A phenomenological study on leaders' experiences of sustainability in the South African mining industry

By

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DECLARATION

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ABSTRACT

The aim of this research was to investigate and explore leaders' experiences of sustainability in the South African mining industry. Sustainability has emerged as an essential leadership concept due to the degradation of the environment and social impacts associated with mining. This study was conducted to gain an understanding of the experiences of sustainability leaders in the South African mining industry and their perceptions regarding what it means to be a sustainability leader. The experience of the challenges that sustainability leaders face as well as the approaches that they use to influence positive sustainability outcomes were also investigated.The study used a transcendental phenomenological qualitative study approach to identify leadership challenges associated with sustainability, highlight sustainability leadership successes as perceived and experienced by leaders within the SA mining industry, identify strategies leaders use to influence positive sustainability outcomes and explain the meaning of sustainability as experienced by sustainability leaders. A total of 12 executive leaders in sustainability from the South African mining industry across all commodities including gold, platinum, coal, manganese and diamonds were selected using purposive sampling to participate in the study. The views and experiences of sustainability leaders obtained through semi-structured interviews are described through individual structural descriptions. The study findings show that there are different meanings ascribed to sustainability leadership. However, the experience of the challenges pertaining to sustainability leadership amongst the leaders shows a level of commonality. These include the ability of sustainability leaders to influence positive environmental outcomes beyond their leadership roles as they deal with and rely on various stakeholders varying from mining technical teams to communities and government authorities responsible for enabling sustainable development. The experience of success from the sustainability leaders is linked to positive outcomes beyond themselves such as an improved understanding of environmental issues by the teams that they lead and community empowerment. The study is expected to make an industry contribution by advancing the understanding of sustainability and sustainable development. A sustainability leadership development framework was developed to enhance the role of leadership towards sustainable mining.

Keywords: South African mining, sustainable development, sustainability leadership, environmental impacts, social impacts, stakeholder engagement.

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LIST OF ACRONYMS AND ABBREVIATIONS

AMD	Acid mine drainage
CS	Corporate Sustainability
CSI	Corporate Social Initiative
CSR	Corporate Social Responsibility
DFFE	Department of Forestry, Fisheries and the Environment
DMRE	Department of Mineral Resources and Energy
DSP	Dominant Social Paradigm
DWS	Department of Water and Sanitation
EM	Environmental Management
EPs	Equator Principles
ESG	Environmental, Social and Governance
ESMS	Environmental and Social Management Systems
ETFs	Exchange Traded Funds
GDP	Gross Domestic Product
GHG	Greenhouse gas
GLfS	Global Leadership for Sustainability
GRI	Global Reporting Initiative
HLPF	High Level Political Forum
IAEG-SDG	Inter-Agency and Expert Group on SDG Indicators
ICMM	International Council on Mining and Metals
IFC	International Finance Corporation
IFC PS	International Finance Corporation Performance Standards
IGF	Intergovernmental Forum on Mining, Minerals, Metals and Sustainable Development
JPOI	Johannesburg Plan of Implementation
MDGs	Millennium Development Goals
MDG-F	Millennium Development Goals Achievement Fund
MOI	Means of Implementation
MPRDA	Mineral and Petroleum Resources Development Act (Act 28, 2002)

NDP	National Development Plan
NEMA	National Environmental Management Act (Act 107, 1998)
NEP	New Environmental Paradigm
NGOs	Non-Governmental Organisations
OEC	Observatory of Economic Complexity
PGMs	Platinum Group Metals
PRI	Principles for Responsible Investment
RMDI	Responsible Mineral Development Initiative
SA	South Africa/South African
SD	Sustainable Development
SDGs	Sustainable Development Goals
SL	Sustainability Leadership
SLP	Social Labour Plan
SRI	Socially Responsible Investment
TB	Tuberculosis
UK	United Kingdom
UNCED- UN	Conference on the Environment and Development
UNCSD	United Nations Commission on Sustainable Development
USA	United States of America
USSR	Union of Soviet Socialist Republics
VNR	Voluntary National Review
WCED	World Commission on Environment and Development
WSSD	World Summit on Sustainable Development

CHAPTER ONE: INTRODUCTION

1.1. Introduction

Sustainability refers to the ability to maintain and endure over the long term. According to Millar et al. (2012) , as cited in Diaz-Iglesias et al. (2021), the theory of sustainability originated in the 1960s from a growing environmental concern about the impact of business on the environment. Sustainability involves balancing social, economic and environmental considerations to meet current demands without threatening the ability of future generations to meet their own potential requirements (Blinova et al., 2022). Sustainability is closely linked to the concept of sustainable development (SD), which was famously defined in the Brundtland World Commission Report (1987) as "Development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (Brundtland, 1987, p. 16). There is currently no overarching prescriptive framework for how sustainability and SD should be implemented in organisations; instead, organisations must make these critical decisions based on their own requirements and concerns (Abusaada & Elshater, 2024; Akenroye et al., 2018; Eustachio et al., 2023; Leal Filho et al., 2021; Li et al., 2023; Rashed & Shah, 2021).

Development is considered sustainable when it balances environmental, social and economic needs, also known as the 'triple bottom line' (Mvile & Bishoge, 2024). The Brundtland World Commission Report (1987), from which the concept of SD and sustainability originates, emphasises that there is no single approach towards the implementation of sustainability, thus countries and organisations may adapt and implement sustainability in accordance with their unique political and economic systems. Hilson and Murck (2000) and several more recent scholars including Abusaada and Elshater (2024), Li et al. (2023), Rashed and Shah (2021) and Leal Filho et al. (2021) also emphasised the notion that there is no single framework for the implementation of sustainability in accordance with the Brundtland World Commission Report.

In 2002, Downing asserted that South Africa's poor mining practices had cost the country its greatest asset - the environment. To date, Downing (2002) assertion remains true. Although the South African (SA) mining industry plays a vital role in the economic growth and development of South

Africa (SA), the industry is currently facing sustainability challenges because mining has had undesirable impacts on the environment and on society. Mining activities have serious negative impacts on the environment and the communities living near mine sites, leading to interlinked environmental and social impacts. These impacts include land pollution, water pollution, influx, climate change, air pollution and soil erosion, amongst many others (Dikgwatlhe & Mulenga, 2023; Laka, 2021; Laker, 2023; Makua & Odeku, 2017; Seloa & Ngole-Jeme, 2022; Shackleton, 2020; Sun et al., 2024; White, 2013; Wolkersdorfer & Mugova, 2022). A significant example of these impacts includes unclosed mines, which has resulted in legacy issues (Downing, 2002; Makua & Odeku, 2017; Mvile & Bishoge, 2024). Due to these numerous environmental and social impacts, the mining industry is considered unsustainable by concerned communities and stakeholders.

The ability to successfully lead sustainability in mining requires leadership approaches that will change the current mining practices to incorporate SD requirements and green mining (Boeske, 2023; Ramos-Mejía & Balanzo, 2018; Woo & Kang, 2020). Thus, in order to address the negative environmental and social impacts caused by mining and mining legacy issues in SA, a 'sustainability leadership' approach is required. This research therefore aims to investigate and explore leaders' experiences of sustainability in the SA mining industry. Sustainability has emerged as an essential leadership concept due to the need to ameliorate the degradation of the environment and address the social impacts associated with mining. This research is based on the concept of SD, an approach which aims at promoting ecologically and socially sustainable development to benefit both business and society, which in the context of this study encapsulates the mining sector and wider society.

Sustainability can mean different things to different people and to scholars, depending on the particular context (Boeske, 2023; Ciegis et al., 2009; Eustachio et al., 2023; Rout et al., 2020). It is, therefore, essential to clarify that the research on sustainability within the context of this study was undertaken based on the SD theory originating from the definition proposed in the Brundtland World Commission Report (1987), that is, as development that addresses the needs of the present without threatening the ability of future generations to meet their requirements. Development is considered sustainable when it balances environmental, social and economic needs, also known, as mentioned above, as the 'triple bottom line'. Put differently, development is considered

sustainable when it generates positive economic benefits without harming or negatively impacting the environment and society. Using Redekop's (2010) rationale, within the context of this study, "Sustainability is a relatively straightforward concept that does not need extensive elaboration…we take the term to mean meeting the needs of the present without compromising the ability of future generations to meet their own needs" (Redekop, 2010, p. 2).

Sustainability challenges in the SA mining industry include both negative environmental and social impacts. These are well researched by scholars and relate to surface and ground pollution, negative social impacts on communities, air quality related impacts, and legacy issues caused by abandoned mines (Askham & Van Der Poll, 2017; Cornelissen et al., 2019; Naidoo, 2015; Ochieng et al., 2010; Pooe & Mhelembe, 2014; Schwegler, 2006; Selmier & Newenham-Kahindi, 2021; Tripathy & Patnaik, 1994). As highlighted above, based on the concept of sustainability and the definition of SD put forth in the Brundtland Commission Report, development is sustainable when it balances three fundamental needs: (I) positive environmental change; (II) positive social change; and (III) economic empowerment.

Even though sound legislation has been developed to ensure responsible mining and to promote sustainability in mining, for example, the Minerals and Petroleum Resources Development Act (MPRDA), the National Environmental Management Act (NEMA) and associated regulations, the role of leadership is pivotal for the successful implementation of sustainability in mining. Leadership intervention is urgently required in SA mining to implement and enforce legislation and mitigate the negative environmental and social impacts of mining (Hamann, 2003; Kanyumba, 2023; Xavier et al., 2017). Although critical for the future of mining, the topic of the role of leadership in implementing sustainability in mining is currently under-researched. To the researcher's knowledge, no study exists that addresses the leaders' roles in implementing sustainability in SA mining. Based on the dearth of investigation into this issue in the sector, this research aimed to investigate leaders' experiences of sustainability in the SA mining industry.

The epistemology underpinning this research is based on the advancement of the understanding of sustainability leadership (SL) within the SA mining industry, thus diminishing the gap between the theory of and what has been written about sustainability and its actual practical implementation

on the ground in real-world situations. The SD agenda requires leaders to make decisions and integrate environmental and social considerations into the activities in the mining industry. The meaning of sustainability, as lived and experienced by those who lead in the SA mining industry, will be explored in this research. By understanding how leaders experience sustainability, this research will contribute to the knowledge bases on sustainability in mining and responsible mining. This study aims to generate in-depth knowledge and insights, and a fuller understanding of how leaders in SA mining experience sustainability.

This chapter outlines the background to the SA mining industry. This is followed by the outline of minerals mined within SA as well as their distribution and locality. Mining methods influence the nature of environmental and social impacts caused by mining. The mining methods used to mine various minerals are therefore discussed within the chapter. Processing methods, uses of minerals as well as mineral markets are outlined to ensure appreciation of the mining industry and its context. The chapter also outlines the study aim as well as research objectives and questions. The significance of the study is discussed. The chapter also outlines the delimitations of the study and the broader structure of the thesis. The next section outlines the background on the SA mining industry in terms of how it has evolved and will highlights the economic impact of the industry in the broader context. An attempt is made to provide the necessary appreciation of the crucial role of mining in SA to justify the further investigation of SL within this pivotal sector.

1.2. Background on the South African mining industry

This section of the thesis provides an overview of the SA mining industry and an understanding of the industry's history and role in the SA economy. For the context of this study, the significance of the mining industry in SA and the industry's impact on the wider economy of the country needs to be understood. The review of the mining industry context is vital because the investigation of SL in the mining industry can only be justifiably achieved with an in-depth understanding of the background of the industry and how it has developed to the realities faced in the current situation.

The history of mining in SA found its beginning through an exploration that was conducted by Governor Simon van der Stel in 1685. Van der Stel was the first governor of the Dutch Cape Colony, also known as the Cape of Good Hope. In 1685, Governor Simon van der Stel led an

exploration expedition to an area called Springbokfontein, which is located approximately 550 kilometres north of Cape Town (Cairncross, 2004). It took decades after Van der Stel's initial exploration for mining to actually begin and the site explored by Van der Stel only eventually became the first commercial mine in SA in 1852, almost 200 years later. In this time, three shafts were constructed to mine copper. Significant copper deposits were further discovered in the area in the 1870's, leading to the development of additional mines in the vicinity (Cairncross, 2004).

Even though copper played a significant role in the early history of SA mining, it is not a mineral that SA is renowned for. Diamonds, gold and platinum are the minerals that have singled out SA as one of the leading countries in mineral production. Diamonds were discovered in the country in what was to become the city of Kimberley in the1860s. This discovery gave birth to a strong mineral industry in SA (Antin, 2013). Since then, the mining sector has been one of, if not the main, drivers of the SA economy. The development of the Witwatersrand goldfields was followed by the discovery of the first diamond in 1887, further strengthening the mining industry's economic presence in SA (Minerals Council South Africa, 2021). The Bushveld Igneous Complex was discovered around 1924, resulting in the commencement of platinum mining. The discovery of diamonds, gold and platinum catapulted the ascension of the mining industry in SA and the consequent formation of significant mining houses such as Anglo American, De Beers, Goldfields and Harmony, amongst others (Antin, 2013). Coal was mined later in the 19th century after the discovery of gold and diamonds near the Witwatersrand gold mines. Due to the oil crisis and high demand for oil in the 1970s, many oil companies invested in coal and established collieries in SA (Antin, 2013; Moore et al., 2024).

To date, gold, diamonds, platinum and coal remain the four leading mineral commodities mined in SA. The country's mines, that is, Glencor, JCI and Lonrho, later housed under Implats, Amplats and Lonmin (now taken over by Sibanye-Stillwater), produce 80% of the world's Platinum Group Metals (PGMs). SA remains the largest producer of platinum, chrome, manganese, vanadium and vermiculite. The country is within the top 10 producing countries in gold, diamonds and coal. Even though the country has historically been the leading producer of commodities such as gold, diamonds and platinum, gold production has been in decline in recent decades. SA is no longer the number one producer of gold and has been overtaken by China (Adekoya et al., 2021).

SA also contains reserves of iron ore, beryllium, titanium, manganese, chromium, copper and uranium. The country has produced an average of 68,9 metric tonnes of iron since 2010. Figure 1.1 shows iron ore production by country in 2022 and 2023. Cumulatively, SA ranks 7th in the world after Australia, Brazil, China, India, Russia and Iran (Statista, 2023).

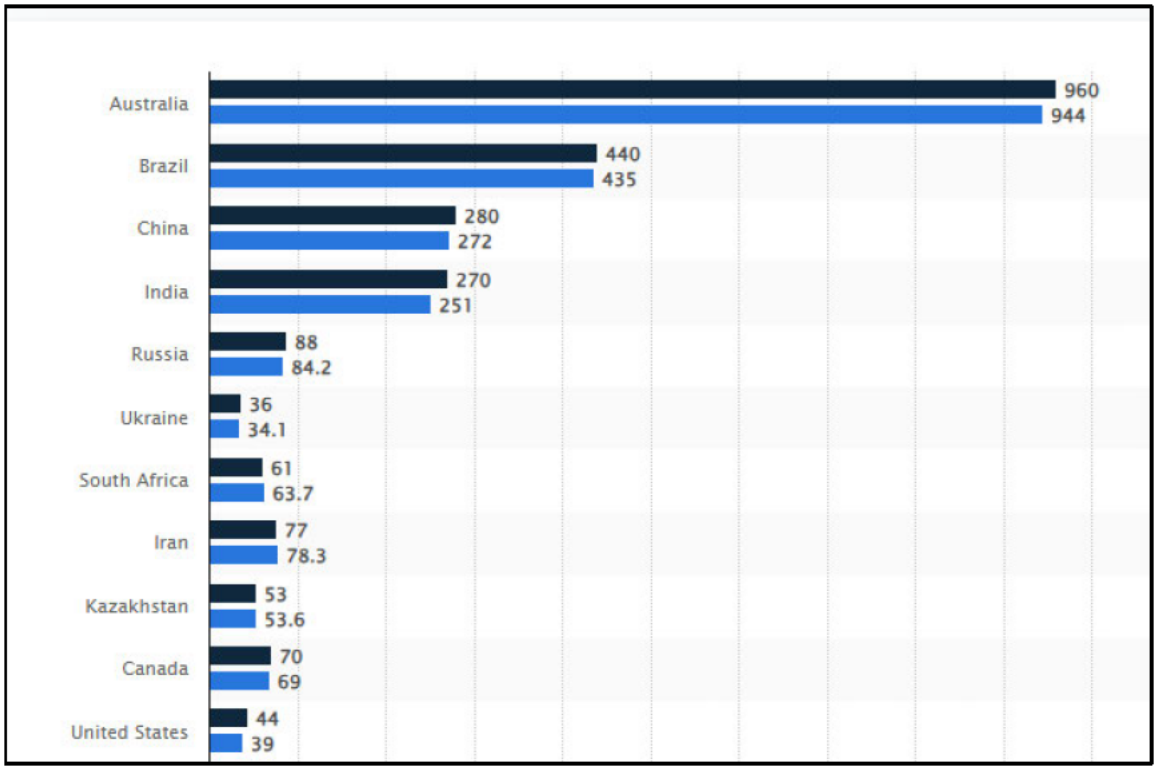

Figure 1. 1: Iron ore production by country

Source: Statista (2023)

As shown in Figure 1.2, mining is a significant employer in SA with 477 000 people employed in the sector. The industry contributes 400 billion rands in gross domestic product (GDP) to the economy as of 2020 (Minerals Council South Africa, 2021; Statista, 2021).

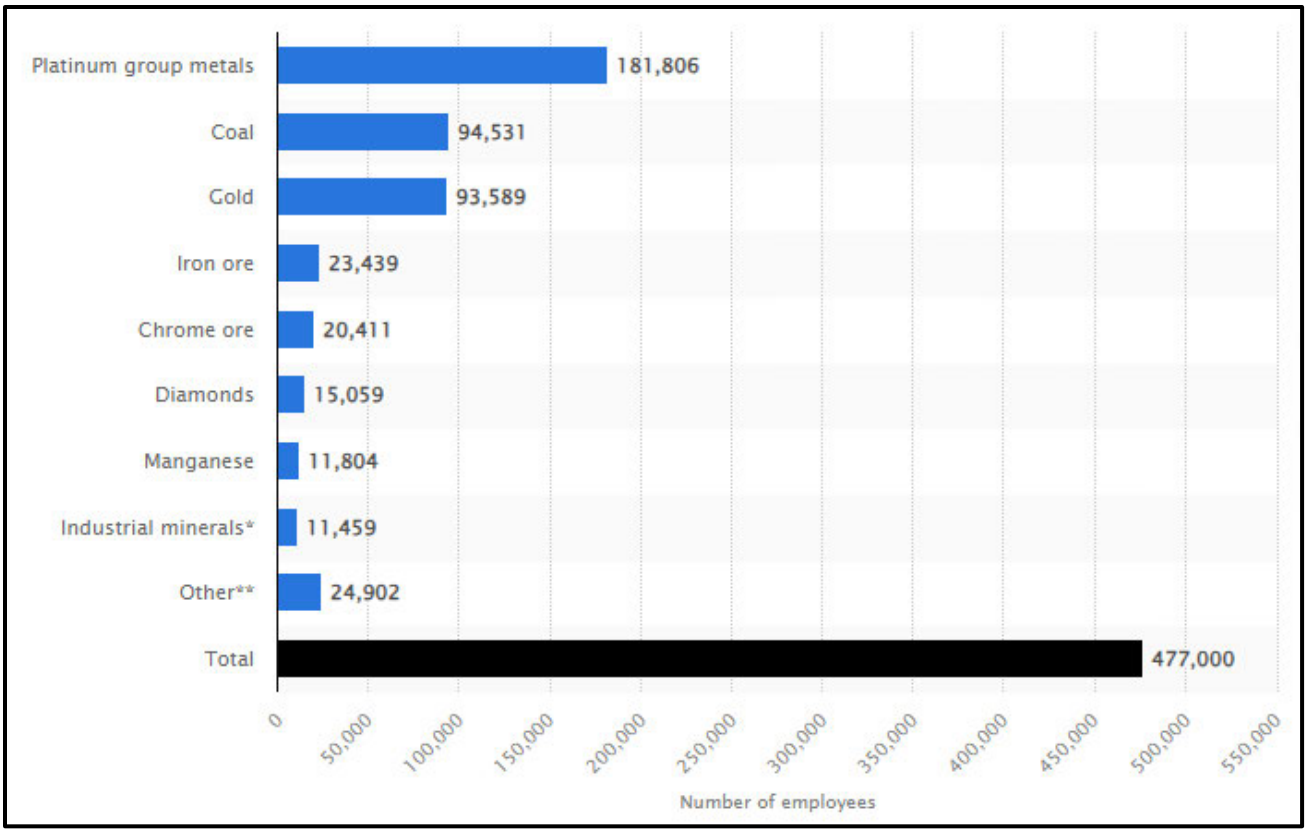

Figure 1. 2: Mining employment statistics

Source: Statista (2021)

Over the years, the impact of mining on the SA economy has declined. In the 1980s, mining was the second highest economic contributor after manufacturing, with a 21% contribution to the economy. This percentage declined drastically to only a 6.3% contribution to SA GDP in 2023 (Statistics South Africa, 2023). The decline of the economic impact of mining in SA is not to be confused with the increase in production. In some commodities such as platinum, SA has actually increased production in the past decade from 163 tons to 200 tons per year, however the pricing of these commodities has fallen (Africa Mining IQ, 2023), meaning that the direct contribution of mining to South Africa's GDP has steadily decreased.

Notwithstanding the safety-related and other challenges, such as a downturn in the prices of coal and PGMs, the mining industry has remained a significant employer and has had a major positive economic impact in SA. The role of mining in the SA economy is well known and cannot be

underestimated - mining creates jobs and livelihoods for people. The Minerals Council South Africa (2024) estimates that the sector added more than 7,500 jobs in 2023, employing 479,228 people, and total wages increased by 7% to R189.6 billion. However, when it comes to the impacts of mining on environmental and social well-being, many researchers agree that leadership interventions to mitigate adverse environmental impacts are urgently required (Manyuchi et al., 2020; Namutebi, 2017; Nyirenda et al.; Ochieng et al., 2010; Sorensen, 2011; Stephan, 2000).

Despite the decline of mining in the past decades, the above economic statistics show that mining is necessary for the SA economy. Without mining, the SA economy would undoubtedly suffer, and the unemployment rate would increase, exacerbating the country's already high levels of poverty. South Africa therefore requires mines and its associated activities to eradicate poverty and increase economic output. However, mining needs to be done sustainably, by taking into serious consideration the prevention of environmental pollution and minimising adverse social outcomes.

1.3. Minerals mined in South Africa and their distribution

Within SA, based on the geological formations prevalent in the country, various minerals are located within certain regions. SA falls within the top five leading producers of diamonds in the world, with Russia holding the top spot in terms of carats produced (Maebe, 2024). Diamonds in SA are mined mainly in Kimberley, Limpopo, Gauteng (Cullinan) and in the Northern Cape. The Cullinan Diamond Mine produced the largest diamond ever found in the world known as the Cullinan Diamond. Most diamond mines in SA are owned by De Beers Consolidated Mines. There are other role players in diamond mining in SA including Petra Diamonds and a few other exploration companies such as Trans Hex, Rockwell Diamonds and Diamond Corp (Macmillan, 2017). Figure 1.3 shows the mining locations in SA and commodities mined.

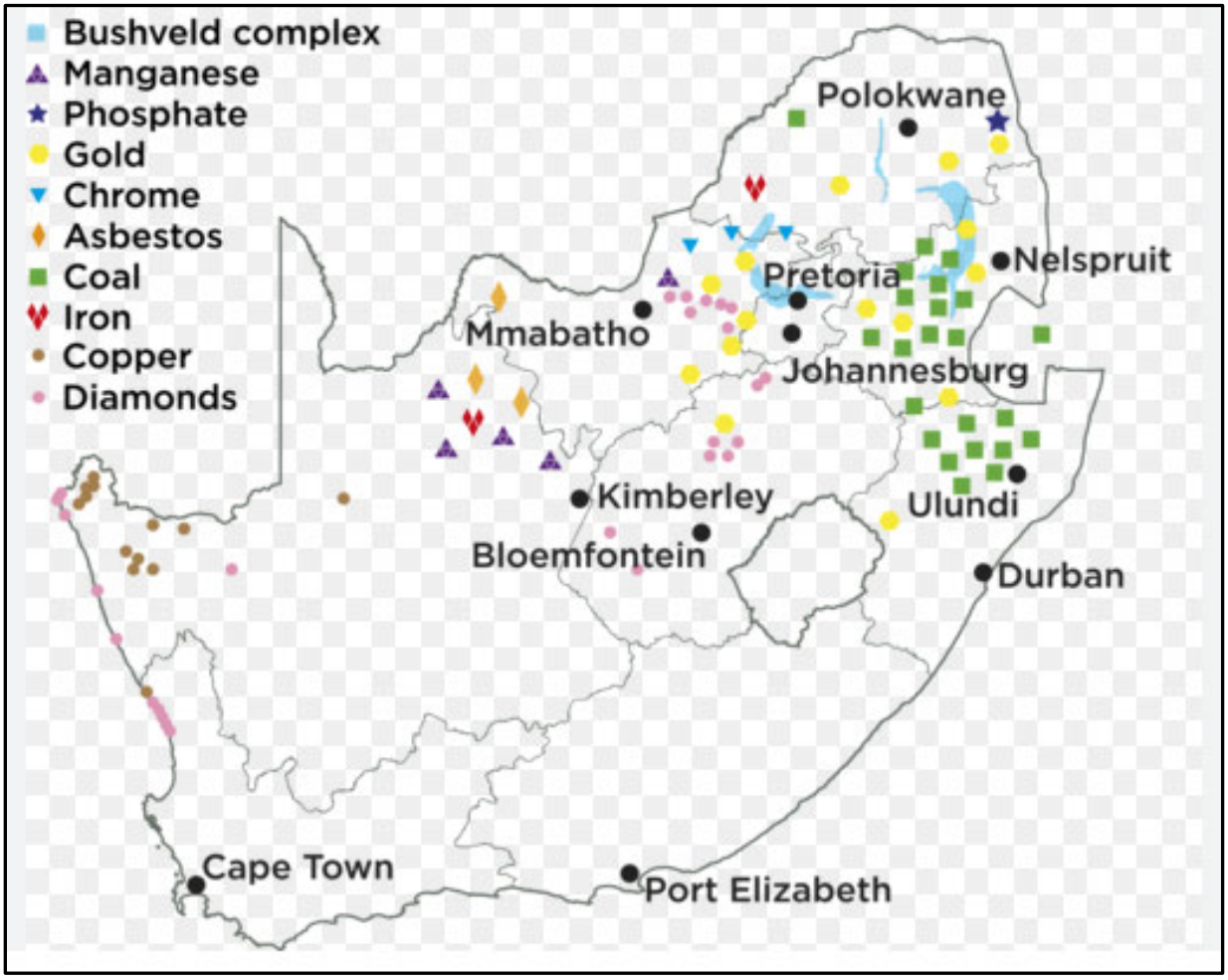

Figure 1. 3: Mining area in South Africa and Commodities

Source: Siyavula (2024, p. 1)

Gold mining (shown in yellow) takes place in Johannesburg, Carletonville, Welkom (Free State), Evander (Mpumalanga) and Klerksdorp. The Witwatersrand Basin situated in the provinces of Gauteng, Mpumalanga and Northwest contains one of the world's largest reserves of gold. Within the Witwatersrand Basin, there are several gold bearing basins including the West Rand, East Rand, Central Basin and Far West Rand. These basins have been mined for over a century. Over the years gold has become hard to mine in the basins resulting in deeper mines and increased mining costs (Elbra, 2017; Hartnady, 2009).

SA is the world's largest producer of platinum and chromium. These minerals are mined in locations such as Rustenburg, Steelpoort and Mokopane. Platinum is mined in a geological formation commonly referred to as the Bushveld Complex. Platinum is not mined as a single mineral but is found in ore containing multiple minerals referred to as Platinum Group Metals, commonly referred to as PGMs. The major PGM mining localities in the Bushveld Complex include Rustenburg, Mogalakwena, Amandelbult and Marikana (Bowman, 2018; Cole & Broadhurst, 2020).

SA ranks amongst the top 10 producers of coal in the world, with China leading at the top spot. The Mpumalanga Province is the largest coal producing region in SA. The province boasts towns such as Witbank, Middelburg, Ermelo and Secunda which are all mining towns and have a few coal mines. In the Limpopo Province, coal mining takes place in Waterberg and Steelpoort. In KwaZulu-Natal, Richards Bay and Dundee are the two major towns where coal mining occurs. Sasolburg and Vereeniging located in the Free State Province are other minor coal regions, while several other provinces in SA have coal mines on a smaller scale (Marais et al., 2021; Norouzi & Fani, 2021).

Copper production initially played a significant role in SA's mining and economy; however, it became insignificant over time when compared to other commodities such as gold, platinum and coal. A significant deposit of copper was found in the Okiep Copper Mine more than a century ago. This resulted in one of the few earlier commercial mines. Today, the country's copper production is only at a small scale and SA relies on copper imports from neighbouring countries. Even though there are copper deposits in SA, the country's copper mining industry is small in relation to other African nations such as Zambia. SA does not even fall within the top 10 countries producing copper. Instead, the DRC and Zambia fall within the top 10, ranking 3^{rd,} and 7th, respectively. Copper is also produced as a by-product in PGM mines (Money, 2021; Norouzi & Fani, 2021).

SA is, however, the number one producer of chromium. In 2022 the country produced 18 million tons of chromium, followed by Russia, which only produced 6.9 million tons. Thus, by comparison, SA produces more than double the chromium produced by the second contender, Russia. Chrome mining operations are located in the Bushveld Complex in SA within the Limpopo, Northwest and Mpumalanga provinces (Adhikari et al., 2022; Nieboer, 1988).

SA is also the leading producer of manganese. The country has significant reserves of manganese ore in the Kalahari Manganese Field in the Northern Cape Province. The Kalahari Manganese Field remains the largest reserve of manganese in the world, with SA accounting for 33% of global manganese reserves. Leading manganese producing companies in SA include South32, Assmang and Jupiter Mines. Production of manganese in SA has averaged about three million metric tonnes, used domestically and exported to international countries such as China, India and the United States of America (USA) (Steenkamp et al., 2018).

Vanadium is a versatile metal with a good structural strength. Global demand for vanadium has increased due to consumption in the energy sector. SA is in the top 3 leading countries when it comes to vanadium production, with China and Russia in the first and second spots, respectively. SA produces about 9,1 million metric tonnes of vanadium annually (Steenkamp et al., 2018). Just as with platinum, vanadium ore is also found in the Bushveld Complex. Vanadium is also exported mainly to China, the USA and Japan (Moshikaro & Pheto, 2023).

Palabora Mine is the primary producer of vermiculite in SA. Vermiculite production occurs mainly in the Limpopo Province. The bulk of the product is exported to international markets including the USA, Europe and Asia. SA is the leading producer of vermiculite in the world (Gilligan & Nikoloski, 2020; Kelley et al., 2017; Sharaky, 2014).

One of the world's most controversial fibre minerals that was historically mined in SA is asbestos. Hart (1988) notes that asbestos mining in South Africa began in the 1930s and attracted several big and small mining companies. There were two companies that were major producers of asbestos at the time and asbestos was produced in the north-western Cape and north-eastern Transvaal (now known as Mpumalanga and Limpopo Province). SA was the only country in the world that produced all three varieties of asbestos, that is, chrysotile (white), crocidolite (blue) and amosite (brown). At the time, SA was the third largest producer of asbestos after Canada and what was then considered the Union of Soviet Socialist Republics (USSR). The production of asbestos in South Africa increased by 73% between 1960 and 1980 (Braun & Kisting, 2006; Hart, 1988). Bonn (1999) indicated that at the peak of production there were more than 40 crocidolite mines in

SA, which were owned by European and British companies, employing an excess of 21 000 people.

As with many commodities and rich deposits, asbestos mining contributed to employment, economic progress and livelihoods for both companies and employees employed by the mining companies. However, the occupational diseases and environmental-related effects of asbestos resulted in thousands of employees contracting asbestosis, lung cancer and mesothelioma. Due to these challenges, asbestos mining was banned in many countries including SA. The last asbestos mine in SA closed in 2002 in the aftermath of a public health disaster, as asserted by Braun and Kisting (2006). The next section briefly explores the various methods that are used to mine the minerals discussed above.

1.4. Mining methods used to mine minerals

Mineral mining methods depend on various geological conditions of the ore that is being mined such as its location, whether it is located at a shallower or deeper depth, its thickness and grade. Minerals that are mined differ in shape, sizes, depth below surface, angle of dipping and many other characteristics. The size and shape of the mineral deposit and its depth below surface dictates the mining method that will be used. In mining, a mineral deposit is referred to as ‘ore’. Hamrin et al. (2001) state that “Ore is an economic concept. It is defined as a concentration of minerals that can be exploited and turned into a saleable product to generate a financially acceptable profit” (p. 1). Methods to mine minerals are as varied as the mineral shapes and quantities themselves and therefore are limitless. An overview of how minerals are mined is important for an understanding of the interrelation between mining and sustainability issues, including the impacts on the environment and social wellbeing. The intention in the subsections to follow is to briefly summarise the characteristics of major mining methods. Figure 1.4 shows an example of the underground mining environment.

Figure 1. 4: Underground mine environment

Source: Moneyweb (2024)

1.4.1. Room and pillar mining method

The room and pillar method is used to mine ore with a dip of less than fifty degrees. This method is used to mine the ore by creating a grid of open rooms with pillars to support the overhead rock mass. The mining sequence is optimised to accommodate rock conditions and ventilation demands. The ore is mined using a drill and blast technique. The optimum sizes of the rooms and the pillars is calculated using mineral planning techniques to ensure that the maximum amount of profitable ore is recovered. Rock enforcements and bolts are used to ensure safety of mined pillars and to avoid collapse. Accurate drilling and good blasting techniques minimise overbreak of rocks and blast damage on the supporting pillars. Roadways for infrastructure and ore transport are created inside the pillars to move ore. A degree of ore loss is always possible in mining due to safety

requirements and physical conditions. The intention is to maximise recovery of ore as best as possible to make a profitable return (Balt & Goosen, 2020; Hustrulid & Bullock, 2001; Nelson, 2011).

There are several variations of the room and pillar method of mining such as classic room-and-pillar mining, post room-and-pillar mining as well as step room-and-pillar mining. Classic room-and-pillar mining is used for flat ore deposits with moderate to thick beds and inclined deposits with thicker beds. Using this method, large open stopes are created enabling trackless machines to travel to the flat floor. Vertical large ore bodies are mined in linear layers from the top to the bottom using a stepping formation. Post room-and-pillar is used for ores dipping between twenty degrees and fifty-five degrees (Hamrin, 2001). The mines are designed to have large vertical shafts. Mined out spaces are backfilled and used as work platforms to mine the next ore body. Step room-and-pillar mining is done to accommodate rubber-tired vehicles where the ore dips too steeply for the vehicles to drive. Haulage roads are created with a special modified angle to enable trackless equipment to be used for drilling and other requirements. The room-and-pillar mining method is favoured for its potential to enable the creation of multiple production areas, thus enabling the maximised utilisation of labour and machinery (Balt & Goosen, 2020; Hustrulid & Bullock, 2001; Nelson, 2011).

1.4.2. Vein mining

Vein mining is conducted on a highly variable narrow ore deposit. The ore body can be anything from large to a massive formation and may be very wide in certain areas containing minerals. This can occur in many commodities including gold, copper, zinc and uranium. Narrow vein deposits are usually continuous with varying grades of minerals across the vein. The deposits are simple but equally complex with changes in grade from coarse to nuggety. The geometry of vein deposits varies in continuity, dip angle, strike orientation, width and bulk density (Hamrin, 2001). The mining method involves identifying and mining mineral veins through underground tunnels and shafts. Once minerals are identified, they are extracted through various mechanical means using drilling, machinery or handheld tools. Vein mining is considered more labour-intensive than other forms of mining.

1.4.3. Shrinkage stoping

Shrinkage stoping is used to mine a steeply inclined ore body. The ore is mined from the top down and shrinks as it gets mined. The ore body is accessed through a vertical shaft. Horizontal drifts are developed vertically through the strike of the ore body. The ore is blasted with explosives from the hanging wall. When this is done, the ore falls to the ground level through gravity and shrinks in volume and size. Support to prevent collapsing of the mined area is constructed through installing timber or steel sets. Backfilling of mined areas is also carried out to provide additional support and prevent subsidence. Backfilling can be done using waste rock, cemented tailings and other suitable materials. Other mining methods utilised in mining that are not discussed here in detail include big hole stoping, cut and fill stoping, longwall mining and block caving (Hamrin, 2001).

1.4.4. Opencast mining

Opencast mining is used to extract mineral resources that are close to the earth's surface. The depth and position of the ore determines how deep the open pit needs to be before minerals are reached and excavated for mining. Prior to open cast mining, minerals are surveyed and explored through geological surveys. Once the resource estimation and quantification are complete, the clearing of the site begins using machinery. In this stage vegetation, trees and topsoil are cleared. Topsoil is stockpiled for rehabilitative purposes. The stripping of the overburden is done after the clearing of the site (Hamrin, 2001). Drilling and blasting are done through drilling of holes in the rock and use of detonators. Opencast mines usually produce more waste rock than underground mines. The next section briefly considers how minerals are processed to extract ore and separate them from waste products that may be mined using the methods outlined above. Figure 1.5 shows open cast mining done on surface to extract minerals.

Figure 1. 5: Surface opencast mining

Source: Africa Mining IQ (2024)

1.5. Processing methods used for minerals

Mineral processing refers to a process of separating ore from waste rock. Various methods exist for ore processing depending on the mineral to be mined e.g. gold, diamonds, coal, iron, etc. Most processing methods involve crushing and grinding of ore to reduce size. Crushing and grinding enables the separation of minerals from unwanted waste contained in the ore. This method uses machinery such as ball meals, cone crushers and jaw crushers (Mining World, 2017).

Minerals have varying densities. The varying densities of minerals allows them to be separated through gravitational separation. In this process water and air is used as a medium to allow the

separation to take place. Flotation, jigging and spiral concentrators are used as methods for gravity separation.

Magnetic separation relies on magnetism to separate magnetic minerals from nonmagnetic materials. Equipment used to create magnetic fields includes drum separators, magnetic rolls and magnetic pulleys. Electrostatic separation uses the different conductivities of minerals to separate conductive minerals from nonconductive materials. Particles are charged and subjected to an electric field which causes the separation of conductive and nonconductive materials (Mining World, 2017).

Leaching dissolves valuable minerals from ores in a suitable solvent. Leaching is used in gold, silver and copper processing. Smelting is used to heat processed minerals to a high temperature. This causes the metal to melt and separate from non-valuable minerals such as rock. Smelting is used for PGMs, iron, copper and lead. Dissolving, precipitation and leaching is used to separate the metal from impurities.

After smelting, refining is required for some minerals including gold and PGMs. Hydrometallurgical refining uses liquid solutions to refine precious metals and involves several steps including solid-liquid separation. The separation uses filtration and sedimentation to separate metals from impurities. After separation, the purification of metals is done using solvents, precipitation, ion exchange and absorption. Metal recovery involves a process where electric current is used to extract metals from purified solutions through electrolysis. After the metal recovery, drying is done to remove moisture and remaining impurities from the metals. The final step involves the refining of the metal so that it is ready for selling to customers and markets (Mining World, 2017). The following section describes the numerous uses of minerals that are extracted during the mining processes discussed thus far.

1.6. Uses of minerals

Diamonds are widely used in jewellery to create gemstones, rings, necklaces, earrings and bracelets. Diamonds are popular for their look of glamour and durability. Diamonds are favoured for their hardness in the creation of tools for cutting and grinding. They are used to make tools such

as saw blades, drills and grinding wheels. The cutting ability of diamonds is also used in healthcare to produce dental drills, surgical tools, scalpels and dental burrs. Other uses of diamonds include optical windows due to their high transparency and low absorption as well as sensors for detecting pressure and magnetic fields in geology and aerospace (Chatterjee, 2006; Kogel et al., 2006; Mining World, 2017).

The obvious use of gold is jewellery due to its beauty and durability. For centuries gold has been used as a medium of exchange. Investors use gold to hedge against inflation and consider it a safe anti-inflation investment. In electronics, due to its conductivity, gold is used to produce televisions, smartphones, computers and tablets. Some medical health technologies also use gold. In sporting events and awards ceremonies gold is used to coat awards and trophies as a symbol of excellence and achievement e.g. the FIFA World Cup is made of 18 carat gold. Many other sporting awards in tennis, at the Olympics and in football leagues are made from gold (Eurosport UK, 2022; Minerals Council South Africa, 2024).

PGMs consist of six platinum group metals, namely platinum, palladium, rhodium, ruthenium, osmium and iridium. These minerals are all contained in the same ore that is mined through the processes discussed above. Catalytic converters constitute the main use of PGMs and are responsible for 71% of PGM products used in the world. Other applications of PGMs include their use in electric cars, the demand for which is projected to increase in the future as part of the movement to reduce reliance on hydrocarbon fuels. Healthcare-related uses of PGMs include anti-cancer drugs, cardiac treatments, implants and dental applications. Figure 1.6 shows platinum being processed in a smelter (Afrexim, 2024; Chidunchi et al., 2024; Hughes et al., 2021).

Figure 1. 6: Platinum processing smelter

Source: Anglo American Platinum (2024)

The primary use of coal around the world is for heat generation, while a secondary use includes the generation of electricity. Steam ships and trains were historically powered by coal (Chatterjee, 2006; Kogel et al., 2006; Mining World, 2017). However, these steam trains have now mainly been replaced by diesel, gas and electric trains. During the Industrial Revolution coal became the cheaper alternative to wood as it produced more energy when burned. Electricity generators such as Eskom's power stations in SA burn coal to heat water, which produces steam that powers turbines for electricity generation. Coal plants remain favoured for electricity generation, and in SA, 82% of electricity is generated by coal (Department of Mineral Resources & Energy, 2023). Countries such as China, Australia and Poland also rely on coal for electricity generation. In addition, coal is used for mineral production to heat and separate minerals from ore. Domestic uses of coal are mainly for heat generation in coal stoves in some households in SA.

Copper has been used for thousands of years because of its versatile metallic nature. Due to its high conductivity, copper is used widely for electrical wiring and transmission lines. Copper is also used in buildings for the transmission of electrical current. The metal's resistance from

corrosion favours its use for water supply in plumbing to transport cold and hot water. Copper is also an important element for use in electronics for making circuit boards, switches and connectors. Coins and currency have for centuries been made from copper and are currently still minted from copper, including the latest use of copper alloys in coin making. The antimicrobial properties of copper make it suitable for use in healthcare, as copper surfaces reduce the spread of bacteria and viruses. The most sustainable and futuristic use of copper is for renewable energy systems as it plays a significant role in renewable energy technologies such as solar panels, wind turbines and geothermal systems (Chatterjee, 2006; Kogel et al., 2006).

The prime use of chromium is in the production of stainless steel. Chromium is added to iron and alloying elements to improve the resistance, strength and durability of steel. Chromium's ability to resist corrosion makes it a favoured material for electroplating applications. Chromic oxide, a compound of chromium, is used as a catalyst in chemical reactions. Other uses of chromium include the manufacturing of paints, plastics and ceramics. Wood preservation-based products contain chromium for protection against decay (USGS Mineral Resource Program, 2010; Worldstainless, 2024).

Like chromium, manganese is added to iron to improve the resistance, strength and hardness of steel. The mineral is also used in both chargeable and non-rechargeable batteries. Lithium iron found in batteries contains manganese and the metal is used in several other chemical containing products including hydrogen peroxide, dyes and fertilizers. In addition, manganese crystals are used to produce glass, and manganese is added in welding wires to improve the quality of the welds. Vanadium is also used in a similar fashion to manganese and chromium as an alloying element. Vanadium redox flow batteries use vanadium ions for energy and durability and vanadium compounds are used in the chemical industry. Specifically, vanadium oxide is used as a catalyst in the production of sulfuric acid. Vanadium is applied in nuclear plants for reactor vessels and fuel cladding (Chatterjee, 2006; Kogel et al., 2006).

Vermiculite is used for insulation in construction and in industrial applications due to its lightweight and thermal properties. The insulation from vermiculite is applied in walls, roofs and fireproofing. In agriculture, vermiculite is used to promote plant growth and root development. Some

fertilisers are mixed with vermiculite to improve soil aeration and nutrient availability in soils. Vermiculite has high absorbency for use in absorbents and its light weight makes it a suitable product for use in packaging fragile items for foam packaging to protect objects during transportation (Palabora Mining, 2024; Rashad, 2016).

The use, manufacturing, import and export of asbestos was legally banned in South Africa in March 2008. Prior to this ban, asbestos was favoured for use in many applications because of its unique characteristics. Asbestos is chemically, electrically and thermally neutral, and due to these chemical properties, it was used in various products such as the asbestos cement pipes for distribution of water and liquids, for sheeting in resistance of fire, heat and noise, and in insulation of materials. Asbestos was also used as a protective in clothing, was used to make blankets and mats as well as electrical insulation, pipe seals through asbestos gaskets and as an additive in coatings, paints and sealings (Department of Environmental Affairs & Tourism, 2008; Hart, 1988). The global markets in which these metals are traded will be explored in some detail below, in the next section.

1.7. Minerals markets

The value of minerals is calculated based on market prices. Commodity prices are set dependent on international market exchanges, and these fluctuate on a daily basis. SA exports most of its copper to various countries in Africa and around the world including Mozambique, the Democratic Republic of Congo, China, the USA, and other European countries. China is the leading purchaser of SA's copper ore (having purchased $264M of copper in 2021 from SA). Copper imports into SA are much lower than exports showing a strong copper industry in SA which actually exceeds demand. In 2021, SA imported $5,67M worth of copper, far below the $264M worth of copper exported. Mines that sell copper sell it directly to the buyers, or initiate agreements with international companies, while some participate in commodity exchanges (Observatory of Economic Complexity [OEC], 2023a). Based on available data, the amount of copper sales from SA tripled from 2021 to 2022. In 2022, SA sold $738M worth of copper to China and exported a total of $990M worth of copper globally (Trading Economics, 2023).

According to the OEC (2023a), in 2021 SA exported $7B worth of diamonds, placing diamonds as the 4th most exported product in SA. Similarly to copper, the main destination of diamonds from SA is China. The other destination areas of diamonds are the United Arab Emirates, Belgium, Botswana and the USA (Trading Economics, 2023).

SA gold production was reported to be 110 000 kilograms in 2022. The major destination of SA gold is to the United Arab Emirates, China, the United Kingdom (UK), the USA and India. In 2020, SA sold $13,1B worth of gold. The value increased to $20.1B in 2021. The World Gold Council reported that the world's highest gold demand was experienced during the year 2022. In 2022, SA produced more tonnages of gold than in the three previous years 2019 (105), 2020 (96) and 2021 (107) (U.S Geological Survey, 2023). However, other than the total production figure statistics on how much dollar value SA sold, other indicators have not yet been released.

China is the largest consumer of platinum and uses the product in industrial applications such as electronics, automotive and chemical industries. In 2022, China consumed 75.1 metric tonnes of platinum and was the highest consumer of platinum in the world. Europe was the second highest leading consumer, consuming 48.6 metric tons of platinum. The USA is also a significant market for platinum, using platinum in investment products for securities and other investment options, and incorporating platinum for jewellery and industrial processes. Various investment options exist for platinum, for instance, bullion dealers offer it as bars and coins. Some online stores act as intermediaries and offer platinum products for sale while in other cases, banks and financial institutions offer various investment products for platinum including exchange traded funds (ETFs). Most PGM products have followed a similar pattern of consumption and are also used in healthcare and automotive industries. The demand for PGMs fluctuates depending on economic conditions and changes in industrial processes (Hellenic Shipping News Worldwide, 2023).

SA is the world's fifth largest exporter of coal. International markets for coal exports from SA include China, India, Pakistan and South Korea. In 2022, coal exports from SA to the European Union increased by 582% from 1.4 million metric tonnes in 2021 to 9.6 million metric tonnes in 2022, a more than fivefold increase. This resulted in Europe becoming the second largest destination for SA coal after India. India accounts for 28% of SA coal exports, although volumes of coal

exported from SA to India have declined over the years (Hellenic Shipping News Worldwide, 2023).

In 2022, chrome ore prices reached 17-year record highs. Chrome ore output in SA is affected by demand for stainless steel, availability of power, labour union strikes and weather disruptions. Low demand pushes prices lower whilst high demand increases chrome ore prices. The top 3 producers of chrome ore in the world are SA, Turkey and Zimbabwe, who export to the top 3 importers of chrome ore, namely, China, Indonesia and Japan. In 2022, SA produced 18 000 metric tonnes of chromium, followed by Turkey with 6 900 metric tonnes (Hellenic Shipping News Worldwide, 2023; International Chromium Development Association, 2023; Statistics South Africa, 2023).

Manganese prices were greatly impacted by Russia's war in Ukraine, which broke out in 2022, leading to a sharp decline in prices. COVID-19 also had a negative impact on manganese prices. SA produced 7.2 million metric tonnes of manganese in 2022. Most SA manganese exports are delivered to China, followed by India and Malaysia. In 2022, SA exported $2.9B worth of manganese. China imported manganese worth $3.9B. Like many other commodities, manganese prices are dependent on demand and exchange rates (Gobierno de Mexico, 2023).

SA exported $409M of vanadium and related mining byproducts in 2021. The total amount of vanadium exported by SA in 2021 was 6.54 million kilograms. The main destinations of the exports were China, Spain, India and Brazil, with China spending about $170M of the total export amount. In April 2023, SA vanadium related ore exports resulted in earnings of ZAR900M. SA exports of vanadium and related minerals have increased by 53% since April 2022. The USA became the second largest importer of SA vanadium in 2023, second to China. Since the mineral is sold in dollars, it is also exposed to exchange rate fluctuations and demand prices (OEC, 2023b).

SA became the second largest exporter of vermiculite in 2021 when the country reached exports of vermiculite and related minerals worth $58.9M. The main destinations of the exports were Mozambique, Belgium, Netherlands, Australia, and the USA. Unlike other commodities such as gold and PGMs, vermiculite is one of the few minerals which is not mostly exported to China from SA. Other minerals worth ZAR53.8M were also exported from SA in 2023 (OEC, 2023c).

PGMs have the largest distribution of market capitalisation in SA, accounting for 59% of the market capitalisation, followed by gold (14%,) iron ore (13%) and coal (8%.) The common issues facing SA mines are safety-related, labour-related and exchange rate factors. As mining has occurred for a prolonged period in the country, some resources have been depleted, which forces mines to mine deeper. As the mines mine deeper under the Earth's surface, safety challenges such as fall of ground, man and machine interactions and general incidents may increasingly cause fatalities. All mines are unionised, however labour disputes with the unions cause extended worker strikes that affect operations and profitability. Nevertheless, based on existing resources, the outlook of mining looks positive in SA with the main challenges including water management and the closure of old mine workings, as well as community-related impacts and risks from mining.

1.8. Problem statement

For many years the focus of leadership in the SA mining industry has been to increase production, make enormous profits and escalate the share price of mining companies. As noted by Mhlongo (2023b), Seloa and Ngole-Jeme (2022), Cronje and Chenga (2009), Bolong (2016) and many others, this practice has resulted in devastating consequences for the sustainability of mining in the country. The environment surrounding mining operations is polluted and community social systems have also been egregiously affected by mining. Mining leadership needs to ensure sustainable mining by implementing sustainability in all mining practices, in line with the definition of sustainability espoused in the Brundtland Commission Report (1987).

Seloa and Ngole-Jeme (2022), in a similar vein as Cronje and Chenga (2009), reported that for many decades mines have been making a profit while neglecting sustainability issues, both environmental and social. Research from several scholars including Padmalal et al. (2014), Bolong (2016), Cole and Broadhurst (2021), Mhlongo (2023b) and others shows that while good policy has been developed to enable an environmentally and socially positive mining industry, there is a significant gap between policy and practice. Consequently, stakeholders outside the mining sector, such as the government and surrounding communities, are pressuring mines to take responsibility. Key stakeholders concerned about the mining industry's sustainability have criticised the

government, particularly the Department of Mineral Resources and Energy (DMRE), as promoting the mining industry instead of regulating the industry. This is alleged to be mainly because the mining industry provides jobs, a key goal that aligns with government's agenda to drive economic development despite the dire environmental impacts and adverse social impacts of the sector.

The expectation from various stakeholders, including communities, is for mining leaders to balance economic needs (profit) with social and environmental needs, thus resulting in sustainable mining practices. Leadership in the mining sector has been successful on one end, that is, on the economic front, but has failed many communities and the environment despite several policies and legislative guidelines that have been developed by the South African government. These policies include the MPRDA and associated Mining Charter, and the NEMA and associated legislative guidelines and policies (Cronje, 2014; Cronje & Chenga, 2009; Makua & Odeku, 2017a; Seloa & Ngole-Jeme, 2022).

Kanjere (2017) asserted that leadership in mining had failed societies and left them worse off than before the introduction of mining, with polluted environments and dysfunctional social systems. Recent research from scholars including Mhlongo (2023b), Dikgwatlhe and Mulenga (2023), Badakhshan et al. (2023) and Worlanyo and Jiangfeng (2021) shows that mining is still impacting negatively on the environment and society. The environmental and social challenges faced by the mining industry associated with environmental pollution, abandoned non-rehabilitated mines including asbestos mines, and the Marikana massacre, as one instance, illustrate the scale of sustainability challenges faced by the industry. Thus, there is an urgent need for an enhanced leadership role in the mining industry in order to attain sustainability in the sector and to ensure its longevity.

Despite the urgent need and overwhelming evidence for leadership in the mining industry to take responsibility and mine sustainably, the role of leadership in solving sustainability challenges is yet to be extensively investigated in SA mining. At the time of this study, the only previous research investigating the role of leadership in SD in the SA mining industry that the researcher could locate was a master's study conducted by Makuluma (2011) titled '*A case study from a gold mining company: A call for leadership towards more sustainable futures*'. This study was limited

to the gold mining industry despite SA being a leading producer of other mineral commodities such as platinum and chromium.

Mining has had irreversible impacts on the environment such as abandoned unrehabilitated asbestos and non-asbestos mines, water pollution including acid mine drainage (AMD), and land-related impacts associated with sinkholes and tailings dams. There are currently ongoing lawsuits and litigation cases against some mines in SA due to health-related illnesses contracted by ex-miners associated with silicosis and lung diseases. Communities and mine workers have expressed dissatisfaction with the mines, and have engaged in strikes, some of which have had dire consequences, as in the case of the Marikana massacre (Badakhshan et al., 2023; Dikgwatlhe & Mulenga, 2023; Makua & Odeku, 2017; Monteiro et al., 2019; Munnik et al., 2010; Naidoo, 2015; Ochieng et al., 2010).

Mines need to operate sustainably and must incorporate SD into their operations through careful consideration of the environmental and the wider social impacts of mining. Investigating SL will help to advance knowledge and understanding that can assist the industry towards the implementation of SD to the benefit of the environment and society. Leading SD in mining requires transformations that will integrate SD to assist mines to become 'green' and to attain the social license to operate. This can only be meaningfully achieved through SL, a crucial topic that is the focus of investigation in this study. Contributions from this study will advance the understanding of SL and broaden the knowledge base that will assist mining operations towards a sustainable future. Solving the adverse environmental and social impacts caused by mining and mining legacy issues in SA urgently requires SL. As sound as mining policies may be, legislative frameworks and sustainability practices cannot be implemented automatically. The role of leadership remains pivotal in ensuring sustainable mining.

1.9. Study aim, research objectives and questions

This research aims to explore and investigate leaders' experiences of sustainability in the SA mining industry and to advance an understanding of SL in the SA mining sector. The following objectives were formulated to guide the research undertaken in this study:

- To identify sustainability leadership challenges in the SA mining industry.
- To explore sustainability leadership successes as perceived and experienced by leaders within the SA mining industry.
- To identify strategies that leaders use to influence positive sustainability outcomes.
- To explore the meaning of sustainability as perceived and experienced by leaders in the SA mining industry.

The aims and objectives of this research will be attained by answering the following key questions:

- What are the sustainability leadership challenges experienced by leaders in the SA mining industry?
- How do leaders in SA mining experience success in implementing sustainability?
- What are the strategies used by leaders to influence positive sustainability outcomes?
- What is the meaning of sustainability as experienced by leaders in the SA mining industry?

In this research, a phenomenological approach was used to develop insight into how leaders experience sustainability based on their own understandings and worldviews. Thus, the study documents the experiences and perceptions of twelve leaders in the SA mining industry who are responsible and accountable for implementing sustainability. The leaders interviewed include chief executive officers, vice presidents, chief sustainability officers and sustainability managers.

1.10. Significance of the study

Concerningly, as noted from previous research conducted by several scholars including Nelwamondo and Tshitangano (2024), Currin (2024), Laker (2023), Seloa and Ngole-Jeme (2022), Munnik et al. (2010), Askham and Van Der Poll (2017), Cornelissen et al. (2019), Adler et al. (2007) and others, despite the sector's positive economic impact, mining is not sustainable. Despite the undeniable economic contributions of the sector, there are critical sustainability challenges facing the mining industry from both the environmental and social perspectives. These numerous challenges include: environmental pollution and environmentally damaging practices; AMD and water pollution; ecosystems exposed to mine waste and dangerous heavy metals; health-related

risks from mining legacies of asbestos; lawsuits and litigation cases; community and worker strikes due to negative social impacts associated with mining; abandoned and unclosed asbestos mines and non-asbestos mines with unrehabilitated tailings dams; and mining communities living in extreme poverty despite the economic gains from the mines (Cornelissen et al., 2019; Makua & Odeku, 2017b; Marais et al., 2015; Ochieng et al., 2010) . Thus, the mining industry in SA requires leadership interventions to drive positive social and environmental transformations to achieve sustainability and SD. The negative environmental and social impacts caused by mining and mining legacy issues in SA require strong leadership to address and solve these concerns. Despite this need, the role of leadership in solving sustainability challenges in mining remains under-investigated.

There is an urgent need for environmental and social transformation in mining in order for mines to operate more sustainably due to the extreme and immediate negative environmental and social impacts of mining. This study will advance an understanding of sustainability in the mining sector and will help to promote and contribute vital knowledge towards the knowledge base regarding implementation of SD. By exploring leaders' experiences of sustainability, the study will assist towards broadening the theoretical foundations that can underpin the implementation of sustainable practices in the SA mining sector. Ultimately, the implementation of these practices will promote the attainment of positive environmental and social outcomes and therefore drive the achievement of sustainability. The epistemology of this research is an improved understanding of sustainability and the appreciation of leaders' experiences of sustainability in the SA mining sector. It is hoped that by advancing knowledge regarding sustainability, this research will contribute towards the development of a sustainable mining industry for future generations.

1.11. Delimitations of the study

This study was conducted in the SA mining industry and focuses on leaders directly involved in implementing sustainability. Since the SA mining industry is broad, the leaders were purposively sampled to reflect the diverse mineral commodities that the country possesses, such as gold, platinum, diamonds, chrome, coal and other minerals. This approach qualifies the study as an industry-

wide study in SA, which allowed the study to be encompassing and permitted the researcher to effectively contribute to existing knowledge that focuses on the broad mining sector.

1.12. Structure of the thesis

The first chapter in the thesis introduces the topic of the research, provides the background of the SA mining industry and details the minerals mined, the methods used to extract these minerals, as well as the processing methods. This is important because the interpretation of the leaders' experiences of sustainability in the mining sector cannot justifiably be achieved without fully understanding the context of the mining industry in SA and the specific processes and the consequences thereof prevalent in the sector. Thereafter the problem statement, research aim, and objectives of the research are presented. The significance of the study as well as the limitations of the research are briefly outlined in the chapter.

Chapter Two of the study comprises the first part of the literature review, focusing on the conceptualisation of and theoretical viewpoints related to sustainability and SD which forms the foundation of the study. The history of the emergence of the concepts of sustainability and SD is briefly outlined, followed by a consideration of the global and local view of the implementation of SD. Corporate sustainable development is interrogated in some depth, before SD in the global and local perspectives is explored. The chapter concludes with an overview of the challenges facing SD and sustainability in the South African mining industry.

Chapter Three presents the second part of the review of relevant literature, specifically that on leadership and leadership theory relevant to SL. The chapter begins with a discussion of the historical perspectives of leadership and how the concept has evolved to current understandings. The main leadership theories and styles are explored in some detail before specific attention is paid to sustainability leadership and the models prevalent in this type of leadership. Lastly, the applicability of sustainability leadership to the SA mining industry will be considered.

Chapter Four presents a thorough overview of the methodology employed in the study, beginning with the selection of the appropriate paradigm and philosophy underpinning the research. Thereafter the rationale for adopting the phenomenological approach and how this informed the

sampling, data collection and analysis methods. The measures to ensure the credibility and validity of the data collected will briefly be stated before the ethical considerations borne in mind in undertaking the research are thoroughly considered. The methodological limitations are also discussed in this chapter.

Chapter Five presents the findings of the study beginning with the professional biographies of the study participants. Following this, the findings pertinent to the main themes identified in the study will be outlined, including excerpts from the interview transcripts to substantiate these themes. The themes to be addressed in the presentation of the findings are: the professional leadership experience of sustainability challenges; sustainability leadership success as experienced by sustainability leaders; leadership factors influencing positive sustainability outcomes; and the meaning of sustainability to those who lead.

Chapter Six presents an in-depth discussion of the findings considering the literature that was reviewed to determine the scope of the problem investigated in the study. The main themes identified in Chapter Five are broken down into the subthemes that emerged from the data related to each main theme, and these are analysed in relation to the overall objectives of the study.

Chapter Seven begins with a summary of the overarching conclusions that can be drawn from the findings of the study. Thereafter, recommendations for improved SL to be entrenched in the mining industry will be suggested. Finally, the recommendations for further research into the topic of SL in the mining industry in SA will be outlined.

1.13. Conclusion

Mining is a strong economic vehicle in a country with a high unemployment rate, which at the time that this study was conducted had reached 33% (Statistics South Africa, 2024). The SD challenges faced by the mining industry are well researched by scholars and include environmental pollution and related social impacts and instability amongst communities within which mines operate (Adler et al., 2007; Askham & Van Der Poll, 2017; Cornelissen et al., 2019; Munnik et al., 2010b; Seloa & Ngole-Jeme, 2022). These challenges need SL for them to be solved. This will enable the mining industry to contribute positively towards all three pillars of SD, that is,

economic, environmental and social, instead of just the economic pillar. Leadership interventions are urgently required to facilitate the implementation of SD in mining. The concern to broaden the understanding of SL in the mining industry in SA prompted the interest in undertaking this research. This introductory chapter has outlined the significance of the study by offering a rationale for why the topic under consideration is crucial for the SD agenda that must be addressed within the country. The research aim and objectives were outlined, as well as the limitations of the study. The following chapter begins the two-part review of literature relevant to developing a deeper understanding of sustainability and SD, particularly within the mining industry in SA. Thus, next two chapters of this thesis provide a discussion of the key literature on which the research is founded on.

CHAPTER TWO: A LITERATURE REVIEW ON THE CONCEPT OF SUSTAINABLE DEVELOPMENT AND SUSTAINABILITY

2.1. Introduction

The initial part of the literature review presented in this chapter examines the history of the concept of sustainable development (SD) and sustainability, on which this study is grounded. The implementation of SD and sustainability from a global perspective is first outlined through a thorough consideration of the current body of literature and the crucial areas of interest that emerge from this review. This is then applied and narrowed to how the sustainability concept has been interpreted and implemented in SA, particularly in the mining industry. Since this study investigates the challenges faced by sustainability leaders in SA mining, it is prudent to scrutinise the current literature and to examine sustainability and the leadership challenges facing SA mining.

The literature review will also highlight how sustainability applies specifically to the SA mining industry. Current sustainability challenges facing the mining industry will be identified in light of the existing literature that contextualises the pressing issues in the sector. This will enable a better understanding of how such challenges may be addressed through SL. It is important to note that SD and sustainability are broad and encompassing concepts. Thus, several key concepts associated with sustainability such as corporate sustainability (CS), corporate social responsibility (CSR), and the now popularised concept of environmental, social and governance (ESG) as they pertain to the mining sector will be examined. This is done to ensure that a comprehensive literature review is conducted and to establish that any fundamental concepts that might later inform the study findings are adequately addressed.

2.2. The history and conceptualisation of sustainable development and sustainability

This section provides an overview of the origins of the conceptualisation of SD and sustainability, beginning with a discussion of the early works that addressed these topics, before moving on to the processes involved in the formalisation of the concepts as a result of ongoing debates at United Nations forums and summits and the need to address growing environmental and societal concerns in recent decades.

2.2.1. Early origins of sustainable development and sustainability

Through the centuries the impacts of human activities on the natural environment have largely been ignored and not paid sufficient attention. The work of Thomas Robert Malthus in his 1798 study titled *'An essay on the principle of population'*, as cited in Dorin Paul (2008), initiated early discussions on the environment and, specifically, the implications of human activities and population growth on the environment. Malthus pointed out that population growth was a risk to the natural environment as population growth would ultimately surpass the ability of the earth to provide for human needs.

Although Malthus' theory was proven wrong as technological interventions enabled higher food production for a growing population, declines in birth rates were also experienced by many countries, which could have accounted for why his thinking may have been disproved. Malthus' body of work, however, improved environmental awareness and initiated further thought around the topic of the use of earth's resources to satisfy human needs without due consideration for the environment (Baumol et al., 2007; Kallis, 2019; Sojecka & Drozd-Rzoska, 2024).

Malthus' work paved the way for a study that was commissioned by the Club of Rome in 1972, titled *'The Limits to Growth'* (Marshall & Toffel, 2005; Redclift, 2005). The study was conducted by researchers to examine the implications of worldwide growth for the earth's carrying system, that is, the natural environment. *The Limits to Growth* was one of the first studies highlighting the tension between economic growth and environmental protection. Factors investigated in the study included population increase, agricultural production, industrial production, non-renewable resource depletion, and the subsequent generation of pollution. The findings indicated that population growth would necessitate industrial development to meet the demand for food and would therefore cause an increase in the use of non-renewable resources (Kümmel, 2024; Luckscheiter, 2023; Meadows et al., 1972; Redclift, 2005). Based on the Club of Rome's study findings, it was thought that the natural environment would be put under pressure to sustain industrial and population growth. In other words, as industries increased production, so would their impact on the environment be compounded, and as the population increased, so too would the impact of human activities on the natural environment increase.

Other notable studies that sparked the birth of the conceptualisation of SD are referenced in Hajian and Kashani (2021). Hajian and Kashani (2021) comprehensively summarise the studies that contributed to the initial formulation of the concept of SD, stating:

> *"The Brundtland Report considered the various serious problems regarding environmental degradation in previous decades: explicitly, that human activity had intense negative influences on the earth, and that development and growth would not be sustainable if the process of environment exploitation continued. Important tasks focusing this philosophy involved Rachel Carson's Silent Spring (1962), Garret Hardin's Tragedy of the Commons (1968), the Ecologist magazine Blueprint for Survival (1972), and the report of Club of Rome's The Limits to Growth (1972)"* (Hajian & Kashani, 2021, p. 1).

Many researchers agree that the theory of SD has its foundation and roots in the 1972 Conference on the Human Environment which was held in Stockholm. Dubbed the first world conference to put a global spotlight on environmental issues, the conference played a crucial role in promoting environmental conscientiousness. The outcomes from the conference led to the signing of multiple international agreements intended to reduce ocean pollution and the discharge of waste into the ocean ecosystem, and to impose greater restrictions on the trade of protected and endangered fauna and flora species (Dorin Paul, 2008; Egri & Frost, 1994; Kirkby et al., 2023).

2.2.2. Defining sustainable development and sustainability

Nearly a decade following the 1972 Conference on the Human Environment, the emergence of the conception of SD ensued in 1983 when the United Nations General Assembly formed the World Commission on Environment and Development (WCED), later known as the Brundtland Commission. The Brundtland Commission published a historical document on SD called *'Our Common Future'*. This saw the inception of the concept of SD as it is known today and forms the basis from which the leadership on SD is investigated in this study (Dorin Paul, 2008; Egri & Frost, 1994; Kirkby et al., 2023).

Our Common Future provided the now famous definition of SD, the view that SD refers to "Development that meets the needs of the present without compromising the ability of the future generations to meet their own needs" (Brundtland, 1987, p. 16). The original definition of SD does not refer to this interpretation of development as that which balances economic, environmental and social needs. However, it is today accepted that SD encompasses three pillars, that is, social, environmental and economic considerations. Findings from the literature show that there was no single point of origin for this understanding of SD, as noted by Purvis et al. (2019). Through the gradual emergence of the developing body of literature and evolving environmental viewpoints that emphasise economic growth and the concomitant negative ecological and social impacts, it became widely accepted that development is sustainable only when it balances the three pillars of economic, environmental and social considerations. Thus, as is well-articulated in the South African National Environmental Management Act (NEMA) (Act 107, 1998), "Sustainable development requires the integration of social, economic and environmental factors in the planning, implementation, and evaluation of decisions to ensure that development serves present and future generations" (Republic of South Africa, 1998. p. 586).

Development must ensure sustainable use of natural resources while promoting socially acceptable and justifiable economic growth (Brundtland, 1987; Crosby, 2017; Dalampira & Nastis, 2020; Debonheur et al., 2024; Kumar et al., 2024; Mazutis & Abolina, 2019; Monteiro et al., 2019; Rashed & Shah, 2021; Redclift, 2005). Hattingh (2002) discovered that various philosophical points inform the meaning and interpretation of SD. The green agenda and conservationist philosophical point of view calls for minimal disruption of economic processes and maximum conservation of resources. The social and economic philosophical view of SD promotes the development of the poor within the physical limits of the supporting ecological systems. This view emphasises that environmental protection should not come at the cost of legitimate developmental aspirations of poor nations.

In accordance with Hattingh's (2002) findings, SD can also be interpreted as an integrated agenda of caring for the community of life on earth in a holistic way. This philosophical stance sees SD as an improvement of the quality of life. Thus, in accordance with this viewpoint, an activity is sustainable if it can be maintained indefinitely without jeopardising life on earth. For some, SD is

also seen as a radical political agenda of social, institutional and intellectual transformation. In this viewpoint, the notion of equitable distribution of wealth and justice for the future generation is strongly supported (Hattingh, 2002; Ruggerio, 2021).

2.2.3. Measures to advance the sustainable development agenda

The 1992 United Nations Conference on the Environment and Development (UNCED), popularly referred to as the Rio Earth Summit, brought SD into the international scene (Dorin Paul, 2008). From the discussions held at this conference, the Rio Declaration, Agenda 21 and the Commission on Sustainable Development were formulated. As one of the major aims ratified at the conference, which was also termed the 'Earth Summit', the UNCED intended to ensure that there was effective follow-up on the implementation of the resolutions that had been adopted in the course of the summit. Through this process, the UNCED is considered to have effectively advanced the SD agenda within the international community of the member states.

As an international agreement, the goal of the Rio Declaration, as pointed out by the United Nations (1992), is to "protect the integrity of the global environmental and development system" (p. 1). The Rio Declaration contains 27 principles. The first principles recognise human beings as "the centre of concern for sustainable development" (United Nations, 1992, p. 1) and emphasise that humans are entitled to a healthy and productive life in harmony with nature. The Rio Declaration called for environmental protection for present and future generations and the elimination of unsustainable patterns of production (United Nations, 1992).

Agenda 21, also adopted at the UNCED, provided a framework for sustainability and called for the tackling of poverty, and the reduction of unsustainable development and environmental degradation. The framework takes into consideration both the social and economic dimensions of sustainability and promotes the conservation of resources for development, as well as the strengthening of the role of the major groups (United Nations, 1992). The United Nation's Commission on Sustainable Development (UNCSD) was established to ensure implementation of the resolutions emanating from the UNCED. Since its formulation, the UNCSD has been successful in advancing the sustainability agenda across the international arena.

In September 2000, 189 countries signed a Millennium Declaration with eight measurable Millennium Development Goals (MDGs) intended to reduce poverty by half and to end hunger, promote gender equality and reduce child mortality, among other issues, by 2015 (Sustainable Development Goals Fund, 2022). 2012 marked 20 years since the adoption of the Rio Declaration at the UNCED in 1992. During the 2012 UN Conference on Sustainable Development, the United Nations established a High-level Political Forum (HLPF). The forum was mandated by the conference outcome document dubbed *'The Future We Want',* from which the pledge to achieve all commitments relating to SD was reaffirmed. The intention was to renew political will and to drive intergovernmental agreements toward the implementation of SD by member states (United Nations, 2022).

The MDGs that had been agreed upon by the 189 member states in September 2000 expired in 2015. In September 2015, the United Nations member states instead adopted the SD Agenda of 2030 which outlined 17 Sustainable Development Goals (SDGs), and thus the global world officially moved from MDGs to SDGs. The United Nations initially established a Millennium Development Goals Achievement Fund (MDG-F), which was a cooperated funding mechanism aimed at eradicating poverty and inequality to address progress towards MDGs. Later, a SDGs Fund to support the implementation of sustainability across the world was established.

The United Nations (2015b) noted that, "Agenda 2030 provides a shared blueprint for peace and prosperity for people and the planet, now and into the future" (p. 2). According to the United Nations (2015b), Agenda 2030 "is a plan of action for people, planet and prosperity" (p. 1). Agenda 2030 consists of 17 SDGs and 169 targets (Rashed & Shah, 2021). Amongst the SDGs are the goals intending to end poverty, to ensure the environmentally acceptable management of water and sanitation for all, and to ensure sustainable production patterns. Taking urgent action on climate change is echoed as one of the key priorities of Agenda 2030 (Machin & Liu, 2024; Perevoznic & Dragomir, 2024).

Hajian and Kashani (2021) suggest that "Sustainable development is a notion that at its centre is groundbreaking, yet extremely hard to describe practically" (p. 2). They contend that it is actually quite difficult to define SD in words that individuals and society would understand in practical terms. Salas-Zapata and Ortiz-Muñoz (2019) also assert that:

> *"The ambiguity and lack of clarity about the concept of sustainability is a recurring obstacle to sustainability research…its lack of clarity, namely, its variety of uses, its diverse and sometimes contradictory meanings, and its large number of definitions in response to the discipline or political context in which the term is used"* (Salas-Zapata & Ortiz-Muñoz, 2019, p.153)

Scholars have cited many problems with the concept of SD noting that, for one, the definition of 'needs' is not clear, and that the use of the term 'present and future generations' is confusing and cannot be linked to the environment, in addition to many other limitations (Feil & Schreiber, 2017; Hajian & Kashani, 2021; Malthus, 1986; McNeill, 2004; Salas-Zapata & Ortiz-Muñoz, 2019; Sartori et al., 2014).

For this research and based on the works that have already been undertaken to develop the concept from the Brundtland World Commission Report (1987), the definition of SD as "Development that meets the needs of the present without compromising future generations from meeting their own needs" (p. 1) will suffice. Along with this definition, the research adopts the view that, "Sustainable development requires an integration of social, economic and environmental factors in the implementation of decisions to ensure that development serves present and future generations " (Republic of South Africa, 1998, p. 1).

As noted by Mebratu (1998), Kori and Gondo (2012) and Hajian and Kashani (2021), among many other authors, SD is a multidisciplinary concept with three main dimensions namely social, economic and environmental aspects. Thus, the understanding adopted in this research is that SD should lead to economic prosperity whilst preserving the environment and empowering the society and communities within which business operates, leading to zero harm to the environment and communities.

Some scholars attempt to separate the term SD and differentiate it from sustainability, which remains a highly debatable issue. Rout et al. (2020) highlighted the following: "Sustainability or sustainable development is a complex concept. To put it simply, sustainability, and its antecedent term, sustainable development, mean different things to different authors" (p. 1). On the other hand, many scholars such as Hajian and Kashani (2021), Feil and Schreiber (2017), Sartori et

al. (2014), Mebratu (1998), Salas-Zapata and Ortiz-Muñoz (2019), Harris (2003) and others use these terms interchangeably. This research will adopt a similar approach and will use the terms SD and sustainability as antecedents and collectives. As already indicated, this approach is employed by many scholars and is fitting for this study.

In a similar vein, the concepts of environmental sustainability and social sustainability are in essence different. While some scholars focus their research specifically on each of these elements, other scholars may incorporate both elements, and may add yet others, in their work. This study is encompassing and will investigate sustainability, as already noted, as a three-dimensional concept encompassing economic, environmental, and social dimensions. This approach will not limit the research unreasonably since environmental problems are in any case linked to social challenges. As per the suggestion made by Hajian and Kashani (2021), who draw on Pope et al. (2004), all features of sustainability should be unified for real SD to take place.

2.3. The implementation of sustainable development and sustainability: A global perspective

Global leaders, under the auspices of the UN, have collectively contributed towards the foundation of SD, as presented in the previous section. SD is so broad and encompasses so many facets that it is challenging to know where to start expressing how its implementation can be fully realised. Jönsson and Bexell (2021), as cited in Mthembu and Nhamo (2021), agree with this notion and contend that the SDG agenda is broad and that goals overlap, making implementation complex. Many other researchers, including Hattingh (2002) and Ruggerio (2021), further support this finding and argue that a clear interpretation and consensus regarding the implementation of sustainability has not yet been reached and thus no single framework exists for the implementation of SD. Levin et al. (2012), as cited by Zhukovska et al. (2021), state that achieving SDGs is a "wicked problem" (p. 1) as knowledge on how to make progress towards SDG achievement is incomplete and contradictory. Zhukovska et al. (2021) note that "Achieving sustainable development is a difficult challenge. This cannot be achieved by a single approach …" (p. 2).

The literature review in this next section of the study will, therefore, not propose a 'fit-for-all-purposes' approach for sustainability implementation, but instead will present current views regarding how sustainability should be implemented, based on the body of existing literature. As contended by Herzig and Schaltegger (2006), sustainability is an ongoing journey rather than a destination.

The implementation of sustainability is currently guided by the framework of United Nations goals and targets to be achieved by 2030. The SDGs were adopted in 2015 by the United Nations as a universal call for action towards the protection of the planet and the eradication of poverty, as well as the achievement of world peace and improved prosperity. Since a lack of action in one area affects another area, a total of 17 independent but interrelated goals were developed, as shown in Table 2.1 below. Countries are expected to consider SDGs as a guide towards national planning, policymaking and decision-making. The implementation of sustainability requires partnerships and coordination between the private sector, government, non-governmental organisations (NGOs) and communities.

Table 2. 1: The 17 Sustainable Development Goals

1.NO POVERTY 2. ZERO HUNGER	3.GOOD HEALTH AND WELL-BEING	4.QUALITY EDUCATION	5.GENDER EQUALITY	6.CLEAN WATER AND SANITATION	
7.AFFORDABLE CLEAN ENERGY	8. DECENT WORK AND ECONOMIC GROWTH	9. INDUSTRY INNOVATION AND INFRASTRUCTURE	10. REDUCED INEQUALITIES	11.SUSTAINABLE CITIES	12.RESPONSIBLE CONSUMPTION AND PRODUCTION
13. CLIMATE ACTION	14. LIFE BELOW WATER	15. LIFE ON LAND	16. PEACE JUSTICE AND STRONG INSTITUTIONS	17.PARTNERSHIPS FOR THE GOALS	

Source: Modified from (United Nations, 2015, p.14)

According to Allen et al. (2021), "The sustainable development goals (SDGs) are a result-based framework of 17 goals, 169 targets, and 232 indicators" (p. 2) and are quite comprehensive.

Assuming total implementation of the SDGs, it may not be difficult to imagine a perfect economically, socially and environmentally balanced world. United Nations member countries are expected to consider SDGs in their planning and policymaking and to monitor performance against the targets that have been set. Mining companies operating within United Nations member states, of which South Africa forms part, are expected to follow certain policies and legislative requirements aligned to the SDGs to contribute towards the economy, protect the state of the environment and improve social wellbeing. However, the realisation of the SDGs remains a global challenge, as asserted by many researchers including Tuazon et al. (2021), Yenilmez and Bingol (2020), Wang et al. (2020), Crosby (2017), Makua and Odeku (2017) and others.

Countries report on their promise to implement sustainability through the Voluntary National Review (VNR) (Allen et al., 2021; Lillehagen et al., 2022; Mozammel & Haan, 2016). The Inter-Agency and Expert Group on SDG Indicators (IAEG-SDG) developed 230 statistical indicators used for implementation and monitoring of the implementation of SDGs, which are reported on in the VNRs (Allen et al., 2021; Lillehagen et al., 2022; Mozammel & Haan, 2016). VNRs are meant to accelerate the implementation of the 2030 Agenda and to mobilise multi-stakeholder support towards the implementation of the SDGs. 222 VNRs had been submitted to the HLPF by the 98 UN member states by the year 2022 (United Nations Department of Economic and Social Affairs, 2022). In 2024, 36 countries participated in the VNR process, and the findings were presented at the July 2024 Session of the HLPF (International Institute for Sustainable Development, 2024).

Of the many countries that have presented their VNRs, some have presented for the third or fourth time since 2016, whilst other countries are still lagging, such as the USA, which has never presented a VNR (International Institute for Sustainable Development, 2022). VNRs are widely accepted as critical tools for the realisation of SDGs, as outlined in the 2030 Agenda. Implementation of the SDGs remains a national responsibility and therefore countries report on SDGs and align these with their national priorities, capacities and circumstances. Countries can therefore selectively focus on issues that are aligned with their national interests and fit reporting to their country's purpose and priorities (Inter-Agency and Expert Group on SDG Indicators, 2021; International Institute for Sustainable Development, 2022; Rashed & Shah, 2021a).

According to the United Nations (2015a), "Unprecedented efforts have resulted in profound achievements" (p. 4). In 2015, the United Nations reported on the outcomes that had emanated thus far from the adoption of the MDGs. According to the United Nations Report (2015a), amongst other SD achievements:

- extreme poverty had declined by more than half from 1.9 billion in 1990 to 836 million by 2015.
- primary school enrolment had increased and the number of children out of school had fallen by more than half in 2015.
- many more girls attended school as compared to a decade prior.
- new HIV infections had fallen by 40% between 2000 and 2013.

The UN acknowledged that this progress did not mean that the world was sustainable. Inequality, uneven progress with the world's poor concentrated in some parts of the world, death due to pregnancy and rampant climate change were noted as some of the major global sustainability issues that needed attention (United Nations, 2015a). The adoption of Agenda 2030 and the 17 integrated SDGs in 2015 was meant to bridge these aforementioned gaps and continue the mission towards the promotion of a fair, equal and prosperous society by balancing economic with environmental and social dimensions of development (Inter-Agency and Expert Group on SDG Indicators, 2021; Lillehagen et al., 2022; Monteiro et al., 2019a; Rashed & Shah, 2021a).

The attainment of the 2030 Agenda has, however, been greatly hampered both by interlinked global crises and the outbreak of COVID-19 and subsequent impacts. The Ukraine war has impacted on food security, the availability of energy and humanitarian efforts towards world peace. Approximately 2 billion people live in conflict-affected countries and global economic growth was expected to decline by 0.9 percent in 2022 due to the Ukraine war (United Nations, 2022b), all whilst the climate continues to challenge the global environment, and temperatures continue to increase in parts of the world (Mhlanga & Ndhlovu, 2023). The war in Ukraine has also exacerbated food scarcity for the poorest and soaring food prices have undermined the goal to end poverty as poor people progressively became worse off (Mhlanga & Ndhlovu, 2023). Currently, 1 in 10 people worldwide suffer from hunger. The combination of world conflict, COVID-19, inequalities

and climate change have cumulatively impacted food security negatively across the world. Global unemployment rates are also expected to continue to rise thereby increasing inequality and poverty and hampering economic growth.

Many scholars and the United Nations agree that more significant efforts to ensure progress toward the achievement of a sustainable world still need to be made. While the SDGs are viewed by many as the road map out of global crisis, the implementation of these SDGs is greatly challenged in the run up to the 2030 target for achievement. The exact pace of progress towards the implementation of SDGs is also difficult to comprehend as there are still gaps in the data reported by member states. Fewer countries have comparable data and only 20 percent of countries have data on climate action (Rashed & Shah, 2021).

Decades of progress in health were threatened by the outbreak of the COVID-19 pandemic as essential health services were disrupted in 92% of countries in the world. In addition, tuberculosis (TB) and other related causes of deaths rose. The United Nations (2015b) states that "Education is a lifeline for children in crisis" (p. 11). Inclusive education has been promoted across the world to ensure equitable education. However, over 147 million children missed over half in person instruction between 2020 and 2022 due to the global COVID-19 pandemic (United Nations Children's Fund, 2022).

Climate change, loss of biodiversity and pollution remain the leading environmental challenges of a sustainable world. Reliance on natural resources is continuously increasing and straining the ability of earth's resources to sustain the global population. Increasing pollution and acidification endanger world water resources and oceans. The world remains water-stressed with over 85% of the wetlands lost due to human activity and environmental degradation. According to the United Nations (2022), meeting water and sanitation SDG targets would require the current pace of implementation to be increased fourfold. In terms of current predictions, 1.6 billion people will lack safe water by 2030, and 2.8 billion people will go without proper sanitation. (Allen et al., 2021; Dalampira & Nastis, 2020; Elder et al., 2016; Lillehagen et al., 2022; Morton et al., 2017). Millions of plastics continue to enter the oceans and affect aquatic life and the marine environment. Agricultural expansion has caused global deforestation accompanied with a loss of biodiversity. More

than 45,300 species in the world are now at a risk of extinction (International Union for Conservation of Nature, 2024).

Although much has been done to advance SD globally, much more remains to be achieved to address the current challenges. Obstacles and challenges between developing and developed countries are not the same. While developing countries rely on international assistance to advance the SD agenda, developed countries have the independence to domestically fund initiatives towards SD, though both have matching challenges to curb emissions and meet climate targets (Allen et al., 2021; Dalampira & Nastis, 2020; Elder et al., 2016; Lillehagen et al., 2022; Morton et al., 2017).

Beyond investigations of the practical means to implement sustainability, other research findings show that the various SDGs cannot always be implemented simultaneously. While it is the desire of member states and the United Nations as the lead international body to implement SD and leverage synergies amongst the goals, the reality is that at a given point certain goals may oppose each other. This is echoed by Morton et al. (2017) who note that, for example, the pursuit of the goals to end poverty (Goal 1) and to end hunger (Goal 2) may require the increase of production output by a country, therefore increasing the use of energy and land resources which would impact negatively on Goal 13 (Climate action) and Goal 15 (Life on land). This is an illustration of how certain SDGs compete and may even conflict with each other.

On the other hand, many researchers purport that the positive interactions of the goals of SD must be emphasised so as to encourage a systematic approach to their implementation. As an example, sustainable food production would support Goal 1 (No poverty), would assist towards meeting Goal 2 (Zero hunger) and would help people with healthy living and the reduction of obesity (Goal 3 - Good health and well-being) (Allen et al., 2021; Donaires et al., 2019).

The global journey towards meeting sustainability goals by 2030 has already been challenged by COVID-19 and hampered by the loss of international peace when Russia attacked Ukraine. As asserted by Donaires et al. (2019) achieving the SDGs by 2030 will require integration of efforts across the world, including changes in individual attitudes as well as organisational strategies, government policies and international collective effort.

2.4. The implementation of sustainable development: A South African perspective

This study is conducted within the context of the SA mining industry. Although SD is an international concept, it is important to understand how SD is implemented specifically in SA for the purposes of providing a background and foundation to this study. This part of the literature review is intended to review how sustainability is implemented in SA and how the country is currently faring in terms of the implementation of SD and progress towards attainment of the 2030 SDGs.

The basis of the implementation of SD in SA is found within the Constitution of the Republic of South Africa (1996), hereafter referred to as 'the Constitution'. The Constitution embodies the spirit of SD, and multiple goals of SD, as expressed in the SDGs as values of human dignity, non-sexism, and equality, are expressed within the Constitution. The Constitution grants every individual within SA the right to an environment not harmful to their health or well-being, the right to have the environment protected for the benefit of present and future generations, and the right to secure and ecologically sustainable development (Republic of South Africa, 1996). Thus, in line with the definition of SD outlined in the Brundtland (1987) report, that is, "Development that meets the needs of the present without compromising the ability of the future generation to meet their own needs" (p. 16), the Constitution comprehensively articulates the need for environmental protection, human rights, health care, education and a fair and just society.

The concept of sustainability is also reflected in other legislative frameworks in SA. The NEMA 107 of 1998 states that "development must be socially, environmentally and economically sustainable" (Republic of South Africa, 1998, p. 6), thus embracing all pillars of SD as originally defined in the Brundtland Commission Report of 1987. The principles set out in the NEMA touch on several SDGs including SDG 3 (Good health and well-being), SDG 6 (Cleaner water and sanitation), SDG 12 (Responsible consumption and production), SDG 13 (Climate action), SDG 14 (Life below water) and SDG 15 (Life on land).

Pereira (2014) criticised South African SD policy and argued that too much focus, at that time, was placed on the environment without addressing other important areas such as job creation and land reform. Fourie (2018) noted that in addition to sound legislative frameworks, successful

sustainability implementation depends on coherent and integrated policies. Therefore, the alignment of South African policies with SDGs is critical for the successful realisation of Agenda 2030.

In 2002, the World Summit on Sustainable Development (WSSD) was held in SA. The outcome of the WSSD was the Johannesburg Plan of Implementation (JPOI). The JPOI set out targets for implementation that were inclusive of the MDGs at the time, as the SDGs had not yet been developed (United Nations, 2002). In 2008 SA developed the National Framework for Sustainable Development (Republic of South Africa, 2008). Within the framework, five priority areas relating to SD were identified as requiring intervention. These priority areas of intervention include: the enhancement of integrated planning within the SA government; sustaining of ecosystems and responsible consumption of natural resources; economic development via sustainable infrastructure; creation of sustainable human settlements; and appropriate response to economic and environmental challenges (Republic of South Africa, 2008).

In 2011, prior to the development of the SDGs, the SA government formulated the National Development Plan (NDP) based on the outcomes of the country's diagnostic report from national experts. According to the National Planning Commission (2011), the NDP "is a blueprint for tackling South Africa's challenges" (p. 2). Challenges identified that needed to be addressed by the implementation of the NDP then included poor quality education for black people, lack of public health systems, and the lack of employment.

The 2011 NDP did not however directly translate the MDGs that had been developed by the UN in 2000. It could be argued that job creation would address MDG 1 (Eradicate extreme poverty and hunger) and that the NDP goal to improve health care would address Goal 4 and Goal 5 (Reduce child mortality and improve maternal health). However, there are some MDGs that were not directly addressed by the 2011 NDP, such as environmental sustainability and the promotion of gender equality. Nevertheless, action plans set out in the 2011 NDP, if achieved, would no doubt address some of the sustainability challenges faced in the country. For instance, the expressed commitment to adopt measures for climate change mitigation would undoubtedly help towards the realisation of the SDGs (Biermann et al., 2022).

Both the NDP developed in SA in 2011, and the SDGs developed by the UN in 2015 set out a vision for 2030, for the national and global environment, respectively. Similar to the MDGs, some of the SDGs were not directly addressed in the 2011 NDP, which is understandable as the NDP was developed before the UN had finalised the SDGs. Findings from a study by Mthembu and Nhamo (2021) emphasise that the NDP was initiated before the development of the SDGs and thus, SA already had its own development agenda to address environmental and social issues. A report from Statistics South Africa (2019) found that 74% of the SDG targets were directly addressed by the NDP with a focus on poverty eradication, reducing inequality, and growing the economy. Hence, the 2011 NDP remains a good foundation for a sustainable country and the implementation of SDGs. Mthembu and Nhamo (2021) note that "South Africa has largely relied on the implementation of its NDP to achieve objectives of the SDGs" (p. 13).

Progress has been reported toward the attainment of the NDP and Vision 2030 in South Africa, for instance, statistics that show that the rate of employment increased in the pre-COVID-19 period. According to the National Planning Commission (2020), the average annual rate of employment creation more than doubled in the period between 2001 to 2017, compared to the period from 1960 to 1993. Households with electricity supply and provision of basic sanitation increased from 76,6% to 84.4%. School attendance rose from 91.3% in 2002 to 96% in 2017 (National Planning Commission, 2020).

Although the NDP is intended to align with the MDGs and SDGs, many SDGs were not reported on by the National Planning Commission in 2020, such as Action on climate change (Goal 13), Affordable clean energy (Goal 7), Responsible consumption (Goal 12), Poverty reduction (Goal 1), Zero hunger (Goal 2), Good health and well-being (Goal 3), and Clean water and sanitation (Goal 6). Instead, these were all integrated within the economic focus of the progress report toward the achievement of the NDP (National Planning Commission, 2011). When it comes to the implementation of the SDGs, the SA focus seems to be more on the economic drive for employment creation and, thus, is centred on poverty eradication, good health and access to education. Certain goals, including climate action, provision of clean energy and responsible consumption, seem to receive lesser attention (Biermann et al., 2022; Mthembu & Nhamo, 2021).

SA reported progress toward the implementation of the SDGs in the 2019 VNR. The report showed that growth had been slow, that poverty had declined, but was not eradicated in SA, and had unfortunately increased again by 2019. According to the Republic of South Africa (2019), "The share of people living on incomes below the international poverty line of US$1.9 a day fell from 29.3% in 1993 (just before the end of apartheid) to 16.4% in 2011 but then rose to 18.8% in 2015. Poverty had fallen but began to rise again" (p. 31). This hampered SA's progress toward SDG 1 (Poverty reduction). Food security has improved in SA as hunger fell from 24.2% in 2002 to 10.4% in 2017. However, this good progress does not equate to perfection as over three million households still have no access to good quality food in SA. This is particularly concerning as food waste generation is also considered very high in SA compared to other countries (Republic of South Africa, 2019)

In terms of health and well-being, under five child mortality rates fell from 71% to 48% between 2002 and 2016 (Republic of South Africa, 2019). However, the country still struggles with communicable diseases, as HIV infections have been increasing over the years along with TB infections, and access to good health care remains a challenge for the poor (National Planning Commission, 2023). While 95% of the population in SA has access to electricity, it is of great concern that this achievement goes against SDG 13 (Climate action) as the bulk of South Africa's energy is coal generated and therefore not clean. Clean water also remains a challenge for both the environment and people who need provision. There is poor maintenance of infrastructure, and this may also affect economic progress (National Planning Commission, 2023). Waste generated in South Africa is, on the whole, not recycled despite the improvement from 1.3% to 7.5% of waste recycled in 2016 and 2017 (National Planning Commission, 2023).

Similar to many of the UN member states, far more work needs to be done in SA to achieve SDGs by 2030, as too many people in the country remain unemployed, poor, in poverty and hungry. Hendriks (2018) found that local government funding plays a critical role in the implementation of the SDGs and service delivery for poor people. Such funding would support SDGs by contributing towards poverty eradication, improving health and well-being, and increasing water provision and sanitation, amongst other goals. Hendriks (2018) emphasised that if the way municipalities spend or overspend their budgets does not change, then it will be difficult for the SA government to achieve the meaningful implementation of sustainability. Olsen et al. (2014) found that

finance was one of the fundamental means of implementation (MOI) towards ensuring the successful implementation of SDGs. Hendriks (2018) further asserted that local governments are the closest to the people, where positive impacts of SD should be realised and have both a direct and indirect influence on most of the SDG's targets. Mthembu and Nhamo (2021) concur with Hendriks' (2018) line of thought and highlight that SDGs need to influence domestic policy development, and the impact needs to be felt on the ground level by ordinary people.

2.5. Corporate sustainable development

The concept of sustainability began as a global ideal and a political agenda to address economic, environmental and social challenges. There was also recognition that the business world has a role to play towards SD. This recognition led to the development of the concept of 'corporate sustainability' (CS). Dyllick and Hockerts (2002), as cited in Engert et al. (2016), define CS as "Development that meets the needs of a firm's direct and indirect stakeholders without compromising the firm's ability to meet the needs of future stakeholders" (p. 2). The importance of CS is emphasised by Bansal (2005) and White (2009), as cited in Engert et al. (2016), who state that corporate sustainable development is achieved at the intersection of economic development, environmental protection and social responsibility. Lozano (2011) elaborated a lengthier definition of CS, stating that it can be defined as:

> *"Corporate activities that proactively seek to contribute to sustainability equilibria…while addressing the company's systems, i.e., operations and production, management and strategy, organisational systems, procurement and marketing, and assessment and communications, as well as with its stakeholders"* (Lozano, 2013, p.3)

Both definitions of CS from Dyllick and Hockerts (2002) and Lozano (2011) provide a valid contribution to CS literature. Dyllick and Hockerts' (2002) definition links to the original definition of SD from *Our Common Future* (Brundtland, 1987), whilst Lozano's (2011) definition is more practical and makes clear the relevance of organisational systems through which SD should be ingrained in any organisation. A recent study by Rahi et al. (2024) adopted Dyllick and Hockerts (2002) definition noting that "corporate sustainability can be defined as implementing

business strategies and activities that meet the present needs of companies and their stakeholders while protecting, sustaining and improving human and natural resources to meet future needs" (p. 1)

Linnenluecke and Griffiths (2010) noted that the concept of CS has received attention both in theory and practice over the years since its conception within the Brundtland Report (1987). Despite sustainability issues having been institutionalised over three decades ago, there is still a lack of consensus and clarity as to what exactly CS comprises and how best to attain it. This assertion is also emphasised by Linnenluecke and Griffiths (2010) as they argued that at that point in time, although CS had received much attention in organisational management studies, there was little understanding of how the practical adoption of CS practices could be achieved by organisations. This lack of understating and adoption of practices is also exacerbated by the multidimensionality and complexity associated with the holistic implementation of SD (Langer and Schön (2003), as cited in Lozano (2015).

Thus, the gap between theory and practice remains well noted, as Hahn and Scheermesser (2006) suggest "The fundamental challenge for companies is how to deal with trade-offs between environmental, social and economic aspects of sustainability and… how sustainability can be reconciled with a successful economic development " (p. 13). Companies are now expected to contribute actively towards SD and thus improve the environmental and societal conditions within which they operate (Hahn & Scheermesser, 2006). Balancing profitability with environmental and social concerns is the core challenge (Rahi et al., 2024).

Several frameworks have been outlined to drive corporate sustainable development. These include the Eco Management and Audit Scheme, ISO 14000, ISO 26000, Global Reporting Initiative (GRI) guidelines, AA1000 Assurance Standards, the UN Global Compact and many others. These frameworks have allowed for the development of a few tools for the management and measurement of SD for corporates. Most of these tools are voluntary, and decisions by organisations regarding which tool to use are governed by the interests of stakeholders that the organisation needs to report to and also by how the organisations want to position themselves as 'green' performers. In the case of the UN Global Compact company voluntarily commit based on CEOs to

align their strategies and operations with universal principles developed by the UN on human rights, labour, environment and anti-corruption. CS has moved beyond just a concept intended to help organisations contribute towards environmental and social well-being. As correctly noted by Ng (2018) "Sustainability reporting and compliance practices are increasingly considered complementary to risk management practices…" (p. 1). Ng (2018) highlighted however that the effectiveness of sustainability implementation frameworks has not yet been fully assessed despite the plethora of professional assurance services.

Environmental concerns have become significant when corporate credit risk is assessed. In June 2003, the International Finance Corporation (IFC) formally launched the Equator Principles (EPs). In accordance with the IFC, EPs are a financial industry benchmark for determining, assessing and managing environmental and social risks. One hundred and thirty-four financial institutions in 38 countries have adopted EPs (International Finance Corporation, 2003) and all funding banks in SA subscribe to the EPs. Widyawati (2020) stated that "Investors play a vital role in the global effort to achieve sustainable development goals by ensuring that capital is appropriately raised and allocated" (p. 1). For corporates seeking project finance, the need for CS is unavoidable as their ability to raise finances relies on their demonstration of Environmental and Social Management Systems (ESMS) that minimise and mitigate environmental and social risks. Thus, 'green finance' is one of the key external motivators for corporates requiring loans to adopt sustainability.

Lozano (2015) found that there were both internal and external drivers for the adoption of CS in organisations. Ethical leadership and values, cost savings, efficiencies, profits, growth, employee shared values as well as leadership orientation were identified as critical internal drivers toward sustainability in organisations. Licence to operate, reputation and branding, regulatory pressure and stakeholder expectations were identified by Lozano (2015) as external drivers of CS. Lozano's (2015) findings were based on a review of previous studies conducted by several scholars and organisations, including, amongst others, Lantos (2001), the European Commission Directorate-General for Employment (2001), Cramer (2003), Laffer et al. (2004), Fukukawa and Moon (2004) and Ditlev-Simonsen and Midttun (2011). Lozano (2015) asserted that organisations drive sustainability internally, hoping to improve efficiencies, boost innovation, minimise risks, and increase profits in the process. External pressures, however, push organisations towards

sustainability to manage their reputation, increase brand equity, meet stakeholder expectations and secure their operating licenses.

When considering the effect of organisational culture on the implementation of CS, it could be argued that organisations that need loan finance would be better positioned to adapt to sustainability requirements than organisations with a long history and not requiring loan funding. This is because existing and inherent organisational culture impacts on the attitudes towards the implementation of CS. The requirement for loan funding, when considered with the need of funders to protect their return on loans, forces unsustainable organisations to adopt a sustainable culture.

Organisations requiring green finance are forced to adapt and innovate in accordance with the global principles of sustainability required by such standards as the EPs and the IFC Performance Standards. This statement aligns with findings by Linnenluecke and Griffiths (2010) regarding CS and organisational culture and is supported by the findings of Lozano (2015) review. Lozano (2015) further points out that many organisations approach sustainability without consideration of supply chain impacts, company culture and the interlinkage between the various dimensions of SD. Several researchers are in agreement with the views expressed by Lozano (2015) (see (Baumgartner, 2009; Baumgartner & Zielowski, 2007; DeSimone & Popoff, 1997) and argue that CS initiatives should not only focus on improving such things as raw material consumption, processes and products, but should also attempt to shape corporate culture and attitudes.

Many studies have attempted to investigate sustainable organisations' culture and organisational structures. Gladwin et al. (1995) and Shrivastava (1995) found sustainable organisations to be less hierarchical, more non-bureaucratic, and more participative with decentralised power structures. Griffiths (2010) differentiated between various culture types within organisations and found that bureaucratic organisations that were dominated by the so-called ‘internal process culture’ would be less adaptable to change. Furthermore, these organisations are more likely to be driven by economic performance and are more likely to disregard the broader requirements relating to SD. The maximisation of profits through driving production hard is more likely to be the gameplay of the bureaucratic and internal process forms of organisational culture.

According to Linnenluecke and Griffiths (2010), “Different organisational culture types influence how employees understand and enact corporate sustainability” (p. 360). Sustainability-oriented organisations that successfully implement CS must be adaptable, innovative and flexible. This is because most environmental and social problems are complex and do not have straightforward answers and approaches. Even well-researched environmental challenges such as climate change and the use of renewable energy require a certain level of adaptation to process changes to be solved. Rigid cultured organisations are less likely to embark on such innovation. Linnenluecke and Griffiths (2010) put this assertion well, stating that implementing environmentally and socially innovative products that minimise environmental degradation is unlikely to happen without flexibility and openness to change.

In accordance with Linnenluecke and Griffiths’ (2010) findings, organisations that are more likely to have a positive sustainability-oriented culture and, therefore, the meaningful implementation of CS, have an open systems culture. The open systems culture, as referred to by Linnenluecke and Griffiths (2010), enables organisations to have environmental and social flexibility, to integrate their business activities with the needs of the environment and society, and to pursue ecological innovation along with social sustainability. This notion bides well with Siebenhüner and Arnold (2007) findings suggesting that sustainability-oriented organisations are flexible and innovative enough to introduce resource-efficient technologies and introduce sound sustainability reporting systems.

Researchers have attempted to investigate how CS improves organisational and economic performance and profitability. Findings of earlier studies regarding the relationship between organisational sustainability and economic performance have been mixed. This suggestion is echoed by Artiach et al. (2010), who noted that researchers have hypothesised negative, positive and neutral associations between CS and organisational financial performance. Becchetti et al. (2005), as cited in Artiach et al. (2010), claim that organisations investing in CS incur increased costs to attain such things as employee well-being, charitable donations, the promotion of community development, and opportunity costs for declining social irresponsible investments. Based on this notion, CS is not in the best interest of investors. It reduces profits and turns profits into costs associated with initiatives to support CS.

Ullmann (1985) argued that there was insufficient evidence to assume a direct relationship between CS and organisational financial performance due to the complexity of financial performance. Based on Ullmann's (1985) view, financial performance is complex, and most intervening factors cannot be controlled. He argued therefore that there is no sufficient theoretical support showing a direct relationship between CS and financial performance. On the other hand, several other researchers (Alexander & Buchholz, 1978; McGuire et al., 1988; Waddock & Graves, 1997) claimed that there is a positive relationship between CS and company financial performance. These researchers suggest that intangible benefits that accrue due to CS, such as employee morale, goodwill and positive stakeholder and investor relationships far outweigh the monetary costs of implementing CS.

Salzmann et al. (2005) highlighted that the evidence presented by qualitative studies to link profitability and environmental and social responsibility is not rigorous enough as they lack quantifiable findings. Salzmann et al. (2005) further argue that studies to show how share price performance is influenced by environmental and social performance have also been focused on the short-term and have been ambiguous. Thus, many research attempts to demonstrate that good environmental and social performance could lead to excellent profits have been marred by significant variation and ambiguity.

Findings by Becchetti et al. (2005), Lee (2006) and McWilliams and Siegel (2000) resonate with Ullmann's (1985) viewpoint that there is no significant association between CS and organisational financial performance. What remains indisputable, however, is that by engaging in sustainable efforts, corporates minimise environmental and social-related business risks. Minimising environmental and social risks is purported to be a needed foundation to improve investor confidence and shareholder value.

Flammer (2013) agreed with the findings from other scholars outlined above, and pointed out that despite some researchers, including Ambec and Lanoie (2008), Berchicci and King (2007) and Etzion (2007) having examined the relationship between CSR and stock-market performance, little is known about how the relationship evolves. Flammer (2013) also noted that stock price performance from various companies following major environmental incidents such as oil spills had

been mixed. While certain companies experience a considerable drop in stock prices, others only face a marginal decrease following major environmental incidents. External factors such as green financing have also influenced the adoption of sustainability for corporates requiring loan finance to invest in their businesses (Ng (2018).

2.5.1. The concepts of Corporate Social Responsibility, Corporate Sustainability, and Corporate Social Initiative

Montiel (2008) found that there is often no clear distinction between corporate social responsibility (CSR) and corporate sustainability (CS). The two terms are used interchangeably in many situations. Before the development of theories relating to CSR and CS, social issues research was grounded in CSR, and environmental issues were researched based on environmental management (EM). Gradually CS has become a prominent theory, including social and environmental issues within one umbrella. Montiel (2008) also found that CSR was not well-defined and/or was ambiguously defined. The most cited definition of CSR was crafted by Carroll (1979), who stated that CSR referred to the social responsibility of business, which encompasses economic, legal, ethical and discretionary expectations that society has of organisations at a given point in time. This definition emerged before the broader development and interest in the SD concept that followed the Brundtland Commission Report of 1987.

Since the Brundtland Commission Report (1987), researchers have integrated the CSR concept into other constructs of SD including CS, the triple bottom line and ESG. A simplified contrast between CSR and CS would be that CSR emphasises the responsibility of corporate organisations toward economic, social and environmental well-being, while CS is a concept related to SD as implemented within corporations. Thus, CS can be regarded as a tri-dimensional concept incorporating environmental, social, and economic dimensions defined in SD (Bansal, 2005).

Montiel and Delgado-Ceballos (2014) suggest that only the term ‘corporate environmental sustainability’ should be used when the focus is placed on environmental aspects. Montiel and Delgado-Ceballos (2014) further propose that, likewise, the terms ‘corporate economic sustainability’ and ‘corporate social sustainability’ should be used to denote an exclusive focus on the economic and social dimensions of SD, respectively. Other terms, such as ‘environmental CSR’, are used to

distinguish between aspects which form the tridimensionality of CSR as derived from the SD definition. Popa & Salanţă (2014) noted that CSR evolved from a theoretical concept to a complex managerial tool to enhance organisational reputation and to improve organisations' competitive advantage. Corporate Social Initiative (CSI) is the enactment of CSR by implementing various social initiatives intended to improve community and stakeholder conditions.

2.5.2. Shared value creation

Kramer and Porter (2011) in their study noted that there was diminishing trust in business, causing regulators to set anti-competitive laws, and that business was seen more as a significant cause of social, environmental and economic problems. As discussed earlier in the literature review, many scholars (e.g. Hamann, 2003; Makua & Odeku, 2017; Namutebi, 2017; Spector, 2014) agree with this. Social responsibility thinking was criticised by Kramer and Porter (2011) as peripheral and not at the core of doing business. Kramer and Porter (2011) believe that the 'shared value' concept can solve the challenges that may occur when businesses come under siege in terms of SD. Shared value was initially explored in a prior study by Porter and Kramer (2006). The principle of shared value asserts that businesses should create economic value in a way that creates value for society and thus addresses societal needs and challenges. Kramer and Porter (2011) strongly emphasised that shared value is not social responsibility nor sustainability or philanthropy, but a new way to achieve sustainable economic success where sustainability is placed at the centre of doing business.

Kramer and Porter (2011) define shared value creation as "Policies and practices that enhance the competitiveness of a company while simultaneously advancing the economic and social conditions in the communities in which organisations operate" (p.13). Unlike the CSR and the CSI concepts through which corporates are sometimes mistaken as charitable neighbours to society, Kramer and Porter's (2011) shared value theory advocates for business acting as a business. Thus, in accordance with the shared value theory, businesses should make profits, should limit acting as charitable donors and should create value for society. The critical question is, 'how does a business create value for society without being charitable donors?' In this regard, Kramer and Porter (2011) suggest that businesses should take part in addressing the needs and challenges of society without

being philanthropic and in this way should therefore contribute to the progress of society. By this thinking, companies must broaden the pool of economic and social value instead of trying to be charitable in sharing profits.

2.5.3. The triple bottom line concept

Elkington (1998) is touted as the father of the triple bottom line concept, a term that took off in the late 1990s. Elkington's (1998) theory of the triple bottom line was developed from the notion that social and economic pillars of SD would be better addressed with tangible environmental progress and also in a more integrated manner. In Elkington's words, the triple bottom line focuses not just on the economic value that the organisations derive but also on their positive and negative environmental and social impacts. Elkington (1998) intentionally framed a language that would resonate with business when coining the triple bottom line concept.

The concept of the triple bottom line suggests that organisations pursuing sustainability should not do so based only on economic returns but should also consider environmental protection and social justice. This conceptualisation is not too far different from many other frameworks of sustainability. However, Elkington's coining of the concept actualised the language used by businesses to better understand SD, which resulted in the triple bottom line phrase becoming popular amongst members of business. Using the triple bottom line analogy, the three elements of SD, namely economic, environmental and social, are intended to be combined and to work in unison to balance the needs of the business with environmental protection and social justice.

Marshall and Toffel (2005) explain this well, highlighting that the triple bottom line concept comes to life when eco-efficiency is achieved through realising positive environmental goals while maximising economic gains and placing attention on social consequences and the achievement of social equity. Over the years, a growing number of multinational companies have adopted the triple bottom line concept in their attempt to operationalise SD and become sustainable. Although popular and widely accepted, the effectiveness of the triple bottom line concept as a framework that ensures that an organisation is sustainable is yet to be fully measured in isolation from other sustainability frameworks.

Marshall and Toffel (2005) argue that even if organisations were to consider the social impacts of their operations as well as environmental impacts, there is still no guarantee that such considerations would lead to sustainability. Thus, a meaningful foundation is needed to ensure that organisational actions which ensure sustainability are implemented consistently over time, and that positive social and environmental outcomes are realised from such actions. Marshall and Toffel (2005) argue and emphasise that the bottom line does not stop at just the three factors of economic, social and environmental impacts.

2.5.4. Environmental management

It is near impossible to discuss SD and SD-related concepts without coming across the concept of environmental management (EM). EM refers to the management of the interaction between the natural environment and activities undertaken by human beings and organisations or corporations. EM seeks to identify, avoid, minimise or mitigate adverse environmental impacts caused by human and organisational activities while promoting and enhancing positive environmental impacts. EM is associated with other concepts relating specifically to the environmental dimension of sustainability, including total environmental quality management, corporate greening, environmental life cycle assessments, and ecological sustainability, amongst others.

In discussing sustainability, the concept of EM is limited because it only focuses on the environmental dimension of sustainability with a narrow focus on the economic and social dimensions. As noted by Montiel (2008), some scholars focus entirely on social issues without considering environmental issues, while other scholars map places to focus on environmental issues without much attention to social issues. It is, however, widely accepted that sustainability should integrate environmental, social and economic issues.

2.5.5. Environmental, Social, and Governance as a sustainability concept

The 21st century has seen the proliferation of a sustainability concept called environmental, social and governance (ESG). ESG has become a popular buzzword used in business by practitioners and investors alike. What differentiates ESG from other concepts is that the economic pillar of the tri-factor defining SD is left out and replaced by governance. Many popular sustainability frameworks

include economic, environmental and social dimensions however the ESG framework replaces the economic dimension with governance.

It is unclear from the literature when ESG became a popular concept, at what point it was formulated, and by whom. The roots of ESG as a concept at this stage are not fully known, and research on how ESG became grounded in the mainstream is still in the infancy stage. Findings by Crain Communications Inc (2011) show that the first appearance of the term ESG was noted in the UK Pensions Act of 1995, requiring fund executives to disclose how ESG issues are addressed in investment processes. In 2000, ESG considerations were legalised for pension fund trustees in the UK.

In 2005, ESG was strongly emphasised in the Principles for Responsible Investment (PRI), a United Nations-endorsed principle-based framework supported by financial institutions. The PRI advocates for an understanding of investment implications relating to a business's ESG factors and promotes incorporating ESG issues into investment analysis and decision-making, a process known as socially responsible investment (SRI) (Crain Communications Inc, 2011). The concept of ESG replaces fixation on the financial with an ethical focus relating to how a business conducts itself and addresses human rights issues. Thus, ESG is enacted in a similar way in which other sustainability concepts are put into practice, but greater focus is placed on the ethical conduct of the business.

2.5.6. Corporate sustainability reporting

Herzig and Schaltegger (2006) highlighted that reporting and external corporate engagements play a fundamental role in CS. Beyond managing the economic, ecological and social aspects of SD, organisations are required to foster participation and to report material issues to various stakeholders who may have different interests. GIZ (2012), as cited in Daizy et al. (2013, p. 11) assert that:

> "*A sustainability report provides information on how a company, proactively and beyond regulations, acts responsibly towards the environment around it and works towards equitable and fair business practices and brings to life products and services with lower impacts on the natural environment"* (GIZ, 2012, p. 11).

Herzig and Schaltegger (2006) affirm that CS reporting improves the legitimacy of companies, increases reputation and brand value, and increases organisational transparency and accountability. Consequently, the public acceptance of the company can be better enhanced through CS reporting.

Daizy et al (2013) state that sustainability reporting started in the late 1980s, even before the Brundtland Commission Report (1987) issuance, with the then reports addressing environmental issues such as acid rain, contaminant releases and ozone layer depletion. Brearton et al. (2005), as cited in Daizy et al. (2013), explain that the first Corporate Sustainability Report was issued in 1989 by Ben and Jerry Ice Cream, and in 1990, CS reporting gathered momentum when the Association of Chartered Certified Accountants launched environmental reporting awards. This was followed by the release of Agenda 21 in 1992, which encouraged organisations to report sustainability performance annually (Daizy et al., 2013). Subsequently, the development of specific environmental reporting requirements followed in countries such as the Netherlands, Norway and Denmark.

Today several initiatives and frameworks exist for CS reporting, the most recognisable of which is the GRI. In South Africa, all companies listed on the Johannesburg Stock Exchange must annually compile integrated disclosure reports as per the King Codes on Governance (the latest being King IV). Contained within the King Codes is the principle that strategy, risk, performance and sustainability are inseparable. The King Codes promote integrated thinking and the appreciation of organisations as an integral part of society, stakeholder inclusivity, and corporate citizenship. The definition of SD, as outlined in the Brundtland Commission Report of 1987, is at the centre of the King Codes. The Institute of Directors in Southern Africa (2016) states that "Sustainable development understood as the development that meets the needs of the present without compromising the ability of future generations to meet their needs…is a fitting response to the organisation being an integral part of society" (p. 23). Roberts (2017) reported that tangible benefits had been released by SA companies that adopted integrated reporting, including improved understanding of risk drivers, strategic resource plans and reduced departmental soloing. Roberts (2017) further asserted that South Africa's integrated corporate reporting was ranked number one worldwide for seven consecutive years, based on the World Economic Forum's Global Competitiveness Report.

2.6. Sustainable development in mining: A global perspective

Mineral commodities remain in demand worldwide, gaining investor attention and a justified reason for mines to break the earth and produce. According to Arad et al. (2014), "All countries are dependent on raw materials" (p. 375). The world will still need raw materials such as oil, copper, platinum, gold, rhodium, steel and uranium, amongst others, to create various products for a long time to come. Proposed interventions to mitigate a carbon-intensive world also require raw materials for their execution. As correctly noted by Arad et al. (2014), solar panels, electric vehicles and many wind turbines rely on metals. Undeniably, extraction of raw materials and products created from these materials drives economic growth and employment opportunities, and contributes to various goals of SD, as developed by the UN. However, economic growth also results in negative aspects, such as the impacts of mining on the society and environment, which need to be managed.

The European Union has drafted several policies to balance global resource competition with environmental protection. The Raw Materials Initiative was drafted in 2008 to promote sustainable mining of materials and environmental protection, and to promulgate the improvement of market conditions. Policies implemented by the European Union also include legislation that addresses the management of climate change and the introduction of technologies to curb carbon emissions during the production of raw materials.

Europe produces nearly 2% of gold in the world, with top gold production countries including Turkey, Sweden and Finland World Gold Council (2023). Areas where mining occurs in Europe contain heavy metals in concentrations above the maximum allowed by law. European legislation is considered the strictest in the world, with continuous changes in legislation aimed at ensuring environmental and socio-economic performance (Arad et al., 2014; Macklin et al., 2023).

Malagon Orjuela (2012) highlighted that the JPOI adopted at the 2002 WSSD recognised the importance of mining. The plan called for inclusive mining, the management of both the negative impacts of mining as well as mining benefits and fostering sustainable mining practices by providing financial and technical aid and capacity-building to developing countries (United Nations Sustainable Development, 2002). The Intergovernmental Forum on Mining (2022) confirms what

Malagon Orjuela (2012) pointed out, noting that during the 2002 WSSD, country delegates acknowledged that mining's poor reputation hampers the industry's potential benefits to advance sustainability objectives. The Intergovernmental Forum on Mining, Minerals, Metals and Sustainable Development (IGF) is an international organisation spearheaded by SA and Canada that works with more than 80 member countries and was formed to promote SD and good governance in mining (Intergovernmental Forum on Mining, 2022).

The World Bank has been a vital role player in mining on the world stage. Mining was mostly nationalised in the 1960s to mid-1980s (World Bank, 2022). However, due to the poor performance of state-owned enterprises, by the late 1980s, greater emphasis was placed on open mining markets, which led to the privatisation of mines. The World Bank was increasingly involved in mining in terms of designing policies that would help mining become an attractive investment to private investors. Recently in 2019, the World Bank launched a Climate Smart Mining Facility, a fund dedicated to assisting the mining sector with climate change sustainability. The facility is intended to support the extraction of metals used in renewable energy technologies, including solar, wind and batteries for electric vehicles (The World Bank, 2022).

The impact of the World Bank on the mining industry's sustainability has also been well noted in earlier sections of the literature review. The IFC is a member of the World Bank Group and has formulated standards that all mines intending to lend money have to adhere to in order to qualify for financing to develop mining projects. The IFC Performance Standards (IFC PS) require mines to have environmental and social management systems that identify environmental and social risks for mitigation. The IFC PS advocates for the involvement and inclusion of stakeholders in the development of mining projects and the protection of workers' rights (International Finance Corporation, 2012).

Mining has internationally undergone reforms and has evolved from the sector's initial focus on profit making. According to McMahon (2010), the mining sector in many countries is now seen as a possible engine to drive SD outcomes. This is attempted through the economic linkages of mining to other sectors and the proper channelling of mining profits towards SDGs. The idea of using mineral commodities (green metals) for technologies that will solve climate change has also

gained momentum. Sovacool et al. (2020) state that "Climate change mitigation will create new natural resource and supply chain opportunities and dilemmas because substantial raw materials will be required to build new low-carbon energy devices and infrastructure" *(*p. 30).

The World Bank Group (2017) found that a low-carbon future will see a higher demand for 'strategic minerals' such as lithium, graphite and nickel. Lithium, graphite and nickel demand is expected to skyrocket by 965%, 383%, and 108%, respectively, by 2050 (World Bank Group, 2019). This anticipated demand for mineral commodities sounds promising for the profitability of the mining industry. However, negative impacts on the environment and communities are also expected to increase alongside the increased production attempts from the mining sector. Thus, sustainable mining practices are required to achieve sustainability and the triple bottom line, as suggested by Elkington (1998).

International mining companies grouped themselves and formed the International Council on Mining and Metals (ICMM) in the early 2000s to respond to SD challenges faced by the industry (International Council on Mining and Metals, 2024). The ICMM consists of the seventeen largest mining companies, thirty association members, and eleven regional and global associations (Sethi & Emelianova, 2011). The council formulated ten guiding principles to assist mining companies in the attainment of sustainability. The principles of the ICMM guide the mining industry to apply ethical business practices and integrate sustainability considerations in processes and decision-making. Respect for human rights is also emphasised in the ICMM Principles. In terms of the ICMM Principles, mining companies are required to pursue continual improvement in environmental performance, conserve biodiversity, pursue continual improvement in social performance and mine responsibly (International Council of Mining and Metals, 2022).

The membership numbers of the ICMM have been increasing and many organisations have adopted their principles, including the GRI Reporting Framework. Several projects spearheaded by the ICMM, such as the promotion of the use of zero-emission vehicles for mining, will play a role in developing a sustainable mining industry. The progress made by the ICMM towards the betterment of the international mining scene is indisputable as seen from the organisation's several successful initiatives. In addition to promoting climate change reduction, the ICMM has tried to

improve the relationship between communities and mining companies through its guidance on effective grievance management practices (International Council on Mining and Metals, 2024). The integration of social-related impacts into mine closure planning has also been guided by the ICMM.

It is not clear from the literature what the relationship is between the ICMM and the IGF. The ICMM was formed as a CEO-led leadership organisation in 2001. The IGF was initiated following the 2002 WSSD to serve as a global platform for dialogue among member governments, mining companies and mining stakeholders, including NGOs. Both organisations promote sustainable mining and collaborate to do so in several initiatives, with the ICMM focusing on mining leadership and the IGF concentrating on the dialogue between stakeholders. The two organisations however have a different history despite sharing a related purpose.

In 2013 the World Economic Forum produced its third instalment of the Responsible Mineral Development Initiative (RMDI). The goal of the RMDI was to identify challenges facing responsible mining and to develop approaches towards sustainable mining (McPhail, 2018). The report articulates well the common challenge amongst global mining companies, which is the increased frustration of stakeholders and governments towards mines and the questioning of the role of mining. The lack of capacitation and limited expertise in governments, civil society and companies coupled with inadequate stakeholder inclusion and non-compliance were cited by the RMDI as the main problems facing responsible mineral development on the international scene (McPhail, 2018).

The RMDI proposed six building blocks for responsible mining. These include capacity building, knowledge sharing regarding the positive and negative impacts/benefits of mining, collaborative stakeholder engagement, compliance monitoring, and dispute management processes (Malagon Orjuela, 2012). The prescriptions of the RMDI show commonality with what the IFC PS proposes in terms of the requirements for proper ESMS. The management of risks, involvement of stakeholders, implementation of grievance mechanisms, and compliance monitoring are identified in the IFC PS as prerequisites of a sound ESMS.

There are many initiatives which are not directly linked to mining that have been developed internationally and are intended to support SD. These are driven by various organisations such as the

United Nations, the World Business Council for Sustainable Development and the International Institute for Sustainable Development. The purpose of this review of existing literature was however to critically explore how mining is institutionalised globally and the challenges related specifically to sustainable mining.

2.7. Sustainable development in the South African mining industry

The South African mineral industry has a significant environmental footprint and affects the well-being of both the environment and the communities within which the mines operate. Despite greater strides and progress being made in sustainability science, there is no universally accepted framework for sustainable mining (Segura-Salazar & Tavares, 2018). No single framework or guidance document exists to guide mining companies on how to embrace and integrate SD thinking into their operational models.

The impact of apartheid on the mining industry in SA was significant and continues to affect communities today. The adoption of a 'colour bar' by the mining industry and government during the apartheid era was a means of excluding black labourers from skilled jobs and higher wages, while reserving these opportunities for white workers. This policy not only perpetuated racial inequality but also hindered the transformation of the mining industry. This is well articulated by Schoofs (2000), as cited in Cronjé and Chenga (2009), who indicated that the 'colour bar' resulted in poor economic conditions and an unsustainable mining industry characterised by poverty, unemployment, bad housing, poor infrastructure, prostitution, ill health and an undesirably high influx of documented and undocumented migrant labour. The white unions that advocated for the 'colour bar' policy were successful in keeping the mining industry untransformed, resulting in economic and social challenges in mining communities that have persisted until today, despite the changes in government and policy since the end of apartheid (Cronjé & Chenga, 2009).

The implementation of SD in the SA mineral industry is focused on addressing past imbalances, promoting environmental protection, and driving economic growth. The DMRE has remained the lead authority in implementing policy in the mining industry (Chilenga-Butao & Holland, 2024). Although there are many laws geared towards socio-economic development and the protection of

the environment, the two key pieces of legislation fundamental to the implementation of SD in South Africa are NEMA and the MPRDA.

NEMA is a comprehensive environmental law that provides a framework for the management of the environment in SA (Muswaka, 2017). It aims to promote SD and ensure that development activities do not have a negative impact on the environment. The law requires that environmental impact assessments be conducted for all activities that are likely to have a significant impact on the environment. In the mining sector, this means that mining companies must conduct environmental impact assessments for new mining projects and take steps to mitigate any negative environmental impacts that are identified. NEMA promotes environmental protection and states that "Development must be socially, environmentally and economically sustainable" (Republic of South Africa, 1998, p. 6).

The MPRDA is a law that regulates the mining and petroleum industries in SA. It provides a framework for the granting of mining and prospecting rights and requires mining companies to comply with various environmental and social responsibilities (Morolo, 2023). The law aims to promote SD in the mining sector by ensuring that mining activities are conducted in a way that benefits local communities, protects the environment, and contributes to economic growth. Both NEMA and the MPRDA are important pieces of legislation that are fundamental to the implementation of SD in the SA mineral industry. By providing a framework for environmental protection and socio-economic development, these laws help to ensure that mining activities are conducted in a sustainable and responsible manner.

Mining companies in SA use NEMA and MPRDA as the foundation for complying with SD requirements. The Mining Charter is a regulatory framework developed by the Minister of Mineral Resources in terms of Section 100 of the MPRDA (Morolo, 2023). Its overarching objective is to promote sustainable growth in the mining industry, and it contains several targets that mining companies must meet in order to comply with its provisions. These targets are aimed at advancing the social and economic welfare of mining communities, and include requirements related to local economic development, employment equity, procurement, and local enterprise development (Department of Mineral Resources, 2013).

Beyond legal compliance, some of the mining companies in SA subscribe to the ICMM. The ICMM's principles define good practice requirements for environmental, social and governance of the mining and metals industry. The ICMM principles are intended to promote SD goals and create reporting transparency. Organisations that subscribe to the ICMM are encouraged, in terms of these principles, to integrate SD into their decision-making processes, to respect human rights, to manage environmental and social risks, and to promote the conservation of biodiversity, energy and water (International Council of Mining and Metals, 2022).

By subscribing to the ICMM, mining companies in South Africa can demonstrate their commitment to sustainable mining practices beyond legal compliance (Zvarivadza, 2018). The ICMM's principles provide a framework for companies to integrate sustainability into their decision-making processes, manage environmental and social risks, and promote the conservation of biodiversity, energy and water. The ICMM also requires its members to report transparently on their sustainability performance, promoting accountability and continuous improvement.

The key focus areas in terms of environmental stewardship from the ICMM include biodiversity, climate change, mine closure and water. Mining companies subscribing to the ICMM are expected to minimise risks to biodiversity and not to mine World Heritage Sites. The reduction of the carbon footprint is also one of the key priority areas of the ICMM and thus, mining companies are expected to become part of the solution and contribute towards a low-carbon world (Ateng, 2020). In terms of the ICMM, integrated approaches to mine closure would ensure that mines leave a positive legacy. Mines are expected to also improve the management of tailings and to manage water effectively, ensuring the conservation and the promotion of cleaner water (International Council of Mining and Metals, 2022). The key focus areas for social performance from the ICMM include managing the contribution of mining in national economies, minimising social risks and impacts, ensuring human rights are protected and building skills to ensure mining communities are more resilient (International Council of Mining and Metals, 2022).

On September 25, 2015, the United Nations agreed upon and adopted the 2030 Agenda for Sustainable Development. According to Rashed and Shah (2021), the agenda represents a world plan for taking action by 2030 to tackle the global challenges of environmental degradation and poverty.

It consists of 17 SDGs and 169 targets (United Nations, 2015). Amongst the SDGs are the goals to end poverty, to ensure the availability and sustainable management of water and sanitation for all, and to ensure access to affordable, reliable and sustainable energy for all. In terms of the United Nations (2015), Goal 12 of the SDGs aims "to ensure sustainable consumption and production patterns" (p. 59). Mining companies can choose which of the 17 SDGs are applicable to their operations and then develop programs and plans to support those SDGs. Due to their environmental and social impacts, mining companies remain an important stakeholder that can contribute towards progress for achieving the SDGs. Rashed and Shah (2021) mention that the private sector, including the mining industry, is a job creator and is therefore fundamental for capital and tax income which drives the economy, society, and environment.

Despite the efforts by mining companies and the private sector at large to implement SDGs, Allen et al. (2018) found that the implementation of the SDGs is hindered due to the lack of a useful framework for implementation. In addition, Scheyvens (2018) and Saner et al. (2019), as cited in Rashed and Shah (2021a), suggested that "The private sector should modify their plans to accommodate SDGs for better implementation" (p. 2933).

2.8. Challenges facing sustainable development and sustainability in the South African mining industry

The purpose of this section of the literature review is to examine the current SD challenges facing the SA mining industry. An understanding of these challenges will enable a better appreciation of the sustainability leaders' experiences of sustainability within the industry. The mining industry in SA affects all three pillars of SD, that is, environmental, social and economic, and is one of the most controversial industries in the country as well as worldwide. Many criticise the mining industry in SA for its unequal distribution of wealth, with many communities near mining sites not reaping the benefits of the sector, but only facing social and environmental harm from mining. Consequently, some communities near mines have raised conflicts and experienced negative environmental impacts. Other stakeholders praise and recognise the mining industry as a vehicle for economic growth and infrastructure development, more so since other industries in SA are less developed (Littlewood, 2015).

2.8.1. Abandoned mines

The SA government is faced with legacies of non-rehabilitated mine workings (Naidoo, 2015). Historical laws did not make provisions for mines to allocate funds for the proper closure and rehabilitation of mines when mines cease their operations. As a result, many abandoned mines have become a challenge in SA and have an impact on both communities and the environment. SA historical laws also did not make provision for mines to face legal liability post-closure. Many operating mines who closed due to the end of life of mines or financial constraints left mine infrastructure and tailings dams that were not rehabilitated, without facing any consequences. Such non-rehabilitated workings cause environmental impacts including air quality and water pollution and ultimately affect the well-being of surrounding communities negatively (Guedes, 2010). It is now the responsibility of the SA government to allocate funds and to rehabilitate abandoned mines. Thus far, the SA government is not faring well in terms of addressing what appears to be this unsurmountable task. Cornelissen et al. (2019) noted that there were 6 000 recorded abandoned mines in SA, all non-rehabilitated and impacting the environment and society. Of the 6 000 recorded mines, 249 are asbestos mines which have the potential to impact the health and well-being of communities affected (Cornelissen et al., 2019).

Derelict mines and tailings facilities left after mine closure cause toxic environments which force communities to evacuate their homes due to the degraded environment (Bolong, 2016). Most communities facing such degraded environments lose their livestock as they do not fare well in a polluted environment and communities may also not be able to grow crops. Blasting during mining has the potential to cause houses to crack, amongst other impacts such as dust and noise. Open pit mines change the landscape of the environment and leave dangerous open holes in the ground (Gupta & Lehal, 2009). Soil erosion, loss of plants and trees, wildlife, and destruction of agricultural land all occur as a result of irresponsible mining (Brennan et al., 2005).

In the gold mining sector, abandoned mines have become a hunting ground for illegal miners known as ‘zamazamas’ (Madimu, 2022). Some gold mining infrastructure abandoned by the gold mines, including redundant shafts and tailings dams, have low levels of gold ore that are not accessible by industrial methods. Zamazamas therefore exploit the abandoned mines by carefully

selecting gold-bearing material and rocks and testing the ore using crushing and panning methods (Thornton, 2014). Zamazamas use various materials, most of which, according to Thornton (2014), are locally sourced in SA and can be found in any supermarket. These materials are used to extract gold from gold-bearing rocks obtained from redundant mine infrastructure. From this extraction, the zamazamas sell the extracted metal to world markets, making them part of a synchronised global market operating outside normal legalised and financial systems. Figure 2.1 shows images of zamazamas entering abandoned mine shafts.

Figure 2. 1: Zamazamas (illegal miners) entering abandoned mine workings

Source: Bolhuis (2019)

It would be unfair to suggest that illegal miners cause environmental pollution because they do mine existing non-rehabilitated infrastructure and, in some indirect way, actually contribute towards rehabilitation. However, the informal nature of the zamazama's illegal mining lends itself to turf and territory wars between groups and gangs. Also, at times the pillars that support old shafts are damaged or removed during the mining carried out by zamazamas, creating unsafe working conditions. Zamazamas have to fend off the physical risks associated with their illegal mining activities and may also become entangled in gang wars. Thornton (2014) argues that zamazamas can be viewed as entrepreneurs, mainly motivated young men who, at times, employ up to 20 community members from the poorest areas. However, the risks associated with the illegal nature of their work regularly results in loss of life.

Derelict and ownerless asbestos mines are considered the most concerning due to the health effects associated with asbestos. Asbestos is known to be carcinogenic to humans, with the inhalation of the mineral causing various respiratory diseases such as asbestosis, lung cancer and malignant mesothelioma. Despite many asbestos mining companies facing lawsuits in the 1990s due to the adverse health effects associated with asbestos and the banning of asbestos in several countries, asbestos is still mined in Russia, China, Brazil and Kazakhstan, but fortunately is no longer mined in SA. According to Cornelissen et al. (2019), 249 asbestos mines have been abandoned in SA and the cost to rehabilitate these mines will be nearly R30 billion. The responsibility to rehabilitate will most likely lie with the government since the business owners of these mines are no longer operating. Rehabilitation of infrastructure such as open shafts, pits, dumps and redundant dams will need to be completed to prevent the adverse health and environmental effects of the abandoned mines.

The SA government faces severe challenges in dealing with abandoned mines particularly in light of the fact that there is no specific law in the country that deals with ownerless mines (Mpanza et al., 2021). No specific approaches and methods exist for investigating ownerless mines to ensure that funds are spent responsibly on mines that can be classified as ownerless. Mines can only be classified as ownerless if no owner can be traced and found.

According to Cornelissen et al. (2019), "The lack of specific legislation is problematic as the roles of the parties, the mandate of the DMR and the relevant state-owned enterprises…is unclear" (p. 8). In addition to the above, Cornelissen et al. (2019) argue that certain legislative requirements make the rehabilitation of abandoned mines demanding and challenging. The need for a Water Use Licence for water abstraction for mine rehabilitation projects is strenuous, and so is the requirement for a Mining Right for sourcing materials such as gravel or topsoil to cover mine pits.

In addition to legislative challenges, process challenges have been noted in rehabilitating abandoned mines (Mhlongo & Amponsah-Dacosta, 2016). Administrative processes involving various governmental departments are noted to complicate and delay rehabilitation efforts. The need to involve local communities also thwarts rehabilitation processes and politicises rehabilitation efforts, causing unnecessary delays when agreements are not reached with community members and leadership structures. Cornelissen et al. (2019) found that abandoned mines are a global issue, noting that many countries have only now started formalising responses to abandoned mines.

2.8.2. Environmental pollution

Bolong (2016) emphasised that even though mining provides jobs, promotes economic growth and strengthens trading relations with other nations when done responsibly, mining negatively impacts the environment and causes pollution. His argument is supported by many scholars, including Downing (2002), who argued that poor mining activities in SA have cost the country its greatest resource: the environment. Bridge (2004) indicated that mining has a devastating impact on land, air, water and soil. Bridge (2004) further asserted that mines pollute the environment due to poor compliance with regulatory requirements for environmental protection. Mining-related impacts on the environment can be categorised into: air quality impacts (including noise and greenhouse emissions); land-related impacts (including biodiversity, ecosystems, visual impacts, and waste); and water-related impacts (both surface and groundwater). Consequently, mines negatively impact human health due to environmental pollution caused by mining activities.

Fugiel et al. (2017) states that possible air pollution indicators in mines, amongst others, include emissions of gases such as sulphur dioxides (SOx), ammonia (NH3), carbon dioxide (CO2),

methane (CH4), carbon monoxide (CO) and fine particulate matter. Schwegler (2006) pointed out that dust sources in mines result from blasting and handling of ore, stockpiles, haul roads and waste rock dumps. Dry tailings are known to blow over vast areas, including surrounding villages near mines during windy days, and can contain particulate matter that is harmful to human health; this is especially so when considering the particulate matter less than ten microns (PM10) and two point five microns (PM2.5) in diameter (Moreno et al., 2019). Harmful dust inhalation from mining activities is known to cause black lung disease among miners and communities living near the mines.

The mining industry is an energy-intensive sector utilising 2.7% of worldwide available energy (Fischedick et al., 2014), as cited in Katta et al., 2020). In SA, 65% of energy is generated from coal-based electricity, followed by crude oil (18%). Renewable energy only comprises 11% of SA's energy output and usage (Department of & Energy, 2021). The mining industry in SA is one of the primary consumers of energy. Botha (2022) states that while statistics vary, 14% to 30% of the country's total energy is supplied to the mining industry, 40% of which is consumed by the platinum mining industry. Energy use has implications regarding climate change since most energy is generated from non-renewable energy sources.

The most urgent issue relating to air quality impacts from mines are greenhouse gas (GHG) emissions and climate change impacts. Azadi et al. (2020) claim that although other mining-related impacts are widely studied, climate change impacts from mining remain unaccounted for. Mining contributes to GHG emissions directly and indirectly through the usage of fuel, smelting and gas emissions, and the indirect usage of coal-generated electricity in SA. Norgate and Haque (2010) studied the GHG impacts of mining and found that in copper production, loading and hauling made the most significant contribution to GHG emissions. Norgate and Haque (2010) also noted that falling grades would mean more material and increased energy usage in mines and thus increase the contribution of mining towards the emissions of GHG which would then increase the impacts of mining on climate change.

Ulrich et al. (2020) agree with Norgate and Haque (2010) and assert that the relationship between production costs and GHG has the potential to influence attempts toward cleaner production, and

that a significant relationship exists between ore grades and GHG emission intensity per ton of material mined. For instance, higher ore grades are associated with lower GHG emission intensity per ounce of gold produced, while lower grades are associated with higher intensity. This suggests an inverse relationship between ore grades and GHG intensity.

Noise pollution from mining is also considered to be an air quality-related impact. Many mining activities generate noise, such as haulage, trucks, blasting, drilling, crushing, handling of materials, ore processing and transportation and mine construction. Exposure to environmental noise can cause nuisance and harmful effects to receptors, including village residences located near the mines. Duarte et al. (2015) assert that noise not only has negative impacts on humans but can also negatively affect animal communication and well-being, thus negatively impacting flora and fauna. Duarte et al. (2015) state that noise pollution is still poorly regulated in mines. Compared to other environmental issues, noise pollution is not considered a material issue in mines, as many villages around the mines are exposed to higher noise baseline levels. In actuality, the ambient noise baseline levels have deteriorated in many communities where mines operate.

Mining is a form of land use and, as such, impacts on land. The clearing of vegetation, storage of ore stockpiles and tailings dams all impact negatively on land. Gzik et al. (2003) investigated the heavy metal contamination of soils surrounding mining areas in SA, particularly the Rustenburg area. They found that there was indeed heavy metal contamination in soils surrounding the mines. Metal contaminants included chromium, nickel and other metals extracted from the mines. Although Gzik et al. (2003) did not find any influence on flora, fauna and humans due to the heavy metal contamination, they argued that the land use potential of such an area would be limited as the area would most likely not be viable for agriculture and other land uses. Also, rehabilitation that allows alternative land uses, such as residential and commercial purposes, become impossible post-mining in many open pit mines. Mensah et al. (2025) and Memon et al. (2025) and noted that mining impoverishes local communitties by contaminating sites with harmful elements, thus causing infertile soil resulting in no vegetation growth.

In addition, mine infrastructure is visually intrusive. The 'sense of place' is often lost when mine-related infrastructure such as headgears, tailings dams, waste rock dumps and processing plants are erected. This is more so in green fields where no development has occurred before, and the environment is undisturbed. Waste from mining occupies large spaces of land (Knight, 2018). This includes waste rock dumps and tailings dams. Other waste streams from mines, such as used tires and steel, can be recycled (Oyola-Cervantes & Amaya-Mier, 2019). However, mine processes related waste, such as waste rock dumps and tailings, are often hard to rehabilitate during the life of the mine, leaving lasting negative impacts on the environment.

Developing and operating a mine without losing biodiversity and related ecosystems is nearly impossible as biodiversity and ecosystem-related impacts caused by mining are often immitigable and irreversible. Torres et al. (2022) note that some mining projects occur in areas that contain endemic species necessary for biodiversity and the proper functioning of ecosystems. Such functions are also vital for ecosystem services supply, food provision for animals, and water provision. According to Torres et al. (2022), mining seriously threatens these ecosystems and can cause irreversible impacts due to erosion, pollution, salinisation and traffic interruptions. Torres et al. (2022) found that mining has contributed to species extinction and impacted 1047 species assessed through the Red List, the system used for classifying species at high risk of global extinction.

In SA, the challenges faced by mining and the impacts caused by mining on surface and groundwater are well studied. These impacts are mainly due to gold mining and the associated AMD, which some have also described as the most significant threat to South Africa's natural environment (Ochieng et al., 2010). AMD is a significant problem for coal and gold mining companies in SA, causing water and soil pollution. Ochieng et al. (2010) asserted that "Water draining from coal and gold mines often contains sulphuric acid and heavy metals at high levels" (p. 3351), resulting in the contamination of streams and agricultural lands. Guedes (2010) noted that all provinces in SA are likely to be affected by AMD except the Eastern and the Western Cape. AMD sources are found mainly in Gauteng province in the Witwatersrand Western, Central and Eastern basins. According to Guedes' (2010) findings, the contaminated water from the Witwatersrand basins drains to the Vaal, Orange and Limpopo rivers, which leads to contamination being transported to other provincial waters.

McCarthy (2011) stated that the concerned interest in AMD was triggered by the negative impacts of old gold mines in Krugersdorp decanting contaminated water into the Cradle of Humankind. Rocks that bear 'fool's gold' mineral pyrite or iron pyrite react with oxygen to cause the deposition of sulphuric acid containing water into groundwater and surface water (Tempelhof & Winde, 2019). Many mines in the West Rand and East Rand in SA pump water from underground workings into surface water rivers. This water is sometimes contaminated and acidic, leading to a devastating effect on the environment.

Acidic water is undesirable because it kills aquatic plants and fish and is destructive to the environment. This is by far the most serious risk in the mining industry in SA, particularly relevant to old gold mines and coal mines. Slimes and tailings are known to contain about 3% of pyrite, according to McCarthy (2011). Natural rainwater oxidises the materials from the slimes and tailings and forms sulphuric acid, which infiltrates the dumps and dissolves heavy metals, including uranium. Subsequently, the water reaches rivers and streams and causes widespread pollution to both groundwater and surface water. Although coal mines generally do not have slimes and dumps, water reaches unmined coal and reacts with pyrite in the same way to form acidic water that pollutes surface and groundwater (Tempelhof & Winde, 2019).

Other ways through which mines pollute surface and groundwater include the use of petroleum hydrocarbons which, if not properly managed, can pose serious threats to the environment (Nadim et al., 2000). Ramphisa (2011) noted that petroleum products from mining have presented a category of pollutants that have been the subject of much investigation. Oil spills, leaking tanks and overfilling during the handling of petroleum hydrocarbons from mining activities leads to the contamination of surface and underground water, including soils. However, the impact of petroleum hydrocarbons on surface and groundwater remains underestimated in the SA mining industry. Mining also causes contamination of underground water due to the seeping minerals from mine workings and tables, which may leak into the groundwater table and aquifers (Maya, 2014). Land affected by mining remains polluted for longer periods, long after mines cease to exist and operate (Rai, 2015).

2.8.3. Social impacts of mining

Mining not only has negative impacts on the environment, but also results in negative social impacts which are devastating to communities. Often mining occurs in rural villages and occupies land that would otherwise be used for agriculture in communities that are trying to self-sustain and become self-sufficient. Education levels, particularly in rural villages, are low in SA. While mining brings positive benefits in the supply chain and business opportunities, less sophisticated rural people do not know how to take advantage of the potential benefits from mining. As well noted by Cronjé and Chenga (2009), people from these communities experience a cultural shock and find it difficult to adjust from being an agricultural society to a cash dependent one. The outcome is that supply chain opportunities offered by the mines benefit more affluent and sophisticated business savvy people who reside and originate far from the mines and are thus less impacted by mining.

Affected communities battle to find meaningful business opportunities from most mine operations. Furthermore, the mines do not always absorb enough local labour and instead will import labour from labour-sending areas (Van der Watt & Marais, 2021). Social dynamics may be affected due to the influx of people from labour-sending areas who arrive to work at the mines and rural areas may begin to be as crowded as semi-urban areas. Potentially self-sustaining livelihoods from a rural setting are lost as crops are no longer grown and livestock has no land to grow and roam freely.

Shackleton (2020) emphasised that "Mining operations are one driver of land loss with negative implications for people" (p. 1). Shackleton (2020) investigated the effects of mining in a communal village that lost 8 000 hectares of land due to mining and found that only 23% of households in the affected communities had crop fields while 90% of people in the land unaffected by mining had crop fields. Shackleton's (2020) study implies that the community affected by the mine experienced a reduction of food security and self-sustenance, and a loss of income. The community lost access to grazing and needed to pay money to feed their livestock. This affected the community negatively and people also lost access to natural treatment remedies for better health from

harvesting natural herbs for medicine. Therefore, they were not better off but were instead worse off from mining.

Shackleton's (2020) findings are not surprising. While he investigated a rural village, based on the review of literature conducted by the researcher in this study, it was found that the same devastating effects of mining occur in urbanised areas and mining cities. Greive and McKenzie (2010), as cited in Campbell et al. (2017), noted that new mines bring growth and increase opportunities for housing and other services in cities. This boom increases housing prices however migrants cannot always afford to pay for housing as they flood into areas looking for opportunities for employment in the mines. This results in makeshift housing, squatter camps, informal settlements, tents, caravans, subdivisions and illegal buildings. Social disruptions from the social impacts of mining may erupt, such as increasing substance abuse, prostitution, crime, and conflict between new and existing residents (Lawrie et al., 2011).

Lawrie et al. (2011) found that after mining booms, these effects tend to stabilise once a balance is reached. However, this notion is debatable since it is unimaginable that a city altered by mining can return to its original state. The Rustenburg area where the infamous 'Marikana massacre' occurred in 2012 experienced a boom over the past decades and is home to some of the largest platinum mines in the world. Yet, according to Marais et al. (2015), the municipality in the area struggles to provide services for the growing population and households. Cronje (2014) highlighted that the Marikana tragedy that resulted in 34 mine workers losing their lives is regarded by many as an outcome of the poor living conditions that mineworkers experienced.

Worse effects occur upon the closure of mines when mines shed jobs and stop operating. Siyongwana and Shabalala (2019) studied the area of Pilgrim's Rest in Mpumalanga following the closure of the gold mine that used to operate in the vicinity. The negative impacts of mine closure that were recorded include: increased poverty accompanied by the deterioration of living standards; the emergence of disease and crime; and reduction in employment opportunities and money circulation, leading to reduced buying power. As noted earlier in the chapter, non-rehabilitated mine infrastructure from closed mines impacts the environment and has devastating effects on communities within which the mines were operating. Andrews-Speed et al. (2005) and many other

scholars agree and emphasise that issues such as dust generation, redundant mine infrastructure, open pits and waste rock dumps negatively affect the environment and communities where mines have operated upon the closure of the mine. As indicated by Siyongwana and Shabalala (2019), proper planning is required to avoid and mitigate the negative socio-economic impacts of mining post-closure. This requires forward thinking that goes beyond the profit drive that most mines focus on during the active life of mine.

2.8.4. Economic challenges in mines

The SA mining industry's role in economic development and contribution to employment cannot be underestimated or overlooked. It remains indisputable that the industry is at the heart of the SA economy and plays a vital role in GDP and employment creation. The industry has attracted foreign investment and has given rise to leading global enterprises. In 2023, the SA mining industry contributed 6.3% to the economy of the country, employed 479,228 people, and paid R189.6 billion in salaries and R85.5 billion in taxes (Minerals Council South Africa, 2021).

It is undeniable that the economy of SA needs mining, however, the economic viability of the sector has been challenged over the past years. Global market conditions highly influence the industry since mined minerals are exported mainly from SA to international markets. Gold and platinum prices (these minerals being the top two major employers in mining) have been low in recent years while mines also face shareholder pressure to remain profitable. Input costs (primarily labour and energy) have been rising in many mines while some mineral prices such as platinum have declined over the years from their highest prices and show a declining trend (Baskaran, 2021). According to the findings of a study by Lane et al. (2015), investors rated mining stocks as high risk due to challenges associated with mining and limited shareholder returns. High labour costs, which amount to 36% of operating expenses, and decreasing profit margins have put the mining industry under enormous pressure over the past few years.

More arduous mining conditions also exacerbate the increased operating expenditures as many mines have to mine deeper, exposing workers to increasingly risky physical conditions to mine ore for processing. In addition, Lane et al. (2015) argued that "Poor governance, the prevalence or perception of corruption, tenuous legislative frameworks…unclear royalty and tax regimes make

strategic decisions difficult" (p. 473). The continuous lack of political stability and consistent regulatory frameworks for mining has made strategic decisions nearly impossible for mining leaders. The lack of capacity in government and maladministration that leads to poor spending choices ultimately puts mines under pressure and becomes a barrier for mining companies. In areas with underdeveloped infrastructure, mines are expected to foot the bill and mining licences are linked to large infrastructure projects that exhaust the capital intended to develop the mines.

In the beginning of the past decade, from 2010 until 2014, the mining industry faced political instability, policy uncertainty and labour disputes, one such tragic incident being the Marikana massacre. According to Antin (2013), the Marikana tragedy was also partly caused by labour representation battles between the National Union of Mineworkers and the then newly established Association of Mineworkers and Construction Union. The Marikana massacre greatly reduced investor trust in the mining sector and as a result mines have had reduced cash flow to invest in operations, which has led to job cuts and mothballing of unprofitable operations.

The pressures that mines have faced has led to intense discussion and debate regarding the correct policy to adopt within the mining industry; one such debate revolves around the nationalisation of mines. This debate regarding the nationalisation of mines has led to policy uncertainty as it has been identified as one of the highest risks the mining industry has faced in the past decades (PricewaterhouseCoopers, 2012). The predictions made based on the findings by PricewaterhouseCoopers (2012) have been proven correct since in the past decade investor confidence has declined, several mining operations have ceased to operate, and jobs have been lost.

Burger et al. (2019) elaborated that mining companies have multiple stakeholders who hold multiples interests that at times are at odds. As a result, it becomes difficult for mines to balance the needs of the various stakeholders. This notion from Burger et al. (2019) is understandable when considering that one of the key stakeholders in the mines is the government and communities whose drive is to create and attain employment. The mines, on the other hand, sometimes need to downscale to remain profitable for investors whose goal is to realise dividends and a return on their investment, which may lead to workers being laid off and reduced employment rates.

Balancing the needs of these various stakeholders can be challenging and daunting. Within communities with civic organisations, ward councillors and traditional leaders, mines face land-use conflicts, reputational threats and political interference (Manamela, 2019). The economic viability of the mines is often affected by this as operations do not always run smoothly and mines need to invest heavily in stakeholder engagement and negotiations. Mining executives also struggle to implement profit-focused strategies without consideration of socio-operational agendas and politics. Thus, as Deloitte (2016) states, the pursuit of profits by mines must be balanced with societal and environmental needs. Burger et al. (2019) agrees with Deloitte's (2016) thinking and assert that for mines to conquer the challenges that they face, they need to balance their value creation processes with expectations from various stakeholders.

2.9. Conclusion

The meaning of the terms 'sustainable development' and 'sustainability' are very broad. As noted by Salas-Zapata and Ortiz-Muñoz (2019) this can become a research limitation because the terms are not thoroughly defined in most research. This study has overcome that limitation in the review presented in this chapter by defining the context within which the terms 'sustainable development' and 'sustainability' are used in this research. Firstly, the history and evolution of SD and sustainability was discussed in this chapter. The operationalisation of the concept of SD and sustainability was also discussed from a global perspective and narrowed to a SA perspective, finally concentrating on the SA mining industry perspective.

There are many variable terms used by extension alongside sustainability and SD including CSR, ESG, CS, triple bottom line, and many others. In this chapter a review of these concepts was presented in line with their relevance to the study. Finally, the chapter reviewed literature on current sustainability challenges faced by the mining industry in terms of the environmental, societal and economic challenges facing the sector. This review of the existing literature is relevant as it underpins the objectives of the study and will later inform the findings and results of the study. The next chapter focuses on the second part of the literature review and discusses leadership, particularly sustainability leadership in the context of SA mining. In the next chapter focus is placed on the literature review in terms of leadership and sustainability leadership relevant to the study.

CHAPTER THREE: A LITERATURE REVIEW ON LEADERSHIP AND SUSTAINABILITY LEADERSHIP

3.1. Introduction

The two overarching concepts guiding this study are: (I) sustainability and sustainable development (SD); and (II) leadership. The concepts and theories of sustainability and SD have already been reviewed in the previous chapter in light of the existing current literature. This second part of the literature review, covered in this chapter, focuses on theories relevant to leadership and their associated linkage with sustainability leadership (SL). This is relevant because the study investigates SL in the SA mining industry. Therefore, an understanding of the concept of SL in light of current literature is critical to serve the outcomes of the study.

This chapter first conducts a review of leadership and how leadership is defined and studied by other scholars in relation to the concept of SL. Understanding leadership, specifically SL, from a theoretical viewpoint will enable an improved appreciation of leaders' sustainability experiences in the SA mining industry and facilitate the study outcomes. Leadership theories are therefore discussed in Section 3.3 of this chapter. Section 3.4 reviews literature on leadership styles. The definitions applicable to SL from a literature point of view are discussed in Section 3.5 and 3.6 of this Chapter followed by the SL models. The leadership theories relevant to SL are covered in Section 3.10. The practice of SL in SA mining is covered in Section 3.11. This Chapter concludes with the theoretical framework underpinning the study which will be used as a guiding framework to articulate study findings.

3.2. The history and definitions of leadership

Schein (2017) states that since the Second World War, researchers have been asking what makes a great leader, how successful leaders emerge, and what skills and capacities make them successful. Hunt and Fedynich (2019) explain that ideas regarding leaders and the qualities that demonstrate leadership have evolved over time. Schein (2017) further articulates that until the mid-1920s, the primary themes of leadership studies centred on the centralisation of power and control. This

is when the 'great man' theory described by Thomas Carlyle in 1840, as cited in Early (2017), emerged, which focused on the leader as a hero.

In the beginning and mid-1920s, intelligence, personal attributes and leadership styles emerged as the newer focus of leadership studies and by the late 1920s, leadership studies began to focus more on self-awareness, including enlightened and authentic leadership. According to Schein (2017), researchers have conducted over a thousand studies to identify outstanding leadership's definitive traits, styles and characteristics. Khan (2017) summarised a few working definitions of leadership that have emerged over the years from research by various scholars, as summarised in Table 3.1 below.

Table 3. 1: Leadership definitions

Year	Researcher	Definition
1950	Truman as cited by Ali (2012)	A leader is a man who can persuade people to do what they don't want to do, or do what they're too lazy to do, and like it
1959	Bennis as cited by Yukl (2010)	"…the concept of leadership eludes us or turns up in another form to taunt us again with its slipperiness and complexity. So we have invented an endless proliferation of terms to deal with it … and still the concept is not sufficiently defined" (Bennis, 1959, p. 260)
1961	Tannenbaum, Weschler and Mussarik as cited by Ali (2012)	Interpersonal influence exercised in a situation and directed, through the communication process, toward the attainment of a specialised goal or goals can be called leadership.
1974	Stogdill as cited by Yukl (2010)	There is an almost equivalent number of leadership definitions as the number of people who have tried to define the phenomena.
1988	Bennis as cited by Ali (2012)	A leader or manager sets the target (vision) and then explores the means and ways (leadership) to reads that target
1993	Charlton (1993)	Leadership encompasses the skills, competencies and processes that are required for the empowerment of ordinary people in order to achieve extraordinary goals during adverse conditions, and also to ensure top performance at all times to the benefit of all stakeholders and the organisation.

2014	Sixsmith	Leadership builds strong relationships among people through influence that culminates in the achievement of goals. It is particularly important that leaders create an environment that influences the attitudes and behaviors of people, such that they will feel empowered and consequently strive to maximise their potential.

1999	Hughes, Ginnett and Curphy as cited by Ali (2012)	Men are nothing; it is the man who is everything. It was not the Roman army that conquered Gaul, but Caesar; it was not the Carthaginian army that made Rome tremble in her gates, but Hannibal; it was not 56 the Macedonian army that reached the Indus, but Alexander. Here it is well clear that strength of army is nothing, but the abilities of the commander matter. So leadership is paramount for every moment, action and adventure
2007	Northouse as cited by Sharma and Jain (2013)	Leadership is a process whereby an individual influences a group of individuals to achieve a common goal.
2010	Yukl	Leadership is a process whereby influence is exerted intentionally by one person over others in order to provide direction, guidance and structures, as well as to facilitate group or organisational activities and relationships
2011	Shriberg and Shriberg	Leadership is a non-coercive influence process that can shape people and an organisation's culture, and motivate people to achieve a common goal.
2012	Allio	o The early simplistic paradigm - leadership is good management. o The semantic description - leadership is the process of leading. o The transactional definition - leadership is a social exchange between leaders and followers. o The situational notion - leadership is a phenomenon that precedes and facilitates decisions and actions. o The aesthetical concept - leadership is an art or a craft.
2013	Sharma and Jain	Leadership is a process by which a person influences others to accomplish an objective and directs the organization in a way that makes it more cohesive and coherent.

Source: From Khan (2017, p.55)

From the differing and sometimes opposing views expressed in the studies referred to in Table 3.1, researchers still needed to develop some consensus regarding how outstanding leadership should be defined. This is highlighted by Barker (2002) who ponders "…what to call leadership: is it an art, a study, a discipline, a theoretical construct, what?" (p. 1). Despite the need for a coherent overarching definition, there are countless definitions of leadership. Winston and Patterson (2006) attempted to address the problem of varied definitions of leadership and developed a two paged description of a leader. Bennis (1995), as cited in Epke (2021), identified more than 350 definitions of leadership. To this day, leadership definitions vary across the literature.

3.3. Review of leadership theories

As stated by Specter (2014), leadership theories have evolved over time, with the latest emphasis being placed not only on the behaviour of leaders but also on their relationship with their followers. This is in contrast, according to Hannah et al. (2014), to the so-called 'traditional' leadership models such as situational, contingency and path-goal leadership theories, which focused more on exchange relationships between leaders and followers and providing support and direction. Hannah (2014) agreed with the views expressed by Specter (2014), emphasising that "Leadership theories have shifted over the last few decades from a focus on managerial functions and economic leader–follower exchanges toward greater focus on the interpersonal dynamics occurring within the leadership process" (p. 598). Hannah (2014) asserted that more recent theories of leadership were created in order to address neglected topics such as leader vision, transparency, morality, emotional effects, individualised attention and intellectual stimulation.

Hannah (2014) further indicate that new leadership theories focus on what drives 'followers' to go beyond managers' performance expectations, display high levels of effort, contribute to the group or colleagues and suggest creative recommendations and ideas to benefit the organisations. Emerging theories acknowledge that followers need to be willing to be led and be open to the influence of the leader (Derue et al., 2011). Newer leadership genres include authentic leadership, spiritual leadership, charismatic and transformational leadership, ethical and character-based leadership, servant leadership, and shared leadership (Liden et al., 2008).

Hannah et al. (2014) noted that new genre theories have, however, been criticised for having an overly humanistic approach focusing on morality and detaching the leader from the required 'daily demands and leadership practice. The inclusion of morality into what makes a great leader is considered arbitrary by critics of new genre theories. Hannah et al. (2014) further indicate that certain critiques of new genre theories consider the inclusion of follower feelings, needs and desires into organisational leadership as a potential cause for neglect of organisational goals. Visser (2011) linked leadership theories to SL. The transformational leadership theory was particularly relevant to Visser's (2011) definition of what a leader is, that is "Someone who can craft a vision and inspire people to act collectively to make it happen, responding to whatever changes and challenges that

arise along the way" (p.2). The main leadership theories will be discussed in the subsections to follow.

3.3.1. Trait or great man theory

According to the trait theory of leadership, a great leader is made due to inborn traits including distinct physical, personality and ability characteristics (Northouse, 2021). According to the trait leadership theory, leaders are born with innate talents and traits that enable them to become successful leaders more than most. Thus, in accordance with the trait theory, great leadership cannot be learned as leaders are born not bred (Henman, 2011). The trait or great man theory of leadership was challenged by Stodgill (1948), as cited in Harter (1999). Stodgill (1948) posited that there were no specific traits that characterise good leadership, nor particular traits to be associated with effective leadership. Instead, Stodgill (1948), as cited by Henman (2011), concluded that "A person does not become a leader by virtue of the possession of some combination of traits, but the pattern of personal characteristics of the leader must bear some relevant relationship to the characteristics, activities, and goals of the followers" (p. 2).

3.3.2. Skills theory

After Stodgill (1948) challenged the great man theory, research was conducted to investigate leadership skills, and several theories emerged based on this research. The theory of skills focused on leaders' personal attributes and how these attributes resulted in effective leadership. Such skills are said to be learnt and better utilised through experience. The skills theory posits that leaders can learn how to be leaders; therefore, those unable to lead can learn how to lead. Judgement, knowledge and problem-solving skills were identified as vital skills that could be learnt and thus lead to effective leadership. This suggests that anyone willing to learn can then be a leader. The skills theory enabled scholars to explore how leaders can adapt to changing environments and use educational models to lead (Bass and Bass, 2009); Northouse, 1999).

3.3.3. Behavioural theory

Harter (1999) said that the first study on behavioural theory as it applies to leadership was conducted by Lewin et al. (1939). Early research on behavioural leadership theories focused on tasks

and relations. The behavioural theory suggests that leadership is more than just expression of innate traits and includes learned behaviours. Behavioural theory also focuses on the interactions between leaders and followers. Bass and Bass (2009), as cited in Shaw (2018), explain that according to behavioural leadership theory, followers are independent thinkers who could be motivated through rewards which impacts attitudes and morale. From the behavioural theory perspective, the idea of human relations was promoted, showing that the inclusion of employees in decision-making could produce positive or negative outcomes. Thus, the theory includes participant leaders who consider followers' opinions prior to decision-making and remain accountable for final decisions. Hence, the behavioural theory promotes the training of leaders to interact better with followers to create positive results (Bass & Bass, 2009).

3.3.4. Situational and contingency theories

The situational theories of leadership began to emerge in the 1960s. Research on situational theories investigated how situational factors impacted leader behaviour. Situational leadership theories are based on the notion that individual characteristics make for suitable leadership only in certain situations (Henman, 2011). Fiedler (1967) claimed that successful leadership depended on the leader's ability to influence a situation, which depends on their personality and skills. Thus, according to Fiedler (1967), the critical question to ask is 'What kind of people are required for the successful leadership performance in a particular type of situation?' Fiedler (1967) posited that the success of the motivating performance is dependent on favourable situational conditions and the outcome of the relationship and task orientation. Fiedler's (1967) propositions regarding contingency theory suggested the consideration of both the task and emotional needs of followers.

The contingency theory of leadership was proposed to determine when a task-oriented approach instead of a relationship-oriented approach would result in effective leadership outcomes. In this vein of theorising, Henman (2011) referencing Fiedler (1967) suggests that when the situation is bad (or not favourable), a task-oriented leader is more effective. Unfavourable conditions may include, amongst others, poor organisational relations or undesirable tasks, or stressful work. In such a situation, a task-oriented structured leader exercising control can remove undesirable ambiguity and anxiety (Henman, 2011). When situations are moderately favourable, as in when there

is no crisis, the leader can be more effective by using a relationship-oriented approach that focuses on personal needs of individuals and building confidence. Henman (2011) argued that this brings about more work satisfaction to individuals. According to Fiedler's (1967) theory, performance can be improved either by adapting the leadership style or changing the group-task situation.

3.3.5. Transactional theory

Maloş (2012), as cited in Shaw (2018), said that the transactional leadership theory includes rewards and punishments based on the concept that followers need to be motivated using a carrot or stick approach. Thus, by using rewards and punishments, according to the transactional theory, followers need to be motivated to obey rules and procedures to create successful outcomes. Bass and Bass (2009) noted that the transactional theory assumes that employees have little or no autonomy to make their own decisions and therefore need to be encouraged to follow procedures. Northhouse (2016) stated that transactional leadership theory focuses on extrinsic motivating factors such as money and promotions, and assumes that when such rewards exist, employees would be motivated to surpass targets. Northouse (1999) pointed out that transactional leadership theory operates under the notion that followers are a group of people who will react in the same manner and there is no allowance for followers to be individualistic.

3.3.6. Management theories

Management theories are also considered to fall under the transactional leadership body of theories and these focus on the role of supervision, organising and performance. Managerial leadership approaches emanating from management theories are used in business to punish failure and reward success. Some of the key assumptions of managerial and transactional theories, as adopted from Maloş (2012), include the assumption that people work best under chain command motivated by rewards and punishments. In addition, the managerial theory advocates for followers adhering to instructions of the leader and leaders monitoring subordinates to ensure performance.

3.3.7. Theory X and Y

Theory X and Y was formulated by a popular and well-known scholar, Douglas McGregor (1906-1964). The theory posits that leaders' assumptions about followers affect how organisations are

run; thus, the assumptions fall into two categories, X and Y, which describe two contrary and opposing styles. According to X theory, the average human dislikes work and therefore must be coerced, controlled and directed to exert effort toward the achievement of organisational goals (Turbanti, 2023). Contrary to theory X, theory Y posits that work effort comes as naturally to employees as play and that people will exercise self-direction and self-control to meet company goals. Theory Y also assumes that work achievement in and of itself brings internal rewards to employees, such as the satisfaction of one's ego and self-actualisation needs. According to theory Y, the average human being and employee learn to accept responsibility and actively seek it to fulfil organisational goals (McGregor, 1960).

3.3.8. Transformational leadership theory

Bass and Riggio (2010) said that in 1978 James MacGregor Burns conceptualised leadership either as transactional or transformational. The theory of transactional leadership has already been discussed in section 3.3.5 above. Transformational leaders, according to Burns (1978), as cited in Bass and Riggio (2010), and are those who stimulate followers to develop and achieve extraordinary goals, and those who inspire followers. Transformational leaders are said to move followers to excel beyond expectation (Egri & Herman, 2000a; Muenjohn & Armstrong, 2008; Peng et al., 2020; Robertson, 2018; Vinger & Cilliers, 2006; Yates, 2013). Avolio and Bass (1998) identified key components of transformational leadership, namely (I) idealised influence; (II) inspirational motivation; (III) intellectual stimulation; and (IV) and individualised consideration.

3.3.9. Servant leadership

A servant leadership is defined as a leader who emphasises the empowerment and development of followers whilst at the same time inspiring followers to act as servant leaders. Greenleaf (1977) purported that organisational institutions have a responsibility to care for society. He also noted that some organisational institutions are large, powerful and impersonal, while others may be corrupt. Such organisations are more likely to impact both the environment and society negatively. Thus, exhibiting servant leadership, leaders within organisations need to promote stewardship for the environment and society and become servants of the environment and society. Based on the theory of servant leadership, such servants will create and improve environmental conditions and

societal well-being, thus promoting SD (Mittal & Kaur, 2023). Servant leadership focuses on the growth and well being of people and communities. The key characteristics of servant leaders include empathy in decision making, good stewardship and offering a sense of belonging, connection and collaboration between followers (Zarei et al., 2024).

3.3.10. The spiritual leadership theory

Piwowar-Sulej and Iqbal (2024) noted that spirituality involves finding meaning around one's work, sense making, interconnectdness and deeper intrinsic value. Spirituality is said to bring job satisfaction, improve employee morale, motivation and job performance. Spiritual leadership integrates spirituality and value-based principles to connect followers to vision and purpose (Fry, 2003). Spiritual leaders inspire a sense of meaning in the workplace encouraging people to contribute something larger than themselves. Leaders possessing characteristic of spiritual leadership lead with honesty and integrity, are self-aware and mindful of their thoughts, actions and emotions. These leaders make decisions based on compassion, fairness and ethical considerations (Caza & Jackson, 2011; Piwowar-Sulej & Iqbal, 2024).

3.3.11. The theory of authentic leadership

The theory and concept of authentic leadership developed due to concerns regarding the values of leaders (Gardner et al., 2011). Thus, a new type of leadership based on genuine value-based approaches was called for. Authentic leadership emphasises transparency, self-awareness and values. Leaders adopting authentic leadership aim to be true to themselves building trust and meaningful relationships with the people that they lead. Authentic leaders encourage themselves to have self-understanding and possess vital understanding of their own strengths, weaknesses and emotions. These leaders value open and honest communication sharing their thoughts and decisions with teams to create an environment of trust and respect (Ahmed, 2024; Lorenzo & Aurora, 2022).

3.3.12. The theory of responsible leadership

Responsible leadership refers to a leadership approach that focuses on making decisions and taking actions that are ethical, sustainable, and beneficial to all stakeholders, not just a select few. It involves considering the impact of decisions on employees, customers, communities, the

environment, and future generations. Responsible leaders hold themselves and their teams accountable for the actions and the consequences of their actions (Maak & Pless, 2006). These leaders do not solely focus on short-term gains but also prioritise the long-term sustainability of actions considering environmental, social and economic factors. Responsible leaders are transparent and are committed to the well-being of society and societal challenges including poverty, inequality and wellness (Abraham, 2024; Matos et al., 2025).

3.4. Leadership styles

Leadership styles can be autocratic, democratic or participative. Leaders using an autocratic style tend to make decisions alone and command people to follow. They use what Iqbal et al. (2015) refer to as 'I Tell' philosophy. Autocratic leaders tell their teams and colleagues what to do. Although this leadership style can be effective for giving direction, it ignores ideas and opinions from other team members. When working with senior teams it is also impossible to hold team members accountable since they do not exercise their own thinking in decision-making; instead, they implement a decision that the leader wants (Bwalya, 2023).

Democratic leaders, on the other hand, make decisions in consultation with teams and allow all team members to share their views (Woods, 2021). These leaders let everyone have and express an opinion and only then do they make the final decision. Democratic leaders first ask the team what their opinion is, and the group is then allowed to decide democratically that which is authorised by the leader. Participative leaders adopt a facilitator type of leadership, by encouraging the team to work together in setting goals and developing plans. This leadership style is considered essential for succession planning as it enables future leaders to develop from participating (Iqbal et al., 2015).

3.5. Sustainability leadership: The definition

According to Ferdig (2007b), "Sustainability leaders are informed by an expanded view of the complex universe. Being a sustainability leader means letting go of the ego-driven certainty of right answers and genuinely engaging with different points of view" (p. 32). SL contains elements from other leadership theories. Transformational, shared leadership and servant leadership theories

all have a place within the theory of SL. Thus, as well put by Bass and Bass (2009), cited in Shaw (2018), each theory contributes a foundation and groundwork upon which emerging theories are built.

Research in terms of SL is still in its infancy however a few scholars have already begun to focus on this area. The term 'sustainable' is founded from the basis of environmental concern. Berry and Gordon (1993) defined 'environmental leadership' as the ability of an individual or group to guide positive change toward a vision of an environmentally enhanced future. Egri and Herman (2000b) defined environmental leadership as "The ability to influence individuals and mobilise organisations to realize a vision of long-term ecological sustainability" (p. 2). Robertson (2018), as cited in McCutcheon (2022), views environmental leadership as "A manifestation of transformational leadership in which the content of the leadership behaviours are all focused on encouraging pro-environmental initiatives" (p. 4). Berry and Gordon (1993) emphasise that environmental problems are long term, complex, multi-disciplinary and emotionally charged, and therefore require forms of leadership that are different from traditional leadership.

Although environmental leadership and SL are fundamentally different, one can only exist by taking into consideration the other. As iterated by McCann and Holt (2010), "In determining a definition of sustainable leadership, environmental definitions seem to have framed and defined the topic" (p. 208). In contrast to environmental leadership, SL does not only have the ecological or environmental focus, it encompasses a cosmopolitan view of issues that also includes human rights and social justice. McCann and Holt (2010) use a business angle in their definition of SL as "…concerned with creating current and future profits for an organisation while improving the lives of all concerned" (p. 209). Visser (2011) defined a sustainability leader as "Someone who inspires and supports action towards a better world" (p. 3). Visser (2011) also referenced the definition of SL suggested by the Sustainability Leadership Institute (2011), that is, "individuals who are compelled to make a difference by deepening their awareness of themselves in relation to the world around them. In doing so, they adopt new ways of seeing, thinking and interacting that result in innovative, sustainable solutions" (p. 3).

Ferdig (2007b), as cited in Gabel (2022), defined a sustainability leader as someone "who takes responsibility for understanding and acting upon complex sustainability challenges" (p. 40). This suggests that SL is about taking responsibility in understanding and acting upon complex sustainability challenges faced by the world and organisations alike. Such challenges have been highlighted in the literature discussed in Chapter Two and include, amongst others, the increase in environmental pollution, lack of clean water and sanitation, global warming, and issues related to poverty alleviation and reduction of inequality. Corporate organisations have a role to play and remain a powerful instrument to deal with some of these SD challenges.

3.6. Interchangeable terms for sustainability leadership

During the review of literature, the researcher found that many terms used in the literature can be confused with SL. As noted by Brown (2012), SL goes by various names depending on the perspectives and contexts addressed. It is therefore important to mention such terms for the benefit of the readers of this research so that they can denote the correct interchangeable terms used to refer to SL.

SL is also referred to as leadership for sustainability in some literature. The difference between SL and leadership for sustainability is a matter of framing and perspective. SL adopts a viewpoint that sustainability as a theory developed from the Brundtland Commission Report (1987) needs to be led, driven and championed for organisations, stakeholders and businesses to implement it successfully. Leadership for sustainability, in a different approach, uses leadership theories as the primary bases from which sustainability implementation can take place. Thus, the basis of contrast between one and the other is merely sustainability theory versus leadership theory orientation. In this research, the terms are used interchangeably depending on context and derived meaning.

SL is, however, separate from leadership sustainability. Ulrich and Smallwood (2013) explain this well and state that SL is about leadership influence and effectiveness in caring for earth's resources. In contrast, leadership sustainability is about caring for organisational resources by getting things done.

The term environmental leadership is also used in literature (Dechant & Altman, 1994; Egri & Frost, 1994; Portugal & Yukl, 1994; Redekop, 2010). The theory of environmental leadership focuses on the environment as the primary pillar of sustainability and seeks to investigate how environmental issues can be addressed through leadership. The use of the term 'environmental leadership' does not encompass the social and economic pillars of sustainability. However, the natural environment would always have implications in relation to the socio-economic pillars of sustainability. 'Environmental leadership' will be used in this research on a few occasions where environmental leadership literature is referred to as linked to SL.

The theory of sustainable leadership was also found in the review of the literature (Gerard, 2020; Kanters, 2013; Nartgün et al., 2020). Tideman et al. (2013) indicated that sustainable leadership is necessary for creating sustainable organisations. Sustainable leadership is a paradigm for business leadership. Tideman et al. (2013) argued that, in pursuit of profits, many businesses tend to use outdated models that ignore the environment's and society's needs. They identified attributes for sustainable leadership as imperative for business leadership. These attributes include holistic thinking, adaptivity, systems thinking, collaboration and collectiveness (Tideman et al. (2013). The theory of sustainable leadership lends itself towards creating sustainable value for business with a primary focus on holistic business leadership. Although sustainable leadership may support and lead towards the realisation of SL in industry, sustainable leadership's primary focus and orientation is toward business leadership. In contrast, the primary focus of SL is toward SD within the context of the SD theory defined in the Brundtland Commission Report (1987).

In this study, sustainable leadership will not be used interchangeably with SL. Although the two theories are related and support each other, they do not mean the same thing. Many scholars use the term sustainable leadership to indicate SL or vice versa. One such scholar is Shaw (2018), who explained the theory of sustainable leadership as a theory that addresses how a leader needs to have a vision and mission to address community, social and environmental impacts, that is, the triple bottom line. Contrary to Shaw's (2018) thinking, Avery and Bergsteiner (2012), as cited in Gerard (2020), did not refer to the triple bottom line in their definition of sustainable leadership, instead suggesting that "sustainable leadership requires taking a long term perspective in making decisions; fostering systematic innovation aimed at increasing customer value; developing a

skilled, loyal and highly engaged workforce; and offering quality products, services and solutions" (p. 8).

A more expansive review of the literature suggests that sustainable leadership should address organisational resources with a minor focus on the triple bottom line and more emphasis on creating sustainable organisations. SL seeks to promote and implement SD and to create thinking systems and collaborations that will lead towards achieving the SDGs. Having noted this, it is essential to highlight, as McCann and Holt (2010) have done, that the concept of sustainable leadership is a new theory and remains complex and may be confusing for leaders and organisations. Research is still emerging in this area and there needs to be a coherent universal definition of what sustainable leadership really entails. Avery and Bergsteiner (2012) assert that "…there is no one 'right' way within the overall sustainable leadership paradigm" (p. 5) while Tideman et al. (2013) add that "…there are many meanings, ideas are constantly changing, emerging and being redefined" (p. 8).

3.7. The case for sustainability leadership

Brundtland (1987), as cited by Ferdig (2007b), stated "Humanity has the ability to make development sustainable – to ensure that it meets the needs of the present without compromising the ability of future generations to meet their needs" (p. 5). Hull et al. (2020) noted that finding solutions to sustainability challenges goes beyond the development of technical skills and expertise, but that engagements and collaborations and a resolve to make decisions within uncertainty are also required. Brown (2011) found that significant changes in organisations and social systems are needed to achieve sustainable development goals. The challenges facing sustainability have been highlighted in the preceding chapter of this research. To reiterate a few points:

- Ecosystems in which humans and society live and depend are being degraded and polluted continuously on a daily basis, putting the world at risk and creating irreversible and immitigable environmental and social impacts. The mining industry is not divorced from these issues, as demonstrated by many scholars (Makua & Odeku, 2017; Meadows et al., 1972; Munnik et al., 2010a; Ololade, 2012).
- Scientific investigation is showing that climate change is worse than previously thought. Carbon dioxide emission is beyond acceptable levels, warming the earth and affecting the

wellbeing of both the environment and humanity. In addition, land, sea and air temperatures are rising causing glaciers to melt, amongst an array of detrimental consequences. Extreme weather events that endanger the lives of people and species in the planet are becoming increasingly prevalent (Azadi et al., 2020; Zakaria, 2022; Ferreira & Leite, 2015; Gupta & Arts, 2018; Hub, 2022; International Institute for Sustainable Development, 2022; Monteiro et al., 2019b; The World Bank, 2022).

- Fresh water supplies are either drying out or becoming too polluted for consumption by humans and animal species. Water pollution due to human activities remains rampant. The lack of good sanitation affects the livelihood of many people in the world living in abject poverty (Adler et al., 2007; Askham & Van Der Poll, 2017; Echavarria, 2018; Mhlongo et al., 2018; Ochieng et al., 2010; PricewaterhouseCoopers, 2012; Tuazon et al., 2021)
- The competition for land-use is increasing, along with unemployment, particularly in African countries. People who were self-sustaining within rural areas can no longer do so due to increased industrial activity. The social-related impacts of industrialisation, urbanisation, and mining has impacted the environment and livelihoods of societies (Adler et al., 2007; Ledwaba & Nhlengetwa, 2016; Leon, 2012; Munnik, 2010; Munnik et al., 2010a; Selmier & Newenham-Kahindi, 2021; Sonter et al., 2014).
- Natural species are now being lost one thousand to ten thousand times faster than the natural rate of loss. This results in species extinction and impacts upon the biodiversity of healthy ecosystems. Habitat loss, deforestation, unsustainable industry practices and pollution are some of the reasons for accelerated species extinction (Chivian & Bernstein, 2008; Ferdig, 2020; Fugiel et al., 2017).

The findings by scholars mentioned above show that the consequences of human activities have destroyed the long-term viability of ecosystems and created unacceptable social conditions in communities around the world. Ferdig (2007b) found that from 1950 to 2004, water use increased threefold, the use of wood more than doubled, and the consumption of coal, oil and natural gas increased more than fivefold.

The business-as-usual approach towards leadership needs to contribute positively to the well-being of the people and the environment. While business is a significant instrument for change in the

world, the sad truth is that many business leaders still adopt Friedman's (1970) theory which suggests that 'the only business of business is business'. As Schein (2017) echoed, many business leaders still do not believe in SD and/or that climate change is actually occurring as a result of human activity. The result of this, as well articulated by Tideman et al. (2013), is that business leaders continue to operate with a short-term view with the main goal of creating short-term profits whilst jeopardising the society and the environment in the longer run. Crosby (2017) found that only 10% of business leaders have action plans in place to implement SD.

The argument is usually that business creates employment and economic growth, however as well noted by Schein (2017), employment is beneficial but is still a short-term benefit to society when it is not sustainable and occurs at the expense of the environment and societal well-being. The key question then is, 'what sort of leadership is needed to enact sustainable development and contribute meaningfully towards the realisation of sustainable development goals?' Many scholars have attempted to answer this question.

Faber et al. (2005), as cited in Tideman et al. (2013), pointed out that leaders need to lead and guide their organisations in volatile times and that they must do so in a sustainable manner. Ferdig (2007b) provided a comprehensive explanation of SL and indicated that, instead of providing answers, sustainability leaders design and implement solutions in collaboration with others and bring multiple stakeholders with diverse views together to find solutions to complex problems. Sustainability leaders are flexible and embrace the idea that continuous change is inevitable. They are system thinkers who think holistically across various dimensions. Sustainability leaders take conscious actions, individually or as a collective, which results in positive outcomes for the environment, society and the economy. Their actions reach beyond short term profits and self-interest. They also embrace attributes required from business leaders such as strategic thinking, planning, communication and good management; however, they go beyond traditionally adopted leadership views to transform business towards positive environmental and social change.

Tideman et al. (2013) said that sustainability leaders are concerned with creating future profits for organisations while improving the lives of all concerned. Scholars such as Robertson (2018) investigated SL in the context of environmental leadership. They found that sustainability leaders

have positive behavioural characteristics and, similarly to transformational leaders, as investigated by Bass (1985), they exemplify the four behaviours of transformational leadership, also known as the four I's. These behaviours are idealised influence, inspirational motivation, intellectual stimulation and individualised attention. Sustainability leaders act as role models and exhibit pro-environmental behaviours through environmental and social stewardship. They seek out and implement initiatives that lead to environmental and social well-being, ensuring that they do what is ethical and going beyond self-interest. They make sure that the organisation does not compromise the environment, society or the business.

Sustainability leaders act as champions for positive environmental and social change by encouraging organisations and followers to engage in behaviours that are good for SD, the environment and the companies which they lead (Boeske, 2023). They promote pollution prevention, waste reduction and socio-economic environmental projects that lead to environmental stewardship and the improvement of local economies, as well as resource consumption savings. Sustainability leaders challenge traditional perspectives and the status quo when it does not lead to positive enviro-social change. They promote innovation that seeks to improve environmental and social conditions. By understanding that they need followers to achieve sustainable development goals, according to Osibo (2023), sustainability leaders pay attention to their followers' individual needs to ensure that they are in a position to deliver action plans that will contribute positively towards the environment and social issues facing the businesses within which they operate.

3.8. Sustainability leadership themes

This section serves to highlight emerging themes from the review of the literature conducted by the researcher pertaining to SL. The understanding of these themes will enable a foundation for this study to be developed to better examine leaders' experiences of sustainability in the SA mining industry. La Trobe and Acott (2000) state that "An understanding of how environmental concern is reflected in people's attitudes and value systems is important for the development of responsive environmental management" (p. 1).

Scholars have theorised that environmental problems, and therefore sustainability problems, are rooted in traditional values, attitudes and beliefs held by society and business leaders (Disch, 1970;

Dunlap & Van Liere, 2008). This typology of values can be dubbed a dominant social paradigm (DSP), a term first coined by Pirages and Ehrlich (1974) who described it as the collection of norms, beliefs, values, habits and so on that form the worldview most commonly held within a culture. Several decades ago, according to Dunlap and Van Liere (2008), the prevalent worldview was what was termed the 'industrialised DSP', that is, an anti-ecological belief in an abundant natural environment that drove the press towards growth and prosperity, coupled with misplaced faith in science and technology, which contributed to environmental degradation. As suggested by Egri (2000), the industrialised DSP is an anthropocentric worldview based on the assumption of limitless environmental resources enabling uncapped material consumption and economic growth, and faith in the use of science and technology to solve sustainability challenges.

In contrast to the industrialised DSP that was dominant in earlier decades, the New Environmental Paradigm (NEP) is a worldview that takes environmentalism into greater consideration. NEP is an ecocentric worldview based on the belief that planetary resources have limits that restrict economic growth, and that technology should not be completely trusted to solve SD problems (Dunlap & Van Liere, 2008). Six decades ago, Dunlap (1977) theorised that people's attitudes toward the environment had changed and their concern for the environment had increased. Thus, Dunlap (1977) developed the NEP scales to measure environmental paradigms and worldviews. To some extent, literature shows that Dunlap's (1977) theory was confirmed as many policies were developed in the late 1970s and 1980s to prevent environmental pollution (Brundtland, 1987; Egri & Frost, 1994; Brundtland, 1987; United Nations, 1992). However, since then pollution levels have continued to increase, along with the complexity of environmental and subsequent social issues (Dyllick & Hockerts, 2002; Harding, 2006; Montiel, 2008; Porter & van der Linde, 1995; Rydin, 2002).

The theories of the industrialised, anti-ecological DSP and the NEP are also linked to the findings of Weldford (1995), as cited in Joyce Stuart (2013), regarding the importance of the personal values of leaders towards a successful implementation of sustainability strategies. Weldford (1995) emphasised that personal values influence how leaders implement sustainability strategies. Branzei et al. (2000) empirically tested the theory regarding the role of leader personal values in implementing sustainability strategies and found that personal values have an essential role to play.

Thus, as well noted by Joyce Stuart (2013), the leader's value placed on sustainability as well as the leader's personal values have a significant impact on the successful implementation of SD within an organisation.

Recognising, based on their review of the existing literature at that time, that there were no generally accepted criteria that could be used to describe sustainability leaders, Fernández et al. (2006) investigated characteristics of managers that lead a firm to environmental success. Fernández et al. (2006) found that environmental leaders, and therefore sustainability leaders, ought to have excellent communication characteristics and must engage both internal and external organisational stakeholders successfully. They need to be open to change and use a participative leadership style with an ability to form teams. Sustainability leaders must be technically adept and should exhibit transformative leadership behaviours in combination with a small degree of transactional leadership.

The findings of the review conducted by Fernández et al. (2006) align with Egri's (1994) findings that environmental and social change advocacy leadership requires guiding company processes, accepting change as a process rather than an outcome, and retaining a long term and global perspective while acting locally and in the short-term. Egri (1994) also highlighted that SL is not an isolated phenomenon but requires an internal and external collaborative effort in the organisation.

Fernández et al. (2006) did conduct a broad review of literature but relied heavily on Egri and Herman's (2000b) findings on the study of environmental leadership. Egri and Herman (2000b) surveyed for-profit and non-profit organisations to develop a demographic profile of leaders who are leading environmental change and exhibit leadership characteristics. Egri and Herman (2000b) found that the environmental leaders practiced transformational and transactional leadership. The results from Egri's (1994; 2000; 2004) studies also suggest that sustainability leaders are open to change and are self-transcendent, that is, they are concerned with the wellbeing of humanity and the natural environment.

Boiral et al. (2009) investigated how stages of consciousness development of leaders can influence meaning and corporate leaders' capacity to consider complex environmental issues and related demands. The study by Boiral et al. (2009) was based on the theory of the action logics of

leadership, as developed by Rooke and Torbert (2005). Rooke and Torbert (2005) theorised that great leaders are differentiated not by personality or philosophy, but by how they interpret their own behaviour and the behaviours of others in maintaining power and protecting against threats to the business, a concept that they refer to as 'action logics'. According to Rooke and Torbert (2005), action logics either stunt or activate organisational performance.

Boiral et al. (2009) investigated how the seven action logics developed by Rooke and Torbert (2005) affect environmental leadership, that is, how leaders and managers give meaning to sustainability challenges and address them within organisations. Boiral et al. (2009) found that leaders using the 'opportunity' action logic were least favourable for the emergence of environmental leadership. This is because these leaders and managers are unlikely to be sensitive to SD issues. Since they are driven by self-interest, they are more likely to attend environmental issues when they present a threat to their position of power or gain. The threat can come from stakeholder pressure while the gain may pertain to the improved image and prestige associated with green performance in some organisations.

The 'diplomat' action logic was seen as useful in terms of sustainability performance because of the inclination of such leaders and managers to avoid stakeholder conflict and pressure. The downside of the diplomat action logic is that these leaders and managers are most likely to be comfortable with maintaining the status quo within organisations. This does little to serve SD since most challenges associated with sustainability and environmental leadership are complex and demand the mobilisation of stakeholders.

The action logics most suitable for sustainability and environmental leaders, according to Boiral et al. (2009), is the strategist and the alchemist. 'Strategic' action logic leaders can better deal with resistance to change and divergent points of view as well as conflicts that may arise from such viewpoints. Their ability to mobilise fellow executives and employees towards an environmentally sound vision enables them to solve complex SD challenges in organisations. These leaders can integrate theory and practice towards implementing policies and systems geared towards enviro-social positive outcomes.

The most accomplished leaders are those who employ the 'alchemist' action logic, according to Rooke and Torbert (2005). These leaders are said to have a holistic view of challenges and are talented in managing complex problems. Alchemists have the ability to think at different levels of reality and deal with multiple problems in an integrated manner all while carefully considering the short-term and long-term implications of sustainability challenges. They are able to integrate other action logics and exhibit expert, individualistic and achiever action logics where necessary through adaptation. Boiral et al. (2009) reported that alchemistic leaders exhibit more ethical values as they prefer transparency, truthfulness and honesty. Thus, they are more likely to be authentic and not rely on false appearances when dealing with environmental and social challenges within organisations.

3.9. Sustainability leadership (SL) models

This section summarises the existing relevant SL models from the current body of literature as developed by scholars including Portugal and Yukl (1994), Shrivastava (1995), Epstein et al. (2010), Akins et al. (2013) and Fry and Egel (2021). Other SL models and theories relevant to SL will also be considered thereafter.

3.9.1. Yukl and Portugal's leadership model

Portugal and Yukl (1994) developed a conceptual framework of leadership processes and behaviours to address complex sustainability challenges. These researchers noted that SL is better understood as a process involving various levels of influence, that is, individual, organisational, internal and external.

According to Portugal and Yukl (1994), individual influence happens during interaction with individuals within an organisation to influence their attitudes, logic, behaviours and values. The individuals within the organisation include subordinates, peers and senior people within an organisation. Thus, sustainability leaders according to Portugal and Yukl's (1994) model, as depicted in Figure 3.1, gain converts to drive sustainability initiatives within an organisation and influence policies and procedures for the betterment of the organisations pursuit of SD.

Internal leadership influence happens within an organisation and may include changing organisational policies, developing new systems, setting objectives and targets and changing product designs. External leadership involves creating networks outside the organisation and influencing external stakeholders, customers, suppliers, community stakeholders, activists and governmental stakeholders.

Portugal and Yukl (1994) identified three behaviours relevant for leaders to drive SD: (I) articulating an appealing vision; (II) changing perceptions about sustainability issues; and (III) taking symbolic actions to demonstrate commitment to SD.

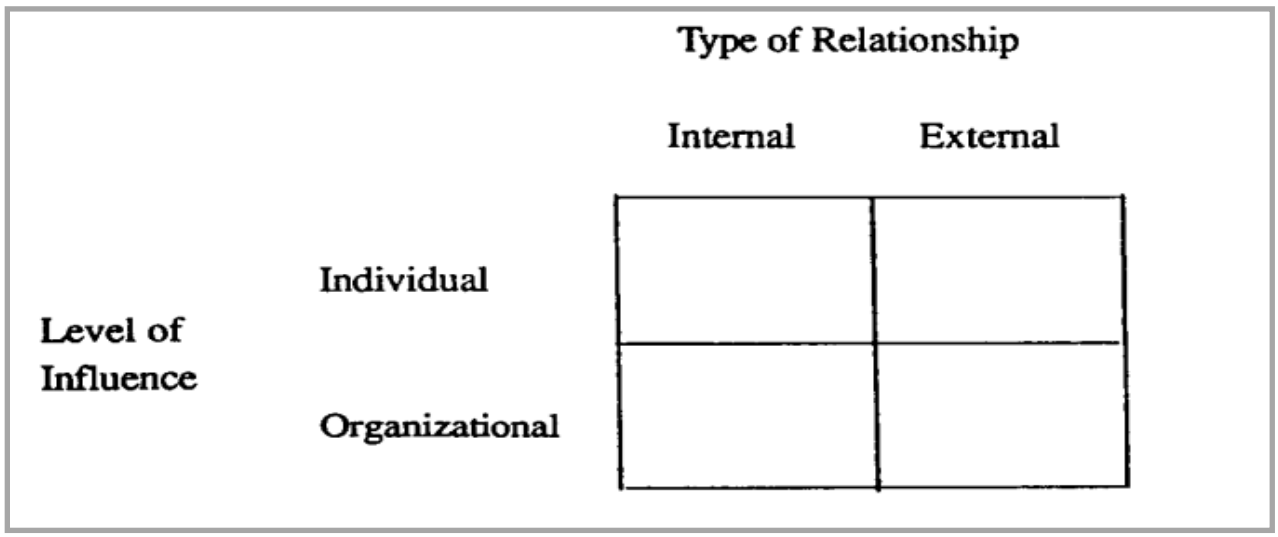

Figure 3. 1: Portugal and Yukl's framework for sustainability leadership

Source: Portugal and Yukl (1994, p. 2)

3.9.2. Shrivastava's ecocentric leadership model

Shrivastava (1995) pointed out limitations of traditional leadership and management. In the context of the traditional view, he said organisations are legal and economic entities created to achieve specific goals. Thus, according to Shrivastava's (1995) view, organisations are systems of production serving economically motivated stakeholders' goals. Noting the limitations of existing leadership models, Shrivastava (1995) proposed an ecocentric leadership model. Shrivastava's proposed

ecocentric model integrates sustainability to the core of business leadership and decision-making. The elements of the model proposed by Shrivastava (1995) include the following:

- Goals – focus from profits to sustainability, quality of life and stakeholder welfare.
- Values – ecocentric values as opposed to anthropocentric.
- Products – creation of products designed for the environment instead of function, style, and wasteful packaging.
- Production systems: low energy and renewable energy reliance instead of non-renewable energy reliance.
- Organisation: Non-hierarchical, participative decision making, decentralised authority and low-income differentials.
- Environment: Harmony with nature instead of domination over nature. Environment is managed as a resource but regarded as limited finite resource. Internalisation of pollution of waste instead of externalisation.
- Business Functions: Market to educate and create awareness instead of increasing sales and consumption. Long term sustainable growth favoured more than short-term profits. Human resources less aimed at increasing production but more aimed at making work meaningful, safe and healthy.

3.9.3. Epstein's corporate sustainability model

Epstein et al. (2010) found that leadership and organisational culture are important elements in driving SD in organisations and balancing potentially competing environmental, social and economic needs. Epstein (2008) developed the Corporate Sustainability Model to help leaders integrate SD requirements into the modes of operating business.

The inputs of Epstein's (2008) model include the internal and external context, business context, and human and financial resources. Epstein's (2008) model requires the inputs to be underpinned by good leadership as a foundation to develop a sound strategy, to be reinforced by a sustainability structure, and for systems, including programs and action plans for achieving SD to be implemented. As outlined by Epstein (2008) in the Corporate Sustainability Model, good leadership

outcomes include improved sustainability performance, positive stakeholder outcomes, and long-term financial performance.

3.9.4. Akins, Bright, Brunson and Wortham's model

Akins et al. (2013) stated that "sustainable development for leadership is the development of leadership qualities that meet the economic, environmental, and social needs of the present while preparing to meet the challenges of the future" (p. 30). Akins et al. (2013) identified ten leadership qualities for leadership in SD based on their study of 13 organisational leaders, executives and business owners. These qualities are: engagement, integrity, humility, empower, develop, reflect, adapt, sustain, learn and practice. The model developed by Akins et al. (2013) is limited because it does not address other issues pertaining to SL, such as dealing with complexity and what personal qualities are required to balance deviant stakeholder needs and demands.

3.9.5. Global leadership for sustainability (GLfS)

Fry and Egel (2021) drew from spiritual and being-centred leadership theories to develop a Global Leadership for Sustainability (GLfS) model for SL leadership, as shown in Figure 3.2 below. According to Fry and Egel (2021), spiritual qualities of self-transcendence and interconnectedness are fundamental for GLfS. Fry and Egel (2021) explain that self-transcendence (beyond self) is a state of consciousness where an individual seeks to go beyond self-interest to other broadened life perspectives, such as their purpose or calling. Interconnectedness is explained by Fry and Egel (2021) as a sense of identity and community with all living beings, from which humans see themselves as interdependent with nature and all living organisms. The theory of interconnectedness suggests that humans are not separate from the larger world surrounding them and are intricately connected with one another in search of a common purpose. According to Fry and Egel (2021), since sustainability is a state of existence where social well-being is maintained without ecological degradation, spirituality, self-transcendence and interconnected value systems can help individuals and leaders have more concern for the environment.

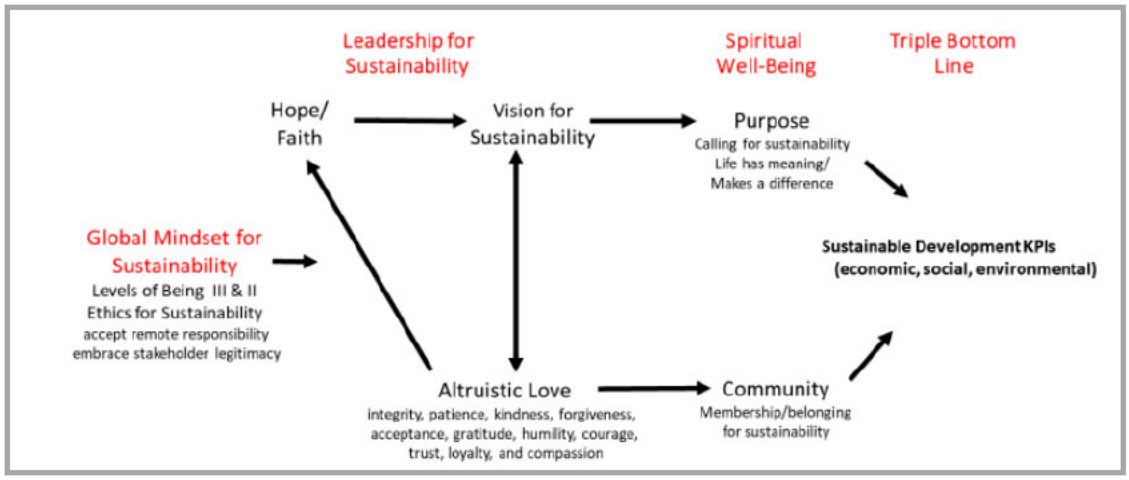

Figure 3. 2: GLfS Model

Source: Fry and Egel (2021, p. 3)

In terms of the GLfS Model, altruistic love promotes kindness and harmony amongst people. Hope and faith in the well-being of communities inspire a vision for sustainability and enables purpose surrounding SL, which motivates people to pursue objectives. According to the Fry and Egel (2021), these elements enable the meeting of key performance indicators that support the three pillars of SD, that is, the environmental, social and economic pillars.

3.9.6. Other sustainability leadership models

A few other models identified by scholars are related to SL to some extent. These models include the 6C Model (Tideman et al., 2013) and the Honeybee Model (Fien, 2014). These models focus on sustainable leadership and, therefore, incorporate the broader aspects of the business beyond the triple bottom line.

3.10. Leadership theories and relevance to sustainability leadership (SL)

Kotter (1995), as cited in Brown (2012), posited that SL is about advocating for and executing change during uncertainty and the unknown. He contends that the complex environmental and social problems organisations face demand change-oriented leadership. Brown (2012) found that theories related to change leadership were fundamental to the execution of SL, the first of these

being transformational leadership. Transformative leaders can develop the necessary vision to connect purpose towards meaningful environmental and social breakthroughs that serve the sustainability agenda. Second, adaptive leadership is essential as complex unknown problems require continuous leadership adjustment and paradigm shifts geared towards timely responses to environmental and social issues relating to SD. Finally, generative leadership, as suggested by Bushe (2019), is essential in allowing a mature understanding and framing of SD challenges in a way that motivates various stakeholders, including organisations, communities and investors, to engage and seek innovative ways to solve problems creatively.

Leading sustainability requires changes in organisational processes; therefore, sustainability leaders need to be open to change. In this case, the theory of self-transcendence versus self-enhancement becomes relevant for sustainability leaders. Sustainability leaders need to be self-transcendent because driving change that will protect the environmental and social consequences of organisational activities goes beyond normal key performance indicators driven by organisations' economic focus.

Many scholars (Egri & Frost, 1994; Egri & Herman, 2000; Fernández et al., 2006; Peng et al., 2020; Vinger & Cilliers, 2006) express that sustainability leaders need to be transformational leaders. In considering the four factors of transformational leadership, sustainability leaders need to possess idealised influence, inspirational motivation, intellectual stimulation and individualised consideration. Simply put, sustainability leaders need to influence change and offer an inspiring vision to others of a sustainable world or sustainable organisation. They also need to mentally engage followers or subordinates or fellow peers within organisations and tailor their influence in accordance with the individual needs of multiple stakeholders beyond the personalised consideration of individuals within organisations.

The transformational leadership theory is also related to the charismatic leadership theory, as noted by Conger and Kanungo (1998). Here it is argued that sustainability leaders need charisma to garner idealised influence and propel the vision of sustainable organisations. The charismatic leadership behaviours can help sustainability leaders with the articulation of such a vision and the ability to influence followers and can also arouse emotions necessary to pursue sustainability goals.

The theory of ethical leadership, as explained by Khan (2017), finds relevance in SL. Honesty, altruism and integrity are relevant for sustainability leaders as, at times, a choice needs to be made between quick profits, environmental protection and social well-being. Social and environmental issues also invoke a sense of justice for communities and ecosystems within which most organisations operate. Ethical leaders can promote justice and make decisions that are fair and equitable.

According to Van Dierendonck (2011), "servant leadership is demonstrated by empowering and developing people, expressing humility, authenticity, interpersonal acceptance, and stewardship, and by providing direction" (p. 1). Sustainability leaders need to go beyond themselves to lead environmental and social change to achieve a sustainable world and sustainable organisations. Environmental stewardship, transformative societal change and influence, giving direction and accepting multiple stakeholders with varying interest demand sustainability leaders to become servant leaders.

Rogers (2011) summarised the relevance of leadership theories to SL very well, saying that sustainability leaders need to have similar capacities that other leaders have such as charisma, adaptability and systems thinking. Such leaders, equipped with leadership capacities, will be in a better position to bring sustainability into organisations and contribute towards building sustainable organisations.

3.11. Sustainability leadership development

Kumar et al. (2014) proposed that "The best aspect of leadership is that we all can learn and develop leadership skills" (p. 82). Khan (2017) agrees that leadership can be learned, and that formal education can provide the skills and knowledge that individuals need to be effective in their roles. Khan (2017) argues that formal education offers conventional teachings and needs to equip leaders with skills to deal with the complex, dynamic and constantly changing circumstances that most organisations face in the current world. Thus, leadership development needs to be frequent and continual. Many scholars such as Bass and Riggio (2010), Tideman et al. (2013), Early (2017) and Nartgün et al. (2020) concur on the need for leadership development. However, as noted by Brown (2012) a decade ago, there is still limited literature on leadership development focusing on SL development.

Rogers (2011) pointed out that sustainability leaders need to learn more about systems and how resources flow through systems. Secondly, Rogers (2011) suggested that sustainability leaders need to build knowledge and understanding of the science of the environment, create competent guidelines and develop systems to minimise harm to the environment and society whilst enabling businesses to pursue their economic objectives sustainably. Thirdly, an understanding of the ecologically based framework is important for sustainability leaders to integrate such frameworks into organisational activities. Sustainability leaders need a deep and articulable grasp of concepts such as, amongst others, cradle-to-grave, natural capitalism, industrial ecology and biodiversity management.

An important theory to also consider in SL development is the theory of action-logics of environmental leadership developed by Boiral et al. (2009). Fundamentally, as discussed earlier in the literature review, this theory suggests that the thinking of leaders about sustainability evolves with adult development over their life course. This theory is also in line with Rooke and Torbert's (2005) study on the seven transformations of leadership. According to Rooke and Torbert (2005), "…great leaders are differentiated not by their personality or philosophy but by their action logic – how they interpret their own and other's behaviour and how they maintain power or protect against threats" (p. 43). Rooke and Torbert (2005) explain how leaders develop through maturity, moving through seven stages of development and found that leaders with post-conventional worldviews were able to better transform organisations. These leaders create better capacities for communication and collaboration, which is the lifeblood of SL.

Rooke and Torbert (2005) emphasised that leaders also need to work on a longer time horizon to be able to foresee and proactively manage complexities. This development area is fundamental for sustainability leaders since problems such as ozone depletion, climate change and social injustices relating to sustainability problems can only be solved through holistic systems and long-term strategic thinking. An excellent example of this cited by Schein (2017) is Joan Bavaria, CEO of Trillium, who founded the first investment firm to focus entirely on socially responsible investment. Bavaria's leadership has since revolutionised funding institutions from only focusing on the economic side of funded projects to the inherent environmental and social risks of such projects. Thus,

sustainability leaders would have a more significant impact by developing systems thinking and long-term thinking to influence similar outcomes.

3.12. Sustainability leadership in the SA mining industry

At the time of undertaking this research, there has yet to be a study specifically focusing on SL that has been undertaken in the mining industry. Although many studies relating to the environmental and social related aspects of mining have been conducted (Adler et al., 2007; Antin, 2013; International Finance Corporation, 2014; Lane et al., 2015; Ledwaba & Nhlengetwa, 2016; Leon, 2012; Mhlongo et al., 2018; Munnik, 2010), the relevance of leadership in mining and SD remains an under-researched area. Challenges associated with SD in the SA mining industry have already been discussed in the preceding chapter. Several leadership themes remain relevant for the mining industry to transform and become sustainable based on the reviewed literature, namely:

- Transformational leadership
- Leadership development
- Systems thinking

Sustainability leaders must drive and influence change from the top to the bottom of organisations and champion the agenda for positive environmental and social outcomes. These leaders need to be transformational in doing so and must integrate environmental and social considerations into the everyday decision-making of mining leaders and executives whose priorities might be different.

The transformational leadership style is the most suitable leadership style to be able to drive such outcomes because it allows sustainability leaders to, firstly, set an inspiring vision by articulating inspirational SD goals that the mining company can achieve, including waste recycling volume increases, water savings, social performance projects, climate change initiatives and community upliftment projects. These projects can be linked to the SDGs as set out in Agenda 2030. Secondly, the sustainability leader, using transformational leadership behaviours, can use idealised influence by paying attention to the needs of individuals within the organisation from the top down and matching sustainable development goals of the organisation with the individual aspirations of

people who work in the organisation. Leaders in the SA mining industry are driven by production and mining targets in pursuit of profits. A transformational sustainability leader would be better able to match production goals with SDGs and create win-win outcomes for SD. Thirdly, a transformational sustainability leader would be able to match the mental orientation and mindset of various disciplines within the mining industry, including engineering, mining, finance and human resources. By doing so, the leader would be able to intellectually stimulate leaders across various disciplines and challenge them to support the SDGs and Agenda 2030.

Leadership development is fundamental for leaders in the SA mining sector. As suggested by Boiral's (2009) theory of personal values and sustainability, mining leaders with an industrial, anti-ecological DSP would not consider the environment and communities' needs in their decision-making. These leaders believe nature can be controlled to their benefit. Also, leaders who have not reached a post-conventional stage are not likely to overcome their limits toward a higher level of understanding of complex environmental and social issues. The mining industry in SA would benefit from post-conventional leaders who understand the reality of SD issues from a broad perspective beyond self-interest and the economic drive.

Since SD issues are complex and interconnected, systems thinking is the foundation of effective and outcome-based SL in SA mining. Sustainability leaders in SA mining need to use systems thinking to solve complex interlinked enviro-social issues including legacy issues such as AMD and abandoned mines.

3.13. Theoretical framework

Jabareen (2008) noted that the concept of SD remains confusing and vague. Jabareen further asserted that there is no agreement on what should be sustained and no agreement on how SD should be translated into practice. This section of the study focuses on the theoretical framework underpinning this research as presented in Figure 3.3 . The theoretical framework comprises three theoretical lenses i.e. the SL theory, ethical leadership as well as servant leadership. These theories will be discussed in relation to the study objectives and provide a framework within which later findings in the study will be interpreted.

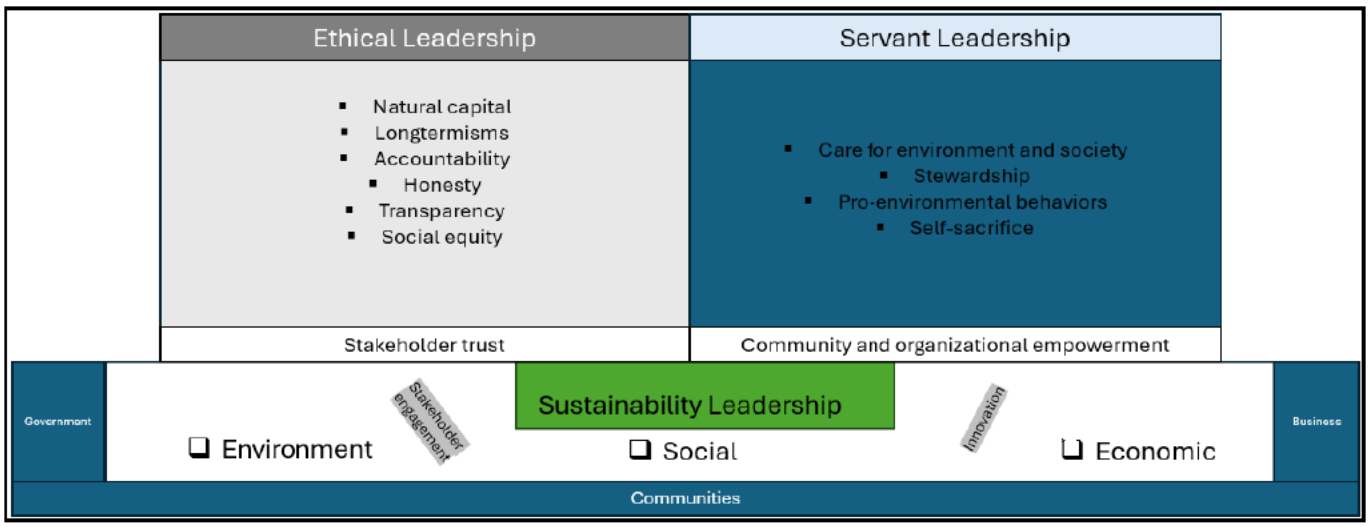

Figure 3. 3: Theoretical Framework

Source: Developed by the researcher

SL is sometimes referred to as sustainable leadership, leadership for sustainability or environmental leadership, depending on context. At times, SL and sustainable leadership are used as interchangeable terms although some scholars use the term sustainable leadership as referring to sustainable leaders outside the enviro-social context within which this study is framed. For the purpose of this study, the concept and the theory of SL is used to explore how leaders balance environmental, social and economic needs to enact SD as defined by the Brundtland World Commission Report (1987).

SL entails guiding organisations towards practices that prioritise environmental protection and social responsibility, all whilst maintaining economic viability. Sustainable leaders inspire organisational practices that promote environmental protection and the well-being of society within which business operates. Innovation and stakeholder engagement form an important foundation for the enactment of SL due to the interdependencies between stakeholders. Sustainability projects require the involvement of all parties including communities, business and government to be successful and to benefit of the environment and society (Burns et al., 2015).

The leadership theory on sustainability is sparked by the complex multi-faceted and interrelated environmental and societal challenges including climate change, social inequity and depleting

environmental resources (Burns et al., 2015). Ferdig (2007) noted that "Anyone who takes responsibility for understanding and acting upon complex sustainability challenges qualifies as a sustainability leader" (p. 9). SL requires a balanced approach to address environmental and social issues related to SD (Fry & Egel, 2021).

Hargreaves and Fink (2004) asserted that SL seeks to meet the needs of current society without compromising the ability of future generations to prosper. Sustainability leaders are change agents who care about the environment and society and equally have the ambition to create positive economic benefits for the alleviation of poverty and societal improvement. The ability to take a long-term view is critical for sustainability leaders to balance current needs and future needs. Multi-stakeholder engagement and mobilisation allow sustainability leaders to mobilise change between communities and governmental institutions to the benefit of the environment and society. Sustainability leaders protect both the environment and society whilst innovating and creating economic opportunities, empowering and promoting awareness regarding critical environmental issues such as climate change, air pollution, water pollution and land degradation.

Jabareen (2008) emphasized the issue of an ethical paradox surrounding SD. The balance between retaining natural capital whilst securing economic advancement remains both a conceptual and practical challenge. Ethical leadership is necessary for the advancement of the sustainability agenda and the implementation of sustainable practices in SA mining. Values, transparency and accountability are critical in ensuring best practices and balancing competing needs between the environment, society and economic viability. Environmental degradation and negative social impacts are often associated with short-termism. Ethical leaders focus on long-term outcomes rather than short-term profits. Ethical leaders recognise environmental and social implications of business decisions and strive to impact the environment and communities positively (Amisano, 2017; Metcalf & Benn, 2013).

Often negative environmental and social impacts from the mining industry, thus unsustainable practice, affects communities and stakeholders within which mines operate. Transparency is required to ensure that stakeholders are made aware of sustainability issues pertaining to their well-being. Trust forms the basis and the foundation within which ethical sustainability leaders can

engage fairly and equitably. Engaging transparently and honestly, ethical sustainability leaders build trust amongst stakeholders and loyalty for SD (Ahmad et al., 2017; Su et al., 2024).

The balance between trade-offs in ensuring environmental stewardship and social empowerment whist remaining economically viable necessitates the need for ethical leadership in SA mining. When leaders act unethically, environmental protection and community well-being are often sacrificed for profitability, thus compromising intragenerational equity as articulated by Jabareen (2008). Such profits are usually short-term and unsustainable as mines led by unethical leaders end up having to pay fines and may face litigation. Ethical leaders prioritise long-term sustainability over short-term profits and foster organisational cultures where sustainability is valued, encouraging employees to adopt sustainable practices. Ethical leaders actively involve all stakeholders including communities and government stakeholders to promote and implement sustainability initiatives (Ab Wahab, 2021; Adamu et al., 2023; Bugdol et al., 2021).

Greenleaf (1977) defined servant leadership as a leader who emphasises the empowerment and development of followers whilst at the same time inspiring followers to act as servant leaders. Greenleaf (1977) purported that organisational institutions have a responsibility to care for society. He also noted that some organisational institutions are large, powerful and impersonal, while others may be corrupt. Such organisations are more likely to impact both the environment and society negatively. Thus, exhibiting servant leadership, leaders within organisations need to promote stewardship for the environment and society and become servants of the environment and society. Based on the theory of servant leadership, such servants will create and improve environmental conditions and societal well-being, thus promoting SD (Mittal & Kaur, 2023).

Ying et al. (2020) asserted that servant leaders enhance their followers' positive understanding of pro-environmental behaviours based on their environmental values. Darvishmotevali and Altinay (2022) noted that servant leadership focuses on serving individuals and that a servant leader is someone whose aim is to serve others and ensure that the needs of others are met. Servant leaders are considered self-sacrificing and exhibit traits of caring and well-being. Therefore, they are more likely to pay attention to environmental and community needs, which promotes SD (Darvishmotevali & Altinay, 2022).

3.14. Conclusion

Although SL as a theory and concept is still in its infancy, the literature explored in this chapter demonstrates the need and call for this transformative leadership approach. Positive environmental and social outcomes can only be attained with leaders that possess the ability to solve complex problems that may endure for the long term and present uncertainties. The chapter began with a brief history of the concept of leadership and how the understanding of the concept has evolved over time. Thereafter, SL was defined, and the different models of SL were explored. Particular attention was then paid to leadership theories and how they may be relevant to SL. Finally, a case was made for the importance of SL in the SA mining industry. The next chapter focuses on the methodology that was applied in the study and presents the research design that guided the overall research process.

CHAPTER FOUR: RESEARCH METHODOLOGY

4.1. Introduction

This chapter outlines the methodology that was used in the course of the research to achieve the objectives of the study. A transcendental phenomenological qualitative approach was employed in the study, as developed by Husserl (1913) and further described by Moustakas (1994), in order to: (I) identify sustainability leadership challenges in the SA mining industry; (II) explore SL successes as perceived and experienced by leaders within the SA mining industry; (III) identify strategies leaders use to influence positive sustainability outcomes; and (IV) explore the meaning of sustainability as experienced by sustainability leaders in SA mining. The adopted approach and rationale used in terms of sampling, data collection and data analysis will be explained in detail in this chapter.

The first part of the chapter describes the research paradigm, that is, the philosophical assumptions of the research, selected to guide all decisions made in the progression of the study. The second part of the chapter outlines the research design used including the purposive sampling procedure, data collection through the use of semi-structured interviews and the phenomenological data analysis methods that were employed. Lastly, the ethical considerations that were taken into account throughout the research will be outlined. It is important to note the choice of a qualitative method for the study instead of a quantitative method. This can be explained by logic derived from Creswell and Poth (2016). The qualitative research approach was used because challenges facing sustainability and SL in the SA mining industry need to be explored in some depth. Thus, SL was investigated using a qualitative approach as this would allow for complex and detailed understanding of SL to be developed, whereas quantitative methods would have only enabled the measurement of constructs and would not have provided a holistic view of exactly what SL means to those who lead.

4.2. Research paradigm and philosophy

Malau-Aduli and Bunmi (2023) noted that research approaches are based on the researcher's worldviews. The approaches used by researchers are based on paradigms which guide

philosophical assumptions and dictate the methods and procedures used for the research. A paradigm constitutes assumptions and ideas that influence the researcher's worldview and therefore their approach to engaging with the research. As well noted by Creswell and Poth (2016), who cite Guba (1990), "Paradigms are a basic set of beliefs that guide action" (p. 40). Research paradigms consist of ontology (the nature of reality), epistemology (what counts as knowledge and how knowledge claims are justified), and methodology (the process of research) (Creswell, 2014; Creswell & Poth, 2016; Malau-Aduli & Bunmi, 2023; Tiwari et al., 2025).

Ontology is defined as how reality is viewed, that is, how the researcher views reality. It focuses on the assumptions that the researcher makes to accept something as true (Al-Ababneh, 2020). These assumptions guide the researcher in engaging with the research topic and direct the researcher's approaches to answering questions.

Epistemology describes the way in which knowledge about reality is acquired and understood. In considering the epistemology of the research, the researcher considers what knowledge is, how it should be acquired, whether the knowledge acquired is trustworthy and what acceptable knowledge comprises (Creswell & Poth, 2016; Malau-Aduli & Bunmi, 2023). There are several epistemological stances that researchers may take including positivism, interpretivism, critical theory and pragmatism. This study sought to explore how leaders experience sustainability from their own perspectives and worldviews. A transcendental phenomenological approach was used in this study. As well noted by Lester (1999), "Phenomenology is concerned with the study of experience from the perspective of the individual…" (p. 3). Thus, an interpretivist philosophical stance was adopted in this study. Malau-Aduli and Bunmi (2023) say that:

> *"The interpretivist epistemological stance is based on the belief that knowledge is constructed through human interpretation and social interactions. It emphasizes the subjective and interpretive nature of human experience. Researchers who adopt an interpretivist stance seek to understand the subjective experiences of individuals and the meanings they attach to their experiences."* (Malau-Aduli & Bunmi, 2023, p 1)

The interpretivist epistemological stance is fitting for this research since the researcher utilised phenomenology to understand the subjective experiences of sustainability leaders by employing a qualitative method. The sustainability leaders' narratives were drawn upon to explore their perspectives on sustainability based on their lived professional experiences.

Bevan (2014) and Williams (2021) state that phenomenological research seeks to describe a person's experience based on the person's perspective, a move away from merely a theoretical lens to a more practical investigation of the way the person experiences a phenomenon. The phenomenon under study in this research is the leaders' experiences of sustainability. In line with Bevan's (2014) view, the research sought to understand the leaders' experience of sustainability based on their own perspectives. One of the important elements of phenomenological research is the emphasis on explaining the phenomenon being studied in rich detail without an attempt to interpret it.

There are various types of phenomenology, each with its own approach and focus. These include the following (Erciyes, 2015; Van Manen, 2016; Williams, 2021):

- Transcendental phenomenology: focuses on consciousness and how it is experienced by the individual.
- Hermeneutic phenomenology: emphasises interpretation and understanding. It examines linguistic practices and cultural practices to investigate the meaning of lived experiences.
- Descriptive phenomenology: emphasises the importance of detailed description and analysis of experience. It seeks to examine the structures and meanings of experience through examination of the details of experience itself.
- Existential phenomenology: emphasises the individual's lived experience as it relates to cultural, historical and social contexts. It seeks to understand the nature of human existence and the meaning of being.
- Narrative phenomenology: is about storytelling and investigates how storytelling and narrative shape the human understanding of the world. It attempts to understand how individuals develop and construct their narratives and how these shape their identities and understanding of the world from their own perspectives.

None of the above types of phenomenology, except transcendental descriptive phenomenology, are relevant to this study. This is because the research does not focus on linguistic practices, rendering hermeneutics irrelevant for this study. Both existential and narrative phenomenology are also not suitable for the study since the phenomenon under investigation does not relate to cultural practices and is not about storytelling. Therefore, this study used transcendental descriptive phenomenology to investigate the leaders' experiences of sustainability in the SA mining industry. Due to the focus of the study on experience, transcendental phenomenology is suitable placed to illuminate the leaders experiences of sustainability so that the study objectives are met.

The researcher has attempted to explain the leaders' experiences and has used bracketing to set aside his own assumptions and preconceptions. Bracketing, or as it is referred to in phenomenological language, *'epoché'*, differentiates between two important schools of thought when it comes to phenomenology, that is, Husserl's transcendental approach and Heideggar's hermeneutical approach. Husserl's approach requires bracketing, which means that the lived experience on the researcher's part and the researcher's own assumptions should not influence research outcomes. When investigating a phenomenon, according to Husserl, the researcher is required to intentionally suspend their preconceived ideas and to remain objective in their view of the phenomenon being investigated, thereby "reaching a state of neutrality against epistemology and prepares self to see a clearer picture of being's essence" (Erciyes, 2015, p. 3). Epoché means abstaining from judgement and prior experience on the researcher's part. The relative axiological belief in bracketing is that the researcher's preconceived ideas and biases need to be controlled and not expressed, nor should they influence study outcomes.

Heideggar's hermeneutical approach focuses on the question of the meaning of being, thus, investigating the 'being' of human beings. Heidegger claims that humans are focused on familiarity and lose sight of their being from existing familiarity. 'Being' stands for things as they are and as people come to know them. Heidegger believed that bracketing and epoché are impossible because research cannot be presuppositionless (Erciyes, 2015; Omole, 2024). This is well articulated by Friesen et al. (2012) who propose that "Heidegger's hermeneutical phenomenology rejects the claim of some phenomenological methods that ideal "essences" of experience or consciousness can be isolated outside of the researcher's cultural and historical location" (p. 9).

Heidegger's hermeneutical phenomenology was disregarded as an approach that could be employed in this research. The method was not accepted by the researcher as suitable for investigating the lived experiences of the sustainability leaders who formed part of the study. Kafle (2011) noted that hermeneutic phenomenology utilises idiomatic expressions to express sentiments and intentions that are to be presented by everyday language. Friesen et al. (2012) said that Heidegger's hermeneutic phenomenology is "particularly open to literary and poetic qualities of language and encourages aesthetically sensitized writing as both a process and product research" (p. 9). This methodological approach was not adopted for this study as it was not deemed appropriate to answer the aims and objectives of providing in-depth understanding of the phenomenon of the leaders' experiences of sustainability. Instead, Husserl's transcendental phenomenological approach was accepted by the researcher as more suitable for this study. This approach enables the investigation of lived professional experiences of sustainability leaders with less emphasis on their lifeworld, but more emphasis on their lived professional leadership experience.

Experience has different meanings and descriptions according to different people, the ontology adopted for this research is relativism. In terms of this philosophical perspective, objective reality does not exist. Relativism instead proposes that reality is relative to the individual perspective and that experience is subjective (Soffer, 2012).

The research in its nature is qualitative and inductive, which is in line with the phenomenological study approach. The researcher has adopted a constructivist paradigm and the interpretivist epistemological philosophical stance. Honebein (1996), as cited in Adom et al. (2016), defines the constructivist paradigm as one which acknowledges that people have their own understanding and knowledge of the world through experiencing things and reflecting upon what they have experienced. This philosophical stance has been used to understand the leaders' thoughts and ideas in terms of the meanings they assign to their experience of sustainability. This philosophical stance is in line with what the founding father of phenomenology, Husserl (1859-1938), believed, as cited in Priest (2002), "…that all knowledge was derived from experience" (p. 3). Husserl purported that the meaning of experience is anything that a person may be conscious of (Priest, 2002), which in the case of this study, may include an abstract concept such as sustainability.

In line with the interpretivist approach, the researcher intended to draw a holistic view of the leaders' thoughts and actions, as well as the meanings that they assign to their experience of sustainability. The reason for choosing the phenomenological study approach is because many sustainability theoretical frameworks have been identified in the literature (these were widely discussed in Chapter Two) as well as concepts relating to sustainability and ways in which sustainability can be successfully implemented. However, little knowledge is available specifically regarding leaders' experiences of sustainability. Limited studies have focused exclusively on leadership and its applicability to SD, more so in the mining industry of SA. There is therefore a gap in the current body of knowledge, where sustainability has not been linked to leadership, and leaders' experience of sustainability has not been studied in the context of the SA mining industry. The intention of this study was to close the gap between theory and practice, but also to contribute new knowledge, underpinned by lived experiences, to the understanding of the meaning of sustainability. The concepts of sustainability and SD are confusing to many scholars and may have different meanings to different people, which has been discussed in the literature review.

4.3. Rationale for adopting a phenomenological approach

Many scholars including Creswell and Poth (2016) attest that a phenomenological study approach is not the easiest of approaches to use for beginning researchers. This assertion proves to be true considering the depth of terminology and abstract language used in phenomenology. To a beginning researcher, words such as 'lived experience', 'life world', 'transcendental', 'phenomenological reduction', 'intentionality', 'being' and 'essence' can be daunting. In the context of this study, despite the obvious challenges of the phenomenological study approach, it cannot be denied that a need for new knowledge and perspective regarding issues of SD and SL is required. Based on the researcher's viewpoint, such issues ought not be investigated using theoretical frameworks since several frameworks already exist around issues of SD.

Moreover, multiple concepts have been developed from the concept of sustainability including the triple bottom line concept, CSR, ESG, 3Ps (people, planet, profit) and so forth. The key issue of investigation then is how these concepts may translate in practical terms in an industry that is known to impact strongly on all three pillars of sustainability, that is, the economic, environmental

and social pillars. At the forefront of creating SD outcomes are the sustainability leaders in mining. Key questions in the field from the perspective of the researcher are: (I) how do leaders entrusted with ensuring sustainability in mining experience sustainability? and (II) what are their key challenges and successes? Investigating these issues from a theoretical perspective might contribute new knowledge but such knowledge would not be unique considering the plethora of sustainability frameworks already developed. The gap between theory and practice in SD and sustainability is wide and more extensive research that addresses the practical implementation of SD for leaders is thus required.

Using a phenomenological approach and examining the lived experiences of sustainability leaders not only offers a new perspective but contributes to advancing a newer and fresher understanding of the sustainability concept. This is true to being transcendental – "…everything is perceived freshly, as if for the first time" (Moustakas, 1994, p. 34), as cited in Creswell and Poth (2016). This approach also closes the gap between theory and practice by sharing common meaning and leadership insights from those accountable for delivering positive sustainability outcomes on a daily basis in their professional lives. Based on this view from the researcher, a quantitative research approach and other qualitative research approaches including grounded theory, the case study approach or the ethnographical study approach were discounted for this study.

4.4. Research design

Phenomenology entails the attempt to understand the essence of a phenomenon by examining the views of the people who have experienced that phenomenon. This examination is based on people's views of how they experienced the phenomenon in terms of their own individual understanding and therefore their own perception and account. Merleau-Ponty (1962), cited in Erciyes (2015), defines phenomenology as the study of 'essence' which seeks to find out definitions of consciousness or perception. This research was designed to examine the leaders' experiences of sustainability based on their own perceptions. In accordance with the aim of the study, the researcher intended to gain deep insight into leaders' experiences of sustainability from their own understandings and the meanings that they assign to their subjective experience.

Several frameworks have been developed to promote SD and sustainability, however leadership and the leadership experience of those responsible for the realisation of sustainability are topics that have been under-investigated in SA mining. To the researcher's knowledge, at the time of conducting this research, this study was the first to specifically investigate SL in the broader SA mining industry inclusive of all commodities mined in SA.

In line with Keen's (1975) thinking, as cited in Hycner (1985), "Unlike other methodologies, phenomenology cannot be reduced to a 'cookbook' set of instructions" (p. 3). Thus, when it comes to phenomenology, research design is merely a guideline. Creswell and Poth (2016) noted that "there is no agreed upon structure for how to design a qualitative study" (p. 71). The design of this study was undertaken by following guidance from Moustakas (1994) and was supplemented by research from scholars including Creswell (2014), Creswell and Poth (2016), Priest (2002), Boyd (2001) and Williams (2021). The sampling procedure, data collection and data analysis methods that were employed in the study will be discussed in the sub-sections to follow.

4.4.1. Sampling procedure

Hycner (1985), cited in Groenewald (2004), stated that "A phenomenon dictates the method… including even which type of participants" (p. 45). In this study, the researcher kept this suggestion in mind when designing the methods to be used to understand the phenomenon of leaders' experiences of sustainability in the SA mining industry. The phenomenon being researched dictated the selection of study participants who are leaders and are better positioned to have a deeper understanding and experience of sustainability in SA mining. These are leaders either directly involved in the implementation or influencing of SD as defined in the Brundtland Commission Report (1987) and are assigned by virtue of their roles to create positive sustainability outcomes. The researcher also sought to understand the SL experience of leaders, the challenges faced, the highlights of success, their experience of influencing positive sustainability outcomes and the essence and meaning of sustainability as lived and experienced by the leaders. The intention was to engage leaders who influenced sustainability in the mining sector, particularly those who were accountable for implementing SD.

Non-probability purposive sampling was utilised to identify study participants from the list of mines and leaders represented in the Minerals Council of South Africa. The Minerals Council is an organisation that represents mining companies in SA from all commodity sectors and represents 90% of SA's minerals output. Non-probability purposive sampling enables the researcher to exercise judgment in choosing participants for the purpose of the research. Family Health International (2001) defines the operationalisation of purposive sampling very well, saying "Purposive sampling groups participants according to pre-determined criteria relevant to the research questions" (p. 5). Alkassim and Tran (2015) identified various methods of sampling that can be used in purposive sampling including maximum variation sampling, homogeneous sampling, typical case sampling, critical case sampling and expert sampling, amongst others. The approach used in this study is more closely aligned to expert sampling. Several considerations were made when the selection of the candidates for participation was decided upon:

- The participants had to be in leadership positions that were accountable for sustainability in mining. Such positions included CEOs, vice presidents of sustainability, heads of departments, chief sustainability officers and sustainability managers. Not all leadership positions in mines have this accountability for implementing sustainability. Therefore, selection was made carefully in line with this requirement to include mines that have leaders who hold these portfolios.
- Since the study is intended to investigate leaders' subjective experience of sustainability in SA mining, the researcher ensured that the selection of participants was representative of the SA mining industry. Thus, participant selection involved participants who have had experience working for mines producing diverse commodities in SA, that is, gold, platinum, coal, manganese ore, chrome, vanadium, zirconium, titanium and even vermiculite. Because the study is industry wide, participants who have had working experience in the mining of various commodities were considered to be more suitable for the study. This was done to ensure better representation of the SA mining industry and the commodities produced. The study would not stand as a SA mining industry study without this consideration, therefore multi-commodity experience was an important criterion for participant selection. Participants who worked across various commodities (gold, platinum, diamonds, coal, manganese, etc.) in their respective leadership careers were highly favoured for selection

to participate in the study. Selection included participants who worked across the mining sector, the DMRE and mine consultants.

- Another requirement was that participants had to have more than 10 years of experience as a minimum as sustainability leaders, 13 to 20 years was preferable. Thus, lower-level sustainability employees did not fit this criterion, and only senior managers and executive leaders were included.

A sample size of 12 participants were selected for the study from the initial list population of 23 participants obtained from the Minerals Council. The population consisted of leaders and professionals who were accountable for implementing sustainability in their positions. Using purposive sampling, a sample of 12 participants were then identified from the list. This sample size was more than sufficient to reach saturation as Boyd (2001), cited in Groenewald (2004), suggested that long interviews with 10 participants were adequate for a phenomenological study. Creswell and Poth (2016) suggested that even four or five and up to ten participants would suffice for a phenomenological study. Table 4.1, highlighted in the next page, shows the position that participants hold in their respective companies and their years of experience, as well as the companies they have worked for, and the commodities mined.

Table 4. 1: List of study participants and identification codes

Participant Code	Name	Position	Years of experience	Company worked for	Commoditties
P1	Terry	Senior Vice President	27	Debeers, Harmony Gold, Sibanye-Stillwater	Diamond and gold
P2	Fana	Senior Vice President	20	Highveld Steel and Vadium, Impala Platinum, Anglo Platinum	Steel, platinum and vanadium
P3	Brad	Senior Vice President	27	DRD Gold, Lonmin, Vedanta Resources, Impala Platinum	Platinum, zinc, iron ore, copper
P4	Moshi	CEO	24	Assmang, Sibanye-Stillwater	Manganese, platinum, gold
P5	Mandla	Head of Sustainability	17	Sibanye Stillwater, Vedanta Zinc International, Presidency RSA, Gold Fields	Zinc, copper, gold and PGMs
P6	Nozi	Senior Manager	16	Anaex, Seriti Resources, Tshipi e Ntle Manganese, La Farge	Manganese, coal
P7	Terence	Corporate Social Respo	21	Kumba Iron Ore, De Beers	Iron ore
P8	Tenda	Manager: Corporate Aff	19	Petra Diamonds, Deloitte, South32	Diamonds and gold
P9	Mutodi	Head of Sustainability	21	Department of Mineral Resources	All commoditties
P10	Charlize	CEO	18	Sibanye-Stillwater, Aquarius SA Platinum, African Rainbow Minerals, Consulting	All commoditties
P11	Henry	Director	17	Department of Mineral Resources	All commoditties
P12	Michael	Head of Environmental	21	Environmental legal firm	All commoditties

Source: Developed by the researcher

Figure 4.1 in the next page shows mineral locations in SA. The areas where participants worked are denoted with a red cross. It is important to note that the crosses do not match the number of participants. The attempt is to show the scale with which participants have participated in the SA mining sector. Participants with multi commodity experience, which were carefully selected for the study to ensure representation across the SA mining sector, are shown with red crosses multiple times to cover the commodities that they have worked in. It is safe to confirm that participants selected covered all commodities mined within SA, both major and minor, since most of them had multi-commodity experience and worked for various mine producing commodities such as gold, manganese, coal, platinum and iron ore. Most mining in SA happens in Johannesburg and Rustenburg; these areas are concentrated on the map indicating more presence by the study participants.

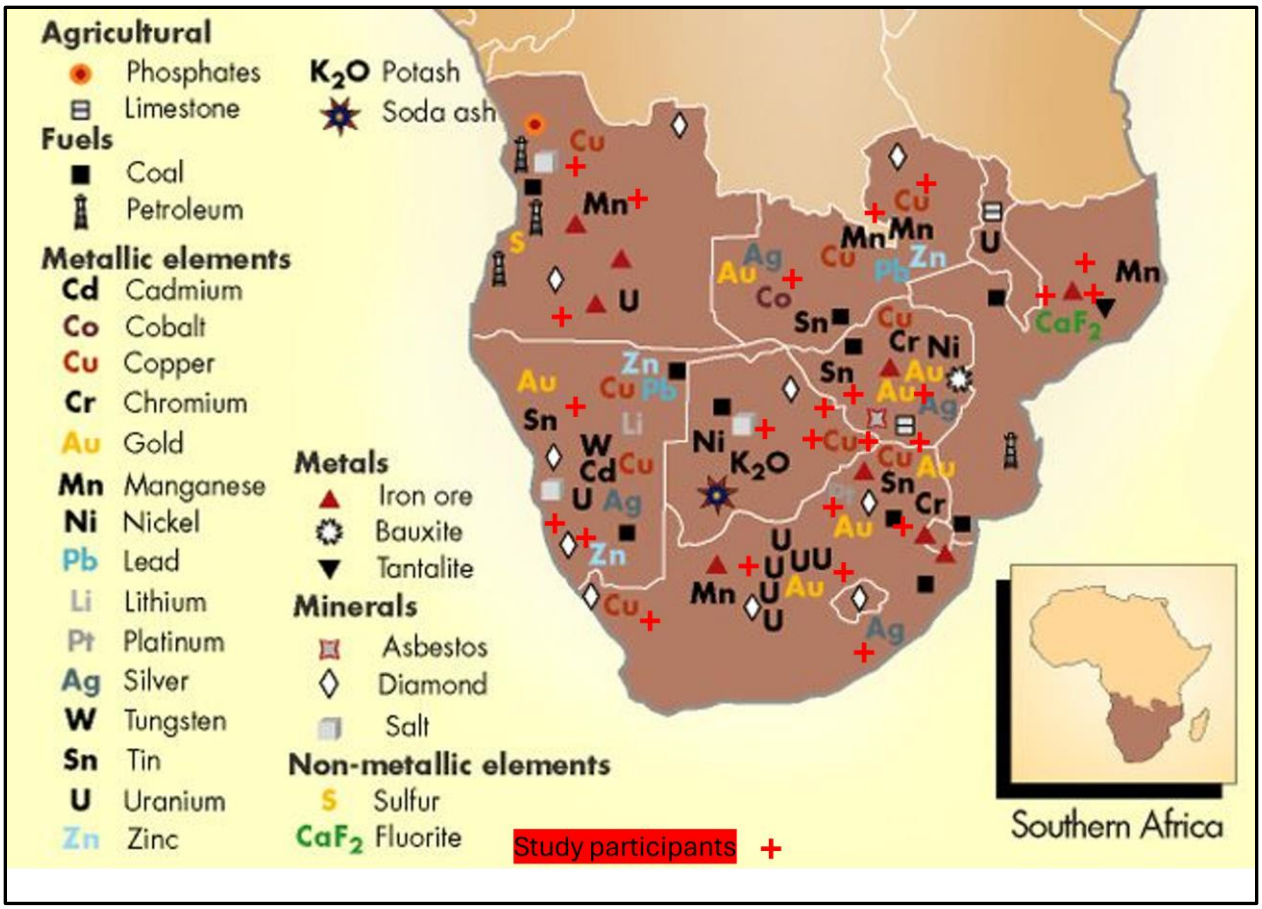

Figure 4. 1: Minerals locations in South Africa where study participants worked

Source: Adopted from Resources Southern Africa (2024)

4.4.2. Data collection and interview process

The research focused on the phenomenon of the leaders' experiences of sustainability in the SA mining industry. The Minerals Council provided the researcher with the necessary gatekeeper's letter (Appendix 3) as needed in line with the University of KwaZulu-Natal's ethical clearance requirements. An informed consent letter was provided to participants for them to understand the purpose of the research, and the benefits and risks of the research (risks of the study were low since the study does not involve human experiments). Participants were fully informed of the voluntary participation clause, and the researcher ensured their understanding that consent could be granted only if they were fully aware of the nature and purpose of the research and were willing to participate in the study.

An interview guide (Appendix 1) was developed as an instrument, with questions formulated in line with the study's aim and objectives. The guide as a research instrument was developed to prompt discussion but not structure discussions to a point of stifling the illumination of the phenomenon under investigation. Thus, the instrument was designed to have a few open-ended questions, true to the phenomenological study approach, starting with 'What is your experience of sustainability challenges?', and so on. Creswell and Poth's (2016) suggestions on the use of semi-structured interviews and including a few open-ended questions to allow the participants to freely express their views were followed in the study. The development of the interview guide was influenced by the considerations regarding the research objectives. Effort was made to ensure that questions are focused and elicit responses that will enable the study objectives to be met.

Semi-structured interviews were conducted with the study participants on Microsoft Teams and, in certain circumstances, in person. The attempt was to capture rich descriptions of the phenomenon and to allow the semi-structured interviews to flow without interference and interruption from the researcher. The initial intention was to conduct all interviews in person. This proved to be near impossible and could have led to a prolonged study duration, causing delays and unwelcomed frustrations. Participants had time constraints, for example, some participants had international leadership roles and were responsible not only for SA operations but operations in other countries such as the DRC, USA, Canada and others. Due to these time constraints, most participants opted to be interviewed on Microsoft Teams. Ten out of the 12 participants were interviewed via Microsoft Teams, thus, only 2 interviews were conducted in person. Microsoft Teams was favoured to manage time constraints as not all participants were within the researcher's vicinity and the online platform therefore enabled the researcher to conduct interviews without commuting.

The surprising element of the comparison between the two types of interviews, that is those 2 conducted in person versus the 10 conducted on Microsoft Teams, is that the interviews were much easier to manage in the online platform. Participants are more familiar with online meetings following the disruption of business as a result of the restrictions imposed due to COVID-19. Some participants worked remotely from offices and had become more familiar with online meetings than in person meetings. Face-to-face interviews felt unfamiliar to most participants as they were accustomed to online meetings. In addition, during face-to-face meetings it became difficult to

keep discussions within the scope of the research as participants attempted to engage more on the interpersonal level than a formal professional level with the researcher.

Most interviews took between 40 minutes to an hour. Preparation for the interviews was done through reviewing the questions from the instrument as to ensure a natural flow of answers from the participants. In line with Qu and Dumay (2011) guidance, intensive listening was utilised alongside careful planning and sufficient preparation. Effort was made to hear and understand responses from participants without interrupting the flow of the interviews. The research questions were focused to ensure shared experiences are identified from the study participants (DiCicco-Bloom & Crabtree, 2006).

The researcher constantly used 'bracketing' to ensure that personal and professional biases did not affect study outcomes and interpretations of the lifeworld of the participants. Bracketing is used in qualitative research such as phenomenology to mitigate and guard against the researcher's pre-conceived ideas so that they do not impact research outcomes. As well explained by Priest (2002), "Bracketing, a mathematical metaphor, involves putting one's natural attitude to the world 'in brackets' in order to place it temporarily out of question" (p. 3). Bracketing is also referred to as epochè which, according to Patton (1990), as cited in Priest (2002), means the deliberate suspension of judgement and presuppositions in order to investigate a phenomenon from a fresh viewpoint and see the experience for itself. When bracketing, the researcher makes a conscious and constant effort to separate themselves from the study to prevent their subjective ideas and opinions from contaminating the research outcomes (Blinova et al., 2022; Ng, 2018; Umanailo, 2019; Williams, 2021). Describing the leaders' experience of sustainability as experienced by the leaders themselves was the goal of this research.

The face-to-face interviews were audio recorded using a mobile recorder. The researcher had an Apple tablet with an audio recorder, which proved handy to record the interviews. The interviews conducted on Microsoft Teams were audio recorded using this functionality that is available on the software program and transcribed at the same time within the software. The duration of all interviews was between 40 to 65 minutes. An attempt was made to conduct online meetings outside of load-shedding hours to avoid internet connectivity disruptions and network interference. A

choice was made not to take field notes during the interviews as this could impede attentive listening and active engagement with participants. The researcher's attention was reserved for careful listening to the participants and asking prompting questions that directed the interviews towards the topic of their experiences of implementing sustainability.

The Microsoft Teams software transcription, however, proved to be inaccurate. It helped the researcher in some ways to obtain transcription of some sections of the interviews, however the inaccuracies were very prevalent. This issue was solved by appointing a professional transcriber to transcribe all interviews verbatim. The audio recordings of the interviews conducted on Microsoft Teams were downloaded onto the researcher's laptop. Each file was marked and labelled for transcribing. All the data collected was transcribed into a written format by a professional transcriber. The transcriptions were then labelled with participants' numbers and dates.

As well noted by Holloway (1997), citing in Groenewald (2004), phenomenologists do not favour specific data gathering steps, and researchers "cannot impose a method on a phenomenon" (p. 44). Even though questions were posed to the participants, there was no prescription regarding how long answers should be or how long the interviews needed to be. Participants were allowed to express themselves, their perceptions, experiences and worldviews without time limitations and impediment. The researcher sought to obtain an in-depth understanding of leadership experiences of sustainability based on the perceptions of the leaders and the ways in which they assign meaning to the phenomenon.

4.4.3. Data analysis

The use of the heading 'Data Analysis' is usually avoided in phenomenological studies. This is pointed out by Hycner (1985), cited in Groenewald (2004), who says that the term 'analysis' means 'breaking into parts' and therefore often means loss of the whole phenomenon. Although the heading 'Data Analysis' is used in this section of the study, during the analysis of the data the researcher ensured that the context and wholeness of the phenomenon was not lost. Data was engaged deeply, and reflection was undertaken regarding the meanings that the study participants wanted to express. The researcher ensured that the meaning of essence is not lost, and that the life worlds of the participants is reflected in the findings to be presented in this study.

Giorgi and Giorgi (2003), as cited in Groenewald (2004), state that phenomenological research is about describing. Its aim is to describe with greater detail and accuracy the phenomenon being studied without consideration of any pre-given frameworks and theories. Thus, the facts given to describe the phenomenon by the study subjects should remain true. In conducting the data analysis of the data collected from the semi-structured interviews in this study, this principle was followed by the researcher. It became crucial to use bracketing to prevent the researcher's own bias and pre-conceived ideas from influencing study outcomes. The intention was to understand clearly and in detail how mining leaders experience sustainability.

In line with Husserl's thinking, all knowledge in this research was gained through the experience of the sustainability leaders interviewed. These individuals "…are seen as the vehicle through which the essential structure or essence of the phenomenon may be accessed and subsequently described" (Priest, 2002, p. 2). Thus, the essences and essential structures of the phenomenon need to be explicated. In order to reach this stage, four processes are fundamental, in line with Husserl's suggested approach. These are: intentionality, phenomenological reduction, description, and essence (Moustakas, 1994; Priest, 2002).

Priest (2002) says that intentionality is the process whereby the mind consciously directs thought to an object. It is the focus on the consciousness of experiences of individuals and how they perceive and interpret a phenomenon. This process involved exploring the subjective meanings and perspectives of the sustainability leaders interviewed in this study. The goal was to uncover the meaning of sustainability as lived and experienced by these leaders in the SA mining industry.

Phenomenological reduction is the process that facilitates transcendence. It is the change of attitude on a researcher's part which is necessary to achieve a phenomenological philosophical inquiry. Phenomenological reduction goes hand in hand with bracketing and epoché. In simplistic terms, if the attitude on the researcher's part is not changed to carry out the inquiry, untested personal assumptions and pre-conceived ideas might contaminate the illumination of the phenomenon under examination. A fresh viewpoint, one allowing transcendence, is necessary for phenomenological research. This can only be attained through phenomenological reduction. In the context of this study, as already explained, the researcher continuously bracketed and guarded against the

imposition of his commonly held beliefs to remain true to the aim of the study, that is, to provide in-depth understanding from the perspective of the participants themselves.

The third element, which is the description of the phenomenon under investigation, is only achieved once reduction has been attained. Thus, after constantly bracketing throughout the interviewing stages and data analysis processes, the researcher has ensured that the units of the phenomenon under investigation could be described in their essence. 'Essence' is the final stage of the fundamental elements of Husserl's phenomenological research. In this stage, the phenomenon is described. In the context of this study, it is important to note that multiple perspectives may appear, essences might shift based on reflection and intuiting. In line with the four-step approach already discussed, the data analysis in the study also proceeded through the steps outlined below, which are proposed by several scholars including Moustakas (1994), Colaizzi (1978), Creswell (2014), Creswell and Poth (2016), Priest (2002), Boyd (2001), Groenewald (2004) and Williams (2021):

- **Familiarisation**

Participants' transcripts were read several times by the researcher to obtain an initial understanding of the contents of the transcripts. During this stage reflection on data analysis commenced.

- **Grouping of all units of the experience**

In this stage, the contents of the transcripts were grouped according to the units of the study, that is, the sustainability journeys of leaders, the experience of challenges, the experience of positive outcomes and the meaning of sustainability. The meaning units were identified. Experiences were analysed through intuiting, reading and re-reading the transcripts several times until a certain point of understanding was reached. Familiarity of the horizons of the data streams was achieved during this stage.

- **Formulating meanings**

Significant phrases or sentences pertaining to the phenomenon were identified. Significant quotes and key points of the experiences of the sustainability leaders were analysed and reflected upon to understand their specific meanings. Meanings relevant to the phenomenon were identified.

Bracketing was used by the researcher to ensure that pre-conceived notions did not affect study outcomes. This step consisted of formulating meanings from the participants' statements and explications of their experiences. Transcripts were read several times, repeatedly, to gain insight and obtain data interpretation. In this stage use was made of the key verbatim descriptions and narratives from participants.

- **Clustering of themes**

Thematising was performed in this stage. Identified meanings were clustered into key themes and bracketing was again applied to avoid undue influence of the study outcomes. The process followed at this stage is best described by Creswell and Poth (2016) who said that "This inductive process involves researchers working back and forth between themes from the bottom up by organising data inductively into increasingly more abstract units" (p. 67). The themes were constantly checked against the explications of the experiences presented by sustainability leaders in the transcripts. Continuous reflection on the data and how participants attached meaning to experiences was done. As Creswell and Poth (2016) explain, "The inductive-deductive logic process means that the qualitative researcher uses complex reasoning skills throughout the process of the research" (p. 67). In the case of phenomenological research, reliance is more on reflection than logic to explicate and illuminate participants' experiences.

- **Structural description**

In this stage, aspects essential to the experiences of sustainability leaders in the SA mining industry were captured and described, which allowed for the final presentation of the data analysis. Through this process, intentionality and phenomenological reduction formed the foundation of the data analyses to ensure that the true essences and structures of the phenomenon were illuminated.

Verbatim quotes from transcripts were the main sources of data analysed in the study. According to Groenewald (2004), when delineating data, statements that illuminate the phenomenon are selected. The researcher then uses bracketing to prevent presuppositions that may interfere with data analysis. Redundant units are discarded, and the researcher can also consider a few times certain meanings were expressed. Whilst most studies would look for commonality, in a

phenomenological study individuality is just as important in capturing the essence of a phenomenon. The responsibility of the researcher is to remain true to the phenomenon by constantly bracketing throughout the process. The essence of meaning should be captured with depth and within a holistic context. This process cannot always be described, it is rather artistic, as well noted by Colaizzi (1978), as cited in Hycner (1985), who argued that "Particularly in this step is the phenomenological researcher engaged in something which cannot be precisely delineated, for here he is involved in that ineffable thing known as creative insight" (p. 288).

By grouping clusters of themes, the researcher was able to identify significant themes and topics from the research without ignoring individual expressions which illuminated the phenomenon. The researcher deeply interrogated the phenomenon under investigation in the study through reading, listening, clustering and going back to the interviews all whilst bracketing to avoid bias.

4.5. Data credibility

The credibility of the data collected in the research was improved by accessing the recordings of the interviews that were conducted in Microsoft Teams. This meant that statements from participants could be confirmed multiple times to avoid misrepresentation. The use of a professional transcriber ensured that recordings were accurately transcribed for data analysis. This approach is in line with Creswell and Creswell (2018) suggestion indicating that reliability can be enhanced through good note taking and transcribing in addition to using a good tape recorder. Data that contradicted emerging themes was carefully investigated through further analysis to ensure that the important aspects of the phenomenon were not overlooked. The interviewing of participants from all commodity sectors in the SA mining industry ensured that the study was valid as representative of the industry (Creswell & Creswell, 2018).

Furthermore, validation of the study findings was also achieved through the appointment of a transcriber after the interviews had been completed. Comparing the researcher's understanding of the interview participants with the transcribed scripts enabled further validation of the qualitative data collected. Multiple layers of data analyses also provided validation of the data collected. Although

the transcripts were analysed manually, NVivo was used to supplement the identification of key study themes.

Another important aspect of ensuring the validity and credibility of the collected data was achieved through the width and depth of the participants' experience. Leaders who were interviewed emanated from diverse backgrounds including engineering and mining. This improved the validity of the study since multiple perspectives were investigated. The use of verbatim accounts from participants also promotes credibility of the findings. To this end, no grammatical corrections were made when the study participants are quoted later in the description of the findings presented in the next chapter of the thesis. This was deliberately done to ensure that participants' statements are not modified and to ensure that the credibility of the study remains intact.

The credibility of the study is also addressed through the experience of the sustainability leaders and their leadership roles. Participants hold executive and senior managerial leadership roles with their combined leadership experience totalling 248 years. As well explained by Priest (2002), "…people who have lived the reality of the subject being investigated provide the only legitimate source of data…" (p. 6).

4.6. Bias and ethical considerations

The question of bias was addressed through bracketing, or epoché, true to the phenomenological study approach. Study findings are reported from multiple perspectives through the various horizons of the leadership experiences of participants.

Ethical clearance (Appendix 4) was obtained from the Humanities and Social Sciences Research Ethics Committee at the University of KwaZulu-Natal prior to the researcher commencing with the recruitment of participants for the study, as per the university's requirements. The researcher honoured the ethical standards set by the university though the following measures. A gatekeeper's letter (Appendix 3) was requested from the Minerals Council of South Africa granting permission for the researcher to proceed with recruitment of participants for the study. Participants' wishes were fully respected and they were not forced to agree to participate in the interviews without being fully informed about the research and only then giving their consent. The informed consent

and information sheet (Appendices 2 and 5) were sent to all participants. No harm to humans occurred as part of the research. Consent and approval by the participants for the interviews to be conducted was obtained for all the interviews. Other ethical considerations included ensuring that participants were not called outside of their office hours, thus they were not disturbed during their personal time. Instead, all interviews were conducted during professional working times.

A matter that is often missed in the consideration of ethical issues in a study is that ethical decisions should be made throughout the various stages of the research, from its configuration through to the interviews, as well as during the data analysis stage and the reporting and discussion of the findings. In the context of this research, the use of pseudonyms was implemented to protect participants' identities. Despite sustainability issues being topical, and the prevailing view that there is nothing confidential about sustainability leaders sharing their experiences, the privacy of participants should not be compromised. The use of pseudonyms was made more personable by assigning people's names instead of numbers or such terms as 'interviewee'. Since experiences are personal, care was taken not to use impersonal pseudonyms.

Information obtained during the interviews that exposed the names of companies where participants are employed or their personal information was not shared in the presentation of the findings in the study, to respect the privacy of participants. In the verbatim quotes where this information was disclosed, such as the names of companies and revealing information that risked the privacy of participants, these sections have been redacted and not shared.

4.7. Conclusion

The constructivist research paradigm and interpretivist epistemological philosophical stance underpinning the study were explained in this chapter. The chapter also provided the rationale for the selection of a phenomenological qualitative method instead of a quantitative approach or other qualitative methods. This chapter then explained the specific research methods used to achieve the objectives of the study, that is, the purposive sampling procedure that was used to identify potential participants, the semi-structured interviews that were conducted to collect data, and the phenomenological data analysis that was carried out as prescribed by several scholars referenced in the data analysis section. The literature on the phenomenological methods gathered from various scholars

showed that a phenomenon cannot be computerised. Thus, the use of computer software (NVivo) was only undertaken to identify emerging themes from the data without losing the essence of the phenomenon. The chapters to follow will provide a detailed presentation and discussion of the findings of the study as well as the research outcomes achieved based on the study objectives.

CHAPTER FIVE: FINDINGS

5.1. Introduction

The previous chapter discussed the research design and methodology employed in the study, as well as the ethical procedures followed in the study. In this chapter, the key findings of the research are presented in line with the phenomenological study approach. The participants' expressions relevant to the SL experience are presented using verbatim quotes from the semi-structured interviews conducted with the sustainability leaders in the SA mining industry.

This study aimed to explore and investigate the leaders' experience of sustainability in the SA mining industry and to advance an understanding of SL in the SA mining industry. The study used a transcendental phenomenological qualitative study approach as described by Moustakas (1994) to: (I) identify sustainability leadership challenges in the SA mining industry; (II) explore SL successes as perceived and experienced by leaders within the SA mining industry; (III) identify strategies leaders use to influence positive sustainability outcomes; and (IV) explore the meaning of sustainability as experienced by sustainability leaders in SA mining.

A purposive sampling method was used to identify 12 study participants who had leadership roles within the mining industry from the list of mines provided by the Minerals Council of South Africa. The participants were selected based on their leadership experience and experience with the various commodities in SA mining. Cross-commodity mining experience in SA was essential in the selection of the study participants because SA produces various commodities including gold, diamonds, PGMs, manganese, coal, iron ore and vermiculite. Therefore, the study needed to be representative of this fact considering that the study investigated leadership in SA mining, industry wide. Speaking to people who had specific commodity experience without covering all commodities would not have positioned the study well as an industry study. It was discussed in the research design section that the preferred number of years of experience when purposively sampling was 12 to 20 years' experience, and a minimum of 10 years' experience. This requirement was fully met. The experience of the candidates ranged from (lowest) 16 to 27 (highest) years. Combined and in total, the 12 candidates interviewed have 248 years of experience in mining in SA (refer to Table 4.1 for study participants and their role titles). It should be noted, as previously discussed in

the research design section, that the names previously shown in Table 4.1 are not real names but are pseudonyms that have been assigned to each participant. It is again noted that the use of numbers or impersonal pseudonyms such as 'Respondent X' or 'Participant Y' or 'P1, P2' was not preferred since the research was to explore the leaders' personal viewpoints of their professional leadership contexts. Again, it should be noted that grammatical errors from participant statements were not corrected in the presentation of the interview excerpts in the chapter.

5.2. Summary of the participants' biographies and sustainability leadership journeys

The section below provides a summary of the biographies of the study participants. The participants selected were in leadership positions directly accountable for environmental and social sustainability in their roles. The participants have therefore experienced the leading of environmental sustainability for many years throughout their careers starting from junior leadership positions to more senior leadership positions, and even executive c-suite positions.

5.2.1. Terry

Terry started her career working as an official for various SA government departments responsible for environmental enforcement. Such departments include the Department of Forestry, Fisheries and the Environment (DFFE), Department of Mineral Resources and Energy (DMRE) and Department of Water and Sanitation (DWS). These are the departments responsible for protecting the environment in SA and some of the duties they are tasked with include granting permits and licenses for mining rights, environmental authorisations, and issuing waste licenses and water use licenses. The protection of environmental resources such as water resources, biodiversity and air quality management also fall within these departments.

After working for the SA government for several years Terry moved into the mining industry and served in management and leadership roles for various large mining companies in SA until she began her current role as Vice President of Environment in the mine in which she now works. As Terry noted:

> "*I have worked in different companies, different geographies and different commodities.*"

She is currently an executive responsible for environmental sustainability and ESG for one of the largest SA mines, and reports to the CEO.

5.2.2. Fana

Fana has a background in mining as a mining manager and started his career in platinum mining. His responsibilities have included mine designs, long term mine planning and project planning. After working in the platinum mining sector, he joined gold mines and contributed to various leadership roles including Senior Vice President and Chief Operating Officer. Fana's commodity experience includes steel and vanadium in addition to gold and platinum. Due to his role as a General Manager, he was directly accountable for environmental sustainability in the mines that he led. His leadership profile as well as his mining technical background provided an important dimension of multi-commodity experience in the study.

Fana holds a Bachelor of Science degree in mining and a master's degree in business leadership. He has 20 years of leadership experience in mining. Fana's journey as a sustainability leader was shaped by a community related strike that stopped production in one of the mines that he worked for. After this incident he became more aware of environmental and social issues and started incorporating the key risks associated with sustainability in his leadership and management.

5.2.3. Brad

Brad's career commenced as a learner official in the 1990s and progressed to Mine Manager by early 2000. In 2006 he became CEO of one of the biggest mining companies in SA. Brad has had multiple leadership positions in mining and has worked in various commodities including platinum, gold and zinc and also within an international firm. His various roles spanning over 27 years include General Manager, Chief Operating Officer, Chief Executive Officer and Board Member.

5.2.4. Moshi

In 2006 Moshi started her career as a trainee and subsequently as an economic development manager. She began her career in government working for a municipality and thereafter moved to a manganese mine. Moshi has 24 years of experience, and her leadership roles have included

Manager, Department Head and Managing Director, amongst others. Her commodity experience over the span of 24 years includes manganese, coal, copper, aluminium, zinc and PGMs.

5.2.5. Mandla

Mandla has been involved in senior management positions in mining and the government sector. His career spans over 17 years. He has experience in multi-commodities within SA mining including gold, PGMs and zinc. He also worked as a consultant for diamond and chrome mines. His roles have included Sustainable Development Manager, Senior Manager, Director and Chief Officer within the sustainability field in mining, consulting and the government sector.

5.2.6. Nozi

With a career spanning over 16 years, Nozi has consulted in all commodities in mining and worked for manganese and coal mines as a sustainability manager. In describing her journey towards being a sustainability leader Nozi admitted that it was not pre-planned, and that sustainability was a career that she landed into:

> "*My role has actually evolved. It was never something that I thought I would want to do from the get-go, nor was it ever something that I even thought existed when I started my career. It's just been gradually getting promotions. That's how I've actually gotten into sustainability, and I must say it hasn't been easy.*"

In her roles she has formulated long term sustainability strategies and coordinated sustainability programmes aimed at minimising negative environmental and social impacts from mining.

5.2.7. Terrence

Terrence has 21 years' experience in mining, having worked in various commodity sectors including diamonds and iron ore within SA mining. His roles include Sustainable Development Manager, Corporate Social Initiative Manager and Corporate Affairs Manager. Over his two decades of career experience, Terrence has implemented programmes aimed at promoting SD in mining.

5.2.8. Tenda

Unlike a few other participants who had experience in sustainability early on in the careers, Tenda started his career in geology. He then worked with a VP of Environmental and transformed his career into sustainability. Tenda holds a master's degree in geology as well as a master's degree in engineering. He has 19 years of leadership experience and has worked for multi-commodities in SA mining including gold, platinum, coal and manganese. He has also worked as a sustainability consultant for one of the leading consulting firms in SA. His leadership roles include Senior Sustainability Manager, Sustainable Development Manager and Head of Sustainability.

Tenda described himself as someone who is not enthusiastic about the natural environment but rather enthusiastic about the management of the natural environment:

> "*I am not Mother Nature guy at all. In fact, I don't particularly enjoy being in nature, but I do like managing it because I understand our interrelation with nature. So, I'm able to manage it or contribute towards its conservation purely through the lens of understanding that human beings cannot exist or thrive if nature is not protected or conserved.*"

5.2.9. Mutodi

Mutodi started his career at the DMRE as a Compliance Officer and worked with multiple mines for licence approvals and enforcement. He then moved into mining in a managerial role as Environmental Manager for one of the chrome mines in SA. Mutodi has over 20 years of experience and has founded a consulting firm that helps various mines with environmental compliance.

5.2.10. Charlize

Charlize has 18 years of leadership experience in mining. She has vast experience in SA mining in various commodities including iron ore, platinum and nickel. Her leadership and managerial roles include Environmental Manager and Group Environmental Advisor. Charlize is currently the CEO of a consulting firm that she founded which offers sustainability advisory services to mines.

5.2.11. Henry

Henry has worked for the government sector in the DWS as well as the DMRE. In his roles he has worked in enforcement and legal compliance to ensure that mines implement sustainable mining projects and comply with all legal requirements. Due to the nature of his roles, Henry has been involved with all types of commodities in SA mining. Henry's leadership roles include being a director for mine environmental management.

5.2.12. Michael

Michael is one of the leading environmental attorneys in SA and is a partner in one of the leading law firms in SA. Through his various roles in his career Michael has become one of the leading thought leadership experts in ESG and speaks in various conferences to help companies implement sustainable practices. Michael described his journey towards being a sustainability leader as a journey of passion saying:

> "*I've been an attorney for 15 years now, and I suppose I always knew I wanted to be in the environmental space at least…when I told everyone that that's what I wanted to do, they basically laughed at me and said that I should go find another firm which does this. But I guess my passion shone through and I eventually found a team which was in the mining team that took me on to continue my passion*"

Michael is currently the lead of environmental law and ESG and has helped multiple mining companies in SA with advisory on sustainability practices.

5.3. The professional leadership experience of sustainability challenges

When discussing SL challenges, Fana could not help but reminisce over the past, indicating that when mining started, the area in which the mine he operated was located was isolated with very few people in the surrounds. Thus, mining was the only activity in the area. However, with the introduction of mining came jobs, infrastructure and communities. He said:

> "*Here there was no community problem. When I got here, there were no people. So, it made life much, much easier. This has been my experience.*"

Fana further highlighted that mining brought outsiders to the areas where mines operate, which created social challenges. When it came to environmental sustainability, Fana felt that compliance was being pursued by the mines only because they are forced to by legislation. He found it quite challenging that in order for mines to comply with environmental legislation they have to wait longer for approvals, saying:

> "*That, for me, is a part which I find that frustrates a lot of businesses because you're dealing with something that you know that on my side that there's an implication, people might lose jobs in two years' time if this thing is not sorted out. When the other person is sitting on the other side, he has no clue. When we are telling him or her, he's not making his problem. He says don't make your problem my problem.*"

Michael indicated that the leadership challenge experienced by leaders is the understanding of sustainability. According to Michael, *"sustainability is broad and all encompassing"*. Michael asserted that leaders that he has consulted, in their attempts to implement multiple aspects of sustainability, fail to gain traction because they attempt to do too many things.

The second challenge emphasised by Michael was the securing of leadership buy-in when implementing sustainability initiatives in an organisation. Michael strongly believed that sustainability needed to be led from the top and therefore senior management buy-in is a must, albeit not easily attainable in certain instances.

Terrence had a similar experience when it comes to leadership buy-in and the understanding of sustainability as well as the inclusion of sustainability at the core of the mining business. He said:

> "*I think what is challenging, especially from a cultural point of view, is to make people believe that this is as important as the machines, as pushing tonnes or putting or the exporting, etcetera. Because like I said, you have to be deliberate and intentional, otherwise, it's hard to get people to really believe why we are doing it, right. Maybe that links to culture as well, because if people can't quantify it to the bottom line, to what the rand and the economic value is to that, then it's*

kind of tough. I've been on that journey, especially if you're working with a bunch of engineers and very technical fraternities."

Terrence further indicated that the lack of buy-in from organisations leads to the role of SL becoming that of enforcement, saying:

"*You almost have to enforce, right. But what you want to do, you want to reach a maturity where you stop enforcing and it becomes more organic in the way people think, the way they show up and the way they make decisions.*"

Tenda's experience of SL challenges also related to the fact that the sustainability leader needs buy-in to influence positive sustainability outcomes. Hence, according to Tenda, buy-in is required within the mining companies:

"*So, what I find challenging is to mobilize or transform the mindset of those individuals to consider sustainability aspects. People have been in their roles for 20 to 30 years, naturally tend to be in at least senior management. So, when you have a lot of those guys are critical mass. Yeah, their job or transforming the mindsets that's become difficult because they're able to revert to the comfort of having survived so long without really having to do anything for the environment or the people.*"

The cyclical and volatile nature of mineral prices was expressed by Brad as one of his key challenges in leading sustainability. When mineral prices are low, mines need to reduce capital to cater for the slower economic environment. Brad expressed this as one of the key challenges that he has experienced as a sustainability leader:

"*We're going to build solar. We're going to have water tanks. We're going to plant on so many trees and maybe even some game farms, and all these things. It was a great picture a year and a half ago, two years ago. It was really a great picture. I was going to sink mines, diversify to make our business more sustainable, and get into other metals to get out of this PGM cycle, which is all great. As I arrived here, what happens? PGM, price dumps. The first instruction I get is, you see this capital. It must come down.*"

Brad further emphasised that the job of a sustainability leader really becomes challenging under such circumstances as the mining company then either delays or fails to deliver on its promise:

> "*Your job really, really becomes challenging. As you said, now there are conflicts in your own mind about what you have to do, what you can do, what you can't do. So, it is a lot more difficult to make these decisions and these trade-offs in this environment where your means have all of a sudden reduced significantly.*"

Terry reiterated the idea of buy-in as key when expressing the challenges that she faces as a sustainability leader. She noted that sustainability is still seen as a cost and not an integral part of the mining industry. She said:

> "*The biggest challenge we have is that we're seen as cash out of a business, we're ancillary to the core, and not seen as an enabler and an unlocker of opportunity and potential for the business. I think that mindset has to land first, that sustainability and ESG are no longer just a sideshow, it is an integral facet of how you do your business.*"

Henry noted that communities around the mines remain poor as mining impacts on their well-being and livelihoods. He indicated that gaps in the regulatory regime of the mining industry have been exploited by the mines and this has impacted the attainment of positive sustainability outcomes. In this regard he stated:

> "*Our communities remain very poor and undeveloped. So, you would see that these are the challenges which may be a result of maybe our legislation is not tight in certain areas. The industry to some extent does take advantage and just exploits, mines, and goes and they leave the state with a lot of environmental liabilities. Mines are put into maintenance forever and now we are dealing with issues of illegal mining. So, some of these things are things that were created as a result of ignorance or negligence of the industry itself. So, these challenges are there and obviously influencing sustainable development.*"

Henry further highlighted that poor communities usually exist around profitable mines:

> "*Our communities are poor, the mines are not... You can't say to me your project for SLP is going to be what, planting of vegetables? That's not sustainable. What about road infrastructure? What about water supply? What about electricity? What about schools, clinics, things that people can be able to work in even if the mine is closed? So, we have those elements that are still a challenge in this country.*"

However, according to Henry, despite the economic success of the mines, communities around the mines remain poor due to the lack of shared value.

5.4. Sustainability leadership success as experienced by sustainability leaders

Part of the objectives of the research was to investigate the leaders' experiences of sustainability success. This section reports on the findings regarding this unit of investigation.

Fana highlighted the re-mining of tailings as one of the key successes that he has experienced as a sustainability leader. He explained that the technology used in mining processes many years ago did not remove all the gold that was in tailings. In one of the projects that he was involved in, newer technology was used to re-mine tailings thus rehabilitating the environment, creating employment opportunities, and generating revenue and profits. He indicated that the tailings dam that was re-mined contained 0.5 grams of gold per metric tonne of tailings. The remining of tailings is key to mine closure as most mines have large tailings dams that they struggle to rehabilitate before they close.

Fana's experience confirmed findings gathered from Michael as he also explained that mine closure has been one of his key elements of success that he has experienced from the mining industry:

> "*I think in the last five or so years, again, we've seen a complete shift in how companies tackle closure and hopefully ensure more sustainable closures going forward. I think mining companies have really understood that they are part of a broader stakeholder base, and they have an impact on their local environments,*

and I mean the physical environment and the social environment within which they operate."

Like Fana and Michael, Terrence's perception and experience of success as a leader when it comes to sustainability also related to life of mine and rehabilitative mine closure as he noted:

"*When you think about life of asset or the future in the front-end stages, I think that for me is a measure of success, it's not necessarily only the outcome or what we will receive as the impact at the end for me, the success would be getting it right from the start. It means then ultimately, you're going to get the desired outcomes, you're going to get the desired impacts, whether it be in two years, three years, five years, or ten years. You'll start feeling the net positive impacts that you want in a few years. So, yeah, that's success for me, it goes back to culture, organisational culture, making shifts in the organisation, not somewhere in the middle or towards the end, but right from the start. But it does take a huge management of change.*"

Mutodi highlighted long-term thinking as an important element of success in sustainability. Mutodi noted that long term infrastructure projects are critical for success in sustainability. He believes that through these projects, mines can contribute to the long-term well-being of the environment and societies within which they operate. He cited a project where mines in Burgersfort were able to build a road that helped communities which became a sustainable project and contributed towards the safety of the community.

Tenda took a slightly different perspective when discussing his experience of sustainability success. According to Tenda, success as a sustainability leader meant that his role would now be redundant due to a deeper understanding of sustainability by fellow leaders in mining outside the environmental field. Tenda noted that:

"*I would have succeeded in executing the obligations of my role is when senior management and our executives can talk about sustainability without me being in the room or talk about sustainability and make decisions that have sustainability*

in front and centre without needing to be pushed or cohered. Uh alternately, when my role becomes redundant, the redundancy of my room would mean the company no longer needs that dedicated voice on sustainability everyone in the team knows what's the right thing to do, and you no longer need a separate portfolio. So, the CEO in his or her decision making will just know that, oh, I can't do that because of this. And that's how I know I would have succeeded in executing my role."

Brad's success as a sustainability leader hinged on the difference made to society in terms of the contribution of the mine towards employee well-being and community empowerment. Brad recalled experiences related to the company that he is leading where the mine provided bursaries to poor but capable community youth members. Knowing that he has changed the trajectory of poor families through actions such as these provided him with satisfaction. He recalled this experience of success as a sustainability leader, saying:

"*I think, the year before last, and we gave out quite a few bursaries to local people around the mine that we invited the child that was going to get the bursary and the parents. The parents were so grateful and thank you because you know you've changed the trajectory of that family from living in a squatter camp or being unemployed, especially with our stats on youth unemployment. Now all of a sudden, that whole family from now onwards will have a different future. You changed that. I remember standing outside now, as we're saying goodbye to everyone and they're climbing in their taxis and they're going on the buses taking them back. My colleague comes next to me, and he sees me looking at the people going off like that and he says, 'Brad, this is why we mine, hey.*"

In recalling this experience, Brad highlighted his proud leadership moment of sustainability success and great satisfaction at knowing that he made a difference through contribution and changing someone's life.

Terry indicated that success for her was marked by the inclusion of environmental considerations in the company strategy as well as the consideration of environmental stewardship in business decisions and processes. Terry noted that:

> "*For me, success is marked by a couple of things. The fact that we have our very first pillar of our strategy dedicated to responsible stewardship, that we're living that value, and that our purpose is aligned to and underpinned by our values, many of which talk to sustainability imperatives. The fact that we've wired it into our organisations, business processes and decision making, and the fact that sustainability... Our business is being recognised for its contribution towards sustainability, towards the triple bottom line, towards good citizenship.*"

Moshi's experience of success as a leader is based on making a difference in people's lives and receiving appreciation from the efforts made. Moshi however also expressed that the job of a sustainability leader can feel like a thankless job at times. She noted that not all initiatives show positive outcomes early on and that not all positive outcomes from the sustainability projects implemented are recognised by stakeholders. Similar to Brad's experience, for Moshi knowing that one has made a difference to someone's life results in a fulfilling experience as a sustainability leader. She stated:

> "*Some people didn't even have the means, their parents didn't have the means to go to varsity. Through your intervention, you have spotted those people, you ensured that the companies where you operated take them under their bursary scheme, and then someone three years or four years down the line comes to you and then indicates to you, If you didn't intervene in my life back then, I wouldn't be where I am. These simple things, they are they are not seen, but that's true sustainability to me because it's not about how many lives you impacted, but even if it's one. But I know that there will be that replica effect. That little girl who went to varsity and now she becomes the breadwinner in the family and feeds her family. You get it? The cycle of poverty has been broken.*"

Henry described his pivotal experience as a leader as happening when environmental compliance issues are taken seriously. He describes moments when he visits mines where environmental compliance is low and gratification in having the leaders of the mine taking him seriously. He finds joy in ensuring adherence to environmental laws and standards.

> "*Where operations are operating either contrary to the law or the approvals and agreements. Where I get involved, when I arrive, you will know that someone who takes this issue seriously has arrived and you will comply. You will comply. If it means you will pay fines, you will pay some good millions. To ensure that you comply, you will learn what it means to do things the right way. That is the greatest joy.*"

Henry further explained that in some of the mines that he had been involved with, leaders of the mines were not sure what to do, and in some instances environmental compliance had not been effectively monitored. He found that when he explained what needed to be done to ensure compliance and good environmental stewardship, this made a difference:

> "*So, when you arrive and you take them through the process, you realise you are contributing to someone who will continuously and for years ensure that that particular mine operates sustainably and in compliance with the law.*"

Similar to Terry, Henry found joy in ensuring that processes were in place for good environmental practices. He did this through coaching environmental practitioners and leaders in the mine and found satisfaction from this:

> "*So, you are impacting by teaching others what is to be done, and what is expected. The interpretation of the law sometimes is not accurate. When you clarify and help people understand the process and processes, you really feel fulfilled that you are not just employed, but you are contributing indeed to the economy of the country.*"

Unlike other participants, Nozi felt that she had not had the experience of success in her role as a leader, saying *"I don't know. I still feel like I haven't achieved much, actually"*. Nozi further expressed that for her, success means helping the business grow, even if it is by a small margin:

> "*Now that I'm thinking about success will be when I get confirmation that the business has grown by even just 1% of its EBITDA because of the good that we*

are doing. I think for me, that will definitely define as some form of success because it will mean then that we've actually done something good that's not only contributed to our stakeholders but also to us as a business. I think that's how probably I would define the success of sustainability."

Nozi further explained that in her view the experience of success as a sustainability leader would be fulfilled by doing something *"worthwhile"* for all stakeholders, that is, the business, communities, and government. At the time of the interview, she did not feel that she had reached this point and therefore did not feel like she has personally experienced success in her role as a leader of sustainability.

Contribution towards business was also confirmed by Charlize as fundamental experience in the leadership role. Charlize mentioned some of the groundbreaking and environmentally innovative projects that she had been involved in as giving the feeling of satisfaction:

"*We are getting plant growth on tailings dams with zero topsoil. That's a massive innovative breakthrough for us, which we think will have a massive impact on sustainability, on cost, and future ways of management of tailings dams.*"

Whilst Charlize found satisfaction in her immediate contribution towards sustainability as a leader, she expressed that from a global point of view much still needed to be done. She expressed her impact as a leader as immediate but felt that more needed to be achieved in the global scale. Charlize expressed that when money is spent on sustainability it is spent on reporting and monitoring, instead of the actual implementation of sustainability efforts from the ground. She said:

"*There's too much money inside companies on advertisements, marketing and sustainability reports and systems and tools to quantify it. There's too much money on monitoring. There's almost nothing on implementation.*"

Charlize also indicated that many companies were still spending little on sustainability efforts compared to other activities.

5.5. Leadership factors influencing positive sustainability outcomes

One of the objectives of this study was to investigate the sustainability leaders' experience in influencing positive sustainability outcomes. By doing so, the study also explores how leaders contribute to the sustainability agenda in their roles.

Michael described his experience in influencing positive sustainability outcomes in the following manner:

> "*As a true believer of sustainability myself, in the early days of my career, I kind of had to justify for myself what I was doing. I often would lie awake at night wondering if I was lying to myself around the impact that I was potentially having because it was early days in the environmental legal world then, and effectively all we did was compliance. But I justified it in my early days by saying that we were assisting clients to achieve full compliance with the law and that the law was put in place with sustainable development in mind. The law was there to assess all the impacts, put in place mitigation measures, et cetera. So, in my mind, by assisting clients to achieve legal compliance from an environmental perspective, we were helping with sustainability in terms of development out there. But I suppose in the back of my mind, I was always asking if I was just fooling myself and actually just helping big companies impact and pollute more. But in the last few years, that has really changed.*"

Michael's response indicates a conflict between consulting with firms and ensuring they have the right licences for compliance versus contributing towards pollution by helping them acquire environmental licences. Michael further explained that based on experience, this has now changed as more mining companies are now attempting to promote environmental stewardship and adhere to SD requirements. This he explains in his statement saying:

> "*Now I can sleep well at night. We do far more impactful stuff than just legal compliance these days. I mean, it's broader sustainability projects around really changing the world, helping clients achieve their Net Zero targets, their*

biodiversity positive targets, their water efficiency targets. This is way beyond legal compliance stuff."

Terrence noted that many years ago the understanding of sustainability was limited in the mining companies. Sustainability leaders therefore struggled to influence positive sustainability outcomes. According to Terrence this situation has however improved:

"*But the depth of the understanding a few decades ago is not as topical as it is now. So for me, I found it exciting, but there's a lot of rigour, much more rigour around the conversation, especially in corporates and business. What's nice is that sustainability is no longer just left to sustainable development practitioners. It's now a business prerogative. It's on the management scorecard.*"

Terrence further explained that in order to influence positive outcomes, sustainability leaders need to understand the businesses that they serve. Thus, they need to understand not just the value chain but the political landscape within which the business operates.

"*If you need to be successful in what you do, you need to be able to not just understand your value chain in mining, you need to understand the macro external sustainability, political landscapes, and the global environment. It's broadened up. And I think what I enjoy about it, and I've seen it, is that it's gone from what was very much ad hoc and a nice to have to business critical. So that's been a good journey though.*"

In terms of buy-in, findings from Terrence are similar to findings gathered from Charlize. Charlize stated that in the beginning of her career as a leader she had to work harder to obtain buy-in from senior leadership and stakeholders in the mining companies where she worked. She then spent most of the time in the operational environment to influence common understanding and better influence positive environmental outcomes:

"*I would spend a lot of time on the ground. I would wake up, and at four o'clock I would start with my inspections and finish my inspections. So, I finished the work*

that I had to have done for the day. Then by seven o'clock, really spend time on the ground to earn that respect from the guys. So, if it was to go spend time on the plant, to spend time underground, wherever they went, I went. That was definitely a massive thing for me because once we were in a boardroom and I said something, they knew what I was speaking about because they knew they were standing next to me when we spoke about that on the ground. I think that was a big turning point for me and my career. I think now it's different. There are so many frameworks and there's so much attention internationally that I feel like anyone that starts their career now, it's easier because people have buy-in."

Just like Terrence, Charlize agrees that sustainability is now a widely discussed topic. Thus, sustainability practitioners and leaders no longer have to struggle trying to get operational teams to understand the concept and implementation of sustainability initiatives, although other challenges remain.

Tenda expressed the importance of altruism in influencing mining leaders to implement sustainability initiatives. In this way, according to Tenda, mining companies can make decisions that are good for all stakeholders.

"*I think I have a responsibility to move the rest of the leadership team to think about our role in society. So, part of what I need to do is to ignite certain emotions within the leadership team to say yes, you mining this diamonds, yes, bonuses are great, but look at what we can do four our host communities for instance, this Friday I was at veteran university and we had 350 kids, grade 12 kids who needed some motivation. We got them together in a big hall and we spent half the day. Just trying, uh, to motivate them to do well in their exams, to totally altruistic thing from the company's perspective. But when you share those experiences with the rest of the leadership team, one would hope that they start seeing the role of the firm or the role of the enterprise beyond just being a profit-making entity. So, part of my role is to ignite those type of emotions. To cultivate those within the*

leadership team. Because then we put ourselves in a better position to make decisions that are for the good or for all stakeholders involved."

Mutodi strongly felt that for sustainability leaders to have positive outcomes, there must be senior leadership commitment in sustainability initiatives. He expressed great concern that some of the sustainability projects that he had been involved in lacked senior leadership commitment:

"*If this SD is a dying matter to the sector, the senior management should love these projects and they must make sure that they revisit those projects time and again. It shouldn't be the issue of seeing them as they open them and then that's it. No more follow-up, no more monitoring, no more visits, no more instructions. It should be an issue. You see when you are doing an ISO 140001, for example, they will say management must commit.*"

According to Mutodi, senior leaders need to constantly follow up and monitor progress on sustainability initiatives to ensure positive outcomes. He said: *"We only see middle management visiting the site time again, but we don't see anything afterwards from senior management".*

Mutodi's assertion also aligns with Terry's leadership experience as she noted that one needs to attain senior leadership buy-in to influence positive sustainability outcomes. Terry highlighted that having a vision as a leader has helped her with buy in from stakeholders involved in enabling sustainability:

"*I think you've got to articulate a very compelling vision. I think your vision cannot be separate to where the business is going. It has to be one vision and it has to be holistically incorporated. I think when that vision is articulated, you've got to get the buy-in of your leadership because leadership is what is going to drive downward integration and downward adoption. The leaders have got to walk the talk.*"

Terry further noted that having passion is also important. Passion, Terry suggested, allows the sustainability leader to have the conviction needed for the upholding of a meaningful sustainability strategy:

> "*I think passion is a big consideration. You've got to be passionate about your business. You've got to be passionate about where you're taking it. I think allied to all of that is conviction. You've got to have bought into the sustainability story and understand how it upholds the rest of the strategy. So, conviction is a very important thing. I think from a leadership perspective, you've got to walk the talk and you've got to deliver to build credibility.*"

Terry further maintained that innovation and creativity are critical factors influencing positive sustainability outcomes:

> "*I have to also say being in the South African mining sector, innovation is crucial. You can't do business as usual and think you're going to get a different outcome. You must, in fact, be creative and solutions-orientated as well.*"

Terry also expressed that ethical leadership is an important element in leading sustainability. This is because, Terry commented, mining business impacts people beyond the boundaries of the mines.

> "*You must be able to lead with compassion because so much of your business impacts people beyond your garden or your gate. It takes a deep level of compassion to be able to realise that you want to take them along with you as you journey through your life of mine or time as a business.*"

Findings expressed by Brad in his interview align with Terry's suggestions, as Brad noted that principle-based leadership is important for SL. Brad emphasised the importance of allocating resources as an overarching factor in influencing positive sustainability outcomes. This, as he notes, starts with principle-based leadership:

> "*I think it has to start with principle-based leadership. That's the core of all this leadership, where it's safety, production, ESG, paying your taxes, whatever, it's principle based. The fact that you are not... I'm a capitalist through and through, I believe, capitalism, the way we allocate resources to build society, capitalism does it quite effectively. It does need tweaks every now and again, but if there's a need it generally allocates resources to it, and then it gets delivered into society.*

The moment you start interfering with that, or you get people who are not specifically trained in resource allocation, it goes awry. I believe companies are the vehicles in most cases, that correctly allocate the resources and deal with them appropriately."

Brad further explained that the economic survival of the mining companies is important for any sustainability initiatives because if mining companies are not surviving, naturally they will not invest in sustainability initiatives to the benefit of the environment and society:

"*If the mining industry vanished from South Africa today, there would be less schools in this country, there would be less bursaries, there would be less universities, there would be less educated people, and there would be less water solutions. The air will probably get dirtier, not cleaner.*"

Moshi highlighted the issue of empathy as important in becoming a good sustainability leader and influencing positive outcomes:

"*If you don't have empathy as the leader, I think it goes back to how you were brought up. You cannot come on next door and then you feel good about yourself. Being a good neighbour is very critical. Or you blossom as a company in a country that is full of poverty like it's happening in South Africa. How do you feel? How do you even brag about your returns, your profit margins, and whatever? How do you sleep at night? It's all about being empathetic, being patriotic, and wanting to see your country blossom or the earth blossom. It's not only about you but also about taking care of the planet from which you got those resources.*"

Henry emphasised the importance of environmental education amongst stakeholders as important for the attainment of positive sustainability outcomes. He further noted that legislation needs to continually improve so that the mines can operate more sustainably:

"*I think environmental education to our people, the involvement of everyone, the youth and our females remains key in this country, especially looking at our political history as a country. I think that is pretty much how some of these things can be dealt with. Continuous improvement of our legislation that regulates these*

industries. I think to some extent that those are some of the things that can help resolve these issues."

In a similar vein as Henry, Nozi highlighted the importance of educating employees about sustainability and having meaningful conversations regarding sustainability. She explained that conversations about sustainability need to reach the same level of discussion around safety issues in mines:

"*I think more importantly, for me, it will be a conversation that needs to be held through various roles, whether it be safety meetings first thing in the morning when employees are going into the workshop, they need to breathe and live it just like any other element. When we're discussing safety, we're discussing not only safety but all other things that relate to the ESG, so that there's a better buy-in. Because if I'm asking you to change from using a host pipe to remove spillage to actually using a shovel, which is much more sustainable and not wasting water because South Africa is a water-scarce country. The person needs to understand how that affects them from a personal perspective as well as what change it also brings to the business. It's a conversation that requires a whole culture change in the business. But it's one of those that if it's not being held, no one will talk about it, nor will people know what they need to know because no one is talking about it. So, influence does play a huge role. Engagement does play a huge role as well. I think continuous improvement and change management also need to come into play.*"

Charlize also confirms viewpoints from Henry and Nozi in terms of promoting sustainability awareness and education, noting the following:

"*So, sustainability for me as a leader is not just from an environmental perspective. Sustainability includes interaction and collaboration with different entities. Collaborating with government, collaborating with industry, collaborating with communities. Because if we aren't able to create this awareness or if we aren't able to teach the next generation about sustainability, they won't be sustainable.*

The difficult component of that is changing culture. And culture is not just from poorer communities, culture is also from really richer communities. You have to change their mindset that just because this is how it's always been done is not how it should always continue to be done."

Charlize highlighted the role of changing culture as being important for sustainability, because ensuring long-term sustainability entails teaching future generations and changing mindsets.

5.6. The meaning of sustainability to those who lead

Part of the research objective was to understand the meaning of sustainability as lived and experienced by sustainability leaders. Brad reflected on how the way of human living has evolved over time and how mining was done differently a century ago, noting that sustainability means recognising the limits of the earth's carrying capacity and thus balancing economic needs with other fundamental needs. Reflecting on how human beings lived in the past, Brad pointed out that the early stages of human development were characterised by nomadic lifestyles which meant that the idea of sustainable living was adopted and after occupying a specific area within the natural environment, nomadic people moved and enabled ecosystems to regenerate and recover after the humans have impacted on them. In this way, the natural resources used by humans, including wood for fuel, plants for nutrition and animals for hunting, could regenerate.

Thus, to Brad, sustainability meant that the carrying capacity of the earth needs to be considered when any human activities take place, including mining. Brad felt strongly that sustainability should not only be focused on in mining but should be a way of living. He noted that previously the separation of domestic waste, such as plastics, used to be someone else's responsibility (waste service providers, government, etc.) and now this mindset is shifting with more people realising that they have the responsibility to contribute positively to the environment through the separation of their own waste.

Relating to mining, Brad strongly asserted that, *"Companies are developed so society can thrive. Mining actually exists so that the human species can thrive"*. He further noted:

> "*So, you cannot produce metals to make sure an element of the human race thrives while you create more harm than the good you create. Surely that is not sustainable by definition. So, you have to integrate the package.*"

Brad also highlighted that the meaning of sustainability to leaders will also be impacted by the leader's value system. Thus, according to Brad, the leaders' value system shapes their approach and integration of sustainability into business by considering the expert views. Brad emphasised that not all leaders are experts in sustainability and ESG and therefore expert thinking needs to be taken into consideration when implementing sustainability in the mining industry.

Describing what SL means, Terry asserted, *"First and foremost, I think sustainability is about having a strong, resilient business that has a presence now and, in the future,"*. For Terry this also means that the business needs to be profitable and is able to share *"value with others"*. Terry further explained that to her sustainability also means having a strong business with strong prospects. The viewpoint of a successful business whilst being sustainable is also in line with one of Brad's viewpoints as he said that:

> "*Companies must survive. If you wipe out the companies, you will not get these things done. If the mining industry vanished from South Africa today, there would be less schools in this country, there would be less bursaries, there would be less universities, there would be less educated people, and there would be less water solutions.*"

Mandla noted that SL means having a deep understanding of the environmental, social and governance challenges faced by the mining industry. Such understanding, according to Mandla, comes with care for the environment along with social intelligence for the holistic understanding of mining impacts.

Tenda indicated the following about the meaning of SL:

> "*It means driving sustainability objectives in a way that supports the execution of the business plan or the business strategy. See, it means being able to engage with the Chief Operating Officer responsible for operations to say yes, we know that*

you'll make more money doing this. However, if we do it the sustainability way. Look at the impact, the negative impact that such a decision would have on the environment and the people, and articulating what that is likely to mean from a business perspective."

Tenda also indicated that being a sustainability leader in mining means guiding production teams to consider the environmental impacts of activities and not just pushing for production and profitability, thus prioritising environmental considerations alongside production and profitability. He emphasised that driving profits at the expense of the environment can lead to an unsustainable business, saying:

"*If you are overly exploitative, the short-term gains will be wiped out when the company shuts down, which in today's world will inevitably be the case.*"

Similar to Tenda, Mutodi also referred to profits. However, in Mutodi's case the emphasis was on profits used to support sustainability outcomes:

"*Sustainability in the mining sector means that the owners of the mines or the owners of projects should ensure that a certain amount of the profits that are coming out of that specific area, even if it's the local or regional area are being ploughed back to the affected people in that area. But such implementation should at least impose a long-term effect. If you were to put in the scale, the impact of dust and depletion of the resources in that area is a hundred years plus effect, it will never come back. So, if you are doing an equivalent project, you should do something that can match the impact.*"

Mutodi felt strongly that the mining industry needs to match initiatives with the impacts on the environment, as initiatives are started but never last over the longer term. He argued that mines were not contributing even 10% of their profits to sustainability initiatives.

Charlize asserted that the meaning of SL for her goes beyond environmental management. She indicated that SL is multi-faceted and broader than the natural environment:

> "*Sustainability for me as a leader is not just from an environmental perspective. Sustainability includes interaction and collaboration with different entities. Collaborating with government, collaborating with industry, collaborating with communities. Because if we aren't able to create this awareness or if we aren't able to teach the next generation about sustainability, they won't be sustainable.*"

Henry indicated that sustainability requires urgency and emphasised that *"we might not be able to enjoy the future if we do not take action and act now"*. Thus, he said, sustainability means pioneering sustainable ideologies, implementing them and standing firm for the sake of the future generation.

Michael highlighted that SL meant that leaders needed to shift their mindset in decision making for sustainable considerations beyond profit making:

> "*Sustainability requires a shift of mindset in terms of the considerations that you consider in any decision-making process. So, historically I think leaders were quite narrow focused in terms of short-term financial benefit. Sustainability requires you to change your thinking drastically and to try to consider other factors in any decision-making process that historically you may not have considered and that is hard. But I think if you're going to be a true leader in sustainability, that is what is required. I mean, even a simple decision-making process would be something like choosing whether or not your canteen should use reusable crockery and cutlery versus disposable. Historically, a leader who didn't have a sustainability mindset would just think about what the cheapest option was, and the cheapest option is obviously to get disposable items in place. However, a sustainability leader will consider all the externality costs, the environmental cost, et cetera. So, it requires you to broaden your mindset and ask more pointed questions other than just what the financial cost or benefit may be to a decision.*"

He believed that all decisions, down to even the smallest concerns in a company, should be taken with sustainability in mind and by considering not only profits, but wider external and environmental costs and implications.

5.7. Conclusion

This chapter first briefly outlined the biographies of the participants to provide the context within which the study was conducted. The participants have an impressive 248 years of combined experience across a broad range of commodities in the mining industry in SA, which positions the study well as the findings can be considered to widely represent sectors in the industry. The findings of the study were presented in line with the overall aim and objectives of the study by drawing on the data gathered from the semi-structured interviews. Excerpts from the interviews were presented which focused firstly on the leaders' professional experience of addressing sustainability challenges and some of their successes. Thereafter the findings related to the leadership factors that may influence positive sustainability outcomes were outlined, followed by the leaders' views of the meaning of sustainability. No interpretation of findings has been made as this will follow in Chapter Six. Thematizing and clustering of themes will be conducted in the next chapter where the study findings will be linked to discussions considering existing literature.

CHAPTER SIX: DISCUSSION

6.1. Introduction

The previous chapter focused on the presentation of the results of the study, which focused on the expressions relevant to SL drawn from the semi-structured interviews conducted with sustainability leaders in the SA mining sector. Verbatim quotes from the interviews that address the overall research aim and study objectives were selected from the transcripts, in line with the phenomenological study approach. In this chapter an attempt has been made to link the study findings to other research; however, limited studies are available that specifically investigate the mining industry in SA at the practical level of implementation. Most studies conducted previously have investigated impacts of mining activities on the environmental and social landscape, yet grassroots level implementation challenges, positive sustainability initiatives and SL remain under-investigated.

This study attempted to obtain descriptions of the experience of SL from the leaders selected to participate in the study. Efforts were made to obtain descriptions of their lived leadership experience and not to simply offer theoretical explanations. The transcripts were analysed to identify the essence of the experience of SL as lived and experienced by these leaders in the mining industry. In addition to this, NVivo was used to identify a hierarchy of codes related to the themes of the study. The researcher took care not to lose the essence of the phenomenon under investigation. The use of computerised data analyses was balanced with the physical and manual analysis of the transcripts in the attempt to determine meaning units and contexts. The discussion of the results presented in this chapter is aligned with the four study objectives:

- To identify sustainability leadership challenges in the SA mining industry.
- To explore sustainability leadership successes as perceived and experienced by leaders within the SA mining industry.
- To identify strategies that leaders use to influence positive sustainability outcomes.
- To explore and define the meaning of sustainability as perceived and experienced by leaders in the SA mining industry.

Data analyses in the study was done following guidance from Creswell and Creswell (2018). An interview guide was developed as an instrument for data collection through semi-structured interviews. All recordings from the interviews were transcribed by a professional transcriber. The analyses of the data commenced with familiarisation. Thus, transcripts were read several times to understand content and commonality. This step allowed for the preparation for data analyses. During this stage reflection on data analyses commenced. Units of experience were grouped thus formulating the meaning of experience pertaining sustainability leadership from the study participants. Coding was done using the NVivo software package to develop themes from the transcriptions and facilitate interpretation. Findings were then clustered into key themes from the thematic analyses. The analyses conducted aligned to four key themes:

1. Sustainability challenges experienced by leaders;
2. The experience of success and effectiveness of positive sustainability efforts;
3. Leadership factors and strategies associated with positive sustainability outcomes; and
4. The meaning and essence of sustainability leadership.

The discussion of the findings pertaining to each of the themes identified in the study is presented below.

6.2. Theme 1: Sustainability challenges experienced by leaders

This primary theme was crucial in establishing what the key challenges are as experienced by the leaders in the mining industry in terms of sustainability. The findings show that the scale of the challenges experienced by sustainability leaders participating in the study ranges from operational involvement through to engaging communities and government alike. Sustainability leaders needed to balance the complex interactions between environmental, social and economic needs of the mining enterprises that they are involved with. The sustainability leaders relayed their lived experience and conceptualised their perceived views. The challenges experienced by these leaders resulted in the identification of several subthemes including: environmental challenges; community challenges; political challenges; leadership and governance; and the sustainable closure of mines. Figure 6.1 shows the detailed hierarchy chart related to Theme 1. Each of the subthemes will be discussed more fully in the subsections to follow.

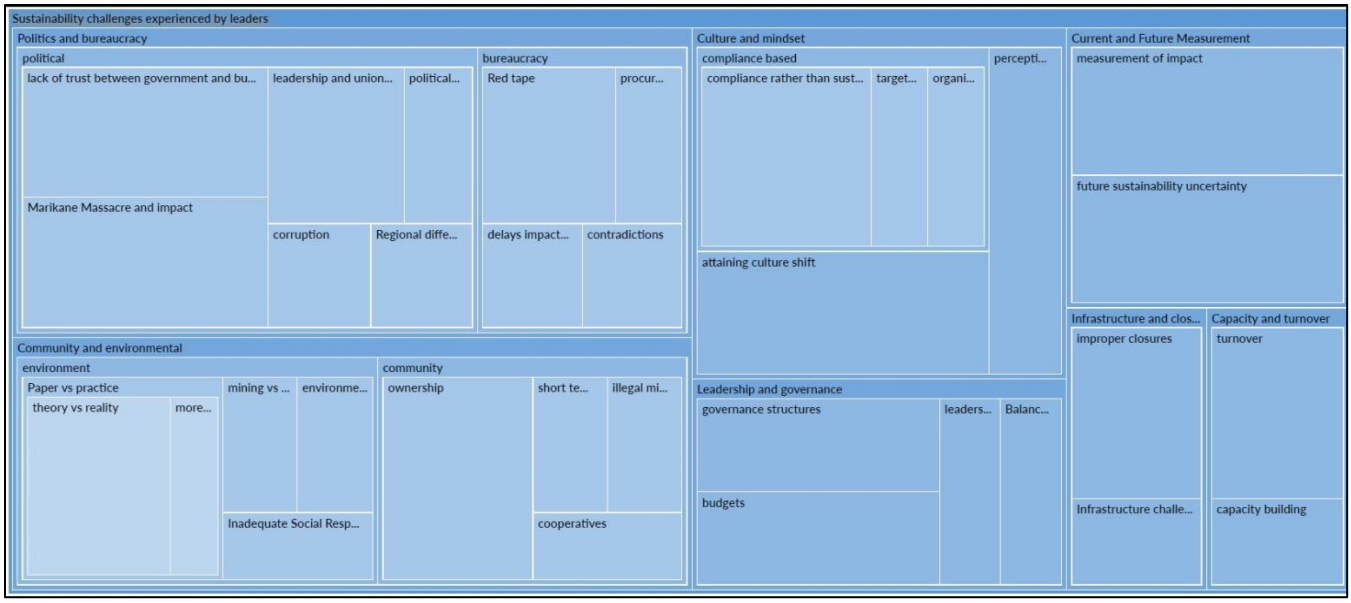

Figure 6. 1: Hierarchy Chart Theme 1 – Sustainability challenges experienced by leaders

Source: Developed by the researcher

6.2.1. Environmental challenges

Findings from the interviews showed that leaders experienced limitations pertaining to the pragmatic implementation of innovative solutions to solve environmental problems. The findings indicated that there was great divide within the environmentalist community, which comprised two sides, as termed the 'right side' and the 'left side'. The right side focused on monitoring and reporting environmental issues, whilst the left side was more involved with the practical implementation of solutions. However, to date there seems to be more emphasis on the 'right side' as there is much monitoring and reporting, but this is not sufficient for addressing sustainability challenges. There is, hence, a deficiency in innovative approaches and implementation efforts at ground level. Thus, the leaders believed there must be more practical interventions and action-oriented approaches being introduced in sustainability efforts.

Whilst monitoring the state of the environment is important for determining pollution levels, the findings from participants highlight that these measures are not adequate. Too much monitoring

without action to mitigate sustainability challenges meant that there was no change at the ground level. The tracking and reporting of data without initiatives to address environmental pollution and negative community impacts caused by mining activities does not benefit the environment and society within which mining takes place. This finding is supported by Makua and Odeku (2017) who asserted that mining companies need to be held accountable and protect against negative environmental impacts as well as the societal impacts associated with their activities.

Various environmental challenges caused by mining, such as the loss of vegetation, deforestation and pollution, are adequately reported on by environmental consultants and researchers; however, there are limited implementation efforts at the practical level to mitigate these challenges. Equally, social impacts related to mining challenges are tracked and reported but there is limited action to resolve such issues and reverse unsustainability. Thus, action needs to be taken on the ground to implement solutions that will benefit and improve the state of the environment.

The findings of the study demonstrate that whilst sustainability practices looked impressive on paper, there were shortcomings when it came to practical implementation at ground level. Such shortcomings included areas such as rehabilitation, vegetation loss, land use and water and waste management. Charlize expressed strong sentiment regarding the lack of innovation and implementation when it comes to solving environmental challenges at the grass root levels. She highlighted the matter that upon removing soil to build mine infrastructure most mines leave topsoil stockpiles unattended and unrehabilitated, thus they treat the topsoil stockpiles as just dirt. An innovative approach to this would be to use seeds to revegetate the stockpiles. When this is done, the stockpiles would be greener and would generate less dust and would thus contribute less dust particulate to communities around the mines. The need for innovative approaches in solving environmental problems in mining is expressed by scholars such as Dehkordi et al. (2024). Various aspects of mining contribute to pollution sources in the environment, for example, ore crushing, blasting and drilling, tailings and pollution containment dams. Environmental factors such as rain and surface water runoff as well as dry winds result in the release of the pollution contained in mine facilities into the environment. This impacts both the environment and communities around the mines. These findings of this research indicate that innovative technologies in mining, processing and

waste management can limit environmental pollution and promote sustainability in mining, in line with the findings determined by Dehkordi et al. (2024).

A similar notion to that of topsoil management was expressed by participants regarding tailings, that is, instead of leaving tailings as dirt and unattended, mines could implement an organic amendment on the tailings side slopes and create a growth medium resulting in a regenerative ecosystem and limiting dust emitted to surrounding communities. However, participants expressed strong views that the overall lack of innovation and implementation limits solutions to environmental problems and contributes towards unsustainable mining. It is the position of this research that challenges presented by mining that result in impacts on the environment and society are practical and therefore need practical means to solve. Such practical means can contribute towards the SD imperative and lead to sustainable mining. Despite impressive sustainability reports, implementation towards SD in mining is lacking, and participants believed that this was due to the companies failing to implement certain measures diligently and to innovate new methods to address the numerous impacts of mining. This finding is not surprising considering that scholars such as Schein (2017) express strongly that innovation and activation are key elements of sustainable thinking that sustainability leaders need to implement. Without innovation and implementation sustainability efforts fail.

There is a disconnect between progress on paper versus the meaningful changes that need to happen to address the environmental and social challenges that mining presents. Action needs to be taken on the ground to implement solutions that will benefit and improve the state of the environment to mitigate mining impacts. This will improve the state of sustainability in mining to the benefit of the environment and communities surrounding the mines.

Findings in this study show that mining has led to pollution such as poor air quality in areas such as Mpumalanga and Witbank in SA. Such challenges persist even after mine closures which undermines sustainability efforts. This needs to be addressed through clearer objectives. This finding is also confirmed by research from multiple scholars including Tripathy and Patnaik (1994), Fugiel et al. (2017) and Moyo et al. (2024). The challenges have posed significant barriers towards the achievement of SD in mining. Residents living near mine sites are exposed to high levels of dust,

and emissions of particulate matter, sulphur dioxide and nitrogen oxide. These emissions can cause respiratory illnesses and other health problems.

Leaders in this study indicated that the long-term effects of mining activities, such as dust pollution and resource depletion, need to be matched by projects to ameliorate the impacts of these occurrences. Hence, sustainability in the mining sector requires that a proportion of profits should be reinvested in affected communities for long term impact. However, there is a current lack of such reinvestment and participants noted that the mining industry's sustainability efforts need to improve in terms of financial contribution by the mines. There was strong sentiment that some of the profits made by mining companies should be reserved for environmental management and community upliftment. Therefore, internalising external environmental and social costs as explained by van Noordwijk et al. (2023).

The findings related to the experience of the sustainability leaders in terms of environmental challenges are congruent with findings of previous research conducted by many scholars including Askham and Van Der Poll (2017), Cornelissen et al. (2019) Makua and Odeku (2017) and Munnik et al. (2010). This study found that there is a gap between the concept of sustainability and actual implementation of practices on the ground, similar to the findings of other authors. Practical solutions are required to ensure that environmental challenges can be addressed. Impacts from mining activities are felt on the ground in terms of the environmental challenges yet no solutions are implemented at a reasonable pace. Contributing to this challenge is also the fact that sustainability and SD remain theoretical concepts with limited practical frameworks to ensure the actual implementation of initiatives at the ground level.

6.2.2. Community challenges

The natural environment within which mines operate is shared with communities surrounding the mines. This was noted by Kemp (2010) who stated that mines search for minerals in remote communities, most of which are home to indigenous, poor and vulnerable peoples. The mines have a responsibility to improve community livelihoods through environmentally friendly and socially beneficial projects and through such efforts, the mines attempt to attain the SDGs as developed by the United Nations. The research found that sustainability leaders experience challenges from

communities during the implementation of these projects. Conflicts arise due to ownership, distribution and control. Hence, attempts to improve community wellbeing as per the requirements of SD are often met with resistance due to individual self-interests. Such prevalence of self-interest and disputes over ownership may result in hampering community development efforts and become an obstacle to SD.

The findings of the study indicate that politics, power dynamics and self-interest derailed well-intentioned efforts by the mines to improve communities' wellbeing. One participant explained a situation where a mine dump was donated to the communities for remining thus benefiting most pillars of the sustainability agenda by cleaning the environment, creating employment and promoting economic advancement. However, despite being well-sponsored and profitable, the project was not successful because community members could not agree on who should benefit and how profits should be shared. This highlights a fundamental issue in respect of the promotion of community-related SD in mining, because even when practical solutions exist there may be limitations in terms of alignment towards real implementation.

Communities where mines operate may be run by traditional authorities while others are governed by the municipalities. Participants expressed concern that the traditional authorities, normally referred to as '*Kgosi*' sometimes fight amongst themselves and are divided. This creates challenges in implementing sustainable projects geared towards the SDGs as required by the United Nations (United Nations, 2022a). The findings of the study showed that municipal ward councillors also pose a challenge to the achievement of the SDGs because they are sometimes divided and do not work collaboratively. This is because their interest is in developing their own areas and they may not look at collectively developing the community.

The findings indicate that self-interest was an impediment to community SD as collective benefit was sometimes overlooked due to individual interest and power dynamics between groups. In addition to issues relating to divisions, political dynamics and conflict over resource allocation, a further challenge within communities was that there was a desire for immediate benefits rather than long-term rewards. Such desire for quick rewards can at times lead to mines exploiting these communities by offering short-term projects with instant benefits instead of addressing long-term

needs. These projects often lack sustainability and are carried out primarily to satisfy the community. The findings of the research suggest that the vicious cycle of short-term thinking prevented long-term sustainable solutions from being developed as immediacy was favoured over sustainability. Quick fixes were often implemented instead of long-term economic resilience and community empowerment being the overall motivation behind the inception of initiatives.

Illegal mining is a global challenge, and SA is no exception Madimu (2024). Participants noted that sometimes illegal mining occurs due to holding rights over large areas that are not used for mining and the community's belief that there are resources within that land. The holding of mining rights over vast areas that mines fail to develop and actively mine causes a breakdown in community trust and contributes to illegal mining. Consequently, the environment may be damaged with no accountability towards rehabilitation.

6.2.3. Political challenges

Politics and bureaucracy remain an ongoing reality when it comes to mining. These issues pose a challenge towards the implementation of sustainability projects and sustainable mining. Sustainability leaders in this study experienced hindrances when implementing sustainability projects. This was informed by the lack of trust between government and businesses. There was also a lack of trust in the municipalities' ability to utilise investments effectively as well as a desire for greater control over funds by the community. This impedes the development of meaningful sustainability project partnerships between mines, communities and municipalities.

The literature reviewed in this study showed that, on the left, there was a deep-rooted history of mistrust and perceived exploitation by the mines and government from community members. On the right, government viewed mining companies as prioritising production and profits whilst mines felt that some of the regulations intended to promote environmental stewardship and community upliftment were politically motivated and contributed less to the sustainability agenda. The implication of this finding is that the three critical parties responsible for implementing SD i.e. communities, mines and government, are often at loggerheads. These challenges regarding institutional coordination and the lack of alignment between mines and government are well reported by De Sa

(2019) highlighting the lack of trust and increased conflict between the mines and other stakeholders.

The Marikana strike and massacre has left considerable longstanding effects of massive job losses and other related economic challenges. The residual impact was the subsequent increased platinum prices which has led to further financial strain on mining companies (Hill & Maroun, 2015; Webster, 2017). The area has struggled to recover since the strike (over 10 years ago) thereby emphasising the need for more investment to boost the local economy. This sentiment was expressed by participants in this study who noted that the prolonged strike led to massive job losses and the industry has struggled to recover after this period.

Relating to the Marikana strike, some believe that it was influenced by certain elements including leadership changes within the DMRE and subsequent disruptions in mining operations. Such disruptions and changes contributed to the formation of a new workers union party eventually leading to the Marikana massacre.

It was found that the high levels of poverty, which is exacerbated by corruption, hinder the creation of an environment conducive to SD efforts. High levels of poverty amongst some of the communities within which mines operate complicate efforts towards SD as people prioritise survival over long term sustainability goals. The local economic development departments of mines often attempt to formulate community cooperatives as structures responsible for implementing sustainability projects. The cooperatives end up being exploitative and members within cooperatives sometime use resources to benefit themselves in the short term. Thus, vulnerability to corrupt behaviour increases due to poverty, which hampers sustainability efforts from the mines.

It emerged that beyond external community and government related challenges, sustainability leaders at times experience internal company bureaucracy and red tape which stifles sustainability efforts due to long and tedious processes required to approve sustainability projects. Participants expressed that egos around the boardroom table and managerial internal politics at times prevent approval of some sustainability projects from sustainability practitioners. In addition, procurement processes and budget approval are also delayed at times, which hinders progress and slows down

operations. There seems to be extensive verification processes required for mining-related data that can span over decades, which further contributes to sustainability project delays.

Procurement processes, budget approval delays and logistical requirements were identified as internal issues within mining companies that challenge the implementation of sustainability projects. Participants expressed that some of the processes were slow and cumbersome making it hard to secure the necessary resources and vendors. This resulted in slow implementation of sustainability projects.

6.2.4. Leadership and governance problems

The lack of leadership in government structures and municipalities was identified by the participants as one of the frustrations experienced when trying to implement sustainability projects in mining. There seems to be inadequate social responsibility in local government structures. Such inadequacy has led to a lack of broader infrastructure needs such as roads, water, electricity, clinics and schools. These types of inadequacies hinder SD efforts and are experienced by leaders as a challenge which hinders progress. When such deficiencies are experienced amongst communities, the mines are forced by community members to act like government i.e. to build roads and to provide water and sanitation as well as other facilities that the government is responsible for. Thus, mines become derailed in the attempt to implement long-term sustainability projects as the immediate concern from communities becomes the provision of basic needs that the government should in fact be providing.

Leadership buy-in and governance structures were highlighted by sustainability leaders as crucial for the attainment of sustainability goals. Sustainability efforts must be led from the top and leadership buy-in becomes crucial. Without the full leadership support, sustainability initiatives are likely to face obstacles and not reach desired outcomes.

Governance structures are crucial for addressing sustainability initiatives and currently there may be a need to re-evaluate board compositions, decision-making processes and subcommittees for proper alignment with sustainability goals. This must be done to ensure that sustainability is integrated into organisational functions. This is not surprising considering the ESG concept which

promotes environmental, social and governance. In this context, governance is seen as key in ensuring the realisation of sustainability outcomes. Furthermore, senior leadership and governance structures need to be involved in sustainability issues based on the notions from the ESG concept (Huang, 2021). The findings of the study did indeed show that governance structures are critical to tackling sustainability initiatives successfully, however best plans are undermined when the right leadership is not in position. This finding is line with views from other scholars including (Adams, 2013), Baporikar (2023) and Zahari et al. (2024) highlighting the importance of the right leadership structures, governance in both the private and public sector as well ethical leadership in advancing the SD agenda.

It is the position of this study that sustainability needs to be embedded in the organisational strategy of a company and must be incorporated in organisations' procedures and processes. This is critical for ensuring that sustainability is not just an afterthought within mining companies or a separate function within the companies but instead that it is embedded intrinsically within the organisational operations, procedures and processes. When sustainability is embedded within the organisation it becomes a fundamental driver of decision-making, guiding the organisation to long term goals that will benefit future generations.

These findings are strongly aligned with findings from Fernández et al. (2006) and Ferdig (2020). Fernández et al. (2006) and Ferdig (2020) suggested that competitive advantage can be attained by integrating environmental issues into business strategies. For this to happen, sustainability leaders need to be open to change. Such openness to change, in accordance with the views of Fernández et al. (2006), will allow the concept of SD to be exercised in a manner that improves business processes and enables business to respond to environmental and social demands associated with sustainability.

Culture and mindset dynamics do add to challenges from an intrinsic perspective. Results imply that there is still a midst of being compliant out of obligation only. Furthermore, In the mining industry, there has been a historical focus on meeting minimum requirements rather than genuine commitment to social sustainability. Hence it becomes more of a tick-box exercise to satisfy

regulatory bodies instead of the greater concern of social responsibility. In addition, some companies may resort to manipulating their records rather than effectively adopting sustainable practices.

When mining companies resort to forcing the meeting of compliance obligations without any real commitment to sustainability this becomes a hindrance to real sustainability progress as long term impacts of sustainable mining are not realised. Mining companies that do not value sustainability attempt to comply to the bare minimum legal requirements and become less transformative and innovative in their approaches to sustainable mining. Sustainability goes far beyond complying to minimum requirements as it is about creating long-lasting, meaningful benefits for the environment and communities. The study found that the long-term vision of sustainability aims at ecosystems that are functional, self-sufficient communities resilient to challenges posed by economic cycles and environmental degradation. For such a vision to be achieved, mining companies need to go beyond compliance.

Participants expressed that some mining companies do not report environmental and social sustainability efforts honestly because they are not truly committed to change, which results in the falsification of compliance numbers. This is supported by Fernández et al. (2006) who noted that the focus on compliance limits sustainability performance as it disregards strategic opportunities. Companies who focus on compliance usually do not go beyond compliance and create long term sustainability initiatives.

The study found that the SA mining industry is still more enforcement based rather than organic driven. Hence there is still much room for improvement before the mining companies reach a level of organic integration and fully embrace sustainability. The aim should be to reach a stage where sustainable practices are ingrained within the decision-making processes and organizational culture without the need for enforcement mechanisms. The results of the study show that achieving sustainability requires shifting the mindset of the organisational workforce towards a culture that embraces and prioritises sustainability rather than viewing it as purely output-driven targets.

In the literature review it was reported that companies seeking project finance were more encouraged to implement sustainability initiatives as most funding institutions demand SD. The findings from the study based on the SL experiences show that multinational companies seem more inclined

towards a more holistic approach to sustainability. Participants expressed strongly that multinational mining companies listed in stock exchanges had more strategic and integrated approaches towards SD. This is because these mining companies are constantly under greater scrutiny from the investment community and are thus forced to access sophisticated tools and frameworks to demonstrate that they are sustainable.

The results of the study show that achieving sustainability requires shifting the mindset of the organizational workforce towards a culture that embraces and prioritizes sustainability rather than purely as output-driven targets. Achieving sustainability is an ongoing process. This is prominent in the mining sector where technical expertise often takes precedence. Therefore, it becomes a challenge to shift such mindsets to focus on sustainability. In addition, older or longer employed workers may be resistant to change and wish to continue with the traditional ways of doing things instead of being open to sustainability initiatives. This challenge is exacerbated by the fact that sustainability in the social context is not easy to measure and remains intertwined with societal systems and human behaviour. This complexity makes it difficult for technical engineers to fully grasp and embrace sustainability in their day-to-day operations in the mines.

Another challenge associated with sustainability that the study found is the perception within the technical fields in the mining industry that sustainability is “soft” and not a “core” mission of production tonnages of ore relevant to profitability. Activities such as rock breaking, hoisting and processing are seen as tangible and directly related to profitability. Conversely, environmental management and social performance are at times seen as nice to haves.

The external perception of the sector by both government and NGOs remains a leadership challenge due to historical and political issues. There is significant pressure from various stakeholders including political forums where mining remains a prevalent topic of discussion even though many stakeholders lack the understanding of the sector. In this instance, sustainability becomes more of a political debate. These uninformed perceptions end up complicating the discussions and decision-making processes and painting a poor image of the sector.

The study found mining to be a highly visible industry with a significant economic impact thus attracting varying interest from stakeholders, even those that have a limited understanding of the complexity surrounding mining companies. The challenge therefore for leaders within mining companies is to navigate the external pressures without losing sight of key sustainability goals.

6.2.5. The unsustainable closure of mines

Mine closure and land related issues also featured strongly on findings related to the challenges faced by sustainability leaders in mining. Mine closure rehabilitation, and generative land use practices are still not attained after the closure of mines, leaving unrehabilitated mines to the detriment of society and the environment. What is taken from the environment is hardly replaced, and ecosystems are left degraded. Historical laws in SA did not make provisions for mines to allocate funds for the closing and rehabilitation of mines when they cease operation. As a result, many abandoned mines have become a challenge in SA and have an impact on both communities and the environment.

This finding is well noted by several scholars including Cornelissen et al. (2019), Mpanza et al. (2021), Mhlongo (2023a) and Cole et al. (2024). Several mining operations have closed due to being unsustainable in SA, and the country has 6 000 documented abandoned mines according to Mhlongo (2023a). When the mines close considerable challenges affect both the environment and communities surrounding the mines. Distress arises in communities due to job losses as most people living in communities in close proximity are employed by the mines and rely only on mining as an economic vehicle that enables them to sustain themselves. Poor health arises from the contamination of land, soil and water due to ceased mining activities. There are also safety related risks from abandoned mine shafts and pits due to the risk of falling and caving in.

The closure related mine risks are also exacerbated by illegal miners in SA referred to as ‘zamazamas’. The country is believed to have around 70 000 illegal miners, as noted by Mpanza et al. (2021). Due to the informal nature of illegal miners, gang violence erupts as various groups of illegal miners scavenge minerals from historical mine sites and compete for the best dig sites. Furthermore, the illegal miners live within communities nearby the mines causing safety concerns.

Improper mine closures often lead to complications. Such closures can result in communities being faced with environmental challenges such as dumps, subsidence and pollution. There are also other concerns related to limitations on future activities such as tourism and agriculture due to improper land use after closures. All of these affect the future sustainability of the mine and area holistically. This challenge was also identified and reported on in studies reviewed during the perusal of relevant literature in this research. Naidoo (2015) and a number of other scholars including Siyongwana and Shabalala (2019) and Makua and Odeku (2017) expressed concerns about abandoned mines. Naidoo (2015) further indicated the challenge of AMD that is caused by abandoned mines that do not have rehabilitation funds. Cornelissen et al. (2019) noted that there were 6 000 recorded abandoned mines in SA, all non-rehabilitated and impacting the environment and society. Of the 6 000 recorded mines, 249 are asbestos mines which have the potential to impact the health and well-being of communities affected. Whilst the active mining companies are attempting to achieve better closure rehabilitation than historical mines, findings based on the experience of sustainability leaders show that this is still a challenge.

Further complicating the issue of mine closure is the matter of infrastructure capacity in many of the areas where the mines need to close. When mines are no longer profitable and need to end their operations, they may lack the capacity to continue the services that they have been running during profitable operational stages such as provision of water, electricity, and sanitation. There are infrastructure inadequacies in some areas to support social, mining and economic activities, such as water and electricity provision, as well as the mushrooming of population growth-related housing developments. Hence, the infrastructure has not been upgraded to service the demand and extra capacity needed.

The findings of the study suggest that there is a greater need in SA mining for regenerative land uses and rehabilitation, which would enable mines to restore mined land in ways that promote ecological health, biodiversity and sustainable economic activities post mining.

6.3. Theme 2: The experience of success and effectiveness of positive sustainability efforts

One of the objectives of this research was to highlight the experience of success and effectiveness of positive sustainability efforts as perceived and experienced by leaders within the SA mining industry. This is important for advancing the understanding of sustainability and what works when it comes to the implementation of sustainability measures. Findings related to this key theme will advance the understanding of sustainability and promote the positive implementation of SD within SA mining. Figure 6.2 on the following page shows the hierarchy chart of Theme 2.

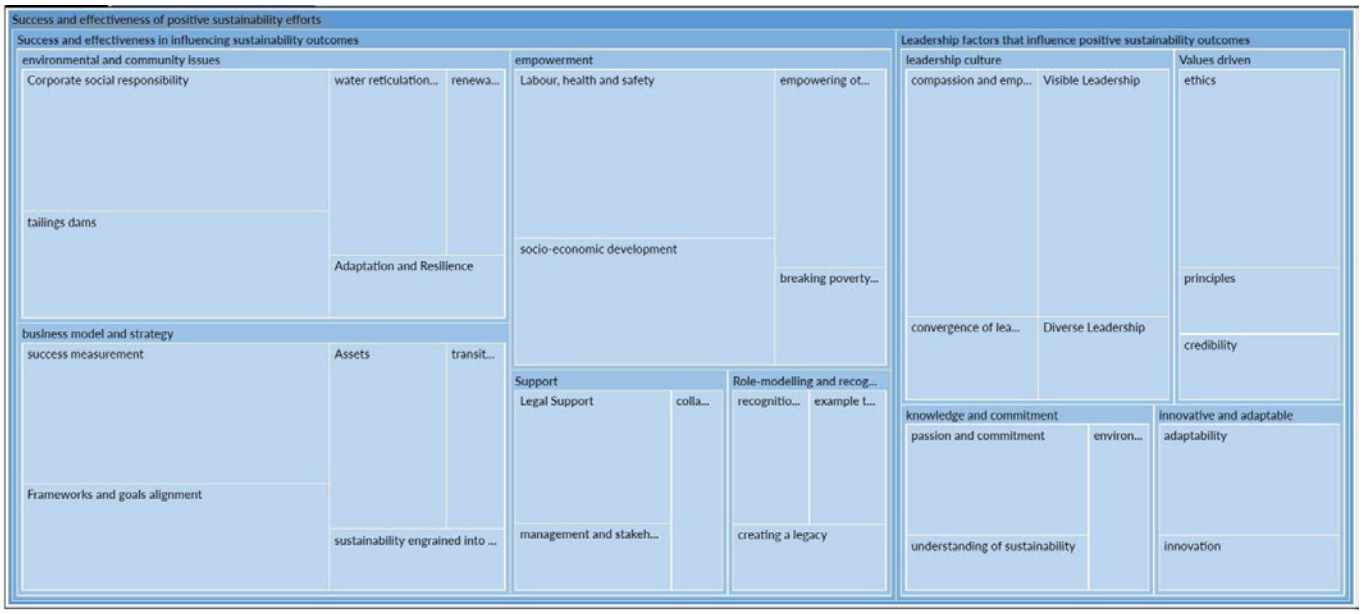

Figure 6. 2: Hierarchy Chart Theme 2 – The experiences of success and effectiveness of positive sustainability efforts

Source: Developed by the researcher

Figure 6. 3: Word cloud on the experience of success and effectiveness of positive sustainability efforts

Source: Developed by the researcher

Figure 6.3 above shows the word cloud developed on the leaders' experience of success and effectiveness of positive sustainability efforts. The subthemes to be discussed in the following subsections emerged from Theme 2.

6.3.1. Empowerment and socio-economic development

Empowerment and socio-economic development were seen as key for effective and successful sustainability efforts by the participants. Socio-economic developments inclusive of basic needs such as sanitation and ablution facilities for communities were being promoted by the mines in

which they were employed. There are also other projects in relation to community business development initiatives aimed at empowering local entrepreneurs to diversify and become self-reliant. Such projects were seen as more beneficial when integrated with environmental considerations as well as SDGs Webster (2017). Participants noted that true impacts come from addressing the most fundamental everyday needs that many people take for granted – providing basic sanitation, ablution facilities and improving living conditions for many households in the poorest communities surrounding the mines. Such projects are often undertaken without seeking praise or validation

Participants expressed that they experience more success when implementing sustainability projects that benefit a broader community than just the individuals who aim to empower themselves out of self-interest. The study found that success in sustainability from those who lead is associated not only with the high-profile deals but even with the small thankless improvements that meet the essential needs of people. This finding from participants for contribution and achieving a higher purpose helping others aligns with characteristics of servant leadership as investigated by scholars several scholars including Coetzer et al. (2017), Kyambade et al. (2024) and Muktamar and Nurnaningsih (2024).

Social infrastructure such as access to clean water, healthcare, education, decent sanitation and improved living conditions do not solely fall under the responsibility of the mines, but also local government. Even though such social infrastructure projects are not entirely the responsibility of mining companies, the study found that sustainability efforts geared towards such sustainability projects contribute to people's quality of life and bear the most transformative tangible benefits. Thus, when operating with a sense of responsibility, despite the perception by many stakeholders that mining is an exploitative industry, mines make real positive contributions to local communities. The challenges relating to water and sanitation have been reported by Asoba et al. (2020) highlighting amongst others limited government support, the failure of water related projects and theft of water related infrastructure. Despite the provision of basic needs such as water and sanitation falling outside the mines, the study found that support related to these needs had an impact to the quality of life of people and sustainability leaders experienced meaning during the implementation such projects.

Participants expressed that successful projects build trust with communities which can create the foundation for long term SD. The research found that projects that can tick all the right boxes in terms of creating employment opportunities and being sustainable (generating their own income instead of relying on continuous financial aid) are critical to advance sustainability in the SA mining industry.

The study also found that the need to diversify economic generating activities from mining itself to create more employment opportunities, even after mine closures, necessitates the case for long term sustainable projects. The social, economic and environmental benefits of sustainability projects need to grow even when mines are no longer in operation. Through leveraging community strengths, resources and knowledge, business models need to be developed that will outlast the mines themselves. Participants highlighted that when this is done, they find meaning in their work and experience feelings of effectiveness.

Small businesses are seen as important vehicles for mine communities' local economic development (Dhanah, 2017). The attempt is to generate commercial projects from small businesses that will have multiplier effects which will provide opportunities for the local economy to thrive. Education and empowerment geared towards small local businesses is seen as fundamental towards improving local economic conditions. One participant highlighted a project in the mine that they were involved in wherein a business training centre was developed for small businesses to receive training. Upon receiving training, the businesses were then capacitated adequately to procure various items to the mines. Thus, instead of procuring items from national companies that already have a solid base, mines created opportunities for small local companies to grow their revenue base and even expand to areas outside the mines. This was seen as a highly successful and sustainable project which led to the creation of employment opportunities and assisted mines to contribute positively to the local economy.

Poverty remains a challenge in SA with high unemployment rates (Fransman & Yu, 2019). The study found that breaking the cycle of poverty through sustainability efforts was seen as meaningful by participants. Initiatives that led to the disruption of the cycle of poverty within poor families by providing education and other means were favoured amongst the participants. One participant

noted the case of providing a bursary to a student from a poor family who then became successful and broke the poverty cycle within her family. This was seen as a small but significant initiative which had a ripple effect. The study found that success in SD is experienced by leaders when they see lasting changes from the sustainability efforts supported by mining companies.

Breaking generational poverty was viewed as the most meaningful impact that sustainability leaders can have to affect the lives of poor communities surrounding the mines. It was widely reported that due to high unemployment levels in SA, one employed person supported up to eight family members to whom they may be directly or indirectly related. The study found that sustainability initiatives that promoted access to education and employment provided sustainable impact and benefited both the mines and the communities. The mines are often able to employ learners who form part of their bursary scheme, capacitating themselves from a labour point of view. The same learners can lift their families from extreme poverty, creating a ripple effect. This type of sustainability was found to be self-perpetuating as the learners who become breadwinners for their families can mentor and support the next generation of younger people who face similar challenges. This sustainability approach to economic empowerment allows the mines to achieve a number of SDGs starting with quality education, no poverty and zero hunger because access to education by younger learners eradicates poverty and hunger when they in-turn support their families (United Nations, 2022b).

6.3.2. Labour, health and safety

Participants expressed vehemently that labour as well as health and safety issues were important for the achievement of a sustainable mining industry and that progress in this area meant success. This is not surprising considering the number of fatalities that the mining industry has experienced. Since 1993 the number of fatalities in the SA mining industry improved from hundreds per year to less than a hundred per year. In 1993, 615 fatalities were recorded in all commodities in SA mining, but in the past decade the number has dropped significantly. In 2020, 2021 and 2022 the number of fatalities recorded from all commodities in mining are 60, 74 and 49, respectively (Minerals Council South Africa, 2023).

Although there have been improvements in safety, zero harm remains the goal for the mining industry. The participants expressed strongly that performance on safety was key in advancing a sustainable mining industry. There have been improved health and safety measures implemented such as provision of personal protective equipment and better treatment of staff, including initiatives for gender equality. There have also been efforts to address TB prevention within the communities with successful treatment and monitoring resulting in reduced TB cases. COVID-19 interventions including high vaccination rates have been achieved and this was possible due to relationship and trust building. The study found that there has been a shift from a higher rate of TB infections amongst mine workers to lower rates. Also, the mining industry has shown impeccable support for HIV-infected workers and general healthcare. Thus, the TB incidences recorded within the mine employees remain lower than in surrounding communities. Participants highlighted that this was a significant achievement towards zero harm and a sustainable mining industry.

During COVID-19, the role of the mining industry became important in achieving high vaccination rates. Mines promoted vaccinations and made facilities available for employees to vaccinate and promoted awareness amongst surrounding communities. Participants indicated that this indeed was a meaningful contribution towards sustainability and the well-being of people, not only to those employed in the mines but within the wider communities as well.

6.3.3. Sustainable enviro-social projects

The research found that there were various successful and effective initiatives directed toward environmental and community issues. There was a noticeable shift in mining companies towards community-focused initiatives and striving for harmony within communities. Successful projects included the removal and reprocessing of mining dumps. One company had also introduced initiatives including motivating grade 12 students, which showed a commitment to community welfare beyond just profits.

Some of the enviro-social projects that were successfully implemented included the rehabilitation of the environment and creation of employment opportunities. The reprocessing of mine dumps promoted employment opportunities but also removed the dumps from the areas and ensured that environmental impacts including dust and water pollution were prevented. Such projects that

benefited the environment and society were highly favoured by participants and were considered key towards the implementation of SD.

Participants expressed that mining companies are now understanding better that they need to share value and that they are part of broader stakeholders including government and society. Through some of the enviro-social projects mining companies were going beyond compliance to share value with stakeholders. This presented a shift in how mining companies approach their social licence to operate. There was broader recognition of the need for positive social impact in this area.

Altruism and contribution to stakeholders was meaningful and important to sustainability leaders. Participants found meaning in interacting with the younger generation from underprivileged communities to promote awareness around environmental and social issues. In some of the interactions, leadership from the mines outside the sustainability field of practice was invited. Participants highlighted that from these interactions the leaders were enlightened in terms of the impact that mining has in under privileged communities. Thus, such interactions transformed mining leaders to shift their focus from immediate financial rewards to SD and the lasting impact on communities. This made securing buy-in from senior mine leaders to execute SD initiatives easier due to the improved understanding and heightened emotional awareness of the real impact on the ground.

Renewable energy was found to be one of the critical areas in which mines have successfully contributed in terms of sustainability. The mining industry has swiftly adopted various means of renewable energy according to the participants. Some of the mines are now operating off-grid on renewable energy. This had once seemed improbable however, due to the investment in resource allocation and improved appetite, some of the mines have now successfully installed solar farms and wind energy farms to supplement their energy demand. This adaptability demonstrates a proactive approach to finding alternative solutions and aspiring to sustainable practices. Climate change is the greatest risk to the global economy and the environment (Rising et al., 2022). The research found that SA mines have made significant progress in seeking renewable energy projects to reach zero carbon emissions. Despite the negative historical reputation for environmental impact, based on the findings of this study, it is evident that the mining industry has attained significant traction towards the implementation of renewable energy sources.

Mining operations are energy intensive and require significant amounts of power to extract and process ore. In SA, reliance is on Eskom-generated electricity which is unsustainable, and coal-based. Progress from the mining industry towards renewable energy not only reduces pressure on the main Eskom-based grid but also contributes towards the reduction of carbon emissions. Participants expressed strongly that this was significant towards attaining SD goals.

Participants expressed the need for climate adaptation plans to be integrated into Social and Labour Plans (SLPs). By doing this, the mines would not only reduce their footprint but would also promote awareness amongst communities on climate-related risks. Through community education and training, members of the communities can safeguard their own livelihoods and infrastructure against climate-related risks. Also, small businesses surrounding the mines, such as small farmers, can adopt climate smart techniques to derisk their farms against climate change. The study found that embedding such strategies into SLPs and local economic development initiatives would create a ripple effect and promote SD not only for the mines but for local businesses and communities.

The study found that one mining company has reused redundant infrastructure such as tailing dams, resulting in new economic activity in addition to restoring ecosystems and contributing towards environmental sustainability. Through innovative techniques such as plant growth in tailings dams without topsoil, this project aims to generate wealth and improve the sustainability of the environment. In addition, the company is dedicated to protecting the environment and increasing insect populations in the ecosystem. The land where the tailings were located were revegetated for the benefit of the environment and ecosystem restoration.

Turning environmental liability into opportunity was found as one of the key approaches towards sustainability in the mining industry. It was found that projects that turned mine environmental liabilities to profitable community projects were much easier to support and fund as mines did not have to consider cutting costs when implementing such projects. Such projects not only restored the land and rehabilitated contaminated areas but also revitalised economic systems within the community, which benefitted both the environment and society. Once areas were rehabilitated, considerations for sustainable land uses such as agriculture could be explored.

Water management was also seen as a critical performance area for enviro-social projects. Mines operate around water scarce communities and villages (Donnenfeld et al., 2018). Thus, the stewardship around water can affect water availability within communities relying on subsistence farming and livestock. Some members of the communities tend livestock that drinks water around surface water bodies. The study found that this area was important for sustainability. Furthermore, landowners who rely on borehole water are adversely affected when their borehole water dries out due to a dropping water table. The research found that this was a key performance area for the mines when it comes to sustainability.

In most mines water is managed by engineers. Participants reported that they were seeing improvement in the understanding of water sustainability and the protection of water resources from the technical engineering teams. Engineering teams were seeking partnerships with the municipality to manage excess water that is pumped from some of the mine workings, which in most times was clean fissure water. This water could be donated to the landowners and surrounding communities to cater for water shortages. The research found that there were several projects initiated by the mines in this area to partner on water supply projects, however slower implementation from the side of the municipalities hampered some of the successes of the projects. The projects are intended to help landowners irrigate and cater for community related water supply needs (Askham & Van der Poll, 2017).

The research found that when it comes to enviro-social projects mining companies were not limited to only compliance with by-laws, but focused on impactful sustainability projects that aim at changing the world and helping clients achieve their global goals such as net zero, positive biodiversity and water efficiency. This is an important consideration as it was discussed earlier that focus on compliance by the mines can sometimes cause missed opportunities related to going beyond compliance. Mines committed to SD set goals aiming for at least 90% achievement in sustainable mine planning year on year leading up to 2030. In addition, performance for these goals is closely monitored and linked to key performance areas, scorecards and employee performance evaluations. This approach is in line with the suggestion by Fernández et al. (2006) that to drive sustainability, performance systems must be developed and integrated to internal systems

establishing sustainability project missions and targets. Such projects, when realised, create leadership experiences of fulfilment on the part of sustainability leaders.

Getting the sustainability strategy right from the start and linking sustainability performance to business process is key to the success of mining companies towards a sustainable future and sustainable businesses. Some mining companies were role models to others in their effectiveness and success in sustainable practices. One mining company was recognised for their contribution towards sustainability and community efforts. This was because sustainability was well embedded in the business. The same company received recognition for their sustainability efforts, including being first in various initiatives. This enhanced their reputation and set an example for others, thereby positioning the company as a leader in the industry. Again, this was because sustainability was deeply ingrained in their business ethos.

For some participants, their expertise and contributions are recognised even after moving between areas or regions and it reflects how their contributions are remembered. Such recognition confirms their impact and ongoing contributions across the regions, which leaves a legacy for others to follow. Such recognition provided a feeling of deeper purpose, meaning and satisfaction to sustainability leaders.

6.3.4. Support, partnerships and collaboration

The study found that sustainability drives require multi-stakeholder partnerships and collaboration. Sustainability leaders can initiate projects to attain sustainability goals. However, the sustainability leaders are not able to solely achieve the goals without partnerships and collaboration. Thus, the collaboration between teams and government in terms of the legal framework was expressed as key for the success of sustainability initiatives. The importance of stakeholder inclusivity in enabling sustainability projects was well reported by Schein (2017) emphasizing that sustainability cannot be achieved through an individual or single organisation, it is a collaborative effort.

There has been an increase in support for sustainability in the sector which is seen as effective and as an achievement. Legal support has evolved considerably as more importance has been placed on legal frameworks and structures in supporting sustainability initiatives. This has become a key

role of lawyers and legal experts in drafting contracts and ensuring corporate governance, and equally, to enable sustainability leaders on the ground to drive compliance beyond compliance initiatives.

There are improved relationships between management and teams such as production to advance sustainability goals. By fostering strong stakeholder relationships, decisions can be aligned with sustainability objectives. This is also due to increased collaboration.

Collaboration was of pivotal importance and has improved in relation to sustainability. At one company, the approach was now evolving from a traditional top-down management style and instead there was more collaboration with peers in different companies. Rather than delegating or directing, they lead through cooperation and collaboration, which fosters teamwork and mutual respect to achieve shared sustainability goals effectively.

6.4. Theme 3: Leadership factors and strategies associated with positive sustainability outcomes

Based on the leadership experience of sustainability leaders, leadership factors do influence positive sustainability outcomes. This was reflected in this subtheme and was informed by the factors to be addressed in the following subsections.

6.4.1. Values and leadership culture

The research found that leadership must be driven by values and that ethical values must be aligned to business practices, which goes beyond just profit margins. Mining companies need to contribute positively to society through sustainable practices and avoid dishonesty around sustainability requirements (Ab Wahab, 2021; Adamu et al., 2023; Ahmad et al., 2017). The mines need to actively manage stakeholder perceptions regarding exploitation for profit as such perceptions are harmful to both the environment and future sustainability. Mostly importantly, mines need to do what they say in order to secure trust and credibility required to fulfil SD projects with stakeholders and must emphasise this fact based on leadership experience.

It is the position of the research that leaders in mining need to have a strong value system based on ethical principles to balance economic, environmental and social needs. This is fundamental as leaders need to contribute to the progress of the businesses for which they are accountable; however, this cannot be done at the expense of the planet and communities. The importance of ethics was emphasised by participants as they highlighted that honesty and transparency is important. Thus, mining companies need to be honest about their sustainability performance in various areas including water use, land use, waste produced and impacts on the environment.

The credibility of leaders is earned when they 'walk the talk' by ensuring their actions complement words and that they consistently deliver results, thus doing what they say and delivering on the business' sustainability promises. This was important in terms of earning trust from stakeholders and attaining success in sustainability.

Leadership must adopt a principle-based form of leadership to ensure effective governance across various sections such as ESG, safety, production and related spheres. Resource allocation in the building of society must also be based on core principles related to sustainability. Principle-based leadership means grounding decisions in core values including safety, environmental responsibility, social equity and integrity. To drive SD, leaders need to be willing to do the right thing from an ethical and a moral standpoint. Resource allocation needs to be guided from an ethical point of view to ensure sustainability responsibilities are not avoided due to costs and instead remain integrated in the way of doing business.

It was important for the leaders in this study to establish a proper leadership culture towards sustainability within the organisation. The integration of leadership and sustainability into a coherent approach to the future is necessary. In such integration, leaders do not have to be experts in all areas but rather use their collective expertise for the purpose of achieving sustainable business and societal objectives. Visible leadership is especially important in the mining industry as compared to other sectors. Hence, there is a need for leadership and management to be visibly engaged throughout project lifecycles. Participants indicated that leaders should not only be visible in major projects but should also participate in all projects during ongoing operations and implementation phases. This would ensure sustainable support and prevent project stagnation.

The diversity of leadership was also identified as key for promoting sustainability in the SA mining industry. There must be diversity in leadership, and this encompasses not only technical skills and expertise, but also factors such as race, gender, age and background. Participants felt that that mining companies tend to be more diverse in leadership compared to other industries, which is a positive factor in this regard.

Associated with the issue of values and culture was that of compassion and empathy. Participants believed that leaders must lead with compassion as they must be cognisant of the significant impact the mining businesses have on surrounding communities. Having empathy builds on ethical considerations of operating in such regions that may have high poverty levels. Hence there is a need for leaders of such businesses to take responsibility and to communicate their commitment to social responsibility.

Participants expressed that empathy, and compassion enabled a deeper understanding of the broader impacts of mining business decisions. This enabled an integrated view of success, not just based on profits, but based on how mines uplift communities and protect the environment.

6.4.2. Innovation and adaptability

Innovation is of critical importance in the SA mining sector as traditional approaches are insufficient for achieving the best outcomes. Therefore, there is a necessity for leaders to be creative and have a solutions-oriented mindset to address complexities within the industry.

With regard to this aspect, the study findings are in line with Ferdig's (2020) notion that sustainability leaders need to adjust, inspire change, innovate and remain solutions-oriented. Ferdig (2020) further suggests that sustainability leaders must embrace the dynamics of unpredictable change and develop reasonable actions that provide a coherent direction.

Leadership must have agility in adapting to changing circumstances inclusive of agile decision-making. Considering this, they must have the flexibility and openness to alternative solutions during times of difficulties and in embracing sustainability practices. The research found that mining was a cyclical business influenced by external factors such as commodity prices. Participants indicated that such external factors affect the profitability of the mines. Depending on rand-dollar

prices, mines either make profits or losses based on production costs. Thus, when mines are profitable it was often easy to motivate for sustainability initiatives to be implemented. However, in a loss-making climate, such initiatives could take a back seat. Adaptability and flexibility were highlighted as a fundamental aspect in ensuring that SD commitments are carried through despite economic down turns. As per Ferdig's (2020) suggestion for leaders to remain agile and emergent, participants emphasised that not all sustainability initiatives are implemented as planned. Due to changing internal and external business climates, plans might need to be adapted, with an intention to achieve the same goals using varied approaches.

6.4.3. Knowledge, commitment and strategy

Knowledge of frameworks governing SD was highlighted as important for the attainment of sustainability in the SA mining industry. Such knowledge needs to be underpinned by commitment to ensure the implementation of sustainable practices. One key company that participants mentioned linked SDGs to their mine plan. Each mine site was then tasked with achieving 90% of SDGs linked to the mine plan. The company developed structures and strategies to support the SDGs. Their strategy also aligned with the ICMM inclusive of the Six Capitals Model as a useful framework for evaluating measurement.

At one mining company, there was a strong incorporation of social sustainability into their operations and initiatives. The mining company intentionally promoted the use of SD words and terminology in their day-to-day business such as 'social sustainability', 'environmental sustainability' and 'operational sustainability'. This approach motivated a shift towards a more comprehensive approach to sustainability. There was a commitment to not only meet regulatory requirements but also to implement initiatives to foster economic opportunities. The shift was a significant evolution as recognition of the company in terms of the interlinkages between environmental impact, social impact and value creation dramatically improved.

For some mining companies, their business model revolved around obtaining assets considered to have reached the end of their geological life. They invest in these assets by incorporating ESG considerations into their development and this revitalisation extends the lifespan of the assets, which benefits both operations and local communities. In addition, some companies started with a

life-of-asset planning which encompassed sustainability considerations such as resource and asset management and utilisation. This demonstrated sustainability practices at a high level, integrating sustainability into the life cycle of the business.

6.5. Theme 4: The meaning of sustainability leadership as experienced by leaders in the South African mining industry

Study findings show that the meaning of sustainability differs amongst its leaders in the SA mining industry. This finding is in line with the findings from the literature. Although the concept and theory of SD is understood by many leaders from its initial birth in the Brundtland Report (1987), there is no single framework prescribing how sustainability and SD should be implemented in organisations. Moreover, scholars use the term sustainability differently depending on context. For instance, scholars such as Galpin and Lee Whittington (2012) investigated SL, however their focus was not on environmental management and social risk mitigation but on the company's mission, values and human resources value chain.

The essence of the study outcome is that participants in the study understood and experienced sustainability as the inculcation of pro-active programs to mitigate negative enviro-social impacts and promote positive enviro-social impacts from mining. However, the lived experience of sustainability and the meaning of sustainability differed from participant to participant. Some participants experience sustainability as a challenge, a social challenge or as an environmental obligation and to others sustainability provided an opportunity to make a difference to rehabilitate the environment through innovation and to eradicate poverty and improve people's well-being. The following sub-themes considered in the subsections below emerged from the research on the meaning of sustainability as lived by the leaders in SA mining.

6.5.1. Deep understanding

The study found that sustainability means a deeper understanding of the environmental and social implications of decisions and activities of organisations and individuals within organisations. Such an understanding also requires the appreciation and apprehension of global enviro-social challenges and challenges specific to the sector which the sustainability leader serves. Impacts of

decision making, and activities of a company need to be gauged with the lens of environmental and societal wellbeing. The research found that sustainability means an individual and an organisation have a genuine commitment to the promotion of SD ideologies in a view of decisions and actions taking place now that have an enormous impact on future generations.

Participants highlighted that in order to lead sustainability one needs to understand the environmental, social and governance (ESG) issues that mines grapple with alongside the appreciation of the communities within which mines operate. Equally important was the profound understanding of people and how to inspire action geared towards SD. Leaders expressed that at times stakeholders are at odds, thus emotional intelligence needs to be cultivated to better assess decisions. In this view, sustainability meant dealing with complex environmental and social issues. A holistic approach is required to align immediate and long-term goals amidst complexity and varying stakeholder viewpoints.

To drive meaningful change, being a sustainability leader means pioneering and championing actions needed in the present in order to create a positive sustainable future for coming generations. Such actions may not be easily comprehended by mining company executives; thus, a sustainability leader needs to transform minds and obtain buy-in. To those who lead, SL meant courage, innovation and collective effort.

The research found that sustainability requires a significant shift in mindset to promote decision-making processes. Hence leaders must move away from traditional, narrow and short-term financial thinking and focus on broader diverse factors. This requires open-mindedness embracing both challenges and opportunities. Such mindset change also includes influencing other colleagues in fostering an understanding of the societal contexts, such as poverty and inadequate local governance.

The deep understanding of sustainability issues was found to be necessary to transform decision-making for leaders to broaden their perspectives. This required a shift and challenging of ingrained unsustainable habits and commitment towards holistic, inclusive approaches for greater good.

6.5.2. Value creation beyond profits

The lived experience of leaders showed that sustainability means creating value beyond corporate profits, being ethical and creating trust. Building corporate trust was highlighted as a cornerstone for ethical leadership. Leaders need to demonstrate integrity, transparency and a commitment to do the right thing for the environment and society.

Reputation of the mining companies and the leaders within the mining companies featured strongly as they are tasked with being responsible stewards of resources and communities. The study found that SL meant generating value by creating positive impacts for communities, employees and the planet. Such a broader concept was found to build a positive legacy of trust and fostered long-term sustainability.

6.5.3. Influence and stewardship

Because leaders in sustainability work with various stakeholders, leading sustainability means influencing positive outcomes that may not be immediately increasing the bottom line. Sustainability means doing good with a long-term view and demonstrating the impact of sustainable decisions to corporate teams with limited understanding of sustainability.

Participants noted that to effectively influence the sustainability agenda it was essential to have a mindset rooted in empathy and a strong understanding of the context within which mines operate. Many communities in SA where mines operate are impoverished and face systematic inequality and collapsed local authorities. Sustainability leaders are therefore faced with rebuilding the trust and empowering communities whose trust is diminished. In this context, participants asserted that sustainability meant acknowledging the struggles and fostering collaboration to make a positive lasting impact for the environment and communities. Sustainability means long-term viability and being aware that long-term implications of decisions must be considered in favour of short-term gains.

The research found that for one to be a true leader in sustainability this meant embracing a mindset that considers the broader implications of every decision, even seemingly simple ones. Sustainability leaders need to consider all external costs associated with decisions and the culture within

the organisation. Thus, SL means consistently reflecting and asking deeper questions to evaluate where the sustainability agenda within the organisation is heading. Driving sustainability objectives in alignment with the business strategy is seen as part of the journey. This involved engaging with key stakeholders and obtaining their buy-in. In order to do this, one has to demonstrate how sustainability practices can support and enhance the business plan, thus contributing to profits instead of just being a cost element.

Policymaking and influence was also highlighted as a fundamental aspect in being a sustainability leader. Participants noted that sustainability meant policies needed to be influenced to create positive outcomes. This involved conceptualising and drafting policies to promote long term sustainability and ensuring that development initiatives consider environmental impacts.

6.5.4. Engagement of stakeholders

Sustainability cannot be attained without stakeholder engagement, partnerships and collaboration. Moving more towards external collaboration with government, industry, and communities was crucial for ensuring long-term viability by raising awareness and educating the future generation about sustainability. Thus, to those who lead, sustainability means communicating, collaborating and creating partnerships with various stakeholders from internal discipline leaders within organisations, to communities and government.

Findings from Ferdig (2020) also confirm the need for collaboration in implementing sustainability projects, “Sustainability leaders develop and implement actions in collaboration with others” Ferdig (2020, p 9). Sustainability leaders find themselves engaging in different conversations with stakeholders on varying topics. Not everyone shares the same perspective, nor do stakeholders have the same level of knowledge and concern about the different sustainability issues. Moreover, engagements with internal senior executives in the mines were vastly different from engagement with community stakeholders, activists and nonprofit organisations. Thus, participants indicated that being a sustainability leader required flexibility in engaging with a myriad of stakeholders and adapting the necessary approaches. Being adaptable enabled sustainability leaders to effectively lead, influence and drive positive change in diverse multifaceted stakeholder environments.

The research found that collaborative working allows for the building and gaining of trust amongst stakeholders. One must spend time on the ground, and this allowed leaders to build respect and trust among colleagues by being actively involved in various aspects of operations. This means working together with government, industry and local communities, each of whom play a critical role in shaping a sustainable future. Being a sustainable leader meant actively creating awareness about sustainability and teaching stakeholders how to think about the world in a way that promotes the protection of the environment and the well-being of society. Internally within mining organisations, this also meant spending prolonged time with operational teams to understand their core duties and the impact that they pose in terms of the environment. Thus, sustainability leaders earn trust from mining operational teams as stakeholders through action on the ground and genuine commitment. One participant emphasised that they needed to advocate for the criticality of sustainability by creating awareness and educating others, saying that as a sustainability leader they had to argue and demonstrate the pragmatic significance of sustainable practices driven by passion for such principles.

6.5.5. Environmental and social commitment

Sustainability means acknowledgement of the unique circumstances and historical challenges in a country and participants expressed the unique circumstances that SA is facing in comparison with developed countries. Participants believed that sustainability is not only about a strong focus on nature conservation as it is in other developed countries, but in SA is also about addressing the indignities of the past and striving for social equity. Therefore, social commitment and redressing historical inequalities was a key constituent of sustainable leadership.

Participants felt strongly that sustainability needed to be used as a tool for social upliftment - addressing the inequalities that persist, creating opportunities for marginalised communities, and ensuring that businesses fulfil their social commitments. Thus, being a sustainability leader meant that one must be holistic and must integrate economic, social and environmental factors in a way that is contextually relevant to the state of the socio-economic environment within SA.

6.5.6. Innovation and adaptability

Sustainability problems are multi-faceted, in both the short term and the long term. Therefore SL, to those who lead, means being able to innovate and adapt to solve enviro-social challenges as well as focusing on opportunities.

Sustainability means thinking beyond the short term, innovating and adapting to ensure the future existence of the business. Sustainability leaders need to drive innovation from the front, for instance, the transition of transportation and equipment to be hybrid and using alternatives such as green ammonia, especially in mining which has an environmental impact through explosives. This finding is not surprising considering that many environmental problems in mining require innovative solutions such as the use of electric vehicles instead of diesel vehicles which use non-renewable energy and the lining of process water dams to prevent groundwater contamination. Similarly, challenges within communities involving waste management and the use of non-renewable energy sources such as deforested wood for fire, require innovative approaches.

6.5.7. Competitive advantage and business survival

Participants expressed that in their perspective and lived experience, sustainability was no longer to be regarded as a cost to company but a business imperative. Thus, sustainability means positioning the business well for long term survival and providing a competitive advantage.

Participants expressed that in the past, it was possible for mining companies to thrive despite a poor sustainability record, but that this was no longer the case as investors now expect mines to comply to ESG requirements. The study found that sustainability was no longer a moral imperative but a business necessity. Thus, to remain competitive mining companies need to integrate SD considerations within their core strategy. Therefore, sustainability means developing strategies for mines to compete in the market using SD as an added advantage.

6.6. Framework for sustainability leadership in South African mining

This section of the chapter presents a framework for SL in the SA mining industry. The framework (as shown in Figure 6.4) is developed from the findings of the research supplemented with the

relevant literature that has been reviewed for the study. The framework considers all the various elements evolving around sustainability that leaders need to grapple within in the SA mining sector. It is the hope of the researcher that the framework contributes towards SD in the mining industry and to SL development.

The main framework is presented first on the following page (Figure 6.4) comprising the sustainability challenges faced by the mining sector as well as the internal and external organisational factors impacting on the SD imperative. Leadership attributes relevant to SD have also been presented in the framework including beliefs and values, leadership styles, leadership behaviours and personal characteristics favourable towards effective SL. In addition to the main framework presented, two additional supporting sub frameworks (Figures 6.5 and 6.6) are presented to supplement the main framework. Whilst the intention was to present one overarching framework, the drawing of the framework became cumbersome necessitating the presentation of the two supporting sub-frameworks separately.

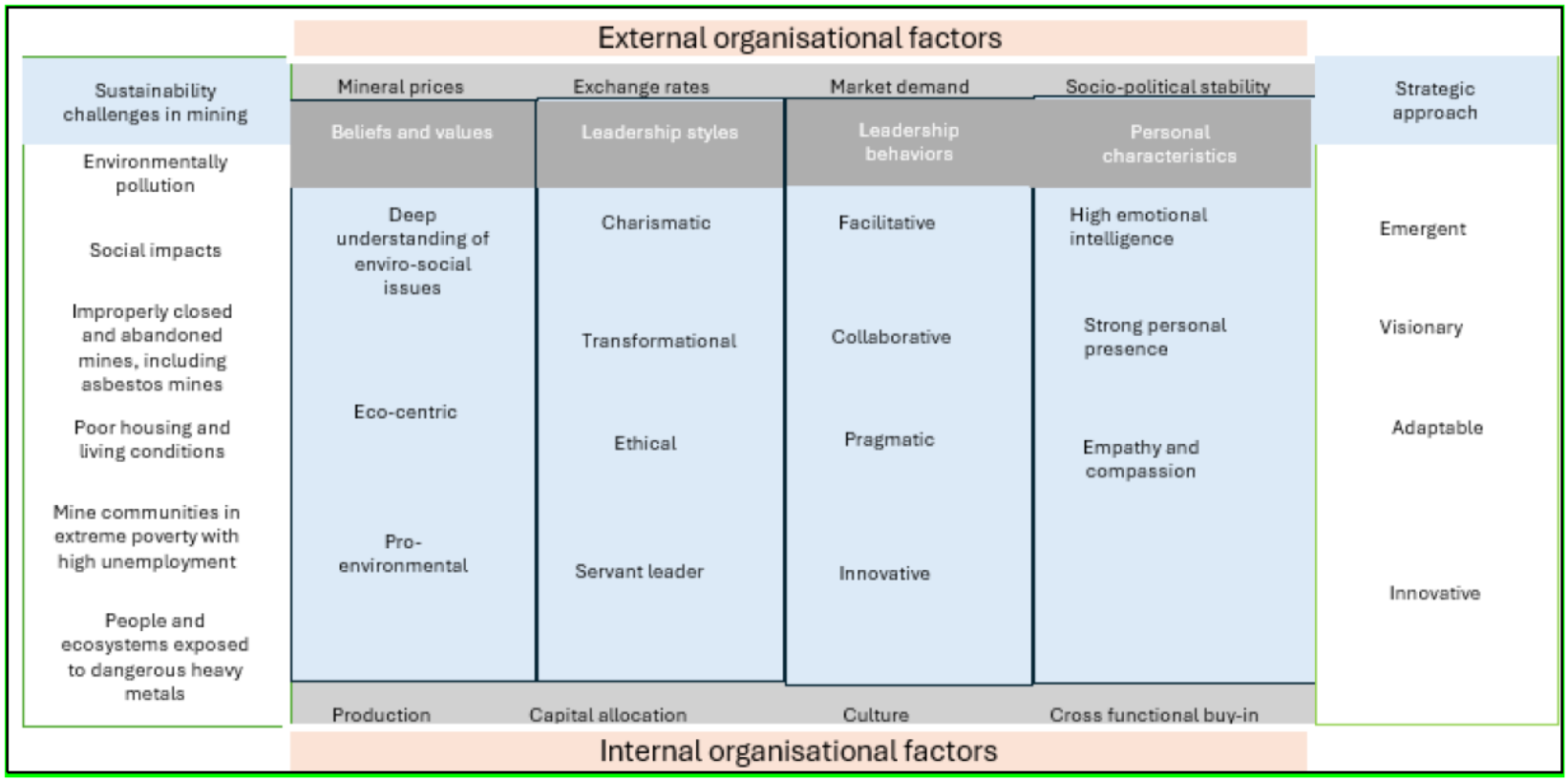

Figure 6. 4: The sustainability leadership development framework for South African mining

Source: Developed by the researcher

Leadership development for sustainability leaders is guided by the interactive complex issues surrounding the social and environmental context within mining. This research has articulated these issues including environmental pollution, the social impacts of mining, non-closure of mines (including asbestos mines), poor living conditions amongst community members, extreme poverty and the loss of biodiversity and ecosystems. These issues are complex, and several scholars have highlighted their complexity. For instance, Parrott (2017) noted that these problems have no single optimal solution as they impact upon a wide range of systems and stakeholders. Based on the complexity of these issues, Parrot (2017) denoted them as 'wicked' problems.

Snowden and Boone (2007) explicated with clarity the concept of complexity in relation to leadership and decision-making, highlighting that complex systems involve large numbers of interacting elements. Complex systems are unpredictable and minor changes in a complex system can produce major consequences. Solutions can therefore not be imposed but rather must emerge organically. SL development needs to consider the complexity that surrounds environmental and social challenges and sustainability leaders need to be able to operate within uncertainty and still make sound decisions that advance the wellbeing of businesses, people and the planet.

The research found that leadership for sustainability is embedded from a deep understanding and belief that environmental protection and social well-being remain fundamental for the better advancement of the world and future generations. Awareness and the deep understanding of the environmental impacts of human activities on the environment and society is critical for sustainability leaders. Such awareness enables sustainability leaders to become eco-centric, pro-environmental and chief facilitators of actions toward the protection of the environment and the promotion of positive impacts within society.

Most times, benefits from environmental protection and social upliftment extend beyond immediate businesses and the individual leaders, and so too do the negative environmental and social impacts. Sustainability leaders are more effective when they possess the ability to think beyond their immediate personal and business needs, but also focus on environmental and societal needs. Thus, empathy and compassion are fundamental personal characteristics enabling sustainability

leaders to contribute positively to the lives of people affected by mining operations and equally protect the environment.

Sustainability leaders need to instil trust amongst diverse stakeholders and articulate a positive and inspiring vision for the future in addressing environmental and social challenges. The study found that charismatic leadership attributes are essential in advancing the SD agenda within the mining sector and this remains an important leadership development area. Sustainability leaders also need to be transformational as most initiatives require certain changes in behaviours within society.

Leading sustainability cannot be separated from ethical values as stakeholder trust has diminished in many sectors of the society within SA. The history of mining has left legacy issues surrounding environmental pollution and land degradation that are not easy to solve. These issues have remained unresolved for many years affecting the reputation of the mining industry and diminishing stakeholder confidence. Sustainability leaders therefore need to exude ethical behaviours and attempt to restore trust during engagements with communities and other stakeholders. Sustainability leaders also need to balance business needs with the needs of the society and environmental protection. This balance at times requires certain compromises to be made. Therefore, having an ethical compass enables leaders to rationalise decisions and remain objective in decision making without undue external influence.

The research found that sustainability leaders are more effective when they strive to serve the environment and communities without an attempt to accrue power or act on self-interest. This requires the sustainability leaders to follow a servant form of leadership, focusing on the wellbeing of people and the environment. Based on the study findings, servant leadership is therefore an important development area for sustainability leaders.

Communities and regulators are not always in agreement with the mines. The mining industry has encountered community strikes due to various issues related to employment and procurement opportunities. Landowners also issue various complaints to the mines in terms of water availability from boreholes, dust from tailings as well as noise and vibrations. Engagements with stakeholders sometimes results in fierce debates due to frustrations and varying views over how issues should be resolved. Sustainability leaders need to develop strong emotional intelligence ensuring that they

remain calm and objective during interactions with stakeholders. Such resilience also enables sustainability leaders to continue developing and implementing sustainability initiatives and projects despite unreasonable objections or factions from particular sectors within the communities. Thus, sustainability leaders also need to possess a strong personal presence to promote collective effort amongst stakeholders.

The complexity surrounding sustainability issues requires leaders to be emergent and possess a vision that is adaptable to changing circumstances. Leaders also need to be innovative in solving complex problems. The research found that leaders need to develop such strategic approaches in order to be successful in executing their roles.

Due to the complexity of sustainability issues, the study found that sustainability leaders need to be transformative in their thinking and approaches. Unlike technical disciplines such as engineering or information technologies where practitioners can invent in isolation, the study found that to be successful sustainability leaders need to influence broader stakeholders. Sustainability leaders therefore need to be facilitative to bring stakeholders together to solve environmental and societal challenges. Innovation is key for ensuring that breakthrough approaches are initiated as many sustainability challenges facing communities such as poverty, lack of access to clean water and sanitation, high unemployment rates and waste management are not easy to solve without innovating. Figure 6.5 on the following page shows the three key pillars relevant for success as a sustainability leader.

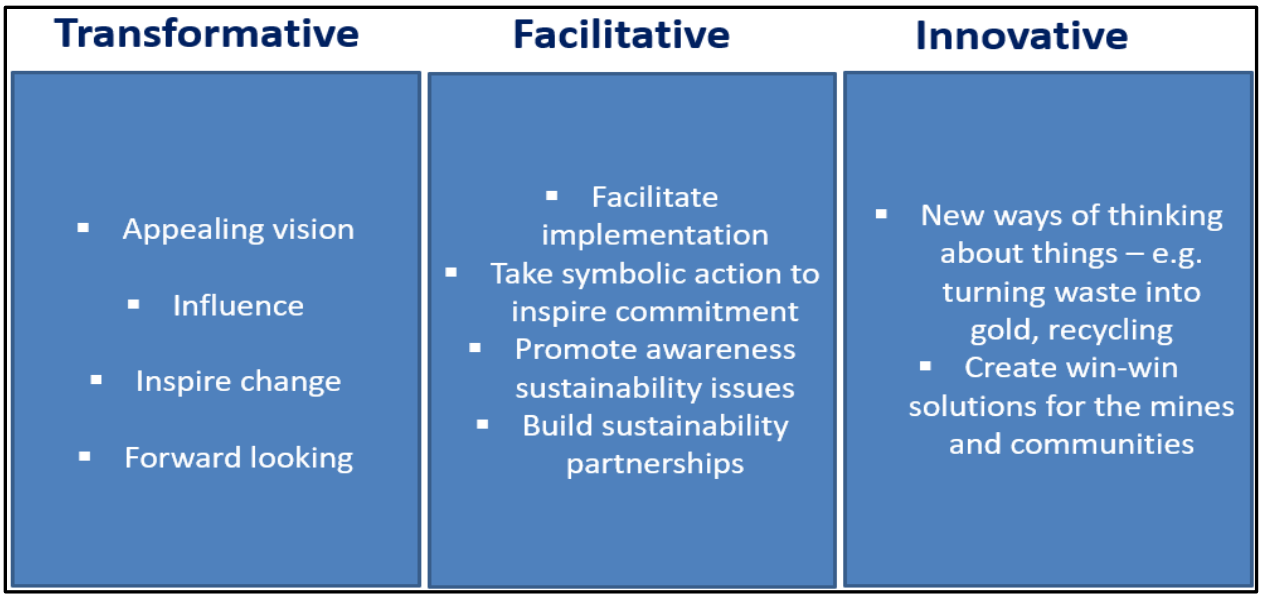

Figure 6. 5: Key pillars relevant for sustainability leadership success

Source: Developed by the researcher

Rooke and Torbert (2005) asserted that companies need transformational leaders who can advance businesses and change the rules of the game in the industries within which they operate. This was found to be relevant in the leadership research of sustainability leaders in the SA mining sector. The action-logics from Rooke and Torbert (2005) can help sustainability leaders within the mining industry increase their impact and advance the SD agenda.

The study found that sustainability leaders adopt various roles in executing their leadership, namely 'expert', 'implementer' or 'alchemist'. Some leaders provide expert knowledge using technical approaches with limited influence. These leaders can provide technical information to the organisation and have strong orientation towards field-related scientific investigations. Certain leaders assume the role of implementors thus implementing sustainability projects using a hands-on approach. These leaders play a critical role in implementing environmental and social projects, rehabilitating the environment as well as initiating waste reduction projects to the benefit of the environment and communities.

Few leaders operate as alchemists thus impacting on broader stakeholders within the mining sector beyond companies that they work for. These leaders influence the call for sustainability amongst diverse stakeholders, influence policy making decisions, collaborate strongly with external stakeholders and participate in global SD issues. The findings from the research showed that all the roles that the leaders play are important towards ensuring SD in the mining industry. The increasing impact of the roles are toward the alchemist. Figure 6.6 below depicts this finding from the study with relevance to SL development in the mining sector.

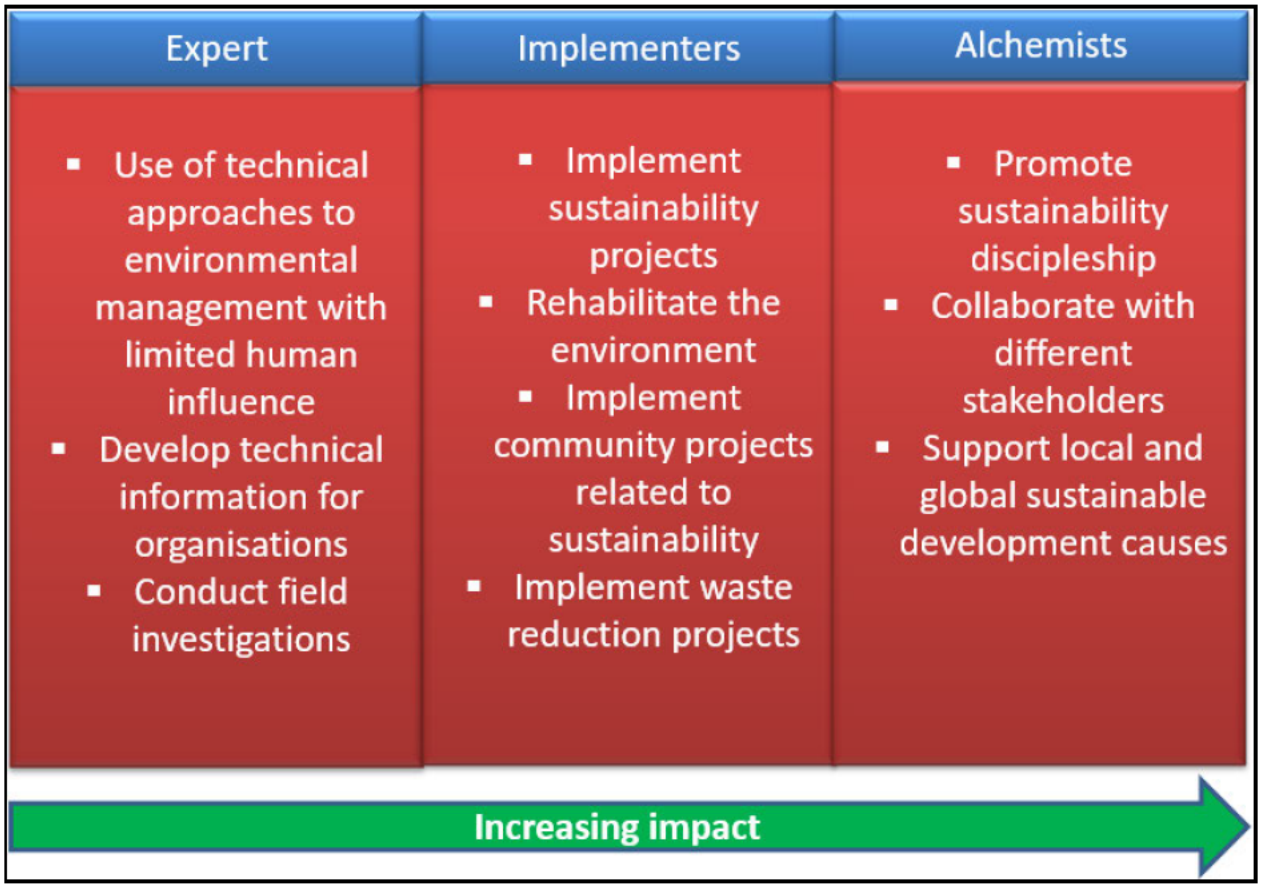

Figure 6. 6: Action-logics for sustainability leadership in South African mining

Source: Modified from Rooke and Torbert (2005, p. 47)

The internal and external organisational context is important for leadership development in sustainability. Internal factors affecting companies such as production, capital allocation, culture and cross functional buy-in impact on the success and implementation of sustainability projects.

Sustainability leaders need to understand these issues and navigate within organisations to advance the SD agenda. External organisational factors including mineral prices and exchange rates have implication on funds available to sponsor environmental and social projects within the mining sector. Sustainability leaders need to understand these issues to adapt the SD strategies and ensure that environmental projects are cushioned against such challenges. The socio-political stability within communities is also important to ensure that mitigation projects are carried out. The study found that some projects are stopped by communities due to the socio-political environment, this happens even after huge funds are invested on projects. Sustainability leaders need to develop an acuity to predict the emergence of such issues on projects and be able to select projects that will not be influenced by socio-political instabilities.

6.7. Conclusion

This chapter provided a discussion of the results of the study, which was structured according to the objectives of the study and the emergent themes related to each objective. The leadership challenges experienced by sustainability leaders were discussed. Use of verbatim quotes to identify units of meaning was made. The experience of success as lived and experienced by sustainability leaders was also explored. The study found that sustainability leaders experienced success when contributing beyond themselves to the wider community through poverty eradication. Enviro-social projects that rehabilitated the environment whilst contributing to the economy and employment creation were also highly favoured. Industry contribution as well as education and awareness were also highlighted as one of the key fulfilling experiences. The essence of the meaning of sustainability from those who lead was discussed in greater detail illuminating the phenomenon under investigation. The next chapter provides the conclusions that can be drawn from the findings of the study and proposes recommendations for the promotion of SL in the mining industry and for further research.

CHAPTER SEVEN: CONCLUSION AND RECOMMENDATIONS

7.1. Introduction

The research aimed to explore and investigate the leaders' experience of sustainability and advance an understanding of SL in the SA mining. In accordance with the study aim, the study intended to gain deep insight into leaders' experiences of sustainability based on their own understandings and the meanings that they assign to their subjective lived experience. As indicated early in the thesis, for the purpose of this study, sustainability was understood as balancing social, economic, and environmental considerations to meet the needs of the present without compromising the ability of future generations to meet their own needs. This concept was first articulated in the Brundtland Report of 1987. The literature review presented in Chapter Two explored the concept of SD in terms of its history and how SD is implemented in SA mining. In Chapter Three leadership theories and their applicability to sustainability were reviewed. Chapter Four presented the research design and methodology adopted in the research. The study employed a constructivist descriptive transcendental phenomenological approach. Twelve participants were purposively sampled and interviewed using a semi-structured interview technique. A formal letter explaining the nature and the purpose of the study was sent to all participants. All participants were duly informed about the aim of the study and what their agreement to participate would entail and freely gave their consent to participate. They were also informed that they were allowed to cease the interview process at any time should they feel uncomfortable to proceed. Chapter Five presented the findings of the study and Chapter Six provided an in-depth discussion of the findings structured around the emerging themes from the analysis of the data. This chapter summarises the findings of the study and outlines the final conclusions that can be drawn based on these. Lastly, recommendations for the promotion of SL in the mining industry and for further research into the area in interest will be outlined.

7.2. Summary of findings pertaining to study objectives

The research aimed to explore and investigate the leaders' experience of sustainability in the SA mining industry and advance an understanding of SL in the SA mining industry. The study aim was to be achieved through the attainment of the following key objectives:

- To identify sustainability leadership challenges in the SA mining industry.
- To explore sustainability leadership successes as perceived and experienced by leaders within the SA mining industry.
- To identify strategies leaders use to influence positive sustainability outcomes.
- To explore the meaning of sustainability as experienced by sustainability leaders in SA mining.

Using a phenomenological approach the study did not solely focus on theoretical findings but the lived experience of SL from those who lead in the SA mining industry. The study sought to advance the understanding of sustainability and SL from those who have experienced the phenomenon. This understanding was attained by examining the lived experience of sustainability from sustainability leaders in SA mining, that is, their experienced challenges, their perceived sustainability leadership success, the strategies they use to influence positive sustainability outcomes, and their meaning of sustainability based on their perceptions and lived experience. Literature showed that many theoretical frameworks were developed to advance the concept of SD. However, there was an implementation gap and there is actually little knowledge in terms of what sustainability exactly means and how it should be implemented at the ground level. This is especially so in the SA mining industry which has been cherished for its economic impact but criticised as an unsustainable industry based on the environmental and social impacts associated with mining activities.

Participants intensely described their perceptions of sustainability and SL in the interviews. From their textural descriptions themes emerged providing meaningful constructs of the phenomena investigated. Participants described sustainability challenges that they experienced, their highlighted successes, the strategies that they used to influence positive outcomes and their perceptions regarding what sustainability means. The conclusion and summary of findings based on the study objectives are discussed below.

7.2.1. Leadership challenges associated with sustainability in the SA mining industry

The lived experience of sustainability leaders in SA mining showed that the key challenges experienced by leaders include environmental challenges, community challenges, political challenges,

leadership and governance challenges, as well as the sustainable closure of mines. Leaders experienced limitations pertaining to the pragmatic implementation of innovative solutions to solve environmental problems. Some of the environmental problems related to legacy issues that caused long standing surface water, ground water and land pollution. The deficiency in innovative approaches and implementation efforts on the ground level created limitations and a lack of progress towards positive environmental outcomes.

Whilst the view of annual reports and public information on sustainability performance from some of the leading mining companies seems positive, some participants argued that there are fundamental challenges experienced at the ground level as there was a lack of practical implementation to solve sustainability challenges. Companies were still failing to effectively engage with communities and find common solutions. Community sustainability projects were not always sustainable and some of them required continuous funding. Leaders indicated that the long-term effects of mining activities, such as dust pollution and resource depletion, need to be matched by projects. Hence, the sustainability in the mining sector requires that a proportion of profits should be reinvested in affected communities for long term positive impact. However, there is a current lack of such reinvestments.

Communities within the areas where mines operate were also seen as adding to challenges. There were factions within communities and communities did not always agree on the sustainability projects that needed to be implemented. Moreover, the focus was always on short term gains rather than long term sustainable projects. Illegal mining was also a challenge and is linked to communities within which the mines operate. Illegal mining caused environmental damage and theft of resources intended to mitigate the environment such as steel pipes, irrigation pipes and equipment.

Politics and bureaucracy remain an ongoing reality when it comes to mining. This poses a challenge towards the implementation of sustainability projects and sustainable mining. Sustainability leaders experienced hindrances when implementing sustainability projects. This was informed by the lack of trust between government and businesses.

The lack of leadership in government structures and municipalities was expressed by the participants as one of the frustrations experienced when trying to implement sustainability projects in

mining. There seems to be inadequate social responsibility in mining communities. Such inadequacy is related to broader infrastructure needs such as roads, water, electricity, clinics and schools.

Improper mine closures complicated the environmental and social climate within which the mines operated. Environmental challenges relating to non-rehabilitated mine dumps, subsidence, non-rehabilitated open pits, and tailings affected both the environment, communities and people who lived there.

7.2.2. Sustainability leadership successes as perceived and experienced by leaders within the SA mining industry

Sustainability leaders experienced intense feelings of success when empowering others, especially impoverished members of the community. The highlights of the successes experienced by sustainability leaders in the mining industry related to socio-economic empowerment, health and safety, sustainable enviro-social projects as well as partnerships and collaborations with other stakeholders.

Projects that ticked all the right sustainability boxes thus creating employment whilst rehabilitating the environment were especially fulfilling for sustainability leaders. It was important for such projects to stand on their own and generate income without depending on sponsorship or cash injections from the mines; in this way they were considered sustainable.

Breaking the cycle of poverty through sustainability efforts was seen as meaningful by participants. Initiatives leading to breaking the cycle of poverty within the family by providing education and other means were favoured. This was also about empowering others, by educating others about regulations and procedures and providing clarity and guidance. This ensures that the cycle of sustainability can continue through others, and it provides a feeling of fulfilment for leaders knowing that they are contributing to both the economy and SD. Achievements in health and safety were also reported as key highlights by participants. Reduced fatalities, TB treatment successes and successful COVID-19 interventions were pivoted as key highlights.

Successful environmental projects such as the treatment of mine tailings and removal of soil dumps were reported as a highlight of successes. One company has reused redundant infrastructure for

the purpose of tailing dams, resulting in new economic activity in addition to restoring ecosystems and contributing towards environmental sustainability. Through innovative techniques such as plant growth in tailings dams without topsoil, the project aimed to generate wealth and improve the sustainability of the environment.

Renewable energy was also one of the key areas where participants expressed that mines are contributing and have set targets to decarbonise and limit climate change. Thus, some mines operate off-grid which minimises climate change from non-renewable energy sources.

Multi-stakeholder collaboration with government and other institutions were highlighted as key successes. This varied from support by government in terms of legal frameworks to partnerships between the mines or other governmental stakeholders to mitigate the environmental impacts and create employment opportunities. When strong stakeholder relations were fostered, participants expressed that sustainability objectives were successfully met.

7.2.3. Strategies leaders use to influence positive sustainability outcomes

The strategies that sustainability leaders use to influence positive outcomes include values and leadership culture, innovation and adaptability, knowledge, commitment, and strategy. The study found that values within the company were important for leaders to influence sustainability outcomes. Ethical commitments within the company helps them ensure that the company will do what is right, thus protecting the environment and wellbeing of communities within which they operate. The credibility of leaders is earned when they walk the talk by ensuring their actions complement words and consistently deliver results. This was important in earning trust from team members and attaining success.

Sustainability leaders used and promoted principle-based leadership to ensure effective governance for positive sustainability outcomes. Resource allocation to promote positive sustainability projects had to be based on key principles and not just short-term profit gains.

It was important for leadership to establish a proper leadership culture towards sustainability within the organisation. The integration of leadership and sustainability into a coherent approach to the future is necessary. In such integration, leaders do not have to be experts in all areas but

rather need to use their collective expertise for the purpose of achieving sustainable business and societal objectives.

Visible leadership is especially important in the mining industry as compared to other sectors. Hence there is a need for leadership and management to be visibly engaged throughout project lifecycles. The diversity of leadership was also identified as key for promoting sustainability in the SA mining industry. There must be diversity in leadership, and this encompasses not only technical skills and expertise, but also factors such as race, gender, age and background.

To influence positive outcomes, sustainability leaders needed to innovate. Innovation is of critical importance in the SA mining sector as traditional approaches are insufficient for achieving the best outcomes. Leaders needed to be creative and have a solutions-oriented mindset to address complexities relating to environmental and social challenges. They needed to have the flexibility and openness to alternative solutions during times of difficulties and in embracing sustainability practices.

Knowledge of frameworks governing SD was highlighted as important for the attainment of sustainability in the SA mining industry. Leaders needed to link sustainability to company strategy so that sustainability is embedded within organisational processes. To do this, the knowledge and commitment to the call for sustainability was found to be vital. It also important for leaders to consider that sustainability is a journey rather than a destination, thus systems and processes within organisations need to be influences taking a long-term view (Vijay et al., 2025).

7.2.4. The meaning of sustainability as lived and experienced by sustainability leaders in SA mining

Study findings show that the meaning of sustainability differs amongst its leaders in the SA mining industry. This finding is in line with the findings from literature. Although the concept and theory of SD is understood by many leaders from its initial birth in the Brundtland Report (1987), there is no single framework prescribing how sustainability and SD should be implemented in organisations.

The participants in the study experienced sustainability as the inculcation of pro-active programs to mitigate negative enviro-social impacts and instead promote positive enviro-social impacts from mining. However, the lived experience of sustainability and the meaning of sustainability differed from participant to participant. The study found that the meaning of sustainability incorporated fundamental components including the deep understanding of sustainability, value creation beyond profits, influence and stewardship, engagement of stakeholders, environmental and social commitment, innovation and adaptability as well as competitiveness and business survival.

The study found also that sustainability means a deeper understanding of the environmental and social implications of decisions and activities of organisations and individuals within organisations. Such an understanding also requires the appreciation and apprehension of global enviro-social challenges and challenges specific to the sector which the sustainability leader serves. Impacts of decision making, and activities of a company need to be gauged with the lens of environment and society wellbeing. Sustainability means an individual and an organisation have a genuine commitment to the promotion of SD ideologies. This needs to be done with a view of decisions and actions taking place now that might have an enormous impact on future generations.

The lived experience of leaders shows that sustainability means creating value beyond corporate profits, being ethical and creating trust. Because leaders in sustainability work with various stakeholders, leading sustainability means influencing positive outcomes that may not be immediately increasing the bottom line. Sustainability means doing good with a long-term view and demonstrating the impact of sustainable decisions to corporate teams with limited understanding of sustainability.

Sustainability means long-term viability and implications of decisions must be considered in favour of short-term gains. Driving sustainability objectives in alignment with the business strategy is seen as part of the journey. This involved engaging with key stakeholder and obtain their buy-in. In order to do this, one had demonstrated how sustainability practices can support and enhance the business plan. The main aim was to show how sustainable practices can contribute to profitability and overall business success.

Sustainability cannot be attained without stakeholder engagement, partnerships, and collaboration. Moving more towards external collaboration with government, industry, and communities was crucial for ensuring long-term viability by raising awareness and educating the future generation about sustainability. Thus, to those who lead, sustainability means communicating, collaborating, and creating partnerships with various stakeholders from internal discipline leaders within organisations, to communities and government.

Sustainability means acknowledgement of the unique circumstances and historical challenges in a country such as SA. Participants expressed the unique circumstances that SA is facing in comparison with developed countries. Participants believed that sustainability is not only about a strong focus on nature conservation as it is in other developed countries, but also about addressing the indignities of the past and striving for social equity. Therefore, for them, social commitment and redressing historical inequalities was a key constituent of sustainable leadership.

Sustainability problems are multi-faceted, both in the short term as well as in the long term. Therefore, sustainability leadership to those who lead means being able to innovate and adapt to solve enviro-social challenges. To those who lead this means focusing on both challenges and opportunities. One needs to think beyond the short term, to innovate and adapt to ensure the future existence of the business.

Participants expressed that in their perspective and lived experience, sustainability was no longer to be regarded as a cost to company but rather a business imperative. Thus, sustainability means positioning the business well for long term survival and providing a competitive advantage.

7.3. Study recommendations

Based on the interviews with the participants the following recommendations can be made:

7.3.1. Leadership recommendations

There is a need for leaders to align with the vision and expectations of the company, demonstrating commitment through actions and communication. Leadership support and buy-in is crucial. It requires leaders without ego and who possess high levels of emotional intelligence to understand and connect relevant people and to embrace sustainability that is comprehensively inclusive of ESG.

Appointing unqualified and inexperienced individuals to strategic positions is detrimental as it leads to problems in implementation and enforcement as well as potential oversights and flaws. Therefore, when it comes to leadership positions, there must be qualified, experienced and trustworthy individuals that are appointed in these positions to ensure success at all levels. Leadership must also ensure that there are adequate budget allocations for the fulfilment of sustainability goals and objectives.

Organisational culture is a driver of sustainable practices. While policies and systems are important, real change begins through the shifting mindset and behaviour. Intentionality is key on this aspect. Considering this, leaders must play a driving role in shaping a strong culture through accountability for their decisions and fostering of long-term sustainability.

7.3.2. Sustainability focused creativity and innovation

Mining companies must transition from traditional mining practices towards more sustainable and innovative technologies. For this to happen, they must learn more about emerging technologies such as agro-mining, phyto-mining, urban mining, and circular economy initiatives, amongst others. Adopting new technologies can help mining companies remain competitive and resilient in the changing industry landscape. All these are important for environmental protection and the attainment of SDGs.

7.3.3. Multi-stakeholder approach and engagement

There must be a robust multi-stakeholder approach in achieving sustainability goals. Stakeholder engagement must include representation from different sectors, including government, NGOs, activists, and other mines. By involving diverse perspectives, more effective and sustainable solutions can be developed to address challenges. Buy-in from all sectors can bring sustainability to life with a collective effort to support post-mining communities in the long term.

Communication at all levels of the organisation is pivotal in creating awareness and change. Effective communication can serve and enable the business to deliver on its sustainability agenda. In addition, robust conversations can allow for business to align with sustainability goals. Hence, clear and transparent communication can drive trust and strategic decision-making towards sustainability objectives.

7.3.4. Demonstrating value for sustainability

Sustainability needs to be seen as integral to the business and not a “by the way” undertaking. It must be integrated to the core functions of the business. In the business world, one has to demonstrate value in order to gain support. Hence the value of environmental, social and governance (ESG) initiatives needs to be demonstrated in terms of supporting profit margins, promoting growth, enhancing image and reputation, obtaining resources and attaining competitiveness, among others.

7.3.5. Environmental and social impact monitoring including climate change

It is crucial for mines to monitor and be honest about their impact on the environmental and social landscape. This will assist with the development of focused sustainability initiatives that can solve challenges at the ground level. It is also crucial to monitor the impacts of climate change. Failure to do so could lead to unsustainable operations and projects in the long term. Hence planning for, monitoring, and adapting to climate change is vital for ensuring continued mining activities.

7.3.6. Government support

No mining company can succeed in implementing sustainability without the support of government structures. Government must also clearly define and prioritise sustainability within legislation with strategies to drive positive change. There was a current lack of clarity on sustainable pathways within government systems, thereby requiring stronger regulations to ensure companies consider sustainability from the outset. The strengthening of regulatory frameworks by government can foster sustainable practices in the mining sector and address socio-economic challenges.

7.4. Contributions of the research

The SA mining industry has a strong economic contribution, employing hundreds of thousands of people and adding the multiplier effect to the economy. The economic impact of the industry is indisputable however the challenge remains when it comes to environmental and social impacts. The industry has not been sustainable when it comes to the environmental and the social landscape. SD is pivoted as the answer to balancing the needs of the economy, environment and society. As well noted by Jabareen (2008), supported by recent scholars including Berrone et al. (2023), there is challenge in incorporating SD into organisations. This is more so in the SA mining industry. Despite the plethora of literature pertaining SD, the practical implementation of SD in the mining industry remained under investigated. The research has contributed to this knowledge gap by studying the experience of sustainability leaders to better understand the challenges facing the implementation of sustainability in mining. By doing so, the research has contributed towards closing the gap between theory and practice when it comes to sustainable mining. The research has highlighted several challenges faced by SD leaders in mining that affect the successful implementation of SD including political challenges, social challenges as illegal miners and theft of infrastructure geared towards environmental rehabilitation. Thus, the practical contribution of the research is the advancement of the understanding of sustainable development and its leadership implementation challenges in the SA mining industry.

The theoretical contribution of this research is the development of the sustainability leadership framework in SA mining. The leadership development framework is intended to help sustainability leaders execute their roles and balance the ethical paradox between the ecological capital and

economic advancement. In addition, the leadership framework will help leaders to better champion the sustainable development agenda amongst stakeholders with competing needs. Other than the study conducted by Makuluma (2011) in the gold mining sector, no study has integratively investigated the role of leadership in sustainable development in the SA mining sector despite the challenges that the industry face. The study has contributed to the industry by articulating the challenges that sustainability leaders face, as well as the approaches that they use to influence positive outcomes. Through the development of the leadership framework, it is hoped that future leaders will use the findings of the study to better influence outcomes towards a sustainable mining industry for the present and future generations. Thus, addressing the urgent need for sustainability leadership in SA mining.

The methodical contribution of this study is the use of transcendental phenomenology to highlight practical as lived challenges faced by leaders during the implementation of SD in mining. The research has found that despite the scientific availability of ecological solutions and social interventions geared towards SD, when it comes to the practical implementation there are challenges in implementing these solutions. Without the use of qualitative methods such challenges would have remained unknown and potential unsolved. Thus, using the qualitative method the research has made a methodical contribution which other scholars can emulate in trying to demystify the gap between theory and practice from issues that are well theoretically researched but practically under investigated.

7.5. Recommendations for future research

One of the goals of this study was to contribute new knowledge to the concept of SD and sustainability in the mining industry. This is important because mining has negative impacts on the natural and social environments. These impacts can be mitigated through inculcating sustainability into mining thus ensuring sustainable mining in line with the concept of SD as espoused by the Brundtland Commission Report (1987).

SL has been investigated using empirical and non-empirical methods. This study brought a unique approach by investigating lived experiences of sustainability leaders in SA mining. By doing so, the study closed the gap between theory and practice. An understanding of the challenges,

highlights of successes and the meaning of sustainability by those who lead it at the forefront in SA mining has been advanced by the study. There is a need for future research that will promote the implementation of sustainability at the ground levels. The formulation of models to promote multi-stakeholder relationships in mining to the benefit of the environment and society is required. Future research needs to identify ways in which relationships between mines and communities as well as government stakeholders can be strengthened for common sustainability partnerships. This will create positive outcomes and ensure that the concept of SD is realised. Future generations can benefit from this and be left better off without the burden of the legacy of unsustainable mining.

7.6. Limitations of the study

The study investigated sustainability leadership challenges pertaining to the implementation of SD within the SA mining industry. Despite multitude of literature available in terms of SD, SL is still under investigated. Moreover, the practical enactment and implementation of the SD concept has not been investigated adequately within the context of SA mining. The study was conducted amidst the aftermath of Covid-19, thus reliance and preference from study participants was placed on Microsoft Teams, personal interviews were not favoured. The transcription of all interviews by a professional transcriber ensured that all interview information was accurately captured for analysis.

7.7. Conclusion

This research closed the gap between the concept of SD and leadership in mining. The understanding of sustainability leaders' challenges and successes as well as the meanings they assign to sustainability will advance the knowledge of sustainability in both the mining industry and other industries. This is especially so because an industry study was undertaken which encompassed all mining commodities in SA and diverse mining companies.

Based on the research findings, it can be concluded that mining will continue to be presented with or will itself present challenges to the environmental and social landscape within which mines operate. The key questions are 'how will these challenges be overcome?' And 'how can the

implementation of sustainability projects at the ground level be facilitated such that negative environmental impacts and impacts to communities are positively mitigated?'.

It is clear from the research that mining companies are trying to be sustainable and that sustainability leaders are doing their best to contribute towards this. However, there remains a challenge in terms of alignment on sustainable projects and innovative solutions. In addition, mines and communities are not always aligned. Short termism and the lack of partnerships remain a challenge. These are all important areas that future research can address to promote SD in the mining industry.

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APPENDIX 1: INTERVIEW GUIDE

- Describe your journey as a leader in enabling sustainability?
- Describe what sustainability mean to you as a leader?
- Describe your experience of the effective sustainability practices that you have experienced in the mining sector? (Explain/describe)
- Describe the experience of key challenges experienced by you as a leader when it came to sustainability in the organisation/sector? (please explain)
- What impact did such challenges have on sustainability in the organisation/sector?
- Describe the overcoming of challenges relating to sustainability and in turn promote more success in sustainability in the organisations you work with?
- Describe the experience of success in relation to sustainability?
- Describe your experience of the primary leadership factors that can positively influence sustainability in the mining sector?
- Describe the key leadership recommendations to promote sustainability/ESG strategy development within the mining sector?

APPENDIX 2: INFORMED CONSENT LETTER

CONSENT TO PARTICPATE IN A STUDY

I .....have been informed about the study entitled "*A phenomenological study on leaders' experiences of sustainability in the South African Mining Industry*" by Mr. Phillip Ramphisa.

I understand the purpose and procedures of the study.

I have been given an opportunity to answer questions about the study and have had answers to my satisfaction.

I declare that my participation in this study is entirely voluntary and that I may withdraw at any time.

I understand that no compensation will be given to me as a result of the study.

If I have any further questions/concerns or queries related to the study, I understand that I may contact the researcher by phone or email [redacted]

If I have any questions or concerns about my rights as a study participant, or if I am concerned about an aspect of the study or the researchers conduct then I may contact:

HUMANITIES & SOCIAL SCIENCES RESEARCH ETHICS ADMINISTRATION
Research Office, Westville Campus
Govan Mbeki Building
Private Bag X 54001
Durban
4000
KwaZulu-Natal, SOUTH AFRICA
Tel: 27 31 2604557 - Fax: 27 31 2604609

I hereby provide consent to:

Audio-record and transcribe my interview YES / NO

Signature of Participant **Date**

APPENDIX 3: GATEKEEPER'S LETTER

MINERALS COUNCIL
SOUTH AFRICA

9 September 2022

Prof Cecile Gerwel Proches and Dr Simon Taylor
Graduate School of Business and Leadership
University of KwaZulu-Natal
Westville Campus
Durban
3630

RE: REQUEST TO CONDUCT RESEARCH

Your email requesting permission to conduct research has been received.

The matter was raised at the Minerals Council's Environmental Policy Committee meeting last meeting held on 1 September 2022. Members of the EPC have in principle agreed to participate in Mr Phillip Ramphisa's survey for his Doctoral Research.

Mr Ramphisa may engage with our office to reach out to VP/Heads of Environment of member companies of the Minerals Council

Kind regards

[redacted]

NIKISI LESUFI
SENIOR EXECUTIVE
Tel: 011 498 7161
Cell: [redacted]
Email: nlesufi@mineralscouncil.org.za

APPENDIX 4: INFORMATION SHEET

UNIVERSITY OF KWAZULU-NATAL
INYUVESI YAKWAZULU-NATALI

Information Sheet and Consent to Participate in Research

Date: March 2023

Dear Participant

My name is Phillip Ramphisa. I am enrolled for a Doctoral Degree in Business Administration at the University of KwaZulu-Natal School of Business and Leadership.

I would like to kindly invite you to participate in a study regarding sustainability leadership in the South African mining industry. The aim and purpose of this research is advance and understanding of sustainability leadership and ESG in the South African mining industry. By so doing, the study will contribute towards an improved implementation of sustainable development in South African mining.

The study interviews leaders in the mining industry, across commodities including gold, platinum, copper, coal, chrome, and steel. Interviews will be held in person and for those who cannot attend in Zoom or Teams.

The study will not disclose names of leaders interviewed and names of companies. It has been ethically reviewed and approved by the UKZN Humanities and Social Sciences Research Ethics Committee (approval number HSSREC/00005222/2023).

The study is expected to contribute towards the implementation of sustainability leadership in the South African mining industry. Your participation will be appreciated.

In the event of any problems or concerns/questions you may contact me on [redacted]email [redacted]or the UKZN Humanities & Social Sciences Research Ethics Committee, contact details as follows:

HUMANITIES & SOCIAL SCIENCES RESEARCH ETHICS ADMINISTRATION
Research Office, Westville Campus
Govan Mbeki Building
Private Bag X 54001
Durban
4000
KwaZulu-Natal, SOUTH AFRICA
Tel: 27 31 2604557- Fax: 27 31 2604609
Email: HSSREC@ukzn.ac.za

Yours Sincerely,

Phillip Ramphisa
[redacted]

APPENDIX 5: ETHICAL CLEARANCE

UNIVERSITY OF KWAZULU-NATAL
INYUVESI YAKWAZULU-NATALI

30 January 2023

Phillip Ramphisa (218086524)
Graduate School of Business & Leadership
Westville Campus

Dear P Ramphisa,

Protocol reference number: HSSREC/00005222/2023
Project title: A phenomenological study on leaders' experiences of sustainability in the South African Mining Industry
Degree: DBA

Approval Notification – Expedited Application

This letter serves to notify you that your application received on 24 January 2023 in connection with the above, was reviewed by the Humanities and Social Sciences Research Ethics Committee (HSSREC) and the protocol has been granted **FULL APPROVAL**.

Any alteration/s to the approved research protocol i.e. Questionnaire/Interview Schedule, Informed Consent Form, Title of the Project, Location of the Study, Research Approach and Methods must be reviewed and approved through the amendment/modification prior to its implementation. In case you have further queries, please quote the above reference number. PLEASE NOTE: Research data should be securely stored in the discipline/department for a period of 5 years.

This approval is valid until 30 January 2024.
To ensure uninterrupted approval of this study beyond the approval expiry date, a progress report must be submitted to the Research Office on the appropriate form 2 - 3 months before the expiry date. A close-out report to be submitted when study is finished.

HSSREC is registered with the South African National Health Research Ethics Council (REC-040414-040).

Yours sincerely,

[redacted]

Professor Dipane Hlalele (Chair)