research*, 1-272.

Enabling leadership of and innovation in SA mining companies in pursuing ESG and the SDGs

Steyn, M. 2014. Organisational benefits and implementation challenges of mandatory integrated reporting: Perspectives of senior executives at South African listed companies. *Sustainability. Accounting. Management. Policy J.* (5):476–503.

Steyn, W. 2021. *The upside of disruptive 4IR technology and innovation*. Retrieved from <https://www.universityworldnews.com/post.php?story=20210419065637167> Accessed 18 May 2021

Sturman, K., Rogers, P., Imbrogiano, J., Mori Junior, R., & Ezeigbo, C. 2018. *Monitoring impact of mineral sustainability standards to align with the Sustainable Development Goals*. Centre for Social Responsibility in Mining (CSRMI), The University of Queensland: Brisbane.

Sullivan, J. R. 2012. Skype: An appropriate method of data collection for qualitative interviews? *The Hilltop Review*, 6):10.

Sullivan, K., Thomas, S. & Rosano, M. 2018. Using industrial ecology and strategic management concepts to pursue the Sustainable Development Goals. *Journal of Cleaner Production*, (174):237-246.

Suroso, E. & Azis, Y. 2015. *Defining Mainstreams of Innovation: A Literature Review*.

Sustainability Accounting Standard Board (SASB). 2023. retrieved from <https://sasb.org/about/sasb-and-other-esg-frameworks/accessed-on-27-07-2023>

Sustainability Accounting Standards Board. 2021. *Our Work*. Retrieved from <https://www.sasb.org/our-work/>

Swilling, M. 2020. *The age of sustainability: Just transitions in a complex world* (p. 350). Taylor & Francis.

Swilling, M., Musango, J. & Wakeford, J. 2016. Developmental states and sustainability transitions: prospects of a just transition in South Africa. *Journal of Environmental Policy & Planning*, 18(5):650-672.

Symon, G.E. & Cassell, C.E. 1998. *Qualitative methods and analysis in organizational research: A practical guide*. Sage Publications Ltd.

Enabling leadership of and innovation in SA mining companies in pursuing ESG and the SDGs

Tang, Y.Y. 2017. *The neuroscience of mindfulness meditation: How the body and mind work together to change our behaviour*. Springer.

Task Force on Climate-Related Financial Disclosure Claims (TCFD). 2023. Retrieved from <https://www.fsb-tcf.org/> accessed 27-07-2023

Task Force on Climate-Related Financial Disclosures (TCFD). 2022. About. Available at: <https://www.fsb-tcf.org/about/> (Accessed: 07 August 2023).

Tateishi E. 2017. Craving gains and claiming “green” by cutting greens? An exploratory analysis of greenfield housing developments in Iskandar Malaysia. *J Urban Af* 40(3):370–393 <https://doi.org/10>

Tayal, R., Upadhyay, R., Yadav, M., Rangnekar, S. & Singh, R. 2018. The impact of transformational leadership on employees’ acceptance to change: Mediating effects of innovative behaviour and moderating effect of the use of information technology. *VINE Journal of Information and Knowledge Management Systems*, 48, 00-00.

Teplická, K., Khouri, S., Beer, M. & Rybárová, J. 2021. Evaluation of the Performance of Mining Processes after the Strategic Innovation for Sustainable Development. *Processes*, 9:1374.

Terra Choice. 2010. *The sins of greenwashing: home and family edition*. <http://sinsofgreenwashing.org/findings/the-seven-sins/>.

The Global Sustainable Investment Review. 2018. *Global Sustainable Investment Alliance*, 2018, gsi-alliance.org.

The International Organization for Standardization (ISO 26000, *International Standard for social responsibility*). 2023. <https://www.iso.org/standard/42546.html#:~:text=ISO%2026000%3A2010%20is%20intended,part%20of%20their%20social%20responsibility>.

The Minerals Council South Africa. 2021. The Minerals Council publishes facts and figures book 2021, *The Minerals Council South Africa*. Available at: <https://www.mineralscouncil.org.za/industry-news/media-releases/2022/send/85-2022/1876-the-minerals-council-publishes-facts-and-figures-book-2021>.

Enabling leadership of and innovation in SA mining companies in pursuing ESG and the SDGs

The Organisation for Economic Co-operation and Development (OECD Guidelines for Multinational Enterprises). 2023. *The OECD Guidelines for Multinational Enterprises*, <https://www.oecd.org/investment/mne/1903291.pdf>

The Presidency, Republic of South Africa. Employment Equity Amendment Bill of 2020, Published, Accessed <https://www.gov.za/speeches/president-cyril-ramaphosa-assents-employment-equity-amendment-bill-12-apr-2023-0000>.

Thomas, M.D., Walker, J.A., Keating, P., Shives, R., Kiss, F. & Goodfellow, W.D. 2000. *Geophysical atlas of massive sulphide signatures, Bathurst mining camp, New Brunswick*. The Survey.

Thomashausen. S, Maennling. N, Mebratu-Tsegaye. T. 2018. A comparative overview of legal frameworks governing water use and waste water discharge in the mining sector, *Resources Policy* (55):143-151

Tierney, P. & Farmer, S. M. 2002. Creative Self-Efficacy: Its Potential Antecedents and Relationship to Creative Performance. *The Academy of Management Journal*, (45):1137-1148.

Tierney, P., Farmer, S.M. & Graen, G.B. 1999. An examination of leadership and employee creativity: The relevance of traits and relationships. *Personnel Psychology*, (52):591-620.

Tillmann-Healy, L. M. 2003. Friendship as method. *Qualitative Inquiry*, (9):729-749.

Tiwary, R.K., 2001. Environmental impact of coal mining on water regime and its management. *Water, Air, and Soil Pollution* 132:185-199.

Topcu, M.K., Gursoy, A. & Gurson, P. 2015. *The role of the servant leadership on the relation between ethical climate perception and innovative work*.

Tourish, D. & Vatcha, N. 2005. Charismatic leadership and corporate cultism at Enron: The elimination of dissent, the promotion of conformity and organizational collapse. *Leadership*, 1:455-480.

Tracey, J.B. & Hinkin, T.R. 1998. Transformational leadership or effective managerial practices? *Group & Organization Management*, 23:220-236.

Enabling leadership of and innovation in SA mining companies in pursuing ESG and the SDGs

Travers, M. 2001. *Qualitative Research Through Case Studies*. London.

Treviño, L.K., Brown, M. & Hartman, L.P. 2003. A qualitative investigation of perceived executive ethical leadership: Perceptions from inside and outside the executive suite. *Human Relations*, 56: 5-37.

Twala, C. 2012. The Marikana Massacre: A historical overview of the labour unrest in the mining sector in South Africa. *Southern African Peace and Security Studies*, 1:61-67.

U.S. Securities and Exchange Commission. 2021. *Commission Guidance Regarding Disclosure Related to Climate Change*.

Uhl-Bien, M. & Arena, M. 2018. Leadership for organizational adaptability: A theoretical synthesis and integrative framework. *The Leadership Quarterly*, (29):89-104.

Uhl-Bien, M. and Marion, R. 2009. Complexity leadership in bureaucratic forms of organizing: A meso model. *The Leadership Quarterly*, 20(4):631-650.

Uhl-Bien, M., & Arena, M. 2017. Complexity leadership: enabling people and organizations for adaptability. *Organizational Dynamics*.

Uhl-Bien, M., Marion, R. & McKelvey, B. 2007. Complexity leadership theory: Shifting leadership from the industrial age to the knowledge era. *The Leadership Quarterly*, 18:(4).

United Nations (UN), 2020. *United Nations Sustainable Development Agenda*, United Nations. Available at: <https://www.un.org/sustainabledevelopment/development-agenda-retired/>

United Nations (UN). 2015. *Transforming our world: The 2030 Agenda for Sustainable Development*. Retrieved from <https://sustainabledevelopment.un.org/post2015/transformingourworld>

United Nations (UN). 2022. *Climate Action*, retrieved from <https://www.un.org/en/climatechange/what-is-climate-change> (Accessed: 28 September 2023).

Enabling leadership of and innovation in SA mining companies in pursuing ESG and the SDGs

United Nations (UN). 2022. *What is climate change?* United Nations. Available at: <https://www.un.org/en/climatechange/what-is-climate-change>.

United Nations Environment Programme (UNEP), *Our work in Africa 2023*, retrieved from <https://www.unep.org/regions/africa/our-work-africa#:~:text=The%20continent%20has%2040%20percent,internal%20renewable%20fresh%20water%20source> (Accessed: 10 April 2023).

United Nations Framework Convention on Climate Change (UNFCCC). 2020. *Annual report 2020*, UNFCCC. Available at: https://unfccc.int/about-us/annual-report/annual-report-2020?gclid=CjwKCAjw5remBhBiEiwAxL2M94IQqDzLVYZ4TvrxuesLI-vYiic4LW8U-SOzXvpn5BMAvclSAD34hoCfWYQAvD_BwE.

United Nations Global Compact (UNGC). 2019. *The SDG Investment Fair: Impact, Risks and Opportunities*

United Nations Global Compact (UNGC). 2019. UN Global Compact-Accenture Strategy 2019 CEO Study – *The Decade to Deliver: A Call to Business Action*. retrieved from <https://unglobalcompact.org/library/5715> accessed on 28-07-2023

United Nations Global Compact (UNGC). 2021. *About the UN Global Compact*. Retrieved from <https://www.unglobalcompact.org/about>

United Nations Global Compact and Accenture.. 2018. *The Future of Business: SDG Ambition*. Retrieved from <https://www.unglobalcompact.org/library/5476>

Uslu, O. 2019. General Overview to Leadership Theories from a Critical Perspective. *Marketing and Management of Innovations*, 161-172.

Uys, J. & Webber-Youngman, R.C.W. 2019. A 4.0D leadership model postulation for the Fourth Industrial Revolution relating to the South African mining industry. *Journal of the Southern African Institute of Mining and Metallurgy*, 119.

Uys, J.& Webber-Youngman, R. 2021. The anatomy of leadership in industry 4. 0: the 4. 0d leadership development model. *London: Knowledge Resources*. Available at: <http://public.eblib.com/choice/PublicFullRecord.aspx?p=6682691> (Accessed: August 3, 2023).

- Valiani, S. 2018. *The future of mining in South Africa: sunset or sunrise?* 5th ed. Woodmead, Johannesburg: Mapungubwe Institute for Strategic Reflection (MISTRA).
- Van Auken, H., Madrid-Guijarro, A. & Garcia-Perez-de-Lema, D. 2008. Innovation and performance in Spanish manufacturing SMEs. *International Journal of Entrepreneurship and Innovation Management*, (8):36-56.
- Van de Ven, A.H. 1986. Central problems in the management of innovation. *Management Science*, 32:590-607.
- Van der Lugt, R., & Ryan, S. 2019. The Role of ESG Integration in Retirement Investing. *Journal of Retirement*, 7(4): 68-77
- Van der Waal, J. W.H., Thijssens, T., & Maas, K. 2021. The Innovative Contribution of Multinational Enterprises to the Sustainable Development Goals. *Journal of Cleaner Production*:285.
- Van Holt, T., Statler, M., Atz, U., Whelan, T., Van Loggerenberg, M., & Cebulla, J. 2020. The cultural consensus of sustainability-driven innovation: Strategies for success. *Business Strategy and the Environment*, 29(8):3399-3409.
- Van Marnewijk, M. 2003. Concepts and definitions of CSR and corporate sustainability: Between agency and communion. *Journal of Business Ethics*, (44): 95-105.
- Van Seters, D.A., & Field, R.H.1990. The evolution of leadership theory. *Journal of Organizational Change Management*, 3(3):29-45.
- Van Tulder, R. 2018. *Business & the sustainable development goals: A framework for effective corporate involvement* :123. Erasmus University Rotterdam.
- Van Zanten, J.A., & Van Tulder, R. 2018. Multinational enterprises and the Sustainable Development Goals: An institutional approach to corporate engagement. *Journal of International Business Policy*, 1(3-4): 208-233.
- Vandenbrande, W. 2019. Quality for a sustainable future. *Total Quality Management & Business Excellence*, (32):1-9.

Enabling leadership of and innovation in SA mining companies in pursuing ESG and the SDGs

Vasilescu, M. 2019. Leadership styles and theories in an effective management activity. *Annals-Economy Series*, (4):47-52.

Vera, D. & Crossan, M. 2004. Strategic leadership and organizational learning. *Academy of Management Review*, (29):222-240.

Verbin, I. 2020. *Corporate Responsibility in the Digital Age: A Practitioner's Roadmap for Corporate Responsibility in the Digital Age*; Routledge: London, UK.2020

Vidal, O., Goffé, B. & Arndt, N. 2013. Metals for a low-carbon society. *Nature Geoscience*, 6(11):894-896.

Walker, J.; Pekmezovic, A.; Walker, G. 2019. *Sustainable Development Goals: Harnessing Business to Achieve the SDGs through Finance, Technology and Law Reform*; John Wiley & Sons: Hoboken, NJ, USA.

Weathersby, G.B. 1999. *Leadership vs. management. Management Review*, 88, 5.

Weber, E., Büttgen, M. & Bartsch, S. 2022. How to take employees on the digital transformation journey: An experimental study on complementary leadership behaviors in managing organizational change. *Journal of Business Research*, (143): 225-238.

Westley, F., Olsson, P., Folke, C., Homer-Dixon, T., Vredenburg, H., Loorbach, D., Thompson, J., Nilsson, M. n., Lambin, E., Sendzimir, J., Banerjee, B., Galaz, V. & van der Leeuw, S. 2011. Tipping Toward Sustainability: Emerging Pathways of Transformation. *AMBIO: A Journal of the Human Environment*, (40):762-780.

What is Responsible Investment? Available online: <https://www.unpri.org/an-introduction-to-responsible-investment/what-is-responsible-investment/4780.article> (accessed on 31 July 2021).

Whetten, D.A. 1989. What constitutes a theoretical contribution? *Academy of Management Review*, (14):490-495.

Wilhelm, W., & Zhang, Y. 2019. ESG Integration in Investment Decision-Making. *Journal of Portfolio Management*, 45(7):98-110.

Enabling leadership of and innovation in SA mining companies in pursuing ESG and the SDGs

Will. M. 2023. *Rise of electricity tariffs brings worry to SA mining industry*, retrieved from <https://www.news24.com/news24/community-newspaper/vista/rise-of-electricity-tariffs-brings-worry-to-sa-mining-industry-20230113> (Accessed: 18 January 2023).

Williams, W.M. 2002. Teaching Children Real-World Knowledge and Reasoning. *Developmental Review*, (22):151-61.

Wilson, S. 2013. *Thinking differently about leadership: a critical history of the form and formation of leadership studies* (PhD thesis). Victoria University of Wellington, Wellington, New Zealand.

Winde, F. 2020. Turning water pollution sources into assets: Exploring innovative options of using abandoned mines for generating and storing renewable energy. *Geography, Environment, Sustainability*, 13(2):6-16.

Winkler, H., Jooste, M. & Marquard, A. 2010. Structuring approaches to pricing carbon in energy and trade-intensive sectors in South Africa, *Climate Policy* 10(5): 527–542. doi: 10.3763/cpol.2010.0103

Witchalls, S. 2022. The environmental problems caused by mining, *Earth.Org*. Available at: <https://earth.org/environmental-problems-caused-by-mining/> (Accessed: 30 September 2022).

Withers, C., Kaufman, D., & Lauxke, T. 2020. Research and Innovation for Sustainable Mining Practices. *Minerals*, 10(2):148.

Women in Mining in South Africa Fact Sheet. 2020. Women in mining in South Africa Minerals Council South Africa. Available at: <https://www.mineralscouncil.org.za/special-features/1064-women-in-mining-in-south-africa> (Accessed: 09 July 2023).

World Business Council for Sustainable Development. 2020. *SDG Sector Roadmaps*. Retrieved from <https://www.wbcsd.org/Projects/SDG-Sector-Roadmaps>

World Coal Institute. 2023. retrieved from <https://www.worldcoal.org/wca-commitment/> accessed (Accessed: 19 January 2023).

Enabling leadership of and innovation in SA mining companies in pursuing ESG and the SDGs

World Commission on Environment and Development, 1987. *Our Common Future: Report of the World Commission on Environment and Development*. Geneva. UN-Dokument A/42/427. Available at: <https://digitallibrary.un.org/record/139811?ln=en>

World Economic Forum. 2017. *Sustainable Development Impact Summit 2017 Report*, (World Economic Forum). Available at: https://www3.weforum.org/docs/WEF_SDIS17_report.pdf (Accessed: 07 August 2023).

World Economic Forum. 2019. *ESG Benchmarking South African Companies*. Retrieved from <https://www.weforum.org/press/2019/10/esg-benchmarking-south-african-companies/>

World Economic Forum. 2020. *The Global Competitiveness Report 2020*, World Economic Forum. Available at: https://www3.weforum.org/docs/WEF_TheGlobalCompetitivenessReport2020.pdf (Accessed: 07 August 2023).

World Gold Council. 2019. *ESG performance in the gold mining sector*. Retrieved from <https://www.gold.org/goldhub/esg-performance-gold-mining-sector>.

World Resources Institute. 2021. STATEMENT: South Africa's Climate Commitment Much More Ambitious Than Before, retrieved from [https://www.wri.org/news/statement-south-africas-climate-commitment-much-more-ambitious#:~:text=WASHINGTON%20\(September%2027%2C%202021\),than%20tar gets%20communicated%20in%202016](https://www.wri.org/news/statement-south-africas-climate-commitment-much-more-ambitious#:~:text=WASHINGTON%20(September%2027%2C%202021),than%20tar gets%20communicated%20in%202016) accessed on 28-10-2022

Worley, C.G. & Lawler, E.E. 2010. Agility and organization design: A diagnostic framework. *Organizational Dynamics*, 39:(2).

Worthington, I. 2009. Corporate perceptions of the business case for supplier diversity: How socially responsible purchasing can 'pay'. *Journal of Business Ethics*, (90):47-60.

Worthington, I., Ram, M. & Jones, T. 2006. 'Giving something back': a study of corporate social responsibility in UK South Asian small enterprises. *Business Ethics: A European Review*, (15):95-108.

Wu, T.C. 2005. The validity and reliability of safety leadership scale in universities of Taiwan. *International Journal of Technology and Engineering Education*, 2:(1).

Xie, H., Ju, Y., Ren, S., Gao, F., Liu, J. & Zhu, Y. 2019. Theoretical and technological exploration of deep in situ fluidized coal mining. *Frontiers in Energy*, (13):603-611.

Xu, Z., Zhang, Y., Yang, J., Liu, F., Bi, R., Zhu, H., Lv, C. & Yu, J. 2019. Effect of underground coal mining on the regional soil organic carbon pool in farmland in a mining subsidence area. *Sustainability*, 11(18), 4961.

Yahaya, R. & Ebrahim, F. 2016. Leadership styles and organizational commitment: literature review. *Journal of Management Development*, (35):190-216.

Yin, R. 1998. The abridged version of case study research: design and method. In: Bickman, L. & Rog, DJ (Eds.) *Handbook of Applied Social Research Methods*. Thousand Oaks, CA, Sage.

Yin, R. K. 1994. *Case study research: Design and methods*, Sage.

Younger, P.L. & Wolkersdorfer, C. 2004. Mining Impacts on the Fresh Water Environment: Technical and Managerial Guidelines for Catchment Scale Management. *Mine Water and the Environment*, 23 (S1): s2–s80. doi:10.1007/s10230-004-0028-0.

Yua, E., Van Luu, B., Chen, C. 2020. Greenwashing in environmental, social and governance disclosures, *Research in International Business and Finance*: 52(C)

Yukl, G. 1999. An evaluation of conceptual weaknesses in transformational and charismatic leadership theories. *The Leadership Quarterly*, (10):285-305.

Yukl, G. 2012. Effective Leadership Behavior: What We Know and What Questions Need More Attention, *Academy of Management Perspectives*, 26(4):66–85.

Zaccaro, S.J. & Horn, Z.N. 2003. Leadership theory and practice: Fostering an effective symbiosis. *The Leadership Quarterly*, (14):769-806.

Zacher, H. & Rosing, K. 2015. Ambidextrous leadership and team innovation. *Leadership & Organization Development Journal*, (36):54-68.

Zhang L., Li D., Cao C., Huang S. 2018. The influence of greenwashing perception on green purchasing intentions: the mediating role of green word-of-mouth and moderating role of green concern. *J Clean Prod* 187:740–750 <https://doi.org/10>

Zorn, M. & Komac, B. 2013. *Land Degradation*. Encyclopedia of Natural Hazards. Encyclopedia of Earth Sciences Series. Springer, Dordrecht. https://doi.org/10.1007/978-1-4020-4399-4_207

Zuckerman, M. 1996. The psychobiological model for impulsive unsocialized sensation seeking: A comparative approach. *Neuropsychobiology*, (34):125-129.

Zuraik, A. & Kelly, L. 2019. The role of CEO transformational leadership and innovation climate in exploration and exploitation. *European Journal of Innovation Management* (22):84-104.