ANALYSING THE SUSTAINABLE DEVELOPMENT GOALS AND SUSTAINABILITY REPORTS OF SOUTH AFRICA'S PLATINUM MINES

by

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DECLARATION

I, **THAMSANQA QUINCY MANGEZI**, declare that:

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Signed: 

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DEDICATION

This dissertation is dedicated to my late aunt,

Letsaba Nthabiseng Alina Tsotetsi

(RIP, I will always love you)

1960:07:06 – 2023:10:24

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ABSTRACT

<u>Keywords:</u> SDG Implementation, Sustainability Reporting, PGM mining, Mining community development, SLP progress, South Africa

This study analyses the SDGs and sustainability reports of South Africa's platinum mines. Balancing economic growth, social equity and environmental protection is crucial for mineral-dependent communities. Hotelling's rule further highlights the need for intergenerational equity in resource extraction, highlighting the importance of aligning mining with the SDGs.

The paradoxical relationship between mining and sustainability is problematic. This is because mining exacerbates the issues that the SDGs aim to address. Notably, South African PGM mining companies, through their SLPs, must benefit the neighbouring mining communities because of their negative societal and environmental impacts. Arguably, achieving this objective is, to some extent, not materialising. Therefore, PGM mining companies' sustainability reports communicate one side of the story and neglect the communities' negative experiences.

Hence, the Minerals Council of South Africa, aims to reposition the industry as a 'sustainability leader'. Particularly given South Africa's global prominence in platinum production. As such, this study adopted the Minerals Council social and relationship capital SDGs, and devised three research objectives. To evaluate PGM mining companies' implementation of the SDGs targets, the effectiveness of their sustainability reports using the SDG Compass. Lastly, the progress of PGM mining companies' SLP sustainability projects.

A dual-qualitative approach via semi-structured interviews and document analysis were used for data collection. First, semi-structured interviews were conducted with mining community stakeholders in South Africa's Bushveld Igneous Complex, a geographically concentrated and globally significant PGM hub. Second, PGM mining companies' sustainability reports were analysed.

The findings of this study, among others, are that PGM mining companies' contribution to their surrounding mining communities vary. Second, it is evident that the majority of PGM mining companies analysed in this study exhibit surface-level understanding of the SDGs and

moderately connect the SDGs with their business case. Lastly, SLP sustainability projects are done in silos, excluding the mining communities' inputs due to misaligned community needs.

As a result, the study recommended, a rigorous, continuous multi-stakeholder approach between the PGM mining companies, the mining communities and several other stakeholders to address the changing mining community needs. Second, to consult sustainability experts, particularly at audit firms, to ensure that strong governance principles are integrated with the SDGs.

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CHAPTER 1

INTRODUCTION

1.1 BACKGROUND

Sustainable development in the mining industry remains a global concern (Dubiński *et al.,* 2013:5). Some experts in 'mining and sustainable development' point out that sustainable development is a guiding principle for mining environmental management (Asr *et al.,* 2019:216). Other scholars provide insights into how the mineral production benefits and use can be sustained from one generation to the next (Zhou, 2023:1). For instance, increased metal recycling is one of many methods to ensure sustainable development in mining (Sovacool *et al.,* 2020:30). Another group of scholars argues for enhanced socio-economic and cultural relations, which represent a critical sustainable development dimension (Lazarenko *et al.,* 2019:2)

South Africa's mining industry is characterised by social inequalities (Rutledge, 2019:39). This is a result of both apartheid and colonial experiences (Diale 2014:19). Such experiences are well-reported and accompanied by vast academic literature (Diale, 2014:19). This literature relates to the role that businesses played in advancing the apartheid system; flawed approaches of adapting to democracy, which delayed sustainable development (Babarinde, 2009:355). Therefore, mining companies' 'attitude-adjustment' was driven by the new democratic systems, and pressures from international declarations and standards by means of globalisation and public-private partnerships, which compelled South African mining companies to appreciate and uphold sustainable development (Kapelus, 2002:275).

As such, the mining industry had to adjust its approach regarding developmental programmes. This process moved from a controlling, heavy-handed approach to a more engaging approach with multiple stakeholders with diverse interests (Diale 2014:19). Hamann (2004:280) points out that this type of institutional change was implemented during the 1990s. For instance, in 1973, two mining companies, Anglo American and De Beers Group, established the Chairman's Fund Trust (Diale, 2014:20). This Trust was to alleviate poverty within the mining community of Soweto (Babarinde, 2009:360). Hence, most South African mining companies have integrated CSR-related practises within their business models.

As such, PGM mining companies are incorporating CSR-related initiatives for their mining communities as a response to their negative environmental and social impacts (Selmier & Newenham-Kahindi, 2021:4). Thus CSR-related initiatives relate to employing local mining communities, providing health services and infrastructure, clean energy and environmental spaces as well as social well-being (International Institute for Environment & Development, 2002:198). Collectively, these elements contribute indirectly to sustainable development goals (SDGs).

The SDGs aim to end poverty, hunger, provide quality education and tackle climate change, among others (Biermann *et al.,* 2022:795). The overarching theme of the SDGs, is to ensure that 'no one is left behind', which is a clear indication to address the needs of society's most vulnerable (Donoghue & Khan, 2019:9). This theme is broad, since it encompasses a wide variety of social and environmental issues (Organisation for Economic Cooperation and Development, 2024). Hence, this vision is to be narrowed down and translated into concrete sustainable development objectives, where profits, people and the planet are adequately addressed, contributing to all 17 SDGs (Sciberras 2020:177).

Additionally, the SDGs maps the United Nations Agenda to achieve sustainable development by 2030 (Garcia-Sanchez *et al.,* 2020:2). Sustainable development is effectively meeting the needs of the current generation, while ensuring the ability of future generations to meet their own needs (United Nations The Brundtland Report, 1987). The 2030 Agenda of sustainable development, adopted by 191 UN member states in 2015, prospects to successfully bring about strong partnerships, prosperity and peace globally (Sciberras, 2020:1). Accordingly, the SDGs build upon the eight Millennium Development Goals (MDGs) (Lowndes & Roberts, 2013:66).

This study is to analyse the contributions of the SDGs for mining communities. Therefore, the Minerals Council South Africa (MCSA), through its social and relationship capital, has adopted nine priority SDGs (SDG-1, 2, 3, 4, 5, 8, 10, 11 and 16) and aims to reposition the country's mining industry as a leading industrial sector (MCSA – Annual Review, 2021:8). The MCSA has 73 members who mine various minerals, including gold, coal, copper and platinum to name a few (Mineral Council SA, 2024:1). Furthermore, South Africa is a global leader in the production of these metals, with 198 large-scale mines spread across 90 towns, cities and villages and a quarter of the country's local municipalities (Cole & Broadhurst, 2021:2).

The platinum group metals (PGMs), as a major user of natural resources, is pressurised to demonstrate responsible resource utilisation and provide credible sustainability data through reporting (Memela, 2020:1). Sustainability reporting is defined as 'the practice of disclosing an organisation's performance towards achieving sustainability' (Boston College Centre, Corporate Citizenship, 2025). Notably, South African PGM mining companies' sustainability reporting is often perceived as a public relations exercise rather than a true reflection of their sustainability efforts, lacking credibility and accuracy (Memela, 2020:2).

Furthermore, considering the significant volume of sustainability reporting undertaken by the industry, the SDG Compass can help mining companies effectively comprehend the SDGs, prioritise relevant goals, set core objectives and report on their progress (Global Reporting Initiative, UN Global Compact, World Business Council for Sustainable Development, 2015:29).

The next section will justify the need of this study.

1.2 JUSTIFICATION OF THE STUDY

South Africa is a global leader of PGMs (Hughes *et al.,* 2021:93) and effectively discloses their sustainability reports, yet the direct impact of mining activities on marginalised mining communities remains a concern (Mudd, 2010). Thus, the unprecedented increase in community unrest and limited access to basic services raises questions about 'true sustainability' (Chinguno, 2013:160). Furthermore, the South African mining industry's contributions to vast economic developments dates back to 1870 with the Kimberly diamond rush and the Witwatersrand gold rush. These developments led to urbanisation and capital investment; thus, mining typically defines the success of South Africa's GDP (Bundy & Cobbing, 2019:1870; MCSA, 2024:18).

Notwithstanding, South Africa is the most unequal country globally, with the country's Gini-coefficient forecasted to be 0.63 in 2025, which is considerably high (Statista, 2025). Yet the country has experienced vast economic developments in mining. Although South Africa is a leader in sustainability reporting several societal impacts suggest otherwise (World Bank, 2023). This study investigates South African PGM mining companies' implementation of the SDGs' targets within mining communities, where the literature suggests a potential gap

between the sustainability reporting practices and observed sustainability programmes on the ground.

The next section will outline the research problem.

1.3 RESEARCH PROBLEM

South African PGM mining companies, through their social and labour plans (SLP), must benefit their neighbouring mining communities (Bongwe, 2020:402). Arguably, achieving this objective is, to some extent, not materialising (Mabuza *et al.,* 2010:2). Thus, there are public concerns that SLP sustainability programmes implemented in the Bushveld Igneous Complex (BIC) communities are not yielding positive outcomes due to misaligned community needs (Bongwe, 2020:403). Moreover, mining communities in the BIC face several societal challenges, which include, among others, unemployment (SDG-8) and inadequate healthcare systems (SDG-3) (Mnwana & Capps, 2015:6). To a certain extent, addressing any communities' societal issues is the government's responsibility (United Nations Development Programme, 2015:28).

Nevertheless, the declaration of the SDGs led to several reforms within the private and public industries (Erin *et al.,* 2022:762). The reforms influence corporate disclosures, regarding sustainable development (Li & Mckernan, 2016:568). The reforms include, among others, making known legislative frameworks at global, national and domestic levels that will improve people's lives, increase public investment, building and upgrading of infrastructures as well as disclosing safe, non-violent measures (United Nations, 2018). Although it is the responsibility of the government to execute the SDGs, as well as champion the reforms, these goals cannot be implemented without the private industry. This calls on SDG-17, which emphasises revitalising strategic partnerships.

Strategic partnerships with various stakeholders are necessary to localise the SDGs towards achieving the 2030 Agenda (Mkhize, 2021:5). This ensures that the SDGs are locally owned since mining communities are vulnerable due to weak linkages between themselves, the mining companies and local government (Bongwe, 2020:394; Slack, 2015:5). This assertion, among other reasons, stems from where mining takes place, areas that lack economic development with limited resources and being located on the outskirts of urban areas (Diale, 2014:16).

PGM mining companies use sustainability reports to communicate various social challenges experienced by their host communities. Thus, it is within a sustainability report that PGM mining companies claim to make a positive impact therewith (Laine, 2010:255). This necessitates further interrogation to comprehend the PGM groups' effectiveness and accuracy regarding its actual sustainability performance.

Globally, the mining industry has faced criticism for impacting mining communities due to its energy-intensive operations (Campbell, 2012:140). Hence, the global mining industry is the most dangerous and damaging of industries (International Labour Organization, 2015; Marimuthu *et al.,* 2021:59). Notably, the industry has been applauded for their level of sustainability reporting; however, their actual sustainability performance remains sceptical (Lauwo & Otusuanya, 2014:92). Furthermore, the PGM industry, key to South Africa's GDP, is not exempt from this trend. As such, it has contributed to the development of the sustainability reporting movement (Hamann, 2006:190).

As expected, PGM mining companies' sustainability reports often communicate one side of the story; hence, the pressing need to consider the other side of the story – the mining community stakeholders' story, of whom sustainability is about in the first place. To gain this insight, it is imperative that mining community stakeholders are comprehensively engaged. Thus, it is perceived that the practical situation may be different from what is communicated in a detailed, well-structured and glossy PGM sustainability report (Memela, 2020:5). This calls into question, the accuracy and effectiveness of the industry's sustainability reporting practice.

The following sections will outline the research methodology that has been adopted by this study.

1.4 RESEARCH QUESTIONS AND OBJECTIVES

The research questions are centred on the Minerals Council South Africa and its members. Therefore, it is prudent to briefly reflect on the functionaries of the organisation. The Minerals Council South Africa (2023) is a professional association representing employers within the mining industry, with the primary objective of advancing the interests of mining and metals in South Africa. Primary roles of the Minerals Council, among others, is to facilitate interaction among mining employers to examine policy-related issues. Furthermore, Mineral Council membership compact has several members interested in a variety of minerals, like copper, gold,

manganese and platinum (PGMs) (Minerals Council South Africa, 2023). PGMs are metallic elements comprising platinum, rhodium, palladium, iridium, ruthenium, and osmium (New Age Metals, 2024).

The research questions pertaining to this study are set out as follows:

Research Question 1:

To what extent is the Mineral Councils South Africa's platinum group metals implementing the SDGs for their host communities?

Research Question 2:

To what extent is the Mineral Councils South Africa's platinum group metals effectively applying the SDG Compass to report on the SDGs?

Research Question 3:

To what extent has the Mineral Councils South Africa's platinum group metals progressed in their Social and Labour Plan sustainability projects?

The following aims will be considered for this study:

- To evaluate the PGM mining companies' implementation of the SDGs' targets.
- To evaluate PGM mining companies' sustainability reports using the SDG Compass.
- To evaluate PGM mining companies' progress of their social and labour plan sustainability projects.

Section 1.5 will outline the research approach.

1.5 RESEARCH APPROACH

For this study, data concerning the SDG implementation targets and sustainability reports was gathered through a qualitative research approach, using semi-structured interviews, as well as document analysis and observations. As defined by Creswell and Creswell (2017:4), a qualitative research approach is suitable for exploring and comprehending the meaning that individuals ascribe to a societal problem.

The next section will outline the research design to be followed in this study**.**

1.6 RESEARCH DESIGN

1.6.1 Semi-structured interviews

Semi-structured interviews were used to collect the SDG implementation target's data. This research design is appropriate because the aim is to gain knowledge from the participants' experiences and the level of understanding regarding a topic being studied (Lewis-Beck, *et al.,* 2003). As such, in addressing the first research question, the study used a 28-item scale, with A1-22 discussing the SDGs' implementation targets and A23-28 outlining the progress of SLP sustainability projects.

1.6.2 Document analysis and observations

One key set of documents used for document analysis is the PGM mining companies' sustainability reports. Sustainability reports analysed include PGM mining companies that are listed as members on the Minerals Council South Africa's (2023) membership compact. These include Anglo American Platinum (Amandebult), African Rainbow Minerals (Bokoni), Bauba Platinum (Platinum Exploration Project), Eastplats (Crocodile River), Impala Platinum (Rustenburg), and Ivanplats (Platreef). In addition, Nkwe Platinum (Garatau), Northam Platinum (Booysendal North), Tharisa Minerals (Tharisa), Sibanye-Stillwater (Marikana), Sedibelo Platinum (Pilansberg), Platinum Group Metals (Waterberg Complex), Siyanda Resources (Bakgatla Platinum), and lastly, Wesizwe Platinum (Bakubung Platinum).

The specific degree (quality) of how the SDGs are reported in the sustainability reports was measured using PwC's (2019:35) challenge framework. The framework can be a driving force to assist organisations in identifying key risks and opportunities, build resilient business models and implement effective strategies to achieve responsible growth (PwC, 2019:35). The scoring is from zero to three, with zero indicating that the SDGs are aligned with the report, yet with no ambition or plan to carry out the respective SDG. Three, which is the highest score that can be attained, indicates that the company report for the SDGs has been reported with great quantitative and qualitative ambition.

The next section will outline the data collection process used in this study.

1.7 DATA COLLECTION

This section will outline the target population, sampling procedure, the sample size, the process of recruiting the participants, primary and secondary data as well as the preliminary data analysis. Since the study employed two research designs, the section will be outlined in a dual manner, except for the target population, which will be discussed next.

1.7.1 Target Population

The interviews were conducted with mining community stakeholders. A community stakeholder is a person or an organisation with a vested interest or stake in the decision-making and activities within a community. As such, the study reviewed an array of mining community stakeholders who reside in the Bushveld Igneous Complex (BIC), in proximity to a PGM operation. Mining community stakeholders were crucial for this research study since they provided invaluable insights, lived experiences and perspectives that enriched and validated the research process.

1.7.2 Sampling Procedure

The study used a stratified purposive sampling, which combined elements of purposive sampling (selecting participants based on a specific criteria) and stratified sampling (dividing populations into subgroups):

- Mining community stakeholders who have resided within the community for over five years.
- Mining community stakeholders employed within the mining community.
- Mining community stakeholders with at least some primary schooling experience.
- Mining community stakeholders who are adults, over the age of 30.
- Mining community stakeholders located within a 50km radius of an operation.

1.7.3 Sampling Size: Semi-structured Interviews

The sample size for the semi-structured interviews was 14 mining community stakeholders. This stems from the 14 PGM mining companies representing a specific mining community. Thus, the study aimed to evaluate how these operations implement the SDGs within their respective communities.

1.7.4 Recruitment of Participants: Semi-structured Interviews

The researcher identified several mining community stakeholders. As such, a geographical web service (Google Maps) was used to select mining communities that are located within a 50km range of a PGM mining operation. The researcher telephonically engaged with them and scheduled an interview to discuss the SDG implementation targets.

1.7.5 Primary Data: Semi-structured Interviews

This study is concerned with PGM operations alongside their vast mining communities, spanning from the eastern, western and southern limbs of the BIC. Due to the COVID-19 pandemic, over 100 countries imposed lockdown periods by the end of March 2020 (BBC News, 2020). Researchers had to adapt to this new norm and familiarised themselves with video technologies, such as MS Teams and Zoom, to perform their work (De Villiers *et al.,* 2021:1). Subsequently, it is likely that more video-based research will be conducted in future. Thus, this study used the available online platforms to conduct the interviews, furthermore, considering the vastness of the BIC, online meetings are viable and cost effective.

Sections 1.7.6 to 1.7.9 will outline the data collection processes for the document analysis.

1.7.6 Sampling Procedure: Document Analysis – Purposive Sampling

This study employed purposive sampling, allowing the researcher to use their judgment in selecting PGM mining companies to gather the necessary information.

1.7.7 Sampling Size: Document Analysis

The sample size of 14 PGM mining companies was selected to perform this leg of the study.

1.7.8 Recruitment of Participants: Document Analysis

Sustainability reports were downloaded on the researcher's desktop. These reports were found on the PGM mining companies' official websites.

1.7.9 Secondary Data: Document Analysis

All listed South African public companies, including the PGM Group are mandated by the Johannesburg Stock Exchange to engage in sustainability reporting. As such, all 14 PGM

mining companies are expected to publicly report on their financial and non-financial material matters. However, if the sustainability report and/or the SLP was not on the website, the researcher communicated with the PGM mining company's secretariat team. Secondary data collection included relevant literature from relevant textbooks, journal and business articles, the Internet and full-text online academic databases (Emerald Insight, Research Gate, Google Scholar, HEIs repositories).

The preliminary data analysis will be discussed in the next section.

1.8 PRELIMINARY DATA ANALYSIS

Semi-structured Interviews

Grounded Theory Analysis

The grounded theory analysis is usually less structured and more adaptable for qualitative data analysis (Yin, 2015). In other words, grounded theory analysis will entail gathering data from the participants' own interpretations of the SDGs. This approach is particularly useful for exploring complex social issues related to the SDGs (Glinka & Hensel, 2017:143).

Transcription

Transcription is the process of converting audio recordings into written text (Ungarsohn, 1996). This entailed transforming raw data obtained in the grounded theory analysis into a manageable format for evaluation.

Thematic Coding

Thematic analysis was used to identify themes mentioned during the interviews, generate codes of based on those frequently mentioned and map out diagrams to understand the themes.

Document Analysis

Thematic

The thematic analysis will follow a six steps framework to draw out themes (Morse and Richards, 2013:142): familiarisation of the data, generating initial codes, searching for themes, reviewing themes, defining themes and consolidating findings into a report.

1.9 CHAPTER CLASSIFICATION

Chapter 1 | Introduction and Background: Chapter 1 of this study comprises the background of the study, justification of this study, the problem statement and the research questions and objectives. This underpins the methodology employed in this study. The chapter concludes with the configuration and layout of the study.

Chapter 2 | Literature Review 1 – The Sustainable Development Goals: Chapter 2 provides a literature review on the sustainable development goals. The chapter begins with the economics of sustainable development followed by non-renewable resource use and Hotelling's rule, thereby analysing exhaustible resource depletion. The mineral case will be discussed together with the Hartwick rule. Further discussions on balancing sustainable development and the mining industry, as well as the SDGs in the South African mining industry, follow. The chapter will conclude with discussions of the SDGs centred on the relationship and social capital of the Minerals council South Africa.

Chapter 3 | Literature Review 2 – Sustainability Reporting: The third chapter details sustainability reporting. This chapter outlines sustainability reporting frameworks in the mining industry. It then details these traditional frameworks in the context of the SDGs, followed by SDG reporting in the mining industry. This chapter will conclude with the SDG Compass, corporate social responsibility and the social and labour plan.

Chapter 4 | Research design and methodology: This chapter details the research methodology for the empirical portion of the study, including the research scope, the research approach and framework, data collection processes and the measuring instruments. Further discussions will include, the sampling strategy, preliminary data analysis, pilot testing of the SDGs and the ethical considerations.

Chapter 5 | Data analysis and interpretation: Chapter 5 of this study will present the results obtained from the empirical portions of the study.

Chapter 6 | Conclusions and recommendations: The last chapter will provide a review of the study and present the study conclusions. Grounded on the findings of this study, several recommendations and suggestions for future research are provided.

1.10 SYNOPSIS

While research has examined the sustainable development goals and the sustainability reporting thereof, this study aims to analyse the sustainable development goals within the PGM mining industry focussing on mining communities located in the Bushveld Igneous Complex and further analysing specific SDG as reported by the Minerals Council South Africa. Furthermore, evaluating PGM mining companies' sustainability reports using an audit firm's challenge framework and the SDG Compass to explore how PGM companies acknowledge the importance of the SDGs. Chapter 1 provided the framework for this study, with respect to its context and background. The next chapter, Chapter 2 reviews the literature on the sustainable development goals in the context of the mining industry.

CHAPTER 2

SUSTAINABLE DEVELOPMENT GOALS

2.1 INTRODUCTION

This chapter outlines the relevant literature, including the economic theory related to sustainable development in Section 2.2. Section 2.3 provides the necessary information regarding non-renewable resources and Hotelling's rule, analysing exhaustible resource depletion. Section 2.4 brings in the mineral case, which will be followed by the Hartwick rule in Section 2.5.

Section 2.6 commences with discussions centred on sustainable development in the mining industry. This will underpin discussions on the sustainable development goals and South African mining in Section 2.7. Section 2.8 will bring in a discussion regarding the UN 17 SDGs. Lastly, Section 2.9 provides context around the specific SDGs and those adopted by the Minerals Council of South Africa, namely social and relationship capital.

2.2 THE ECONOMICS OF SUSTAINABLE DEVELOPMENT

Sustainable development seeks economic progress, subsequently addressing social equity and environmental protection (Polasky *et al.,* 2019:5236). This holistic approach acknowledges that economic, environmental and social factors are interdependent; progress in one domain cannot be achieved at the expense of another factor (Ragheb *et al.,* 2022:105). Furthermore, sustainable development also warrants the well-being of both the present and future generations equally (Qasim *et al.,* 2020:2). As the world grapples with pressing repercussions of environmental degradation (resource depletion, pollution, climate change) and social disparities (unequal income distribution, poor education and health infrastructure) from economic development, understanding the economics of sustainable development is important (Chaturvedi *et al.,* 2024:9062).

Against this backdrop, businesses, civil societies and policymakers are called to devise strategies that reconcile economic growth with environmental stewardship and socially equitable practices (Chaturvedi *et al.,* 2024). Furthermore, sustainable development was formalised by the Brundtland Commission in 1987, as a guiding principle for various global

policies (Wu *et al.,* 2018). The United Nations Brundtland Report (1987) defines sustainable development as 'development that meet the needs of the current generation without compromising the ability of future generations to meet their own needs'. Accordingly, this advocates for effective economic and social development processes, particularly for those living in poverty (Bansal *et al.,* 2023), simultaneously preserving the natural resource base and the environment (Mahadik & Wheeler, 2014:451). Furthermore, measures that deteriorate the environment cannot improve socio-economic well-being, thus intergenerational solidarity is important, which also considers the impact on the opportunities that lie ahead for future generations (Summers & Smith, 2014).

The pursuit of sustainable development involves navigating the complex interplay between social, economic, political and environmental systems (Tallis *et al.,* 2018:567). As such, economists play an important role in unravelling these complexities and charting a path towards a sustainable future (Coscieme *et al.,* 2019). The latter is achieved by providing valuable insights into the role of economic growth, trade-offs, distributional impacts and potential policy and fiscal instruments that can foster sustainable economic development (Zimm *et al.,* 2018:20).

The economics of sustainable development represent a critical area of study. It examines topics that are vital to the sustainable development agenda (Ravago *et al.,* 2015:7). These topics include, among others, resource management, economic growth, climate change and poverty alleviation (Polasky *et al.,* 2019). Despite the growing recognition of sustainability, it remains a challenge to translate it into tangible policies and practices that are effectively implemented (Holom *et al.,* 2022). As such, economic systems prioritises short-term profitability and associated gains as opposed to long-term sustainability (Tallis *et al.,* 2018). This depletes vital ecosystem services, degrades natural resources and exacerbates inequality, all of which are unsustainable (Chaturvedi *et al.,* 2024). Furthermore, the global nature pertaining to various sustainability hindrances necessitates global cooperation, yet economic and political interests frequently inhibit the progress towards shared goals (Bansal *et al.,* 2023).

Examining the economics of sustainable development is important for addressing global challenges related to economic prosperity, social equity and natural resource preservation (van Niekerk, 2020). Resource extraction processes, on the other hand, applied by natural resource holders (miners), resonate the need for sustainable development as a global trend and an

economic priority (Petterson & Tawake, 2016:470). Hotelling's rule will follow, outlining the theoretical and empirical analysis of exhaustible resource depletion.

2.3 NON-RENEWABLE RESOURCE USE AND HOTELLING'S RULE: ANALYSIS OF EXHAUSTIBLE RESOURCE DEPLETION

Section 2.3, which is fundamental to this study, builds upon the previous sections on the economics of sustainable development and Hotelling's rule. As such, this section will expound on the theory of mining, extraction of a mine facing constant prices, profit maximisation of a mine and the Hotelling's rule.

2.3.1 The theory of mining

Non-renewable resources are finite in nature and cannot be replaced at a pace that is quick enough to keep up with their consumption (Awol & Abate, 2021). Simply put, once non-renewable resources are depleted, they are irreplaceable (National Geographic Society, 2024). These include fossil fuels such as natural gas, oil and coal, as well as minerals such as gold, copper and diamonds, amongst others (Guberman, 2022). Notably, the scarcity of both natural resources and minerals raises concerns with respect to the sustainability of the current and consumption rates (Pavloudakis *et al.,* 2024:1). Notwithstanding that both fossil fuels and mineral reserves, respectively, are formed through geological procedures that typically take millions of years (Matwani & Ojija, 2025:2). Therefore, it can be deduced that these resources have a fixed stock of reserves, inferring non-renewability.

Considering the nature of non-renewability of resources and minerals, governments, academics and industrial partners need to develop strategies for a socially and economically justified transition to a low carbon economy (Matwani & Ojija, 2025:2). These strategies will clarify how mineral resources are consumed in society (Che *et al.,* 2022:585). Thus, with stringent resource-saving conservation strategies, future populations will enjoy the same level of access to these minerals (Matwani & Ojija, 2025:2). Notably, implementing various conservation strategies is important for extending the resources significantly, even when global demand increases (Pentari *et al.,* 2024: 1442).

Notwithstanding the relatively short 'lifetime of a mine', ongoing mineral explorations, together with the delineation of novel ore bodies have kept the current reserves stable

(Kuzmenko *et al.,* 2023:4889). Moreover, technological development, adoption of efficient mining practices, as well as the reusing and recycling of minerals have effectively increased the overall availability of mineral resources (Subias, 2017). Considering the 'time' of when to extract minerals, pricing polices need to be geared towards the optimal use of available resources (Subias & Fossas, 2015). To this end, in explaining the theory of mining, the study will make known its assumptions and analogies in the application of what is relevant.

Assuming a simple resource extraction model from an individual mine and a farmer that are both operating in a perfectly competitive industry, is a market structure that embodies many buyers and sellers, free entry and exit, perfect information with no single firm influencing the market price and with participants being 'price takers' (Ansari, 2022; Dean *et al.,* 2020). Both the mine and agricultural managers aim to maximise profits from the minerals extracted and the crops that are produced.

Notably, the output level must maximise the difference between the total revenue (total amount of money received after selling products and services) and total cost (total expenses incurred to produce products and services) (Greenlaw & Shapiro-Ilan, 2018). In other words, to maximise the difference, both the miner and the farmer need to maximise revenue while spending the least to produce it. Hence, in a perfectly competitive industry, this occurrence is where marginal revenue (MR) equals marginal cost (MC) (Carbaugh & Prante, 2011). Finite mineral stock modifies the usual profit maximisation condition of marginal revenue *(MR)* equals marginal cost *(MC)* in two ways (Grainger, 2023).

Suppose the analogy of farming and mining is adopted. First, the mine manager, in contrast to the agricultural manager, faces an additional opportunity cost, which is the cost of using up the fixed stock or being left with smaller reserves. As such, to maximise profits, the mine manager must cover this opportunity cost of depletion. For a competitive firm that is producing a reproducible good, in this case a farmer, their profit maximum condition is price equals marginal cost, such that $p(=MR) = MC$ (Kolmar, 2021). For the non-renewable resources, this being the miner manager, price equals marginal cost plus the opportunity cost of depletion, equationally represented as $p = MC +$ *the opportunity cost of depletion*, which is the value of the unextracted resource, a resource rent (Laig & Abocejo, 2021).

The second feature of non-renewable resources as opposed to reproducible goods is the *value of the resource rent over time* (Subias & Fossas, 2015). As such, timing around when to extract

non-renewable resources is an investment dilemma (Dzage *et al.,* 2024). Moreover, investors have a fixed amount to invest in several assets, such as savings, land, bonds or resources in the ground. Depending on the asset chosen to purchase (and held on to over time), the investors' expectation is an increase in value over time or the expected rate of return (Asrawi & Noueihed, 2017). The question then arises, what exactly is the rate of return with respect to non-renewable resources? Hartwick *et al.* (1986) state that the rate of return to a non-renewable resource, such as a mine, is represented by the resource rent.

Simply put, a resource rent represents the value of unextracted mineral resources (Mazzucato, 2023), defined as, 'the excess of revenue from extracting the resources over the cost of extraction including the opportunity cost of holding onto the resource as opposed to selling it (Daubanes & de Sa, 2014). Accordingly, when the discount rate is positive, the rent will also be positive, increasing in nominal value as the resource is depleted (Leiva, 2016). On the other hand, if the resource rent did not rise in value over time, nobody would buy the mine, since the return on alternative investments would be more attractive (Conrad *et al.,* 2018).

The owner of the existing ore deposit would attempt to extract all the ore deposits as quickly as possible. In any case, there is no incentive to hold onto ore that increases in value at a lower rate than what can be earned on other assets, such as savings accounts or bonds. Conversely, if the ore body's value grows at a rate exceeding alternative investments, the mine manager is not motivated to extract at all (Hartwick *et al.,* 1986). Hence, for mineral extraction to occur, the resource rent must grow at the same rate as alternative assets (Hartwick *et al.,* 1986).

Conclusively, the mine owner is faced with one final and unique condition, known as stock constraint. This is a condition where the total amount of natural resources extracted over a period of time cannot surpass the total amount of available reserves (Xu & Cai*,* 2024). Assuming a rough extraction plan, a miner must decide whether to extract an additional ton of ore now or leave it underground for the following year. And, if the ore is extracted this year and yields a profit of $10.00, investing it at 8 percent would result in total returns, including a profit (rent) of $10.80 accruing to the miner the following year. Alternatively, deferring the extraction to the following year, the mine owners supposedly expect to earn $11.00 profit because of anticipated price changes. By repeatedly performing this analysis, the mine owner can determine the optimal extraction plan (Hartwick *et al.,* 1986).

When faced with the task of extracting resources from a mine that is facing constant extraction costs, one must carefully consider the various factors that can impact the profitability and sustainability of the operation (Lara *et al.,* 2017:153). Thus, one of the earliest economists, LC Gray, identified the need to account for the exhaustibility of natural resources and the implications of this on optimal extraction policies, particularly on mines that are facing constant prices (Slade, 1988).

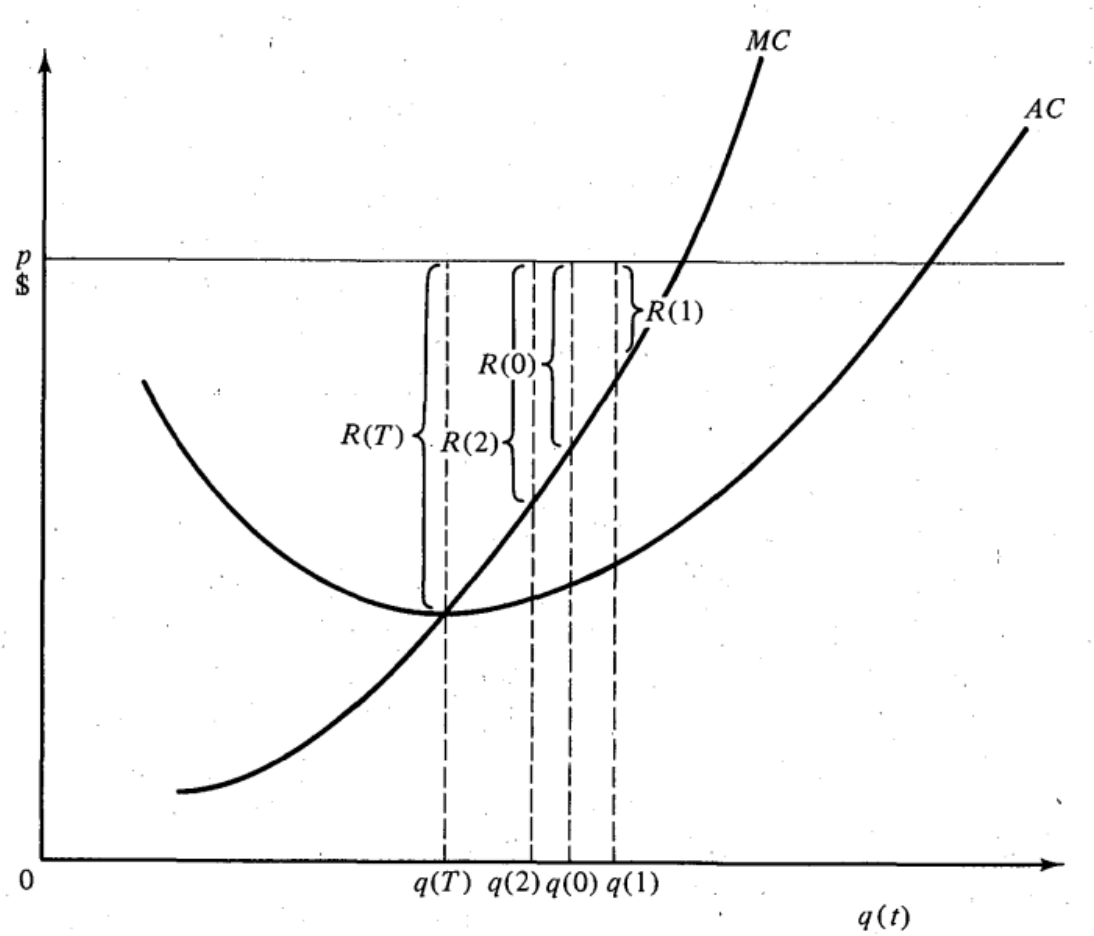
2.3.2 Extraction of a mine facing constant prices

In this model, Gray explored the decisions that small miners faced regarding how much ore to extract and the duration of the extraction period (Hartwick *et al.,* 1986). As such, to address the problem, Gray made several assumptions. The first assumption is when mineral prices would remain constant throughout the mine's lifetime (Sahu, 2018). As a result, the mine owner had full knowledge of the exact reserves (stock) available before extraction (Hartwick *et al.,* 1986). Additionally, Gray assumed that the ore quality was consistent with the extraction costs dependent on the material removed (Baidowi *et al.,* 2021).

To gauge the efficient extraction path of a mine, Figure 2.1 illustrates this phenomenon. If the mine will operate for two periods, the mine owner needs to determine the mineral quantity that needs to be extracted today and tomorrow, applying three main conditions:

1. Price = Marginal Cost + Rent in each period (in present value)
2. Rent today = The present value of rent tomorrow
3. Extraction today + extraction tomorrow = Total stock of minerals

Figure 2.1 indicates mineral extraction over two periods with constant prices. Assuming that the mine encompasses a U-shaped average cost curve *(AC)* and an upward-sloping marginal cost curve *(MC)* over an output range, the constant price is indicated as *p*. Therefore, output today is designated as *q (0)* and output tomorrow as *q (T), T* represents the end of mining operation. With the mine intending to operate within two periods, these curves and the total stock of ore will be a unique solution to the extraction issue that satisfies all three conditions mentioned above. The figure below indicates a mine facing constant prices.



Source: Hartwick *et al.,* 1986

Analysis of Figure 2.1 indicates that the mine owner must choose an initial output level where marginal cost plus the rent is equal to price (*p= MC + rent*). The resource rent at this output level *q (0)* is *R (0),* indicating condition 1, the difference between marginal cost *(MC)* and price *(p).* Following the assumption of two periods employed. In the second period, *q (T),* will have to be equivalent to the extraction and rent will be devised as *R (T).* Condition 2 must then follow that *R (0) = R (T)/(1+r),* where *r* is the, 'market' interest rate, the rate of any return of an alternative asset. Notably, if rents did not increase at the same rate as the interest, extraction would likely not occur in both periods. Furthermore, if the rents rose more slowly than the anticipated interest rate, most of the stock would limit extraction to the first period.

Conversely, if rents rose faster than the interest rate, the miner would defer all extractions to the final period. Thus, holding onto ore underground exceeds the return on alternative investments, making unextracted ore more valuable. Additionally, unless rental value exactly matches the interest rate, extraction will be maximised at a faster pace and should be deferred

as long as possible. To satisfy this occurrence, current (today) and future (tomorrow) output must sum *q (0) + q (T) = S (mineral stock reserves)* – Condition 3. Therefore, for a given *S, r* (interest rate) and *p* (price), there should be a unique level of initial output level that satisfies all three conditions (Hartwick *et al.,* 1986).

To verify the uniqueness of the optimal output level, *q (0),* consider a hypothetical scenario where the mine owner selects an initial output greater than *q (0)*, assuming *q (1)*. The corresponding rent, *R (1)*, would be less than the optimal *R (0).* To satisfy the second-period equilibrium condition, it can be expressed as follows, *R (1) = R (2)/ (1+r)*. This would occur at *q (2)*. While the mine owner would have met two of the three necessary conditions conversely, it violates condition 3. Thus, the sum of *q (1) + q (2)* must exceed *S,* since they both exceed the previously chosen outputs. Such an extraction plan is impossible to attain, simply because the mine owner cannot extract more than what is existing.

Alternatively, if the sum of *q (0) + q (T)* is less than *S*, unused underground reserves would be in possession of the mine manager, which leads to forgone revenue on the unextracted ore. On the contrary, a slightly higher extraction rate would yield more profits, and may be extended to multiple operational periods, with all three conditions satisfying need. Additionally, the point at which the mine will cease operation, depicted by the length of *T*, can also be determined. With Reference to Figure 2.2, it is not surprising that *q (T)* intersects where *MC = AC*. This point represents terminal condition regarding the non-renewable resource extraction problem. This point has a clear economic interpretation, considering any output level to the right or to the left of this point.

2.3.3 Profit Maximisation for the Mine

Profit maximisation entails generating large revenues compared to the production costs (da Gama, 2013:350). Additionally, there is a sequence of revenues less costs for each period, since the depletion of resource stock differs annually (Stimson *et al.,* 2023). For instance, profit in the eighth year would not be comparable to profit in year 11, since the nominal values would differ at any given time. The conditions discussed regarding a mine facing constant prices will also hold in a profit maximisation model. As such, associating a profit maximisation model for the extraction of resources in a competitive market, with the intention to achieve a profitable extraction rate with sufficient cash flow for a seamless operation renders critical discussions to the Hotelling's Rule (Petrov & Tanev, 2015:193; Sahu, 2018).

2.3.4 The Hotelling Rule

Harold Hotelling, an American economist, was one of the first persons to determine several implications of finite reserves regarding consumption and prices under an optimal extraction strategy (Mishra *et al,* 2023). Hotelling stated that the owner of natural resources is indifferent between leaving the natural resources in the ground and extracting them when marginal rents grow at the market interest rate (Cunha & Missemer, 2020).

The rationale is that if non-renewable resources' return on investment (ROI) is lower, the resource owner may choose to extract the resource and reinvest the rents into lucrative investments (Sawada & Managi, 2014:6). Alternatively, if the return is higher, the resource owner will not extract the resources underground since it appreciates faster than other investments (Sahin *et al.,* 2024). Simply put, the resources will not be extracted unless the rate of return on extraction exceeds the interest rate (Slade & Thille, 2006:235). Notably, Hotelling noted that this precedence influences a monopolistic domain of profits from production (Cohen, 2023).

In other words, the Hotelling's rule suggests that the profit maximising mine owner, in perfect competition, will extract minerals at a rate where the price of the extracted minerals rises at the same pace as the market interest rate between two consecutive periods (Cohen, 2023). To explain this, the law of demand can be used. The classical law of demand states that an increase in the price of a commodity will result in a decrease in the quantity demanded; basically, the higher the price, the lower the demand (Ning *et al.,* 2018:184).

Thus, the law of demand results from the diminishing marginal utility (Ellerbrock, 2017). As such, consumers will utilise the first units of an economic good that is produced to fulfil the most urgent needs and with a surplus of units available, their marginal utility will decline (Mohanty *et al.,* 2024). Likewise, with non-renewable resources, the price must rise in the future to lower the demand, allowing resource extraction at a more sustainable rate (Mancini & Nuss, 2020).

For a downward-sloping demand curve, the monopoly producer can only increase the price by decreasing the production levels (Bergman, 2020). Therefore, Hotelling's rule means that if the producer decreases production at a rate that makes marginal profit change by interest rate, total profit from the resource will be maximised (Kharroubi & Smets, 2024). If the production level

is altered one way or the other, the total profit will be less than the maximum (Greenlaw & Shapiro- Ilan, 2018). Hotelling's rule, commonly referred to as the r-percent rate, is paraphrased as the price must increase by *r* percent, where *r* refers to the interest rate (Dixon, 2012).

Hotelling's rule could also be understood from an opportunity cost point of view (Cunha & Missemer, 2020). Undoubtedly, a mining company that exploits non-renewable resources incurs regular production costs and with each unit of output, diminishes the number of natural resources available for extraction as well as future sales and revenue (Puspita *et al.,* 2023:357). Thus, instead of receiving monetary inflows today, the company forgoes these in favour of future gains (Shah *et al.,* 2022). From a financial angle, this opportunity cost comes to the net present value (NPV) of future profits to be generated if the corresponding mineral resources are kept intact (Otto *et al.,* 2007:50).

It should be noted that the responsibility for naming Hotelling's observation as a rule falls on Robert Solow, who was the first economist to use the term Hotelling's rule in a lecture soon after the passing of Hotelling in 1973 (Solow, 1974:258). Solow does point out that Hotelling's concept is not necessarily a rule in the relevant interpretation, since it does not order anything (Livernois, 2009). Hotelling's concept is a description of what a far- and perfectly-sighted competitive market would do under simple conditions (Grainger, 2023). The term, Hotelling's rule, emerges in several scientific works.

In summary, Hotelling's rule states that the price net of marginal cost of a non-renewable resource must rise at the rate of interest that maximises the resource rents' net present value (Grainger, 2023). Hence, the basic message of Hotelling's rule is to ensure that the profitable extraction path of a non-renewable resource, both economically and socially, is one in which, the price trajectory of the resource aligns with the prevailing interest rate (Okullo *et al.,* 2017). This is done to ensure optimal extraction over time, thereby offsetting the inherent limitations of the resource's exhaustibility and promoting sustainable management practices in non-renewable resource markets (Livernois, 2009). Furthermore, Hotelling's rule is deemed a necessary efficiency condition that ought to be satisfied by any optimal extraction programme for a non-renewable resource (Cunha & Missemer, 2020). The extraction programme within a competitive market will, under several ideal conditions, be socially optimal (Grainger, 2023). Thus, an extraction path that is not socially optimal disadvantages the interests of societies,

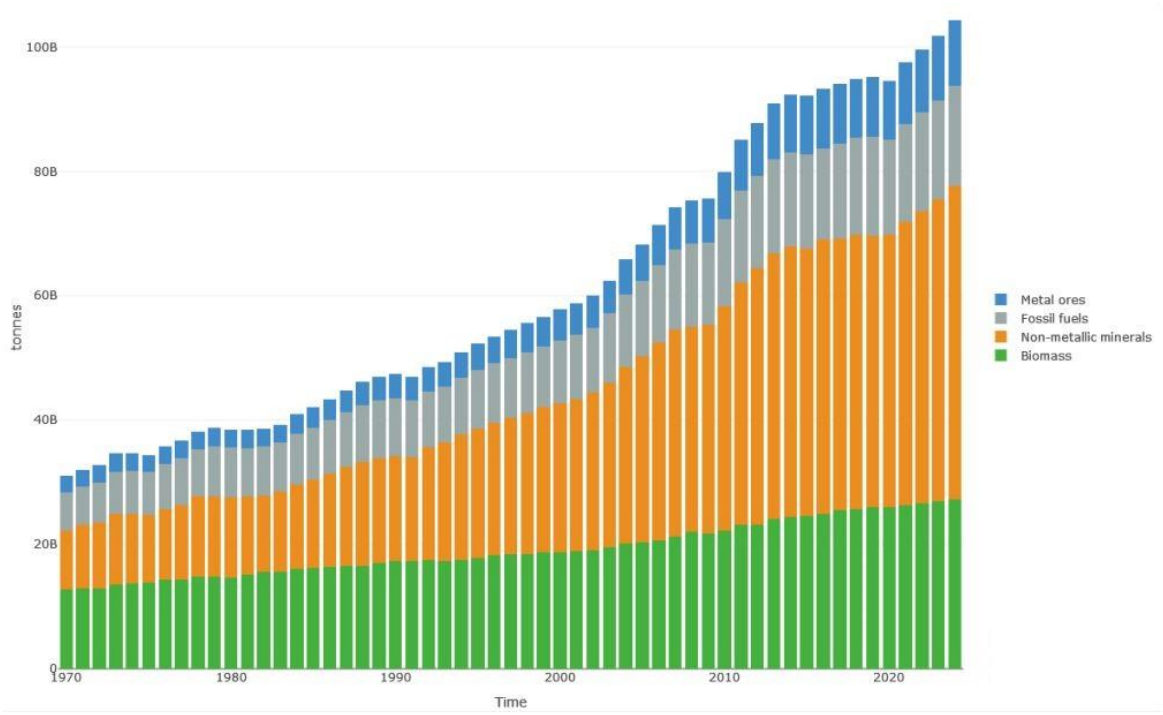
thereby delaying sustainable development (Cunha & Missemer, 2020). The mineral case is discussed in the next section.

2.4 MINERAL CASE

Mining began as a primitive human activity but has since evolved into a highly complex industry with strengthened economic development associations (Alaoma & Voulvoulis, 2018:78). Thus, the mining industry has benefitted humankind for over 1000 years (Carvalho, 2017). As such, natural resources that have been mined and utilised by humans have always prioritised the development of societies and the economy (Fayiah *et al.,* 2020). Max Planck, a German physicist further points out that, 'Mining is not everything; yet, without mining everything is nothing' (Dubiński, 2023). As a result, several industries, both in the past and today, owe their development and amelioration to the development of mining (Sun *et al.,* 2023:461).

The goal of contemporary mining activities is to extract and utilise exhaustible natural resources in a more responsible, sustainable and environment-friendly way (Pavloudakis *et al.,* 2024). These resources are used to satisfy various societal needs and to further economic development (Mudd, 2020). Other needs include energy, telecommunications, infrastructure, transport vehicles, electronics and agriculture (Carvalho, 2017:61). Recently, mineral resources' global extraction has increased significantly, raising concerns regarding long-term sustainability of mining practices and their impact on the environment (Yankovskaya & Kukushkin, 2021).

This growth has spanned from 1970 to 2020. In 1970, the metal ores global extraction was approximately 30 billion tonnes, while in 2010 it had reached 82 billion tonnes, thus increasing by 2.7 times (Carvalho, 2017). Furthermore, the global resource extraction to date, accounts for an estimated 107 billion tonnes per year, which is expected to increase to a further 170 billion tonnes per year by 2050 (Rizos *et al.,* 2018). Figure 2.2 below indicates the global resource extraction of various mineral groups.



Source: Rizos *et al.,* (2018)

The diagram above indicates exponential growth of global resource extraction in each of the mineral resource groups (Rizos *et al.,* 2018). The largest growth was observed in non-metallic mineral resources; conversely, the slowest growth rate being observed in the metal ores resource group (Maus *et al.,* 2020:289). Notably, this rapid growth is driven by economic growth, industrialisation and technological advancements (Ranjan *et al.,* 2021).

Mineral resources are categorised as either, metal ores, fossil fuels, non-metallic or biomass (Graedel *et al.,* 2018:181). The table below classifies and defines these mineral resources.

Table 2.1: Mineral Resources

Mineral Resources	Clarification
Metal Ores	Metal ores are concentrated into the earth's crust or are deemed 'non-precious' metals and must be processed to extract minerals of interest (Hofstra & Kreiner, 2020). Platinum, palladium and rhodium are examples of metal ores.
Fossil Fuels	Fossil fuels are formed from decomposed animals and plants (oil, coal, natural gas). These decomposed remains of ancient plants and animals are in the earth's crust and encompass hydrogen and carbon that are burnt for energy (Yadav *et al.,* 2022).
Non-metallic minerals	Non-metallic minerals are any forms of material, both natural and synthetic, that do not contain elements of metals (Luckeneder *et al.,* 2021). Plastics, fibre, ceramics and rubber are examples of non-metallic minerals (Graedel *et al.,* 2018:181).

Biomass	Biomass is renewable organic material that comes from living animals and plants, and contains energy derived from the sun, with plants absorbing the energy through photosynthesis (Garba, 2021; Irmak, 2017:202).

Source: Author's construction

Associating sustainable development to mineral resources is that modern humans who have access to these resources are overlook the fact that non-renewable resources are depleting (Careddu *et al.,* 2018:2). Furthermore, this is a resultant of the fast-rising demand for numerous mineral resources (Senk *et al.,* 2012). This growth in demand augments the pressure on the available reserves, which accelerates the depletion pace of these resources (Petterson & Tawake 2016:459). This is further pronounced within the energy industries in several countries, including South Africa, where energy security has now become a primary concern (Broadhurst *et al.,* 2015:130).

The demand for mineral resources has compounded, thus numerous global discussions regarding raw materials have emerged (Careddu *et al.,* 2018). Securing mineral resources gravitates towards a broad range of ESG, geopolitical and technological implications (Charles *et al.,* 2023). On top of that, evaluating security issues of raw materials, the availability and affordability as well as the uneven geographical distribution terms must be considered (Hauff, 2023). For the most part, this phenomenon connotes access to a specific set of mineral resources, specifically those often sought after the market is limited; therefore, eliciting a position of privilege for certain countries (Careddu *et al.,* 2018).

Notably, the problem of concern is access to raw materials, ensuring a secure supply of these raw materials and the 'sustainability of raw materials' and lastly, any socio-economic and environmental implications of resource acquisition and extraction (Petterson & Tawake, 2016). This propels less-affluent countries that lack the capacity to acquire, develop and utilise their raw materials to compete with other more affluent countries that have a strong grip on the global raw material trade (Jones *et al.,* 2020), subsequently placing these poor countries on the margin of economic development (Jones *et al.,* 2020; Careddu *et al.,* 2018).

With the theory of mining, extraction of a mine facing constant prices, profit maximisation for the mine and the Hotelling's rule discussed in Section 2.3, followed by the mineral case in current section, the theory suggests that the price of a non-renewable resource should rise at a rate equal to the rate of interest, net of extraction costs, to maximise the present value of the

resource over time (Hotelling's Rule) (Huppertz *et al.,* 2019). Essentially, Hotelling's Rule clashes with the sustainable development principle of intergenerational equity (Khabarov *et al.,* 2023). Thus, if a mine extracts minerals solely for present profit maximisation, the future generation might be left with depleted resources. On the other hand, abstaining from extracting minerals will benefit future generations, but it deprives the present generation of the necessary resources.

Keeping the Hotelling's rule dilemma in mind, the Hartwick rule provides a possible solution (Hartwick *et al.,* 1985). As such, the rule proposes reinvesting all the rents earned from resource extraction into other forms of capital, such as renewable energy, infrastructure or education (Hoogmartens *et al.,* 2017:99). Simply put, the Hartwick rule attempts to balance the needs of both the present and future generations by maintaining overall wealth, even as the composition of that wealth shifts from natural resources to other forms of capital (Seal & Piatak, 2017:603). The next section will outline the Hartwick rule.

2.5 HARTWICK RULE

Hartwick's rule was developed in 1977 for a production economy where consumption at any given time *t* relies not only on the extraction of natural capital but also considers the stock of man-made capital available at time, *t* (Asheim *et al.,* 2023). Furthermore, since the Hotelling's rule is a local efficiency condition, a zero value of the total net investment will derive constant consumption rates over time (Hartwick, 1977). Notably, this result was at the heart of what is now referred to as Hartwick's rule.

In essence, the rule states that resource rents generated from depleting natural resources should be reinvested in man-made capital to ensure a sustainable economic future (Asheim *et al.,* 2023). Investments in man-made capital, such as infrastructure, technology and machinery, have long been the primary focus of economic development strategies. However, a growing body of research suggests that investing in natural capital and the stocks of natural resources is also crucial for sustainable development (Figge *et al.,* 2018:297).

Accordingly, policymakers and organisations must acknowledge the essential function of natural capital in fostering human welfare and economic growth (Basheer *et al.,* 2022). The simple Hartwick rule encompasses, 'a sufficient condition for constant consumption (or utility) in a closed economy with a constant population and stationary technological measures' (Franco

et al., 2019). As such, the Harwick rule highlights the reinvestment of all rents stemming from non-renewable resources (Singh *et al.,* 2023). Furthermore, some authors indicate the relevance of the Hartwick rule in an open economy, where reproducible capital is defined to include foreign assets (Asheim *et al.,* 2023).

In addition, the Hartwick rule was developed for a generic class of models by Dixon (2012). Furthermore, regarding consumption, a viable economy is endowed with two sets of stocks, a stock of exhaustible non-renewable resources and stocks of man-made capitals. The Hartwick rule means that if the accumulation of man-made capital remains at a superior sustainable level, the rule is considered having been applied (Hoosain *et al.,* 2023:115). To this end, the Hartwick rule favours sustainability in exhaustible-resource economies, inferring a constant level of consumption, which could be sustained if the value of net investment equals the value of rents on extracted resources at each point in time (Hamilton *et al.,* 2006:316).

Up until this point, the study has established that the Hartwick rule is a framework for sustainable natural resource management (Asheim *et al.,* 2023). Therefore, it encompasses various approaches according to the strictness of underlying assumptions. These are generally categorised from weak versions based on neoclassical economic theory to much stronger versions that challenge neoclassical assertions, particularly regarding the relationship between man-made and natural capital, and come from a much more ecologically based position (Friederich & Symons, 2022).

To begin, ‘weak sustainability’ theory allows depleted natural capital to be replaced with human-made capital like infrastructure and technology, based on the principle of perfect substitutability (Hansen, 2019). The second theory, ‘strong sustainability’, maintains little or no substitution of natural and physical capital (Figuières *et al.,* 2010). The last theory, ‘very strong sustainability', is based on stringent ecological approaches to development (Figuières *et al.,* 2010). The latter two theories are almost impossible to achieve in practice; hence, the analysis here will focus on weak sustainability theory and the Hartwick rule.

As such, the weak, neoclassical based sustainability theory is consistent with the Hartwick rule, which states that the value of net investments (the difference between the value of capital accumulation and the value of natural resource depletion) should be non-negative over time (Bretschger, 2017). Simply put, the objective of weak sustainability is first, to maintain non-declining utility of human welfare over time; second, to combine efficiency and equity

principles within development (Sato *et al.,* 2002). As such, this section will mathematically prove, under various assumptions, Hotelling's rule and its relationship with the Hartwick rule, considering weak sustainability.

Assumptions:

1. Welfare $W = f(U)$ where welfare serves as a function of utility.
    - $U = f(C)$ Utility is constant over consumption; hence it serves as a function.
    - $C = f(Y)$ Consumption is a function of income, and lastly,
    - $Y = f(K)$ Income is a function of capital stock and resource stock.
2. $K = K_M + K_N$, where KM =man-made capital and KN =Natural Capital stock.
    - K is characterised as homogenous; as a result, K_M and K_N are perfect substitutes.
    - As such, the same amount of welfare (income) can be generated and maintained by either K_M or K_N
    - Full employment together with optimum allocation of all resources,
    - To achieve inter-generational equity
    - Techno-centric – technology will find solutions.

Considering these, the Hartwick rule maintains welfare and consumption over time, with the net value of investments being negative (Cairns *et al.*, 2019). Furthermore, it can be shown mathematically that to maintain a constant level of consumption over time, the value of net investments must equal the value of resource extraction (Asheim *et al.,* 2021). In addition to the above assumptions:

- The objective is the sustain the present levels of Y, C and Welfare over time, in the face of depletion with respect to non-renewable resources, thereby achieving inter-generational equity.
- The model:

$$Y = f(K) \quad (1)$$

Or

$$Y = f(K_M, K_N) \quad (2)$$

- As Y↑, K_M increases, K_N is getting depleted.
- As such, to maintain the same levels of income, K should always be kept constant.
- Therefore, since it is assumed the K_M is a substitute for K_N
- K_M, therefore, should increase at the same rate that K_N decreases.
- Then total K will remain constant,
- If total K is constant, Y will also remain
- Lastly, then C and welfare will also remain constant.

In essence, the Hartwick rule amplifies 'weak sustainability' by asserting that the aggregate stock of capital can be held constant by reinvesting all Hotelling rents from non-renewable resource extraction (K_N) into man-made capital (K_M), to maintain real consumption over time (d'Autume & Schubert, 2008). To this end, the Hartwick rule provides a useful framework for evaluating the sustainability of South Africa's mining industry as it transitions away from reliance on depleting mineral resources. Nevertheless, two perspectives emerge when analysing the negative impacts of mining activities on the surrounding mining communities.

First, legacies of undesirable environmental and social impacts, ranging from geographic displacement of indigenous communities to water, air and land pollution, have emerged (Appiah-Twum & Long, 2023). Secondly, the finite nature of mineral resources globally makes mining incompatible with sustainable development (Segura-Salazar & Tavares, 2018). Thus, mining challenges the broader sustainability agenda and its associated pillars (people, planet, profits) (Girard & Zabsonré, 2021). And, when mining companies and national authorities fail to address these two issues, it is at the cost of the host communities (Appiah-Twum & Long, 2023).

At face value, the phrase 'sustainability and mining' is a paradox (contradiction). This is because once minerals are extracted from the earth (mining), they cannot be renewed (unsustainable) in their natural form (Morvan *et al.,* 2014:372). Notably, minerals are highly valued and have the potential to unlock huge benefits accruing to neighbouring mining communities (Bandyopadhyay & Maiti, 2022). Furthermore, several ways that the mining industry can make this antagonistic relationship a reality for all stakeholders involved, including the host communities, is by (1) embracing a circular economic model, (2) investments in sustainable extraction processes, (3) transition to renewable resources, (4) reinvestment in rents, and lastly, (5) prioritising social sustainability.

Embracing a circular economic model can be achieved in the mining industry through resource efficiency, product life extension and ensuring closed-loop systems (Vargas *et al.,* 2022). Resource efficiency is maximising the use of extracted resources by minimising waste, using technology that will enable the reuse of material during extraction (Rankin, 2016; Tonelli & Marchesi, 2019). Product life cycle entails the design of products (metals) that are durable, repairable and upgradable, and can be used for an extended period of time, which will reduce the demand of new material (Tonelli & Marchesi, 2019:8). In addition, closed-loop systems are designed to ensure that waste from one process is an input for a subsequent one (Jose *et al.,* 2024).

In addition, the mining industry's investment in sustainable extraction via rehabilitation and reclamation of land used, is the second way of bridging the paradox, 'mining and sustainability' (Hauff, 2023). Sustainable extraction involves using progressive rehabilitation processes, where land is restored as it is mined, rather than waiting until mining activities are complete (Pavloudakis *et al.,* 2024). In other words, restoring mined land to its previous state or converting that piece of land for other uses after extraction is complete (Hobbs, 2005).

Transitioning to renewable resources is the third way in which mining companies can be sustainable (Shrivastava & Vidhi, 2020). As such, exploring alternatives, and investing in research and development of 'alternative materials', will reduce the reliance on finite resources (Valero *et al.,* 2021:110). This entails substituting exhaustible resources with renewable alternatives where feasible. Essentially, alternative materials are when mining companies diversify their operations. To this end, mining companies should gradually shift their business models towards industries that depend on renewable resources and offer services that ultimately support a sustainable future (Drusche & Krause, 2021). The fourth point that talks to the investment of rents was thoroughly discussed in Section 2.3.4; nevertheless, it is also an important element in bridging the gap between sustainable development and mining.

Lastly, prioritising social sustainability highlights community engagement, fair labour practices and transparent reporting (Angelakoglou & Gaidajis, 2020). As such, mining companies must actively liaise with local stakeholders to better understand their needs and concerns and co-develop strategies to mitigate any negative social impacts (community engagement) (Rathobei *et al.,* 2024). Furthermore, this entails mining companies' adherence to

and respecting of land rights and involving their host communities in their decision-making processes (Famiyeh, 2017).

Given the above measures to enhance mining sustainability, it is important for mining companies and all relevant stakeholders to remember that achieving comprehensive sustainability requires continuous improvement, strategic collaborations and resilient innovations. In addition, the need for investment in renewable or reproducible capital allows for a more resilient economic model that can withstand the pressures of resource depletion, while ensuring that future generations maintain access to necessary resources and quality of life (Dixit *et al.,* 1980:75; Solow, 1986:141).

2.5.1 Sustainable Development and South Africa: Economic Models

South Africa's mining industry must carefully evaluate how resource extraction today affects future generations, given the finite nature of mineral resources and their long-term sustainability (Elbra, 2013:216). Drawing on the Hartwick rule, the South African mining industry must consider reinvesting resource rents to develop alternative forms of capital, such as human, social, or environmental to sustain economic prosperity as mineral resources become depleted (Girard & Zabsonré, 2021).

South Africa's well-being for current and future generations is influenced by how both natural resources and the environment are managed (Mlambo, 2022:394). Furthermore, the ongoing mineral production processes in South Africa are depleting natural resources at an alarming rate (Barnard & Grobler, 2012; Department of Mineral Resources, 2011; Greiff *et al.,* 2013). Thus, the issues regarding the supposed 'developing' scarcity of South Africa's minerals have become a major concern (Broadhurst *et al.,* 2015:126).

The future of many leading South African mines is a significant concern (Broadhurst *et al.,* 2015:128). Notably, most mining operations have a 'lifetime of mine' of about 30 years, obviously, depending on the depth of extraction and available reserves (Mpanza *et al.,* 2021). Unfortunately, many mineral reserves are nearing depletion (Pavloudakis *et al.,* 2024). Extracting minerals from the earth is an expensive process whether it involves lower-grade ore or a large-scale deep mining (Spanidis *et al.,* 2021). Considering these challenges, the mining industry must adapt to enhance sustainability, focussing on technological innovation and

responsible environmental stewardship to ensure resource longevity while minimising ecological impacts (Calas, 2017).

Additionally, the depth of mineral deposits discovered in South Africa is a complex factor (Broadhurst *et al.,* 2015). As such, the closure of mining operations is accelerating, raising concerns about the long-term viability of mining operations (Hilson, 2001; Broadhurst *et al.,* 2015). This emphasises the need for the industry to implement sustainable practices that align with environmental regulations and societal expectations (Misani, 2010:734). For the most part, several mines have already exhausted their mineral deposits and closed, significantly impacting surrounding communities and the environment (Zvarivadza, 2018). For instance, the Savuka, Tau Tona and Ergo gold mines have all shut down in recent years due to the depletion of their reserves (Mpanza *et al.,* 2021). Additionally, the top tier South African gold mine, Harmony Gold, has closed numerous shafts in the last few decades (Ruffin, 2010:577).

In 2009, Harmony Gold closed several shafts in the Mpumalanga and Free State provinces, resulting in the retrenchment of hundreds of employees (Ruffin, 2010:577). What is more, many mines owned by large mining companies have less than 10 years of continuous production, with a significant portion of their reserves in the form of mine dumps (Mpanza *et al.,* 2021). Given the reality of resource depletion, it is important to note, that South Africa's mining industry may cease to exist (Molopyane, 2019). This raises an important question: Should non-renewable minerals be extracted today or be withheld for future? With the dilemma in place, discussions pertaining to the balancing effect of sustainable development within the mining industry is important.

2.6 BALANCING SUSTAINABLE DEVELOPMENT AND THE MINING INDUSTRY

Sustainable development and mining often seem at odds, yet they must be reconciled for a future that is environmentally and socially responsible and economically prosperous (Gorman & Dzombak, 2018). The mining industry is critical for any nation's economic growth, especially in emerging economies (Basu & Mishra, 2023:871). Furthermore, this industry provides essential resources needed by other industries (energy, manufacturing and construction) (Segura-Salazar & Tavares, 2018). However, the mining industry faces increasing challenges, such as fluctuating commodity prices, social responsibility, environmental concerns alongside regulatory compliance (Yu *et al.,* 2024). These challenges relate to at least one of the sustainable development indicators (Pouresmaieli *et al.,* 2024).

For the most part, sustainable development merely ensures that resources are effectively used for the present and future generations. As such, development is sustainable when it safe-guards renewable (air, +soil and water) and non-renewable finite resources (coal, natural gas, minerals, oil) (Mulyadi *et al.,* 2024:18). Furthermore, a critical sustainable development principle is preserving natural resources so that future generations can meet their needs and, most importantly, thrive, at least to the same extent as the current generation (Barbier & Burgess, 2017). Moreover, sustainable development aims to fulfil basic human needs, improving living standards, enhancing ecosystems as well as forging a path towards a prosperous and secured future (Pouresmaieli *et al.,* 2024).

From the mining industry's perspective, pursuing sustainable development is a challenge and requires changes in corporate governance and strategic planning to adequately address the three sustainability elements – people, profits, and planet (Clausen & Sörensen, 2022:785). This change, particularly concerning the use of non-renewable resource aligns with the Hartwick rule. Essentially, the Hartwick rule provides policy guidance for achieving sustainable growth and development in economies that rely on exhaustible resources (Yu *et al.,* 2024). Notably, sustainability at an economic-wide level is basically equated to the increasing real wealth (Xu *et al.,* 2012).

In addition, over the past few decades, environmental degradation and natural resource exploitation have increased rapidly (Nti *et al.,* 2024). This is due to human activities as well as mining, which destroys the environment for socio-economic development (Robinson; 2004). Mining is critical to South Africa's GDP, contributing about 202 billion Rands (around 11.18 billion U.S. dollars) annually, roughly one-third, to South Africa's economy (Statista, 2024). However, the mining industry's GDP growth rate has followed a declining trend due to issues such as illegal mining activities, fluctuating commodity prices as well as deteriorating infrastructure (Humphreys, 2020:115). Nevertheless, in 2023 alone, South Africa's mining industry employed approximately 500 000, with the platinum group metals (PGMs) being the largest employer, accounting for 38 percent of the total (Statista, 2024).

Moreover, while Platinum group metals generate 57 percent of the accumulated mining revenue and provide high employment in South Africa. The industry suffered a detrimental decline in the last quarter of 2023, as well as the first two quarters in 2024 (Kamata, 2023; Statista, 2024). On the other hand, gold profits increased by 16.5 percent from 2022 (Statista,

2024). As such, gold is positioned as a strong, resilient and trusted asset (Hartmann *et al.,* 2024). This is evidenced through the South African group, Gold Fields, with a market capitalisation of 12.4 billion US Dollars (Statista, 2024). Hence, the mining industry is instrumental in facilitating access to global markets and achieving poverty alleviation (Mencho, 2022). In addition, mining revenue supports several social upliftment agendas in healthcare, housing and schooling through their corporate social responsibility programmes (Yu *et al.,* 2024). Nevertheless, the bottom-line is that mining involves extracting non-renewable resources from the earth, which is unsustainable (Pons *et al.,* 2021).

Hence, there is an urgency to balance sustainable development objectives while mitigating trade-offs (Komnitsas, 2020:79). Additionally, the environmental and social impacts of mining are of major concern, particularly where communities and miners disagree on sustainable development issues (Ololade & Annegarn, 2013:568). Simply put, mining can harm the environment both in the short and long-term (Chukwuma *et al.,* 2020:770). Historic mining operations have left South Africa with a complex economic, environmental and social legacy (Ololade & Annegarn, 2013). Therefore, sustainable development in mining, requires a comprehensive approach that addresses the environmental aspects, and social and economic factors to achieve a sustainable solution (Segura-Salazar & Tavares, 2018). Before the 2002 Mineral Act, mining companies in the country severely damaged the environment by using reckless mining methods and abandoning exhausted mines without any proper rehabilitation efforts (Ganatsas *et al.,* 2021).

There are several hazardous activities related to mining, including managing tailing facilities, air and noise pollution, dewatering underground operations, water scarcity, acid mine drainage, soil and water contamination, biodiversity loss and ecosystem distortions (Sarathchandra *et al.,* 2023). Section 1 of the National Environmental Management Act of 1998 (NEMA) and the Mineral and Petroleum Resource Development Act of 2002 (MPRDA) (18), define 'environment' as, 'the surroundings within which humans exist, made up of (i) micro-organisms, plant and animal life; (ii) the land, water and the atmosphere of the earth; (iii) the relationship amongst those as well as a combination; and lastly, (iv) the physical, chemical, aesthetic and cultural properties and conditions that influence human health and well-being' (Maddala *et al.,* 2021).

The Beyond Petroleum Group (2004) defines environment as 'all conditions, elements and influences affecting human life and habits'. This definition confirms that the environment no only includes natural resources andecology, but also considers the social and cultural environment in which human beings live (Prasetiyo & Asnawi, 2025). Thus, the definitions by NEMA, MPRDA and BP align with the multi-dimensional aspects of sustainable development (social, environmental and economic) (Mishra *et al.*, 2023). As such, sustainable development means using resources wisely to ensure their availability for future generations while balancing environmental, social and economic needs (Raborar & Recio, 2020:50). Although the concept was formally introduced in the 1987 Brundtland Commission report, it is not a novel concept and is seen as unattainable, given mining's destructive nature (Spiliotopoulou & Roseland, 2022:177). Therefore, mining companies should adopt strategies that demonstrate their responsibility to the environment, society and the economy (Nti *et al.,* 2020).

Furthermore, sustainable development in the mining industry can be achieved through strong governance, including policies and strategies that regulate mining's environmental impact (Feris, 2010:73). Section 24(b) of the 1996 Constitution requires the State to manage trade-offs, by establishing an environmental governance framework that safeguards the environment, prevents pollution and ensures justifiable socio-economic development (Segura-Salazar & Tavares, 2018). Additionally, the 1998 NEMA Act governs the environmental regulation, particularly, environmental impact assessments and management plans for mining development. Since the ratification of these acts, particularly the Constitution, awareness of mining's effects on socio-economic and biophysical environments has increased.

For this reason, post-constitutional ratifications show that more awareness led to mining and environmental policies and acts being enacted, to address the challenges posed by the historical legacies of the mining industry (Le Roux, 2012). To this end, South Africa is considered a country with relatively innovative environmental laws; however, these laws have inherent flaws due to their fragmented nature, and lack of coordination and enforcement thereof (Khavhagali *et al.,* 2023).

Regardless of the mining industry, sustainable development means, 'meeting current needs without compromising future generations as well as pursing economic growth, environmental protection and promoting social inclusion'. Although, no disputes have arisen regarding the three dimensions, measuring their progress is challenging (Zamroni *et al.,* 2022). Hence, the

UN established the 2030 Agenda (17-SDGs), specifically for measuring progress pertaining to efforts taken to end poverty, fight inequalities and tackle climate change, while ensuring that no one is left behind. The next section will discuss the SDGs.

2.7 THE SUSTAINABLE DEVELOPMENT GOALS

In 2015, the UN General Assembly adopted the 2030 Agenda for Sustainable Development, a framework intended to shape public policies and inspire global participation in sustainable development (Biermann *et al.,* 2022:795). Notably, although the SDGs were officially established in 2015, their roots draw back to the 1980s, a period marked by deep-levelled inequalities, which is still prevalent today between the rich and the poor (Dikshit & Pandey, 2021; Dukas, 2021:1). Furthermore, the extensive effort involved in formulating these goals cannot be overstated with collaborations evident amongst several entities, such as international organisations, national governments and the private industry (Hoosain *et al.,* 2020). Notably, these entities further aligned their policies and strategies to the SDGs (Kusuma & Kusuma, 2017).

Since their inception, the SDGs will have spanned over 32-years by 2024, expanding the scope of various global developmental efforts (SDG Indicators, 2024). As such, numerous summits, assemblies, conferences and initiatives were hosted by both developing and developed countries to cement these global goals, aiming for full implementation by 2030 (Gayatri *et al.,* 2023). The latter events addressed global development problems and sought to provide an enabling environment for all countries, particularly developing countries, to play a major global development role (Yu *et al.,*2020: 2). They congregated a diverse range of stakeholders, which has been instrumental in shaping the SDGs, ensuring their impact and relevance to the global challenges (Dikshit & Pandey, 2021; Hoosain *et al.,* 2020).

To begin, the groundwork was established at the Brazil Earth Summit in Rio de Janeiro in June 1992. This summit advanced the Brundtland Commission's definition of sustainable development from 1987 (Ávila-Gutiérrez *et al.,* 2022). Next, was the Millennium Declaration in New York in the United States in 2000, which led to the adoption of the eight MDGs (Lencucha *et al.,* 2023). In 2002, the Johannesburg Declaration on sustainable development in South Africa then solidified the global commitment to sustainable development (Scharlemann *et al.,* 2020).

Finally, the commitment was clinched at the UN conference on sustainable development (Rio+20) in Rio de Janeiro, 2012, where global goals were called to address pressing global challenges (Biermann *et al*., 2022). This conference also coined the phrase, 'The future we want', and ultimately, gave birth to the SDGs (de la Torre & Young, 2020:1). In 2013, the UN convened Heads of State to formally propose a draft review of the SDGs. To this end, these discussions led to the adoption of the 2030 Agenda for sustainable development, which was hosted in New York, in 2015, encompassing 17 SDGs (United Nations Department of Economic and Social Affairs, 2025).

The 2030 Agenda aims to strengthen partnerships and promote global prosperity and peace through sustainable development (Rooi, 2020:48). More than ever, in a world where pandemics and wars reveal weaknesses in global socio-economic systems, the SDGs should be amplified and well-executed (Dikshit & Pandey, 2021; D'Adamo *et al.,* 2022:1). Both developing and developed countries need to expediate their actions through strong global partnerships (Edmark & Persson, 2021).

The overarching theme of the SDGs is to ensure that 'no one is left behind' and to address the needs of the most vulnerable in society (Gutiérrez *et al.,* 2022; World Health Organization, 2024). This theme is a broad and far-reaching vision, since it is encompassing a wide variety of social issues from hunger and poverty, poor education and weak health systems to inequality and climate change (Bhandari, 2024). Therefore, it is crucial that the vision is translated into concrete sustainable development objectives, between profits, people and the planet (Dikshit & Pandey, 2021). To address all the sustainable development objectives, the SDGs encompass 17 goals, 169 implementation and outcome targets and 231 indicators. Figure 2.3 presents the 17 SDGs.

Source: United Nations (2015)

The SDGs are indivisible, integrated and interdependent, balancing the three sustainable development objectives (Hamid *et al.,* 2021). Thus, the action on one goal could influence another goal (Scharlemann *et al.,* 2020). Conversely, isolated action could negatively impact other goals, compromising the entire Agenda (Alcamo *et al.,* 2020). Notwithstanding, all interventions of these goals must balance the ecological, economic and social sustainability.

In summary, the 17 SDGs, their targets and indicators can be grouped into the following five key objectives, presented in Table 2.2.

Table 2.2: The Sustainable Development Objectives

The 17 Sustainable Development Goals			
Objective	**Relevant SDG**	**Objective Explained**	**Source**
The Planet	SDG-6,7,12,13,14,15	Protection of the planet's natural resources on climate change, biodiversity and sustainable production.	Vuuren *et al.,* 2022
The People	SDG-1,2,3,4,5	Ending poverty and hunger and ensuring everyone has an equal and dignified life.	Ali *et al.,* 2023
Prosperity	SDG-8,9,10,11	Ensuring fulfilling lives for all, in harmony with nature, focussing on economic growth.	Shukla *et al.,* 2023
Peace	SDG-16	Promoting just and peaceful societies.	Shukla *et al.,* 2023
Partnerships	SDG-17	Working together to achieve the 2023 Agenda and build strong global partnerships.	Mir & Singh, 2022

Source: Author's construction

The next section, Section 2.8, will discuss the SDGs in the context of South Africa's mining industry. It will also establish the important relationship between the SDGs and the mining industry.

2.8 THE SUSTAINABLE DEVELOPMENT GOALS AND THE SOUTH AFRICAN MINING INDUSTRY

The relationship between the SDGs and mining is intricate (Segura-Salazar & Tavares, 2018). This is because the mining industry fails to account for the investment that is needed to compensate for their act of depleting non-renewable resources (Solow, 1974). As such, a violation of the Hartwick rule at any given time, will nullify the anticipated result because all future periods may be weighted equally (Karsadi & Aso, 2023:223). Historically, the mining industry has been central to many developing countries' economies, however, at a cost (Frederiksen & Banks, 2023).

Thus, the mining industry's macro growth brings about widely spread micro costs on the local communities (Yakovleva *et al.,* 2017). Indeed, the mining industry worsens many pertinent issues that the SDGs seek to achieve (Columbia Centre on Sustainable Development *et al.,* 2016). Moreover, if not managed properly, this industry will lead to an increasingly unsustainable future for generations to come; for instance, the displacement of indigenous communities, social fragmentations and various health hazards (Frederiksen & Banks, 2023; Jacka, 2018).

Since minerals are important to a low-carbon economy and the transition to renewable energy, the mining industry is positioned at the 'cutting edge' of delivering their sustainable development efforts (Endl *et al.,* 2021). As exemplified by the cobalt, copper and lithium mining industries, without their involvement, it would be difficult, almost impossible, to meet the growing demand for these critical minerals (Peng *et al.,* 2023). Notably, the latter industries are needed to produce batteries, wires, electronic vehicles and other essential electronics (Hilson & Basu, 2003).

Hence, the assurance that the industry can retain the mass supply of these minerals while also minimising negative environmental and social impacts is imperative (Bainton & Holcombe, 2018:468). Furthermore, the mining industry, or at least, a handful of mining companies within the industry, have emerged as leaders in their sustainable development practices (Kramarz & Przybylska, 2021). However, some mining companies have shown minimal effort in their quest of achieving the SDGs (Hirons, 2020:321).

Table 2.3 presents four mining companies that have not meaningfully contributed to the SDGs. Their contribution to the SDGs is limited by issues such as partnership deflections, conventional methodological approaches, lack of evidence or poor reporting suites.

Table 2.3: Mining Cases

Sefamo Mana Mine – Burkina Faso – The Sefamo Mana mine in Burkina Faso, partnered with Windiga Energy to construct a 20Mw solar plant. The challenges lay with the deflections of roles and responsibilities between the Sefamo Mana mine and Windiga Energy. As such, with responsibilities deflected and elements of SDG washing prevalent (Shen *et al.,* 2015).
Newmont – Denver – Newmont mines' silver, copper and gold reported their SDG results, however, using conventional methodological approaches that are no longer relevant (Littleboy *et al.,* 2019; Tost *et al.,* 2018).
Rio Tinto – London – Simply mapping their activities to the SDGs around their three pillars without providing tangible evidence of their impact or progress towards achieving them (Frederiksen & Banks, 2023).
Barrick Gold – Out of their 102-page sustainability report, briefly mentions the SDGs in only two pages (Lauwo & Otusanya, *et al.,* 2014).

Source: Author's construction

In contrast to the cases presented in Table 2.2, some mining companies have integrated the SDGs into their core business strategies by embedding the goals in their policies and environmental assessments (Ivic *et al.,* 2021). Moreover, the SDGs play a central role in evaluating these companies' operational strategies, one such company is AngloGold Ashanti (AngloGold Ashanti Sustainability Report, 2022).

Despite the perceived paradox between, ‘SDGs and mining’, increasing evidence suggests that the mining industry can contribute to the SDGs (Evans *et al.,* 2023). The UN developed the SDG Atlas, which provides an overview of the mining industry's potential relationship with the SDGs (Moomen *et al.,* 2019). Through case studies, the Atlas illustrates how the mining industry can engage with local communities, promote socio-economic development and use innovative technologies for environmental protection, thus supporting the objectives of sustainable development (Nguyễn, 2022). As such, the SDG Atlas is a framework that maps out various relationships between the SDGs and mining (Capello *et al.,* 2021:10). Figure 2.4 below represents the SDG Atlas.

Source: Columbia Centre on Sustainable Development (2020)

Globally, mining companies are incorporating social considerations into their operations (Marimuthu *et al.,* 2021:59). This is because local communities must benefit from mining activities and adequately compensate for any negative impacts experienced (Trocan *et al.,* 2022). Furthermore, these demands stem from a deeper understanding of the society’s needs

and the impacts on the local communities' economy, health, infrastructure, environment and social well-being (Regotunov *et al.,* 2020). As such, South African mining companies are expected to disclose their societal contributions, which is now legally required per their social and labour plan alongside various reporting frameworks.

In addition, the SDGs impacts on South African mining companies differ across the 17 SDGs; while some areas focus on health (SDG-3) and other areas on education (SDG-4) and gender equality (SDG-5). Nonetheless, a study conducted by Mitchell (2025) found that South African mining companies positively impact SDG-8, which concerns decent work. Obviously, this is due to the labour-intensive nature of the mining industry in the country (Khoza-Shangase & Moroe, 2020).

Typically, mining companies achieve the selected SDGs through social investments that empower mining communities (Wanyenze *et al.,* 2023). Amongst other contributions, the SDGs are considered successfully implemented when population displacement is limited, community unrest minimised and health challenges prioritised (Mancini & Sala, 2018). Notably, when associating mining and the 'SDGs contributions', it is essential to consider 'lifetime of mine', which can range from two to 100 years (Yakovleva *et al.,* 2017).

As such, short-lived mining companies may contribute minimally to the SDGs, but still disrupt the mining communities (Endl *et al.,* 2021). In essence, the SDGs are important to South Africa's mining industry, but their implementation depends on the lifespan of a mine (Van der Watt & Marais, 2021). On the other hand, mining companies with extended lifespans are likely to contribute more to the SDGs, specifically SDG-8, leading to more job opportunities (Cole & Broadhurst, 2021).

Beyond the immediate concerns of 'lifetime of mine', contributions to the SDGs will extend beyond the operational period (Yakovleva *et al.,* 2017). Achieving this requires South African mining companies to strengthen partnerships (SDG-17) with the government, civil society organisations and local communities to address the social ills within the mining communities (Sonesson *et al.,* 2016). Moreover, Sub-Saharan Africa's mineral production can address the various social development needs across the entire African continent (Yakovleva *et al.,* 2017). As such, the SDG Atlas (*Figure 2.4*) envisions a significantly broader role for the mining industry in contributing to the SDGs, extending beyond the African continent.

South African PGM mining companies possess negotiating powers and have leverage in leading social policies with the national government (Nkgudi, 2021:19). Their strong negotiating powers with national institutions include the Presidency, this can advocate for sustainable development at that level (Ivic *et al.,* 2021). The table below outlines South Africa's top four PGM mining companies (Mining Technology, 2024) and provides basic data regarding several material issues.

Material issues are factors that have a significant impact on a mining company's ability to operate. Additionally, material issues are important for decision-making, both for the mine and its stakeholders. The material issues per Table 2.4, include latest production figures for the financial year ending 30 June 2023. Notably, although the production figures are not featured in this study, they provide a glance into the size of the PGM mining company (mineral production), which is essential to the mine's existence. Alongside the production figures (ounces – oz), social investment figures (SDG-8), workforce (SDG-8), women in mining (SDG-5), as well as fatalities and fatality-free shifts (SDG-8 and SDG-3) are included.

Table 2.4: South Africa's Top four PGM mining groups

	Top 4 – PGM mining companies (RSA) – Material Issues					
PGM Mining Company	**FY2023 – oz**	**CSI (ZAR)**	**Total Workforce**	**Workforce – Women**	**Fatality-free shifts**	**Fatalities**
Anglo Platinum	3 800 600	806 000 000	90 000	21 022	9 600 000	3
Sibanye-Still Water	1 769 330	253 000 000	82 788	14 240	9 000 000	11
Impala Platinum Holdings	1 620 000	922 000 000	66 027	9 000	10 400 000	13
Northam Platinum Holdings	809 775	1 500 000 000	22 368	4 473	8 000 000	0

Source: Author's construction

Table 2.4 highlighted several material issues for four PGM mining companies, alongside the remaining 10 PGM mining companies included in this study. It becomes evident that these PGM mining companies, together with other institutions, can achieve the SDGs nationally. Furthermore, these SDGs (SDG-1, SDG-2, SDG-3, SDG-4, SDG-5, SDG-8, SDG-10, SDG-11 and SDG-16) are the SDGs that will be measured in this study as adopted by the Minerals Council South Africa's, namely social and relationship capital. Contextually, South Africa's national objectives and guidelines regulate PGM mining companies' adherence to their social responsibilities, thereby promoting the achievement of the SDGs.

Section 2.9 will provide an overview of the Mineral Council of South Africa and the SDGs.

2.9 THE MINERAL COUNCIL AND THE SDGS

This section will discuss the SDGs, that have been adopted by the Minerals council South Africa's social and relationship capital. As such, since the study is not measuring the entire 17 SDGs but will narrow it down to those of the mineral's council (social & relationship capital), the below SDGs, will be acronymically termed SSDG.

Subsection to follow, Subsection 2.9.1 will outline SSDG-1 (no poverty).

2.9.1 SSDG1: End Poverty in all its forms

SSDG-1 aims to 'End poverty in all its forms everywhere'. Poverty is a multifaceted issue; thus, the UN Multidimensional Poverty Index (2023) associates it with various forms of deprivations in education, health and living standards. The MPI's approach to poverty allows policymakers to develop an understanding of the challenges faced by those living in poverty and the root causes thereof (Babu & Srivastava, 2024). The World Bank addresses poverty through its 'attacking poverty' framework, which emphasises expanding opportunities and increasing income (Aguilar & Sumner, 2020; World Bank, 2024). Moreover, this framework explores the heterogeneity of poverty by identifying several vulnerabilities experienced by various clusters within the 'poverty population' (rural poor, disabled, elderly, children and urban poor) (Castaneda *et al.,* 2016).

The integration of SSDG-1 in mining is crucial for addressing poverty and fostering economic resilience within mining communities. As such, mining companies' contribution to achieving SSDG-1 requires them to play pivotal roles beyond their core business operations (Yakovleva *et al.,* 2017). First, companies must ensure they are compensating a fair and accurate share of taxes and royalties (Maier *et al.,* 2014). In many resource-dependent countries, revenue from mining companies constitutes a substantial portion of government income (Investment & Foundation, 2020). However, paying taxes alone is not a sufficient condition for development in mining communities. The developmental impact of taxes ultimately depends on transparent government policies and efficient resource allocation (Kassa, 2021).

Secondly, mining can contribute to SSDG-1 through inclusive employment (Konté & Vincent, 2021). Moreover, poverty reduction through direct employment that is created by mining

operations is amongst the most immediate solution for the surrounding mining communities (Yu *et al.,* 2024). Indirect employment, which is also a prudent avenue can assist in eradicating poverty within mining communities through local and national procurement processes (Trocan *et al.,* 2022). To this end, direct contribution to SSDG-1 by mining companies can also include promoting skills development, supporting non-mining related livelihood options in the community and implementing community development agreements (CDAs) to broaden anti-poverty strategies (ICMM, 2014). The next SSDG to be discussed relates to ending hunger and achieving food security.

2.9.2 SSDG2 – Eliminate hunger, achieve food security, improve nutrition and promote sustainable agriculture

SSDG-2 states, 'End hunger, achieve food security and improved nutrition, and promote sustainable agriculture' (United Nations Statistics Divison, 2025). SSDG-2 highlights the interlinkages of sustainable agriculture, improved nutrition, stable food security and rural transformation. The goal seeks to create a world that is hunger-free, where in 2030, nutritious food is accessible to all individuals (Gil *et al.,* 2019). As such, there has been an alarming global rise in food insecurity and hunger, exacerbated by, amongst other factors, inequalities, climate change, conflict and pandemics (Arora & Mishra, 2022; Schneider *et al.,* 2023).

Synergies where mining and agriculture intersect offer opportunities for achieving global food security and nutrition (Akanmu *et al.,* 2023). In the context of this study, both mining and agriculture must recognise the adverse conditions that mining communities often face, particularly in terms of economic stability and food security. It is important to acknowledge that both these industries rely on water and land resources, which presents the potential for conflicts and shared interests within the local mining community context (Leyton-Flor & Sangha, 2024). These factors should be regularly assessed and considered in development planning.

To contribute to SSDG-2, mining companies could build and maintain trust with local communities by transparently informing them about water management practices. This approach would also support SDG-6 and could be integrated into the company's health, safety, and environmental management system (Leuenberger *et al.,* 2021).

Additionally, the mining industry should design infrastructure with shared benefits for agriculture, as the two industries can collaborate to achieve SSDG-2 (Jose *et al.,* 2024). Another measure to consider is protecting farmland and livestock from dust and contamination from mining activities (Yakovleva *et al.,* 2017), which is particularly relevant given that mining can dispose of toxic materials and chemicals into the air, water, and soil (Hauff, 2023). Finally, mining companies could more directly support programs for addressing childhood hunger and nutrition in partnership with other stakeholders (Kurowski & Huk, 2021)

The next section will discuss two basic aspects of human capital in any economy, health (SSDG-3) and education (SSDG-4); and will further explain in the context of the mining industry.

2.9.3 Human Capital: SSDG-3 – Healthy lives and promoting well-being for all people, and SSDG-4 – Ensure equitable and quality education for all

Health and education are two fundamental human capitals (Todaro & Smith, 2020). Thus, health is important for an individual's well-being, while education is essential for a productive and fulfilling life (Gündüz, 2018). Both these human capital dimensions are important to expand human capabilities, which are central to development (Edewor, 2014:381). Subsequently, education enables individuals in developing countries to adopt modern ideas, technology and innovations fostering self-sustaining growth (Titus, 2020). Additionally, good health is a prerequisite for productivity and a successful educational journey (Strayer & Stoeffler, 2024). Thus, both education and health are important for development and growth, serving as inputs to overall production (Alinian *et al.,* 2022). Their dual-natured role places them at the centre of economic development (Todaro & Smith, 2020). Moreover, investments in these areas yield valuable returns for both the individual and society, as healthier and better-educated populations drive economic growth and improve overall quality of life (Golberstein *et al*., 2012).

SSDG-3 falls within the two fundamental aspects of human capital. SSDG-3 focuses on good health and well-being and is a key element of the global development phenomenon (Fukuda-Parr, 2018). The interconnected and universal nature of the SDGs means that progress towards one goal will likely have a progressive impact towards other goals (Halkos & Gkampoura, 2021). For instance, affordable and clean energy (SDG-7), clean water and sanitation (SDG-6), and gender equality (SDG-5) are all interlinked and contribute to good health and well-

being (SSDG-3). However, SSDG-3, like other goals, can be comprehensively achieved or acted upon by multiple stakeholders, such as governments (local, national, global), NGOs, community leaders and individuals (Wendiro *et al.,* 2019). As such, SSDG-3 will play a dual role of being both an enabler and an outcome of sustainable development, since it promotes the overall well-being and quality of life for individuals and communities (Wanyenze *et al.,* 2023). The associations that SSDG-3 and SSDG-4 lies in how education contributes to several health awareness agendas, and disease prevention within the global community (Al-Kuwari *et al.,* 2021).

'Access to quality education at all levels, regardless of gender, socio-economic status, country of birth, or regional location' is the focal point for SSDG-4 (Kaffenberger & Pritchett, 2020). As such, this commitment entails providing the necessary resources to access education, early childhood development as well as pre-primary education (Coomans, 2022). This goal stems from the MDGs that prioritise universal primary education offered by good elementary schools (Suwoto, 2021).

Achieving SSDG-4 targets suggests that people are more likely empowered to make informed decisions that will, in turn, have a positive impact on other sustainable development elements (economic and environmental) (Pickering, 2023). Thus, access to high quality education enables individuals to develop solutions to address various sustainability-related challenges (Boeren, 2019). Furthermore, SSDG-4 serves as a multiplier for the achievement of other SSDGs (Fuldauer *et al.,* 2022). To this end, educational attainment has proven to be effective in benefitting certain groups in societies such as the youth and individuals with disabilities, particularly from low-income families (Rose, 2019).

Integrating mining with SSDG-3 necessitates a multi-dimensional approach of improving occupational health and safety processes for both the community and the employees (Cole & Broadhurst, 2021). In the context of this study, the focus is on mining companies' contribution to health for the surrounding communities in proximity to the operation. As such, strategies include, among others, improving occupational health and safety systems in the community (Rikhotso *et al.,* 2024). Thus, a sustainable health and safety system will include the monitoring of chronic health impacts, such as respiratory illnesses. Furthermore, wellness campaigns have proven to be effective by addressing HIV/AIDS in mining communities (Arora *et al.,* 2020). In addition, public health infrastructure is important, and several mining companies have worked with several stakeholders in the provision of health infrastructure and resources for

health services (Leuenberger *et al.,* 2021). Diseases such as HIV/AIDS as well as TB are prevalent in the mining communities. This is because mining areas are associated with social issues such as poverty, prostitution and the influx of migrant labour (Cronjé *et al.,* 2013).

Mining companies and their partners, governments and other stakeholders are always working to support and improve SSDG-3 through joint approaches to monitor and respond to health crisis and public health emergencies, and to build resilient health systems in the communities (Hresc *et al.,* 2018). Strategies that have been implemented, particularly in developing countries, include sponsorship of community health programmes, participation in 'planning responses' to local epidemics, as well as the refurbishing or constructing health facilities (Debie *et al.,* 2024)

The link with SSDG-4 is evident, where mining companies are actively educating their local communities about their health, hygiene, and safety. This is accomplished through safety training programs, educational campaigns, and investment in local schools and training centres (Osewe, 2024). Independent of health, mining contributes to quality education stems from the need to advance youth members in the mining communities to attain an educational background and ultimately improve their lives (Baffour-Kyei *et al.,* 2021). Sustainable strategies that have been implemented in the past, with respect to education, include scholarships, skills development, vocational training as well as infrastructure development for educational institutions (Sukmawati & Maryanti, 2021). Moreover, investing in educational programs that promote science, technology, engineering, and mathematics contributes to a more skilled workforce and fosters innovation within mining communities (Hiam-Galvez *et al.,* 2020).

2.9.4 SSDG-5: Achieve gender equality to empower all women and girls

Women and girls everywhere should have equal rights and opportunities and live in a society that is free from discrimination and violence (UN Women, 2024). SSDG-5 concerns gender equality and women empowerment. Among the targets of SSDG-5, is the 'elimination of all forms of violence against all girls and women, notwithstanding trafficking, sexual abuse and discrimination' (Govender *et al.,* 2023). Achieving this goal by 2030 will require urgent action by all to disseminate the root causes of discrimination that still affect women's rights (Biermann *et al.,* 2022). Additionally, SSDG-5 recognises that gender inequality is a pervasive issue that hinders socio-economic development (Klasen, 2018). What is more, SSDG-5 strives

for women to live comfortably and thrive in a prosperous society (Kumaravel *et al.,* 2025). Furthermore, policies that promote gender equality are crucial for achieving this goal (Pandey & Kumar, 2019).

The available theory regarding SSDG-5 and mining mostly relates to investment in the mining workforce and ensuring equal opportunities for women, as well as an analysis of gender ratios within the entire global and national mining workforce (Lesnikov *et al.,* 2023). Nevertheless, meaningful contribution to this SSDG by the mining industry involves proactively recognising and pursuing business opportunities that will specifically benefit women in the mining community (Kansake *et al.,* 2020). Thus, mining companies are challenged to go beyond the scope of indirectly addressing SSDG-8 through SSDG-5, but through other targeted initiatives actively contribute to promoting gender equality, preventing violence against all women, and providing equal opportunities for leadership roles within the industry (Chigbu & Nekhwevha, 2023).

2.9.5 SSDG-8 – Promote long-term, inclusive and sustainable economic growth, full and productive employment and decent work for all

SSDG-8 aims to ‘foster inclusive and sustainable economic growth, full and productive employment and decent work for all’ (United Nations, 2015). This goal distinguishably integrates the environmental, social and economic aspects (Halkos & Gkampoura, 2021). Economically, the goal targets ‘inclusive and sustainable economic growth for all’ (Sohail *et al.,* 2022). Socially, it promotes full and productive employment together with decent work for all’. This includes men, women, young, and persons with disabilities (Llena-Nozal & Murtin 2019). Environmentally, it seeks to decouple economic growth from environmental degradation (Coscieme *et al.,* 2020). Hence, the goal embodies the achievement ofsustainable development through progress in all areas (International Labour Law, 2025).

At the heart of this SSDG, lies the concept of 'decent work' (Subramony & Rosenbaum, 2024). Decent work means that everyone can be employed in a safe workplace offering social protection for families and opportunities for personal and professional development (ILC87, 2023). The International Labour Organization (2025) outlines that decent work entails setting an acceptable wage that ensures a decent standard of living and benefits such as medical aid,

retirement benefits and family leave. Decent work also enables employees to participate in decision-making processes that affect their livelihoods and well-being (Anker *et al.,* 2003).

In the context of mining and SSDG-8, previous studies suggest that mining companies are making progress in providing local community members with employment opportunities (Hauff, 2023). To expand the inclusiveness of direct employment, mining companies often need to invest in skills development that may not be readily available in the surrounding communities (Selmier & Newenham-Kahindi, 2020). This presents an opportunity for mining companies to indirectly contribute to SSDG-4 and SSDG-5 (Cole & Broadhurst, 2021). Although mining generates employment, the number of direct jobs created is frequently small compared to the scale of capital investment (Endl *et al.,* 2019).

The second way mining companies can contribute is through their procurement processes. Integrating this SSDG can drive local economic growth by developing procurement and supplier strategies and supporting the development of small and medium enterprises (Yakovleva *et al.,* 2017). When mining companies make concerted efforts to source goods and services locally, it can stimulate economic activity in the surrounding regions through a multiplier effect (Guerin, 2020). Notably, mining companies operating in emerging and developing economies are under pressure to prioritise local and national procurement to boost economic growth and diversification (Yu *et al.,* 2024).

2.9.6 SSDG-10 – Reduce inequality within and among countries

SSDG-10 is developed to build inclusive societies by addressing various types of inequality (Canelas & Gisselquist, 2018). This includes economic differences, unequal opportunities, access to resources and social inclusion (Negre *et al.,* 2020). As such, equality is important for a peaceful, prosperous, and sustainable society (Dhai, 2020). Typically, economic growth favours the world's wealthiest, leading to vast income gaps and unequal resource distribution (Maphiri *et al.,* 2021). Furthermore, inequality comes in different forms, related to education, health and income, among others (Suarjana, 2024). Notably, income inequality has been at peak levels since the 1980s, with the top 1 percent gaining a significant share of income growth (Dhara & Singh, 2021).

In addition to income inequality, societal groups such as women, children, indigenous peoples, persons with disabilities and minority groups still face discrimination and exclusion (Healy,

2023). This exacerbates inequalities, especially regarding access to several opportunities (Antoninis *et al.,* 2020). Exclusion ranges from corporate decision-making to political participation, education, healthcare and financial services (Chaskin *et al.,* 2012). Concurrently, the challenges underpinned by attaining SSDG-10 require comprehensive strategies (Zhao *et al.,* 2022).

Several mineral-dependent nations struggle with inequality, particularly economic inequality (Bendixen *et al.,* 2021). As such, extensive research exists on assessing the linkages between poverty, income inequality, federal reinvestment of mining revenue, and mining activities, among other factors (Wegenast & Beck, 2020). Economic inequality creates a ripple effect of social inequality, leading to social unrest and the erosion of a mining companies social licence to operate. Since it is the government's responsibility to reduce inequality through policies and redistributive mechanisms, the mining industry can also play an active role in promoting inclusion (Raborar & Recio, 2020).

Affiliating mining with SSDG-10 can be achieved by mining companies by acknowledging that their activities may exacerbate inequality. As a result, mining companies must be sensitive to the nuances of inequality and prioritise it in their sustainable development agenda (Endl *et al.,* 2019). Furthermore, mining companies operate in traditionally agricultural regions and can increase inequality as farming wages are lower and many communities rely on subsistence practices rather than cash economies (Trocan *et al.,* 2022). Another consideration is when mining companies ignore structural inequalities in the local community, which could possibly lead to social unrest (Rauf *et al.,* 2021).

2.9.7 SSDG-11 Make cities and human settlements more inclusive, safe, resilient and sustainable

This SSDG requires inclusive urban planning and investment strategies that prioritise the needs of marginalised populations. These efforts are critical in addressing systemic inequalities in urban settings, especially in slums and for poverty reduction (Kajiita & Kang'ethe, 2024). Furthermore, SSDG-11's economic policies include sustainable infrastructure and environmental resilience, focussing on transportation, housing and climate change (Mir *et al.,* 2024). Hence, integrating sustainability principles into urban development is important to ensure that all citizens, especially vulnerable ones, have access to basic services and opportunities, fostering more inclusive and resilient communities (Shahid & Ahmed, 2022). As

such, ensuring that city developments improve the quality of life for inhabitants is important (Hidalgo, 2014).

Thus, other than SSDG-14 (Life below Water), SSDG-11 is geographically limited while other SDGs are formulated without any geographic specifications (Gupta & Sigdel, 2021). Notably, urban spaces are not isolated islands and, must consider other SDGs to achieve SSDG-11 (Chatterji, 2021); like the building of democratic and peaceful institutions (SSDG-16) and the promotion of renewable energy and sustainable consumption (SDG-12), among others (Krellenberg & Koch, 2021).

The support of SSDG-11 by mining companies should involve the development of relevant local infrastructure in host communities. This process needs to engage various stakeholders in land use and settlement planning, as well as reclaiming mined land for recreational spaces where appropriate (Rathobei *et al.,* 2024). Mining companies should thus be encouraged to adopt life-of-mine planning when developing new infrastructure projects (Ahirwal & Pandey, 2020). This includes consideration of post-closure and rehabilitation strategies and aligning any footprint expansion with anticipated community use (Spanidis *et al.,* 2021). Another valuable contribution would be the development of cultural heritage plans, which give the land meaning beyond its economic value as a source of minerals (Stevenson, 2022).

Regarding mining waste, commodity prices can fluctuate, sometimes rendering previously discarded material economically viable for reprocessing. In such cases, mining companies may opt to mine tailings (Drobe *et al.,* 2021). Tailings management can involve recovering valuable minerals from landfills and upcycling former waste back into the supply chain (Hamraoui *et al.,* 2024).

2.9.8 SSDG-16 Promote peaceful and inclusive societies for sustainable development, ensure equal access to justice and build effective, accountable and inclusive institutions at all levels

In today's rapidly changing world, the significance of SSDG-16 cannot be overstated (Mukombwe *et al.,* 2024). This goal rests on the management of power and governance to bring about peace (Whaites, 2016). As such, SSDG must be understood in the context of achieving other SDGs, which aim, among others, to eradicate poverty and reduce inequality (Biermann *et al.,* 2022). For instance, SSDG-5 (gender equality) is closely linked to SSDG-16, advocating for inclusive institutions and access to justice for women and girls (Mbah & East,

2022). SSDG-16 is considered a novel goal as it has not been implemented before within the confines of the MDGs and the principles of international development (Milton, 2021).

A goal that ties various institutions' roles together is rare, particularly one that aims to achieve peace and justice amongst various global stakeholders (Fukuda-Parr, 2018). Furthermore, the novelty-factor of SSDG-16 is heightened because it is associated with various structures of power and the rule of law (Biermann *et al.,* 2022). As such, SSDG-16 supersedes the basic normative agenda of development and takes a holistic approach of prioritising its implementation and outcome targets (Fukuda-Parr, 2018). Since this goal assumes the central underlying role of institutions, it will undoubtedly place politics at the heart of these institutions (Raborar & Recio, 2020).

Mining companies can strengthen accountable and transparent institutions by rigorously combating mining-related illicit financial flows through increased transparency and disclosure practices (Lesnikov *et al.,* 2023). They can also contribute to peaceful and inclusive societies by addressing grievances between the company and the community through consultation and negotiation (Fraser, 2018). To prevent company-community conflict, continuous engagements with various other stakeholders is essential for responding to early concerns and sharing necessary information (Ryan *et al.,* 2020).

Moreover, mining companies can employ various strategies to promote peaceful societies, such as implementing human rights assessments, respecting free, prior, and informed consent, enhancing transparency, applying national and local CSR guidelines, and promoting the rule of law (Pons *et al.,* 2021).

2.10 SYNOPSIS

The purpose of Chapter 2 was to provide background on the study's theoretical framework aligning with the research aims outlined in Chapter 1. The Chapter discussed the literature on the economics of sustainable development. Furthermore, since the study hinges on mining, non-renewable resource use and Hotelling's rule were then discussed, outlining the theory of mining, the extraction of a mine facing constant prices and the profit maximisation of a mine. Section 2.3 underpinned discussions of the mineral case and outlined key mineral resources (metal ores, fossil fuels, non-metallic minerals and biomass); further associating them with sustainable development. With sustainable development and the Hotelling's rule discussed,

both sections acknowledged that resources will be depleted, underscoring the importance of the reinvestments thereof – the Hartwick rule (Section 2.5).

Furthermore, critical discussions on balancing sustainable development and the mining industry followed in Section 2.6, where it was stated that the relationship between sustainable development and mining is at odds with each other. This laid the groundwork for the sustainable development goals to be discussed in Section 2.7. This narrowed the SDGs to five keys objectives, the planet, the people, prosperity, peace and partnerships. This was followed by sustainable development in the mining industry in Section 2.8. Lastly, the Mineral Council of South Africa and the SDGs were discussed, centering around the SDGs that have been adopted by this study; discussed in Section 2.9.

CHAPTER 3

SUSTAINABILITY REPORTING

3.1 INTRODUCTION

This chapter builds on the theoretical grounding established in Chapter 2 and provides further context for the mining industry by outlining its sustainability reporting. Section 3.2 outlines sustainability in the mining industry. Section 3.3 provides the literature on sustainability reporting frameworks, followed by sustainability reporting in the context of the SDGs in Section 3.4. Section 3.5 speaks to reporting of the SDGs in the mining industry, thereby underpinning the SDG Compass in Section 3.6. Furthermore, in the context of South Africa, the chapter provides background on corporate social responsibility and mining in Section 3.7, followed by the legislative framework that echoes the Minerals Council South Africa's social and relationship capital, the Social and Labour Plan in Section 3.8.

3.2 SUSTAINABILITY REPORTING IN THE MINING INDUSTRY

Sustainability reporting rates, particularly the societal and environmental issues in the mining industry have risen (Böhling *et al.,* 2019:191). This indicates high compliance within the industry because mining has a large social and environmental footprint (Amos, 2023:554). Large mining companies have made efforts to promote sustainable mining – indicated in their sustainability reports – as mandated by the Department of Mineral Resource and Energy (herein after, DMRE) (Hahn & Kühnen, 2013:14; Iqbal *et al.,* 2021:1). Thus, the DMRE pressurises mining companies to conduct continuous Environmental Impact Assessments (Lesnikov *et al.,* 2023; Rikhotso *et al.,* 2023). Pressure also stems from shareholders, sustainability standard-setters as well as local communities (Agama & Zubairu, 2022:38).

The mining industry is important for the host communities, hence, the focus on profits without a land rehabilitation plan is unacceptable (Segura-Salazar & Tavares, 2018:2). The surge in sustainability reporting is due to non-renewability of mineral resources, high emissions and tailings, energy-intensive production, declining ore grades and other societal impacts (Demirkan *et al.,* 2021). Regrettably, most mining companies' sustainability reports are substandard and poorly presented (Bouten *et al.,* 2015:83; Ramos *et al.,* 2013:319).

This is a concern, since the data published lacks transparency and comparability (Memela, 2020:117). Arguably, sustainability reporting in the mining industry may be a form of

greenwashing (Doyle *et al.,* 2019:1). Greenwashing is the disclosure of inaccurate data or withholding relevant information, also referred to as 'selective disclosure' (retaining negative information and highlighting positive information) (Moodaley & Telukdarie, 2023:1). Greenwashing raises concerns about the reliability of the reported information. Hence, the DMRE holds mining companies responsible for their sustainability impacts and further regulates their reporting processes (South African Government DMRE, 2024; Virgone *et al.,* 2018).

In demonstrating sustainability performance in the mining industry, with the aid of national sustainability indexes, mining companies typically use voluntary sustainability frameworks (Bastida, 2002:21), which will be outlined and discussed in Section 3.3.

3.3 SUSTAINABILITY FRAMEWORKS IN THE MINING INDUSTRY

This section will discuss mining sustainability frameworks, the International Council on Mining and Metals (ICMM), the Global Reporting Initiative (GRI), the Sustainability Accounting Standard Board (SASB), the International Finance Corporation (IFC), as well as the Mining Association of Canada's (MAC), and Towards Sustainable Mining (TSM) programme.

3.3.1 The International Council on Mining and Metals (ICMM)

The ICMM is a global organisation that promotes high ethical and environmental standards in the mining industry. Additionally, the ICMM was founded in 2001 and represents 27 leading mining companies and 38 commodity organisations (Extractive Industries Transparency Initiative, 2025). The ICMM's framework integrates 10 principles that guide mining companies on implementing sustainability within their operations (Brock *et al.,* 2019:782). Furthermore, member companies are to report on their progress in implementing the principles (da Silva *et al,* 2021:1). Principle 10.3 relates to sustainability reporting, and states 'that member companies are required to implement effective communication and reporting arrangements with stakeholders on environmental, social and economic performance' at a group level on an annual basis (International Council on Mining and Metals Mining principles, 2024).

3.3.2 The Global Reporting Initiative

The GRI is widely used and arguably the most influential sustainability reporting framework (Sundarasen *et al.,* 2025). As such, several mining companies globally publish sustainability reports that reference GRI guidelines (Bogacz & Migza, 2016:2). As opposed to the ICMM,

the GRI is applicable to various indsutries and not just mining. However, it has provided mining with tailored guidelines for the GRI Mining and Metals Industry Disclosures playbook, which encompasses the GRI-G4 Reporting guidelines (Bogacz & Migza, 2016:6; Clausen & Sörensen, 2022:788). GRI-G4 focuses on material sustainability impacts related to the mining and metals industry (GRI-G4 Sustainability Reporting Guideline, 2014:7). López-Arceiz (2018:44) has criticised the GRI, suggesting that the GRI-G4's verification processes are adopted by mining companies to merely conceal unsustainable practices.

3.3.3 Sustainability Accounting Standards Board (SASB)

The SASB is a public organisation that uses accounting standards to report material information, which is non-financial in nature, to various stakeholders (SASB, 2021:2). Notably, non-financial information (environmental, social, governance) impacts a company's financial performance (Antoninis *et al.,* 2020). For mining, the SASB has developed industry-specific standards, known as the Metals and Mining Sustainability Accounting Standard (The IFRS Foundation, 2023:5). Furthermore, the standard includes specific sustainability indicators related to greenhouse gas emissions, air quality, energy and water management, biodiversity impacts, security, human rights, business ethics, tailings storage facilities and community relations (Fonseca *et al.,* 2014).

3.3.4 International Finance Corporation (IFC) Performance Standards on Social and Environmental Sustainability

The IFC has eight social and environmental performance standards concerned with mining projects (International Finance Corporation, 2025). These standards align, to some extent, with the objectives of the GRI and the ICMM, however, on project-level management. Notably, the standard accounts for large mining projects, and assessing a mining project's social and environmental risks and the impacts thereof on hosting communities (Bruckner, 2015:418). Performance standard-1 (PS-1) integrates the social impact assessments and stakeholders' engagement throughout the project, and further reporting of any potential risk (Forbes & Ahmed, 2020:25; Lalevée *et al.,* 2020:411). PS-3 analyses resource efficiency and pollution prevention, also emphasising the need for mining projects to minimise resource use, pollution and waste generation (Adeyemi, 2018:17). The remaining performance standards PS-2,4-8 focus on working conditions, community health, land acquisition and biodiversity conservation (Wibowo, 2013). To this end, the IFC covers specific social and environmental impact areas, for a limited period during project coordination.

3.3.5 The Mining Association of Canada (MAC) – Towards Sustainable Mining (TSM) Programme

The MAC has upheld sustainable development since the 1980's (Gueye *et al.,* 2021:2). Thus, it developed a responsible mining framework, the TSM programme (Mining Association of Canada, 2025). The TSM programme aims to improve mining companies' sustainable performance and to ensure operations are environmentally responsible and communities are engaged (Robichaud, 2022). The members in the TSM programme adhere to the programme's standards and report on their performance annually, using the 30 social and environmental implementation and outcome indicators (Oyunkhishig, 2024:3). Lastly, the TSM programme operates globally and has become a cornerstone of the industry's efforts to improve its sustainability performance (Fitzpatrick *et al.,* 2011:376).

The above sustainability reporting frameworks elucidate the growing importance placed on transparency, accountability and responsible practices within the mining industry. Furthermore, they aim to improve the effectiveness of reporting, inform decision-makers about the future implications of mining and encourage the mining companies to justify their existence and demonstrate their commitment to society and the environment.

Table 3.1 provides a summary of the above-mentioned sustainability frameworks.

Table 3.1: Sustainability Reporting Frameworks

Abbreviation	Sustainability Reporting Framework	Founded	Pure definition
ICMM	International Council on Mining and Metals	2001	Mineral international organisation dedicated to a safe, fair and sustainable mining and metals industry
GRI	Global Reporting Initiative	1997	International standards organisation that helps stakeholders communicate their impacts on a wide variety of societal and environmental issues.
SASB	Sustainability Accounting Standards Board	2011	Non-profit organisation created to develop a consistent framework for companies to report on sustainability issues.
IFC	International Finance Corporation	1956	Financial institution that offers investment, advisory and asset-management services to fund projects
MAC (TSM)	Mining Association of Canada's TSM programme	MAC – 1935 TSM – 2004	MAC – National organisation representing the Canadian mining industry, comprising global companies that are engaged in mineral exploration, mining, smelting, refining and semi-fabrication. TSM – programme that supports mining companies in managing key social and environmental risks. The TSM is developed by the MAC.

Source: Author's construction

Mining sustainability reporting frameworks have become important in incorporating the SDGs within the reports (Sotti & Santucci, 2023:56). Sustainability reporting frameworks are traditional in nature and have been used for several decades (Lakhani & Herbert, 2022:3). The SDGs, on the other hand, only developed in 2015 and bring a novel effect on sustainability

reporting (Whittingham *et al.,* 2023:45; UN Global Compact, 2014). As such, the frameworks had to modify their reporting metrics to consider the SDGs (Donaires *et al.,* 2019:183).

3.4 SUSTAINABILITY REPORTING FRAMEWORKS AND SUSTAINABLE DEVELOPMENT GOALS

This section will outline the sustainability reporting frameworks in relation to this study's adopted SDGs. As devised in Chapter 1, the SDGs adopted are those of the social and relationship capital of the Minerals Council of South Africa. Discussions will begin with SDG-1 (no poverty) and 2 (zero hunger), in relation to the GRI. Followed by SDG-3 (good health) and SDG-11 (sustainable cities and communities) under the MAC-TSM programme. SDG-4, quality education in respect to the ICMM follows. SDG-5 (gender equality) is discussed in relation to the Responsible Mining Foundation (RMF). The International Finance Corporation (IFC) and SDG-8 (decent work) will be discussed together. Section 3.6.6 will revisit the ICMM, in the context of SDG-10 (reduced inequalities). Lastly, the Organization for Economic Cooperation and Development Guidelines (OECD) and SDG-16 (peace and justice) will conclude this section.

3.4.1 The Global Reporting Initiative and SDG-1 & SDG-2

The GRI Standards encompass the GRI Universal Standards, GRI Sector (Industry) Standards and the GRI Topic Standards (Raghavan, 2022:9). The alignment between the GRI and SDG-1 and SDG-2 is crucial for mining companies to report on poverty eradication and hunger. As such, these SDGs form part of the GRI Topic Standards. GRI Standard 13 (GRI-13) persuades mining companies and other stakeholders to upstream seafood production, as well as crop and animal farming (Hahn & Kuhnen, 2013). Hence, hunger and poverty are interconnected and addressing one will alleviate the other. As expected, these elements are on the rise and pose significant challenges to global community (de Wit *et al.,* 2020:139). This is exacerbated by climate change and population growth, among other factors (Mukerji, 2023:124). Moreso, the COVID-19 pandemic led to worldwide food insecurity and high poverty levels, thus, the GRI-13 standard was constituted (Global Green Growth Institute, 2023; Tavares *et al.,* 2024). The next SDGs to be explained in the context of a sustainability reporting framework are SDG-3 and SDG-11.

3.4.2 Mining Association of Canada's Towards Sustainable Mining (TSM) and SDG-3 & SDG-11

The TSM programme is associated with SDG-11 and SDG-3 in this context. SDG-11 promotes the development of inclusive, sustainable cities and communities. As such, the TSM programme is relevant since mining operates in peri-urbanised areas (Gueye *et al.,* 2021). A peri-urbanised areas are large bands of land with massive informal settlements that eventually merge within the mining towns causing hybrid and fragmented landscapes of urban and rural settings (Rajendran *et al.,* 2024). Notably, the TSM and SDG-11 are designed to drive environmental practices that supports social and economic linkages between urban, peri-urban and rural areas (SDG-Target 11.4; The Mining Association of Canada, 2025). Furthermore, SDG-11-A echoes the TSM category of promoting community engagement, particularly in urban and peri-urban areas (Cole & Broadhurst, 2021). Interestingly, this is the only TSM category programme that addresses the impacts of mining activities' impacts on communities (Li *et al.,* 2008:843).

Additionally, the TSM programme acknowledges that mining presents challenges to achieve SDG-11, since minerals are non-renewable (Endl *et al.,* 2021). Furthermore, declining ore grades, leading to waste increase impacts the surrounding communities (Gorman & Dzombak, 2018:281). To address this, mining companies operate tailings storage facilities, heap leach pads and waste stockpiles using TSM tailing management protocols to minimise all potential health risks (Mohapatra & Kirpalani, 2016:107). Hence, poor audit records of tailings will negatively impact the mine, its employees and the surrounding communities in respect of their health and well-being (Towards Sustainable Mining Initiative, 2025). Ultimately, poor execution of the TSM tailings programme will contravene SDG-3.

The mining industry generates significant waste from mineral processing after separating valuable metal from an ore body, which can threaten local communities and ecosystems if not managed effectively (Adiansyah *et al.,* 2015:1053; Edraki *et al.,* 2014:411). This compromises SDG-3; hence, the TSM initiative's focus on tailings management is essential. Furthermore, the mismanagement of tailings dams also affects workforce since they are directly exposed to the hazardous substances present in the tailings (Kossoff *et al.,* 2014:229). The ICMM and SDG-4 to follow in the next sub-section.

3.4.3 The International Council on Mining and Metals and SDG-4

SDG-4, beckons for quality education at all levels (primary, high, tertiary) and lifelong learning. Likewise, the ICMM recognises its role for promoting the same agenda in mining communities (Rulandari, 2021). The relevance of SDG-4 becomes evident when opposition to mining activities arises (ICMM, 2024). Typically, the opposition stems from unsatisfied stakeholders who benefit misappropriately with respect to mining taking place in their proximity. In addition, the ICMM (2024) states that if mining is challenged by mining communities, education would be inaccessible to community members. Also, with no education, the local communities' abilities to maximise the economic opportunities or be employees would be limited (Nti *et al.,* 2024). Therefore, the ICMM recognises the importance of contributing to quality education, in partnership with local communities and other stakeholders, to ensure that mining operations benefit the community economically and also support the development of local populations. The Responsible Mining Foundation is discussed in the next section.

3.4.4 Responsible Mining Foundation (RMF) and SDG-5

The mining industry has the potential to positively contribute to SDG-5 by addressing gender-related concerns as well as ensuring equal access to resources and opportunities for women (Pimpa, 2022:258). However, per the Responsible Mining Index (RMI), gender-related issues within the mining industry remain systematic with minimal efforts to achieving SDG-5 (Lesnikov *et al.,* 2023). First, it has been acknowledged that there is minimal participation of women in the mining industry compared to men and women bear a disproportionate burden of the costs and impacts of mining activities while receiving the bare minimum (Nandi & Chauhan, 2022:105). Moreover, the research conducted by the RMF highlights that there is a lack of reporting and monitoring on gender-related concerns in sustainability reports of large mining companies, indicating a lack of attention to this important area (Ivic *et al.,* 2021:15). The IFC in relation to SDG-8 (decent work) is outlined in the next section.

3.4.5 The International Finance Corporation and SDG-8

The IFC, an affiliate of the World Bank, plays a crucial role in promoting sustainable development, subsequently SDG-8 (Nwagu, 2024:79). This is accomplished through investments and advisory services; hence, the IFC finance projects that promote economic growth and create temporary jobs (Adam & Adhariani, 2018). Moreover, the IFC's key stakeholders include the private companies whose resources are leveraged to drive sustainable

economic growth (Reinman, 2015:23). Furthermore, by fostering partnerships and providing financial support, the IFC has aided small-scale businesses located in mining communities (Creamer, 2024). As such, IFC's primary goal is improving the lives of people in emerging economies.

Notably, besides job-creation, mining underpins the achievement of SDG-8 by fostering inclusive economic growth. Thus, it can be stated that infrastructure development and the promotion of economic activities are the outcome of the mining industry (Cawood, 2018). To add, several resource-rich countries with emerging economies, such as Mongolia and South Africa, have mining industries that contribute substantially to their respective GDPs (Ericsson & Löf, 2019:223). Hence, by promoting sustainable mining practices and responsible investment in the mining industry, the IFC plays an important role in achieving SDG-8 in mining communities.

3.4.6 International Council on Mining and Metals, and SDG-10

According to the ICMM (2024), several mining communities in developing countries experience inequality leading to social uproars, which calls on the mining industry to prioritise SDG-10. Additionally, non-prioritisation of SDG-10 in mining will erode that mine's social licence to operate, negatively impacting its reputation and long-term sustainability of their operations (Moomen *et al.,* 2019). Nonetheless, government is responsible for addressing inequalities within a country, with the mining industry as a partner aligning their efforts with government strategies to achieve SDG-10 (Yakovleva *et al.,* 2017). SDG-10 can be achieved in mining by implementing and promoting diversity and inclusion, supporting local economic development and engaging with local communities (Cullet, 2024). Furthermore, applying redistributive mechanisms that actively promote income equality and access to resources can also be an effective way for the mining industry to contribute to SDG-10 (Moomen *et al.,* 2019). The last sustainability reporting framework to be discussed is the OECD and SDG-16.

3.4.7 Organisation for Economic Cooperation and Development Guidelines and SDG-16

The OECD provides resources to member countries in their effort to promote peace, justice and strong institutions at all levels (Ahn, 2024). Through the organisation's work in governance, rule of law, anti-corruption and public administration, the OCED helps countries strengthen their institutions to promote accountability and transparency of their policies (Janowski, 2016). As such, the OECD Due Diligence Guidance (Minerals Guidance) is

responsible for supply chain processes of minerals from conflict-affected and high-risk areas (Zembe & Barnes, 2023), thereby assisting mining companies to avoid conflict and other governance related negative impacts (Littleboy *et al.,* 2019). This promotes inclusive and peaceful societies, which are key aspects of SDG-16. By following the OECD Due Diligence Guidance, mining companies can navigate various social challenges (political instability, violence), subsequently contributing to SDG-16.

Figure 3.1 graphically presents all the SDGs that the study adopted alongside the sustainability reporting frameworks in the global mining industry.

Source: Author's construction

This section provided the background on sustainability reporting; the next section outlines sustainable development goal reporting in the mining industry.

3.5 SUSTAINABLE DEVELOPMENT GOAL REPORTING IN THE MINING INDUSTRY

National governments are the key actors in implementing the SDGs and report on the progress made (Mudd, 2020). Essentially, they are the custodians of the SDGs and must ensure the successful implementation of the 2030 Agenda for sustainable development (Lagesse *et al.,* 2022). With this responsibility comes reviewing sustainability reporting practices of the private industry (García-Meca & Martínez-Ferrero, 2021). Notably, this task is assigned to governments since the SDGs are primarily intended to address sustainable development at country level (da Silva, 2021).

As such, governments must ensure that various stakeholders operating within their jurisdiction align with the SDGs, particularly in areas where they contribute most to the negative impacts (Lodhia & Hess, 2014). Moreover, reviewing sustainability reporting by national governments is to determine whether the inputs are consistent with the SDGs' implementation targets (Demirkan *et al.,* 2021). Furthermore, integrating these inputs into national development plans as a standing policy is essential to ensuring the effective implementation thereof (Lagesse *et al.,* 2022).

In context to mining, a PwC study discovered that 72 percent of the world's largest mining companies already somewhat mention the SDGs in their sustainability reports (Moomen *et al.,* 2019), and 54 percent of these mining companies mention these goals in their business strategies (Ivic *et al.,* 2021). Although mining companies are increasingly reporting on the SDGs, there is an underlying risk of 'SDG washing', where companies merely mention the SDGs without taking concrete actions or implementing meaningful strategies to contribute to their achievement (Costa *et al.,* 2025).

The significant discrepancy between mentioning the SDGs and aligning KPIs to the SDGs for the mining industry is a reporting gap (Lenort *et al.,* 2023). Mining companies control the content and format that is included in their sustainability reports (Demirkan *et al.,* 2021); furthermore, selecting the goals on which to focus, andwhich goals to omit (Sotti & Santucci, 2023). This is a form of institutional capture, which essentially means, in this context, mining companies provide biased information and data to their stakeholders, which influences their understanding of what is reported. This is used to suppress unfavourable information. Notably, this behaviour is likely to hinder the attainment of the SDGs and raises concerns about the accuracy and reliability of the SDG information provided (Johnsson *et al.,* 2020).

SDG-12, which states, 'Ensure sustainable consumption and production patterns' is particularly relevant to the mining industry, in addition to other SDGs adopted in this study. Obviously, the mining industry is a major contributor to global resource extraction and consumption, making it essential for mining companies to align their sustainable practices with these SDGs (Clausen & Sörensen, 2022). Target 12.6 of SDG-12 calls for all United Nations member states to adopt sustainable practices as part of the 2030 Agenda, and to integrate sustainability information into corporate reporting (Sotti & Santucci, 2023).

With the aim of assisting both the national governments and mining companies, respectively, in accurately reporting on their sustainability performance and contributions to the SDGs, it is crucial to establish robust frameworks for assessing sustainable practices in the mining industry (Ivic *et al.,* 2021). Furthermore, in advancing SDG 12.6, the United Nations Trade and Development issued the guidance on core indicators for the entity of reporting on contribution towards the SDGs, which provides a comprehensive set of indicators specifically designed for the mining industry (Yakovleva *et al.,* 2017). To this end, strides have been made by key sustainability reporting frameworks to map out novel ways of attaining the SDGs.

Among the sustainability reporting frameworks mentioned in Section 3.3, one that stands out most in the context of this study is the Global Reporting Initiative (GRI). This is because the SDG Compass is developed by the GRI in conjunction with the United Nations Global Compact and the World Business Council for Sustainable Development, as depicted in Figure 3.2.

Source: Columbia Centre on Sustainable Development (2015)

Furthermore, the SDG Compass incorporates feedback received from companies, government agencies and academic institutions globally. The GRI understands that the planet is currently facing economic, social and environmental challenges and to combat the challenges, the SDGs define global priorities and aspirations for 2030. As such, to ensure reporting of the SDGs is effective, the compass was developed, which explains how the SDGs affect the business and how to place sustainability at the heart of a business strategy. The next section will outline the SDG Compass.

3.6 THE SDG COMPASS

The SDG Compass is a 'response guide that is used by companies in aligning their strategies as well as measuring their contribution to the SDGs' (Kuswantoro *et al.,* 2022; UN Global Compact; 2015). Furthermore, it facilitates companies to understand the SDGs, define their prioritised SDG, setting of business goals, integrating the SDGs and reporting on their progress (Investment & Foundation, 2020). Notably, various SDG-related academic studies have referred to the SDG Compass (Halkos & Gkampoura, 2021; Moi *et al.,* 2020; Meschede, 2020; Schina *et al.,* 2020).

The SDG Compass outlines five steps for companies to align their strategies with the SDGs and contribute to their achievement (Jun & Kim, 2021; GRI, 2015). Notably, this guide is conceived holistically, encompassing the formulation, implementation and reporting of the SDGs (Garcia-Sanchez *et al.,* 2020). Furthermore, the SDG Compass recommends a business-related communication strategy constituting the means of strengthening the relations companies have with their stakeholders (Schramade, 2017). Step 1 of the SDG Compass, understanding the SDGs, will be discussed next.

3.6.1 Step 1 – Understanding the SDGs

The SDG Compass's first step is the 'understanding of the SDG's. This includes unpacking both the targets and indicators, respectively, and identifying how the SDGs relate to a company's supply chain processes (Rendtorff, 2019).

The first action focuses on simply questioning what the SDGs are? The SDGs, also known as the global goals, are a set of interconnected and interdependent goals adopted by the United Nations in 2015 to address global challenges and create a more sustainable future. Prior to 2015, for 15 years (2000-2015), the United Nations' eight MDGs guided global efforts to tackle, poverty, education, gender equality, child mortality, maternal health, HIV/AIDS, environmental sustainability and partnerships (Moomen *et al.,* 2019). Arguably, although significant progress was made during the MDG era, in many areas, there are still numerous challenges remaining (Hassani *et al.,* 2021). Thus, addressing these remaining challenges and building on the progress of the goals, called for 17 interconnected goals (Kara *et al.,* 2021).

The second action is 'understanding the business case' (Global Reporting Initiative, 2016). A business case is defined as 'A situation where economic success is increased while performance in the environmental and social issues are also thriving' (Damigos *et al.,* 2021). Thus, in the

absence of a clearly defined business case, the adoption of the SDGs will be slower than necessary, hindering the contribution thereof and SDG-related actions to be perceived merely as a 'philanthropic exercise' (Whittingham *et al.,* 2023; William, 2023). Nevertheless, philanthropic programmes, as expected, are helpful in building relationships and creating a good reputation (Hidayati *et al.,* 2020); yet, at the cost of long-term sustainability and making a meaningful impact on the SDGs, since these programmes are often separate from the core business (Buhmann *et al.,* 2019).

Adhering to 'the baseline responsibilities for companies' is the last action (Global Reporting Initiative, 2016). The baseline responsibilities entail respecting international norms and standards, among others, the UN Guiding Principles on Business and Human Rights (Van Zanten & Van Tulder, 2021). Essentially, this action delves into upholding all relevant UN policies to respect human rights (da Silva, 2021). The United Nations Global Compact Principle on Human Rights advocates for companies to respect and support human rights, including the rights of workers, indigenous peoples and local communities (Cole & Broadhurst, 2021).

3.6.2 Step 2 – Defining Priorities

Prioritising certain SDGs to maximise impact and allocate resources effectively is worthwhile (Kaffashi & Grayson, 2022). Arguably, most companies still grapple with identifying which SDG is most relevant to their business operations and value chain (Eras-Almeida & Egido-Aguilera, 2020). This is partly due to the complexity of the SDGs and the potential trade-offs among them (Eras-Almeida & Egido-Aguilera, 2020). To remedy the grappling effect, most companies have adopted materiality analysis as a mechanism for 'defining prioritised SDGs' (Moratis & Melissen, 2019).

Materiality analysis is an indispensable method for identifying and prioritising the significant economic, environmental and social material issues for a company and its stakeholders (Ike *et al.,* 2019; Whittingham *et al.,* 2022). Whilst materiality analysis is commonly used in sustainability reports by defining certain sustainability issues as priorities, there is a growing trend of companies cherry-picking the several SDGs that align with their material matters (Damigos *et al.,* 2021). This practice leads to 'SDG cherry-picking', which is a risk of overlooking or neglecting other important SDGs, deemed as immaterial since they do not directly align with their operations (Bendixen *et al.,* 2021).

The first action is mapping out the value chain to identify impact areas. As such, a company should consider its most significant impact on the SDGs, which may extend beyond analysing its directly owned or controlled assets (Wynn & Jones, 2021). For instance, in the case of a mining company, the greatest opportunities could potentially be further up the value chain, such as in base metal refining, or downstream in mineral extraction and concentration (Yakovleva *et al.*, 2017). This process entails conducting a comprehensive assessment from the supply base and inbound logistics (Damigos *et al.*, 2021).

The next action is to select the most relevant indicators and align them with the identified impact areas (Global Reporting Initiative, 2016). As such, identifying relevant indicators on the value chain enables companies to have a clear understanding of their impact on the SDGs (Mancini & Sala, 2018). Lastly, with the value chain mapped out and relevant indicators selected, the final action will define the 'actual' prioritised SDGs (Damigos *et al.*, 2021). At this stage, companies possess an extensive level of understanding of current and potential negative and positive impacts on the SDGs and can develop targeted strategies to address them (Mancini & Sala, 2018).

To this end, when companies are working through the three actions of defining priorities, it is important to note that the assessments are not entirely scientific but also require stakeholder perspectives, which are subjective in nature (Mancini & Sala, 2018). As a result, it is crucial for companies to produce transparent reports and perform these three actions periodically, for instance, annually, to ensure that their priorities evolve in line with changing circumstances and stakeholder expectations (Shen *et al.*, 2015).

3.6.3 Step 3 – Setting Goals

Post defining priorities, companies should distinguish between short and long-term goals (da Silva, 2021). To achieve this, the goals should be SMART (specific, measurable, attainable, realistic and time-bound) (Achenbach, 2021). Dating back to the early 1980s, George T. Doran introduced the SMART framework, which is a widely used tool in business planning that emphasises clear and measurable objectives (Aguilera *et al.,* 2023). The adoption of the SMART framework represented a shift from vague aspirations to actionable goals, making it a cornerstone of management practices (Cothran & Wysocki, 2019; Moore, 2017). Figure 3.3 below represents the breakdown of the components regarding the SMART framework, with each goal crafted to reflect tangible results.

Source: Stainton (2024)

With the SMART goal setting in mind, four key actions in Step 3 (goal setting) include defining the scope of the goals and selecting KPIs, outlining the baseline and selecting the goal type, determining the level of ambition and announcing their commitment to the SDGs (Damigos *et al.*, 2021).

The scope of the goals as well as the selected KPIs would be the impact areas and prioritised issues (Mancini & Sala, 2018). Companies should integrate the SDGs into existing goal-setting processes as opposed to creating a parallel set of SDG-specific goals (Fiandrino *et al.*, 2022). Nonetheless, defining the scope ensures that the companies' goals will include opportunities for a positive impact on the natural environment and contribute to a strong social capital (Mariani *et al.*, 2022).

Defining a baseline and selecting a goal type, is the second action. To begin, defining a baseline typically refers to timing (Clark & Harley, 2020). As such, how the company defines the baseline can impact the likelihood of achieving the goal (or not), hence transparency about how and why a specific goal has been chosen is important (Achenbach, 2021). Furthermore, to monitor the progress made, drastic changes such as divestments, mergers and acquisitions must be considered, as this is likely to affect the baseline and will need to be recalculated (Johansson *et al.*, 2023). An example of a baseline goal is 'the increase of women on the board of directors by 41% at the end of 2024' (Bassuk & Washington, 2013).

Setting the level of ambition and announcing commitment to the SDGs are actions three and four. This action is undertaken by consulting with several stakeholders (Van Zanten & Van Tulder, 2021). Furthermore, ambitious goals typically result in better performance compared to modest goals (Fiandrino *et al.*, 2022). As such, with the bar being set relatively higher, the

goals are not primitive in nature but infused with great ideologies with creativities (van Oijen, 2020). Announcing a commitment to the SDGs is an effective communication tool since this provides simple and practical aspirations of the company's quest in contributing to sustainable development (Van Zanten & Van Tulder, 2021).

3.6.4 Step 4 – Integrating

Integrating the SDGs into the company's overall business strategy is Step 4. This process requires a comprehensive approach across all the company's departments (Fiandrino *et al.*, 2022). Several departments to be included in decision-making processes, include human resources, community relations, environmental management and corporate governance among others (Albrecht *et al.*, 2021).

Additionally, the integration of SDGs involves collaboration with external stakeholders, typically local communities, governments and civil society organisations (Vig *et al.*, 2024). Involving the external stakeholders is important since they are directly impacted by the company's operations (Mariani *et al.*, 2022). In mining, this collaboration ensures that the SDGs are aligned with the community's needs (Yakovleva *et al.*, 2017). This step encompasses three actions; first, anchoring the SDGs within the business; second, embedding the SDGs across all functions of the business; and lastly, fostering partnerships with various stakeholders (Batari *et al.*, 2024).

Anchoring the SDGs within companies entails active leadership by the CEO by integrating the SDGs into the company's mission and values (Eberle *et al.*, 2022). As such, a concerted effort from top management is necessary to ensure that all key stakeholders are conscientised and fully aware of SDGs (Kaffashi & Grayson, 2022). With active senior leadership, the importance of the SDGs is communicated across the organisation (Mariani *et al.*, 2022). Hence, it is the CEOs responsibility to ensure that there are sufficient resources and support allocated to the SDGs (da Silva, 2021).

The second action entails embedding the SDGs across all functions within the company (Pimentel *et al.*, 2016). Moreover, although SDG-dedicated departments play a crucial role in driving the integration of the goals into the company's operations, the embedding, ownership and responsibility for achieving them lies in several functions; among others, the research and development (R&D) department, business development department, operations department, and human resources (Yakovleva *et al.*, 2017). The last action is fostering collaborations and

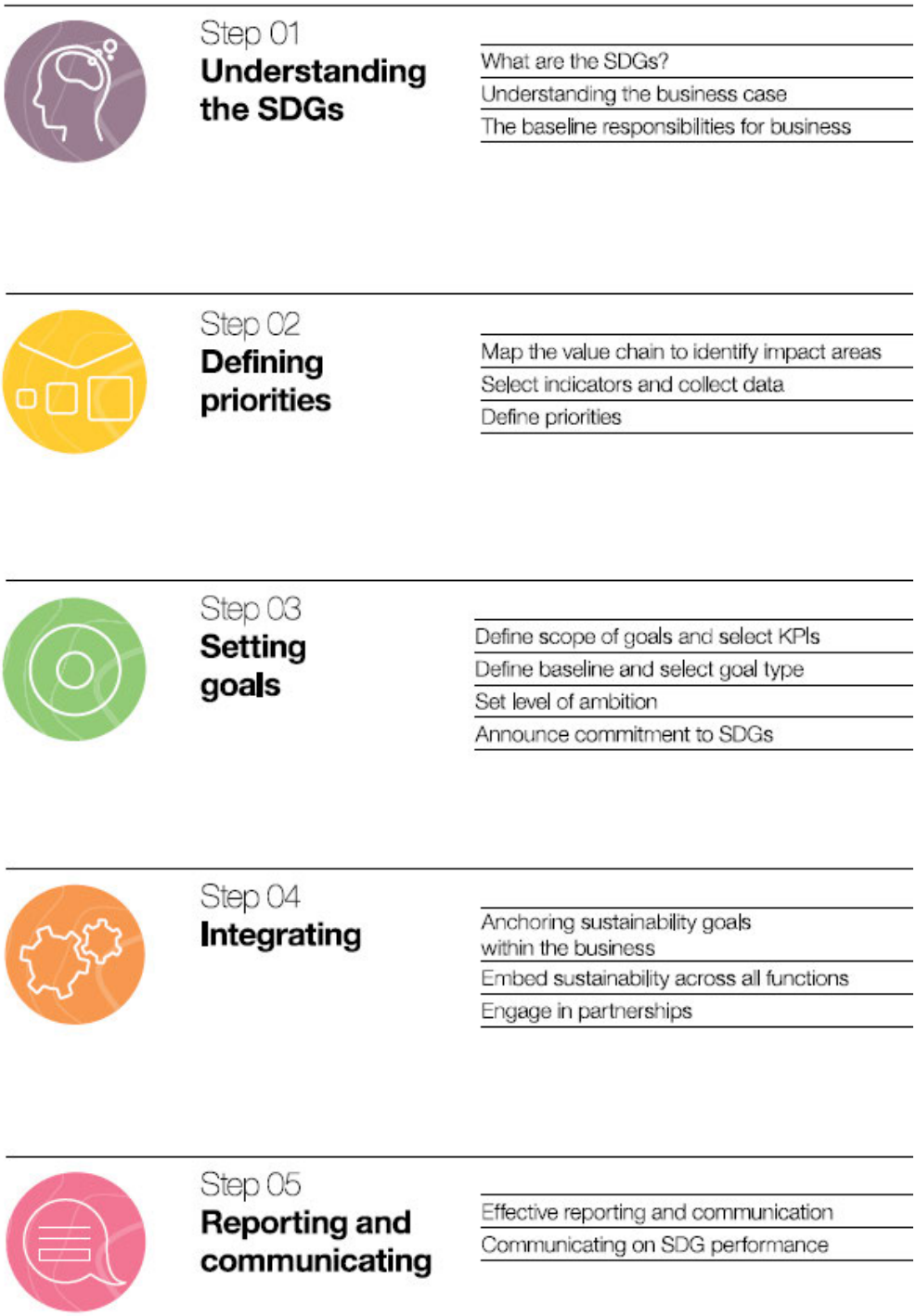
partnerships. The SDGs cannot be carried out in isolation (Selmier, 2015) and require collaboration with external stakeholders (Yakovleva *et al.*, 2017).

3.6.5 Step 5 – Reporting and communicating

The last step is reporting and communicating. The step has two actions, effective reporting and communication together with communicating the progress thereof.

Effective reporting and communication emphasise the importance of companies' use of internationally recognised standards (Amran & Ooi, 2014). Internationally recognised standards include, among others, the GRI standards, SASB standards and the ICMM. Furthermore, companies must remain transparent throughout the entirety of the SDG implementation process and regularly engage with stakeholders to ensure their needs and expectations are addressed (da Silva, 2021). Notably, companies have an option of using existing reporting structures and frameworks to disclose their SDG progress or prepare a more concise stand-alone SDG report (Hummel & Szekely, 2021).

The second action is communicating on the performance. Notably, many companies already communicate on topics that are relevant to the SDGs (Buonocore *et al.*, 2019). By linking existing communication to the SDGs, companies can demonstrate how they are contributing to these global goals (da Silva, 2021). Importantly, this also highlights the interconnectedness of the SDGs and the need for integrated approaches to sustainability. To this end, the SDG Compass provides a robust framework for companies to integrate the SDGs into their core business. The next diagram (Figure 3.4) summarises the SDG Compass (GRI, UN Global Compact and WBCSD, 2015).



Source: GRI, UN Global Compact and WBCSD (2015)

Since the SDG Compass is a guiding framework on how to adopt the SDGs, the SDGs are loosely associated with the CSR in the mining industry (Selmier & Newenham-Kahindi, 2021). In this context, mining companies are increasingly incorporating the SDGs into their CSR

programmes and business strategies to contribute to sustainable development (Yulianita *et al.,* 2019). Thus, when mining companies align their CSR initiatives with the SDGs, they can maximise their positive impact on societal and environmental outcomes (Damigos *et al.,* 2021; Investment & Foundation, 2020). The SDG Compass emphasises reporting, while CSR helps to implement and deliver on SDG commitments (Yulianita *et al.,* 2019). Therefore, when mining companies effectively apply the SDG Compass, their CSR programmes become more closely attuned to the SDGs (Investment & Foundation, 2020; Damigos *et al.,* 2021). Furthermore, this proactive alignment amplifies the traditional objectives of CSR, particularly in the mining industry.

3.7 CORPORATE SOCIAL RESPONSIBILITY AND MINING

There is a definitional challenge with respect to corporate social responsibility as there is no universally accepted definition (Diale, 2014:17). This is because several definitions are based on different social and business theories; also, the concept has evolved over time (Hinson & Ndhlovu, 2011). Thus, it has been pointed out that, 'while CSR has become a fashionable concept within its literature, the abstractness has the potential to render it completely meaningless' (Ndhlovu, 2011:72). However, what has become a prevalent thread among CSR researchers, authors, scholars and practitioners alike, is that the notion of CSR must encompass the following key aspects: voluntarism, corporate behaviour, responsiveness, proactiveness and accountability (Muthuri & Gilbert, 2012; Yakovleva, 2007).

Essentially, the definitional challenge of CSR arises from whether corporations, including PGM mining companies, should act beyond their shareholders' expectations by supporting their various mining communities, or whether such efforts exceed their responsibilities (Shayan *et al.,* 2022). Effectively, CSR must link theory to practice (Shayan *et al.,* 2022:11). Fortunately, since the 1960s, both academics and corporates have contributed to developing and strengthening CSR programmes and broadening their underlying literature (Wang *et al.,* 2016). As such, CSR means different things to different people at different times, thus novel impacts can be included in definitions (Ndhlovu, 2011:72; Yakovleva *et al.,* 2017:9). Novel impacts that have contributed to the definitional misgivings about CSR include corporate citizenship, business ethics, corporate reputation and corporate philanthropy (Camilleri, 2021; Fatmawati & Fauzan, 2021; Rossi *et al.,* 2021; Xu *et al.,* 2021).

Against this backdrop, CSR in the mining industry has become increasingly important, particularly in the context of developing countries (Mzembe & Downs, 2014). Furthermore,

CSR marks a shift in how mining companies view their role and define their responsibility (Wilasittha *et al.,* 2022). In the past, mining companies, although still important, often limit their responsibilities to issues centred around safety, economic performance, social welfare of permanent employees and their obligations to shareholders (Mzembe & Downs, 2014; Bongwe, 2017). However, the contemporary mining industry is expected to account for the damage that their presence may incur upon the neighbouring mining communities (Bainton & Holcombe, 2018). In many developing countries, mineral resource extraction is often considered the primary driver of economic growth and development (Camara *et al.,* 2021).

Hence, mining companies must shoulder their own responsibilities for health and education issues as well as the construction of basic infrastructure through CSR to support the local communities and environments (Mireku-Gyimah & Gyamfi, 2016). For instance, in 2023, Northam Platinum contributed R1.5 billion towards community projects in several South African mining communities, like Brits, Thabazimbi and Lydenburg (Northam Platinum, 2023). This contribution and others like it, aim to create employment opportunities, establish small businesses and improve access to healthcare and education services (Becker-Olsen 2014). Notably, such community contributions are a form of CSI, aimed at ensuring the long-term sustainability of both mining operations and the community well-being (Jenkins & Yakovleva, 2006).

As such, CSR and corporate social investment (CSI) are sometimes used interchangeably (Yulianita *et al.,* 2019). However, South African companies prefer the term *corporate social investment* since responsibility is interpreted as an obligation imposed because of past misdeeds (Abdullah & Abdul, 2013). Encompassed within a CSR framework, CSI programmes aim to promote community development, sustainability and empowerment (Hinson & Ndhlovu, 2011). Furthermore, CSI refers to the company contribution of financial and non-financial resources beyond its commercial activities to disadvantaged individuals and communities, solely for the purposes of welfare and social upliftment (Subagja *et al.,* 2021).

Having established the role of CSR in the mining industry, it is essential to examine the legislative framework governing mining rights applications. The South African mining industry has been placed in a position wherein it had to contend with and adjust the approach to managing development programmes, this process entailed ‘a shift from a controlling, heavy-handed approach to an engaging approach with several stakeholders that have multiple interests’ (Diale 2014:19). Furthermore, Hamann (2004:280) points out that this category of

institutional change was initiated and implemented around the 1990s. Notably, in recent times, the majority of South African mining companies have in one form or another integrated CSR-related value statements and programmes within their business models.

As a result of various legislative frameworks to address social ills in predominantly black communities to alleviate their poor living standards, South African mining companies are obligated to share their mining benefits with their neighbouring mining communities (Department of Mineral and Energy, 2010). Moreover, in corporate mining, there is a strong need for continuous socio-economic and environmental improvement, beginning with mineral exploration and extending to mine closure (Diale, 2014). Thus, the Mineral and Petroleum Resource Development Act (MPRDA) of 2002 (Republic of South Africa, 2002) consists of various legislative frameworks that the South African Parliament uses to address South Africa's long-standing history of inequality in the mining industry (Centre for Applied Legal Studies, 2024); for example, the Housing and Living Conditions Standards (Department of Mineral and Energy 2019), the Mining Charter (Department of Mineral and Energy 2018) as well as the Guideline for Implementation of a Social and Labour Plan (SLP, hereon), to name a few (Department of Mineral and Energy, 2010).

The legislative framework that is relevant to this study is the SLP.

3.8 SOCIAL AND LABOUR PLAN

According to the MPRDA 28 of 2002, operating mines in South Africa are required to submit a Social and Labour Plan (SLP) when an application for mining rights is put forward (Marais *et al.,* 2022). The SLP aims to promote employment and advance the socio-economic welfare of communities impacted by mining activities (Robinson & Blackwell, 2018). Furthermore, the five-year cycle of a running SLP must ensure that before mining rights are granted, mining activities will cater for the needs of the present generation without compromising the needs of future generations through community development programmes and initiatives (Esteves & Vanclay, 2016).

The introduction and implementation of the SLP has faced several challenges, including the lack of coherence between various government departments and insufficient monitoring of SLP initiatives (Adler *et al.,* 2012). Hence, in the absence of a clear objective of what an SLP should achieve, the implementation of any SLP project will be undermined and bleak. Moreover, the top-down approach of the government in developing the SLP policies has also been a major

barrier in ensuring the active participation of the local communities in the planning and implementation stages (Adler *et al.*, 2012).

Mining is a critical component of the South African economy and contributes significantly to the country's GDP. In 2023, the industry contributed an added value estimated at 202.05 billion South African rand to the country's GDP (Stats SA, 2024). Furthermore, a total of 477 000 individuals were employed directly within the mining industry in the same period (Statista, 2024). However, the mining communities are faced with numerous challenges, which ultimately result in community unrest. It may be deduced that where community unrests are prevalent, the SLP initiatives are not fully addressing the socio-economic needs of the communities per the local integrated development plan. In relation to this and as pointed out by Van der Schyff (2012), one of the most controversial features of the MPRDA was the acknowledgement that the country's mineral and petroleum resources belong to the nation and the State as the custodian thereof (Thobatsi, 2014).

As a result, community unrests are fuelled in mining communities because of the misinterpretation of the above Act, which leads communities to believe that mineral resources are their natural inheritance resources and, therefore, expect to be direct beneficiaries from the profits of mining in their locality (Adomako-Kwakye, 2018).

Nevertheless, an SLP has a five-year cycle and includes seven elements: (1) Human Resource Development; (2) Employment Equity; (3) Mine Community Development; (4) Procurement Progression Plan; (5) Housing and Living Conditions; (6) Management of Downscaling and Retrenchment; and (7) Financial Provision (Department of Mineral and Energy, 2024). A key focus of this study is Mining Community Development. Mine community development entails the contribution to a community's long-term needs, which also seeks to ensure that there is fair distribution of benefits and responsibilities associated between the mine and the community.

3.8.1 SLPs Mining community development

The problem of 'benefits' accruing to local mining communities from large-scale mining companies is a complex issue (Mireku-Gyimah & Gyamfi, 2016). This is evident with several community unrests against neighbouring mining companies (Prno, 2013). Mining communities have expressed their dissatisfaction when promises made by mining companies have not been fulfilled (Gueye *et al.,* 2021). Moreover, these communities, to a certain extent, succumb to the mines' environmental and social damages (Karsadi & Aso, 2023). Notably, they have been

extremely outspoken in voicing their demands for benefits, this is worrisome for mining companies since their social licence to operate (SLO) is threatened if they do not adequately fulfil the community's demands (Prno, 2013; Essah & Andrews, 2016).

Mining community development relates to the SDGs in such a way that both initiatives are geared to global economic development and providing essential resources for several beneficiaries. Adhering to a more nuanced approach of each SLP mining community development will inevitably contribute to the SDGs. This is particularly evident in the intricate landscape of South Africa's mining industry. As such, the mining industry, historically entrenched with various societal and environmental challenges, plays a crucial role in the country's economy.

Nevertheless, the journey towards sustainable development in the mining industry, using the SDGs as a vehicle, will require a comprehensive approach to tackling SLP implementation practices guided by the Mining Charter. Essentially, the Mineral and Petroleum Resource Development Act provides an opportunity for the mining industry to carefully craft long-term outcomes that will see mining communities become more self-sustaining and more independent of the mines that they host currently, which have a finite lifespan. The principle of long-term outcomes coincides with the definition of sustainability.

The next section concludes this chapter.

3.9 SYNOPSIS

The main purpose of this chapter was to provide the relevant theory regarding sustainability reporting. As such, Section 3.2 commenced with sustainability reporting in the mining industry. It further stated that the sustainability reporting rates have risen in the industry with a key focus on societal and environmental issues. Thereafter, sustainability reporting frameworks were expounded in Section 3.3; applicable reporting frameworks in the mining industry, included the ICMM, the GRI, the SASB, the IFC and the MAC-TSM programme. This laid a foundation for discussions around the linkages between the latter frameworks, with the SDGs following in Section 3.4.

Section 3.5 discussed SDG reporting in the mining industry, which later provided the SDG Compass in Section 3.6. The SDG Compass was discussed and unpacked its five steps (understanding the SDGs, defining priorities, setting goals, integrating, reporting and communicating). In line with the objectives of this study, it was evident that CSR ought to be

discussed together with one legislative framework, the SLP, with both sections outlined in sections 3.7 and 3.8, respectively.

The next chapter will explain the research design and methodology applied in this study.

CHAPTER 4

RESEARCH DESIGN AND METHODOLOGY

4.1 INTRODUCTION

The research design and methodology employed in a study are critical components that determine the credibility of the findings. The previous two chapters provided a review on the literature on both the sustainable development goals and sustainability reporting. This review provided a solid foundation, underpinning the research instrument and methodology. As such, the purpose of this chapter is to provide a comprehensive overview of the research design and methodology that was used to address the research questions and objectives outlined in Chapter 1.

Section 4.2 below will provide the setting of this study by outlining the research scope. Section 4.3 provides an overview of the qualitative research approach. This includes semi-structured interviews and document analysis, which are key research design frameworks. Section 4.4 outlines the data collection process for both the semi-structured interviews (SDG implementation targets) and document analysis (SDG Compass). The measuring instruments will be discussed in Section 4.5, followed by the sampling strategy techniques in section 4.6. This will be followed by the preliminary data analysis in Section 4.7, which expands on grounded theory analysis, transcription and coding, together with thematic analysis. Pilot testing of the research instrument will be presented in Section 4.8 and the ethical considerations pertaining to the study in Section 4.9. Finally, this chapter 4 concludes with a chapter summary.

4.2 RESEARCH SCOPE

The research scope is defined as parameters that clearly outline what will be included and excluded within a study (Paré & Kitsiou, 2017). The study examined PGM mining companies and their surrounding communities to assess the implementation and reporting of Sustainable Development Goals. This is because PGM mining communities often grapple with intricate social, economic, and environmental challenges, even though the Bushveld Igneous Complex is a renowned global leader in PGM production.

Paradoxically, the BIC, considered the wealthiest basin, is also characterised by staggering levels of poverty and inequality (Cole & Broadhurst, 2021). Furthermore, in analysing the paradoxical relationship, this study included strategic participants in the BIC and analysed the specific sustainability reports.

The tables below indicate the Minerals Council South Africa's (2023) stakeholder engagement cohort, South African mining areas and mineral deposits, as well as various reporting suites. Highlighted elements indicates all 'included' elements.

Table 4.1: Inclusion and Exclusion Criterion – Stakeholder Engagement Cohort (SDGs)

Stakeholder	Inclusion / Exclusion	Stakeholder	Inclusion / Exclusion
Member companies	Excluded	Business groupings and national associations	Excluded
Industry associations	Excluded	Academic and research institutions	Excluded
Government	Excluded	Media	Excluded
National Legislature	Excluded	OEMs and suppliers	Excluded
Government bodies, regulators and SOEs	Excluded	civil society, mining community stakeholders	Included
Organised labour	Excluded		

Table 4.2: Inclusion and Exclusion Criterion – South African mining areas and minerals (SDGs and Sustainability reporting)

South African Mining Area	Province	Mineral Deposits	Inclusion / Exclusion
Witswatersrand Basin	Gauteng	Gold	Excluded
The Kimberlities	Northern Cape	Diamonds	Excluded
Phalaborwa Igneous Complex	Limpopo	Copper	Excluded
The Kalahari Basin	Northern Cape	Manganese	Excluded
Bushveld Ingenious Complex	Limpopo/Northwest/Mpumalanga	Platinum	Included

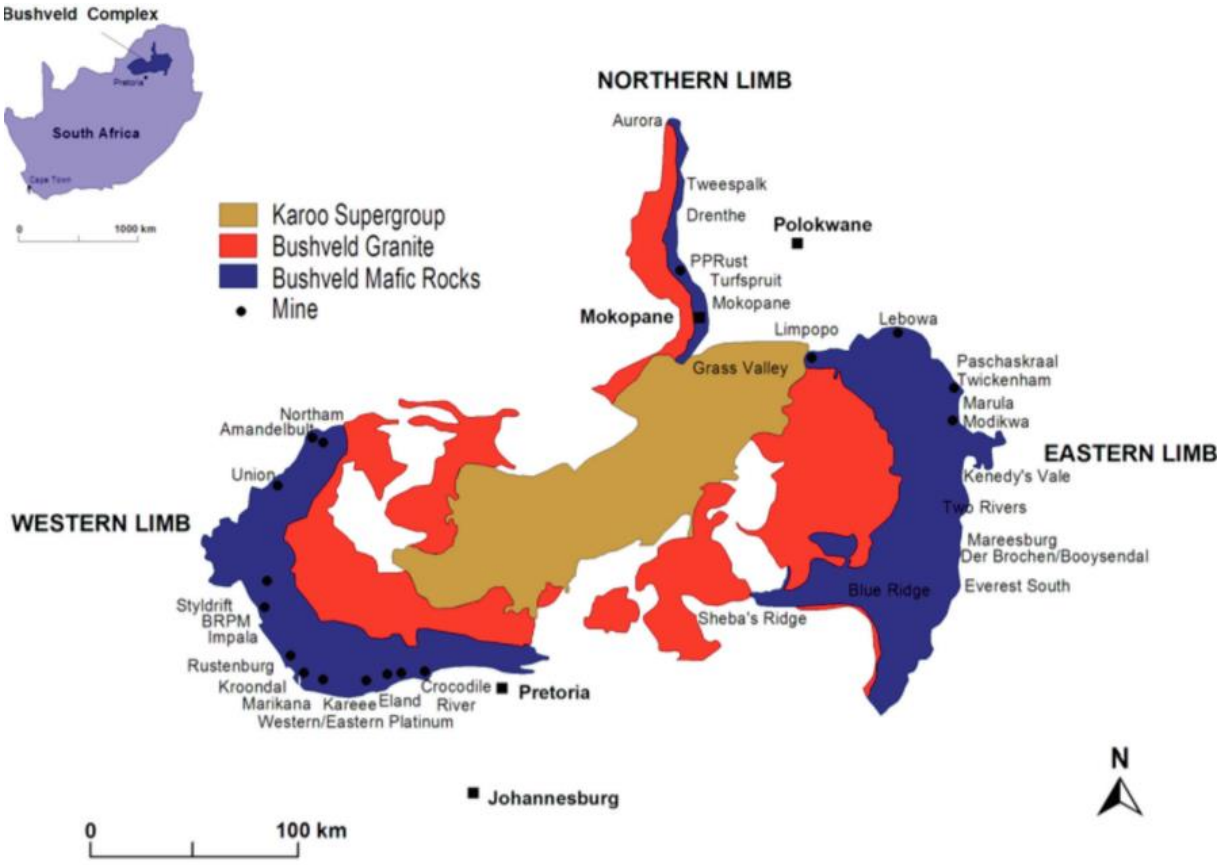
Table 4.3: Inclusion and Exclusion Criterion – Reporting Suites (Sustainability reporting)

Reporting Suites		
Annual Financial Statements	Annual Integrated Reports	Corporate Governance Reports
Remuneration Report	IT Governance Report	Sustainability Reports
ESG Reports	Social and Labour Plans	Human Resource Report
Analytic Reports	Communication Reports	Cultural Affairs Report

The next subsection will outline the included elements of the South African mining area.

4.2.1 Semi-structured Interviews – Sustainable Development Goals

The semi-structured interviews were conducted in the Bushveld Ingenious Complex (BIC, hereafter). Since the mineral of interest is platinum, predominantly located in the BIC, it logically limited the study to this region. As such, other mineral-encompassing basins were excluded. Figure 4.1 illustrates the BIC layout and its associated limbs.



Source: Roberts and Clark-Mostert (2010)

4.3 RESEARCH APPROACH AND FRAMEWORK

This study adopted a qualitative research approach using two research designs, semi-structured interviews and document analysis. Furthermore, the logical plan that the researcher followed to answer the research questions is presented below.

4.3.1 Semi-structured Interviews – Sustainable Development Goals

Semi-structured interviews were conducted to ascertain the implementation of the SDGs by the PGM mining companies in their local communities.

4.3.2 Document Analysis – Sustainability Reporting

Document analysis was undertaken using one set of key documents, namely PGM mining companies' sustainability reports. These reports served as critical tools for measuring SDG disclosure of social, environmental, economic and governance matters within an organisation. Furthermore, a sustainability report is used to inform various stakeholders in analysing an organisation's impact on sustainable development, thus, holding them accountable for their contribution (or lack thereof) to the SDGs.

The SDG Compass was used to analyse the extent of reporting alongside the PwC's Challenge. As of 2024, the Minerals Council South Africa had 73 members who have an interest in a wide range of minerals (MCSA, 2024); these are, among others, 14 coal members, 13 chrome members, eight gold members, three copper members and 14 PGM members (MCSA, 2024).

4.4 DATA COLLECTION

Data collection is the foundation upon which researchers can build their analyses and draw meaningful conclusions (Kim & Yoon, 2025). Thus, robust and reliable data collection methods are crucial for ensuring the soundness of any research endeavour (Pittman & Bakas, 2010). This study used both primary and secondary sources.

4.4.1 Semi-structured Interviews: Sustainable Development Goals – Primary Data Collection

Primary data collection was conducted through a series of semi-structured interviews with mining community stakeholders. Among other methods, interviews, interviews are the most common form used to collect primary data, particularly in the subjects of social sciences (Sahu & Sigh, 2021). Furthermore, semi-structured interviews grant the researcher an opportunity to probe the respondents to gather in-depth insights. Notably, semi-structured interviews are particularly useful for professionals conducting research on applied policy studies (Silverman & Patterson, 2021).

Arguably, the current study, in principle, is a study of policy implementation that seeks an informant's review. The participants for this study included the mining community stakeholders. Selecting this cohort of participants as residents of a mining community was to obtain the primary data since they are directly impacted (positively or negatively) by the presence of a PGM mine in their community.

4.4.2 Document Analysis: Sustainability Reporting – Secondary Data Collection

The purpose of document analysis was to measure PGM mining companies' application of the SDG Compass. Since PGM mining companies are listed on several mineral associations and stock exchanges, they are obligated to have a reporting suite comprising various reports, such as annual financial statements, remuneration reports, IT Governance reports and sustainability reports, amongst others.

Sustainability reports were used as data collection tools for this study. Thus, analysis was done without neglecting other applicable reports that typically encompassed information relating to the SDGs, such as Social and Labour Plans (SLPs), Annual Reports (ARs), Integrated Reports (IRs) and ESG Reports. Notably, these secondary reports would only be analysed if the sustainability reports were not rendering a favourable outcome per the SDG Compass.

4.4.3 Data Collection: Primary (semi-structured interviews) and secondary (document analysis)

Table 4.4 provides an overview of both the primary and secondary data collection processes. The table points out the mining community, province and the stakeholders. Columns A, B and C provide the primary data collection for the semi-structured interviews.

The PGM mining company (D) and the mining operation (E) is for the secondary data collection for the document analysis of sustainability reports.

Table 4.4: Primary and Secondary Data Collection Processes

Primary Data Collection			**Secondary Data Collection**	
Semi-structured Interviews			**Document Analysis**	
Mining Community (A)	**Province (B)**	**Stakeholder (C)**	**PGM Mining Company (D)**	**PGM Operation (E)**
Thabazimbi	Limpopo	MCS-1	Anglo American Platinum	Amandebult Operation
Driekop	Limpopo	MCS-2	African Rainbow Minerals	Modikwa Operation

Brits	Northwest	MCS-3	Eastplats Crocodile	Barplats Operation
Rustenburg	Northwest	MCS-4	Impala Platinum Holdings	Rustenburg Operation
Mokopane	Limpopo	MCS-5	Ivanhoe Mines	Ivanplats Operation
Steelport	Limpopo	MCS-6	Nkwe Platinum	Zijin Platinum Mine
Lydenburg	Mpumalanga	MCS-7	Northam Platinum Holdings	Booysendal North Operation
Rustenburg	Northwest	MCS-8	Sibanye-Stillwater	Marikana Operation
Swartklip	Limpopo	MCS-9	Siyanda Resources	Siyanda Bakgatla
Rustenburg	Northwest	MCS-10	Tharisa Minerals	Tharisa
Ledig	Northwest	MCS-11	Wesizwe Platinum	Bakubung Operation
Pilansburg	Northwest	MCS-12	Sedibelo Resources	Plilansburg Platinum
Waterberg	Limpopo	MCS-13	Platinum Group Metals	Waterberg Operation
Leolo Mountain	Limpopo	MCS-14	Bauba Platinum	Houtbosch Operation

Source: Author's construction

4.5 MEASURING INSTRUMENTS

The study employed two research instruments to obtain the primary and secondary data. The first research instrument, which is an interview schedule, was used to attain the relevant information regarding the SDGs implementation targets (primary data). The second research instrument used was to perform document analysis on various PGM mining companies' sustainability reports using the SDG Compass and the PwC Challenge Framework (secondary data).

4.5.1 Semi-structured interviews – Sustainable Development Goals

A 35-itemised research instrument was used to conduct the semi-structured interviews. The constructs were built per the SDGs adopted by the MCSAs social and relationship capital. The interview questions will outline relevant targets that were useful in addressing the objectives of this study. The interview schedule covered nine SDGs: SDG-1, SDG-2, SDG-3, SDG-4, SDG-5, SDG-8, SDG-10, SDG-11, and SDG-16. Among these, the study focused on 27 implementation and outcome targets.

Items 28-35 were adopted from the mining community development element of the SLP and were used to measure the progress of SLP sustainability projects.

4.5.2 Document Analysis – Sustainability Reporting

The SDG Compass guided the questioning when analysing the sustainability reports. Since the SDG Compass entails five steps, (1) understanding the SDGs, (2) defining priorities, (3) setting goals, (4) integrating, and (5) communicating, the 18 items were split among these steps. Notably, this research instrument was quantified using the PwC (2019) challenge framework, which analysed the degree (quality) to which PGM mining companies reported on the SDGs in their sustainability reports. The PwC challenge framework presented in Table 4.5.

Table 4.5: SDG Challenge Framework – Document Analysis

Scoring:
0 – SDGs stated without an ambition – No plan/ambition for the organisation to act, merely, a simple reference to the SDGs.
1 – SDGs stated with an ambition that is qualitative in nature – The level of ambition for the organisation is qualitative, which narrates their actions in text, however, entailing no quantitative ambition.
2 – SDGs stated with an ambition that is quantitative in nature – The level of ambition for the organisation is quantitative, however, there is minimal data to report on progress (Notably, it is unlikely to attain a report on that is purely quantitative, as such reasonable amount of quantitative, as such, scoring #2 will be per the researcher's discretion)
3 – SDGs stated with both quantitative and qualitative ambition – Moreover, quantitative and qualitative data is provided to indicate progress towards the SDGs.

Source: PwC challenge framework (2019)

4.6 SAMPLING STRATEGY

Sampling strategies are crucial in research as they determine the selection of participants or subjects from a larger population to be studied, enabling researchers to draw insights and conclusions that can be generalised to the broader population (Guetterman, 2020). Two types of sampling strategies were employed in this study: stratified purposive sampling and purposive sampling.

4.6.1 Stratified Purposive Sampling – Sustainable Development Goals

Stratified purposive sampling is a non-probability sampling technique that combines elements of purposive sampling (selecting participants based on a specific criteria) and stratified sampling (dividing the population into subgroups) (Campbell, 2020). The study included a sample of 14 participants corresponding to the 14 PGM mining communities.

4.6.2 Purposive Sampling – Sustainability Reporting

Central to this study, are the 14 PGM members of the Minerals Council South Africa. Considering the document analysis research design, the study employed purposive sampling. Purposive sampling enables the researcher to use their judgement to select research participants who can offer the best information to achieve the study's objectives (Campbell, 2020). Furthermore, it is typically employed in qualitative research when investigating an in-depth comprehension of a phenomenon of interest and the researcher deliberately selects participants that can provide relevant and rich information, even though they may not represent the broader population (Mireku-Gyimah & Gyamfi, 2016). As such, practically speaking, this involved the researcher deliberating selecting participants with knowledge and experience relevant to the research questions.

4.7 PRELIMINARY DATA ANALYSIS

Data analysis is the process of systematically searching, organising and reviewing data to derive meaning through interpretation and summarising specific data sets in line with the research question(s) (Kim & Yoon, 2025; Lestari & Rahmanto, 2021). Simply put, it is merely a process of assessing raw data to extract meaningful information from it (Tabuena & Hilario, 2021). Notably, data analysis may take various forms: descriptive analysis, which involves measures of central tendency, variability, distribution and frequency (Ali *et al.,* 2019), and quantitative analysis, which focusing on quantifying relationships and testing hypotheses (Rahman, 2016); and qualitative data analysis which examines non-numerical data such as images, text and audio to identify meanings and patterns (Tabuena & Hilario, 2021).

Grounded theory analysis, transcription and thematic coding for the semi-structured interviews on the SDGs implementation targets will be discussed next, followed by thematic analysis for the document analysis using the SDG Compass framework.

4.7.1 Grounded Theory Analysis, Transcription & Coding – Sustainable Development Goals

The appropriate data analysis process that this study employed with respect to the semi-structured interviews, included grounded theory analysis, transcription and thematic coding. These data analysis processes for the semi-structured interviews were adopted to ascertain full

comprehension as per the respondents' perspectives and views on the SDGs implementation targets. Notably, a pre-determined and structured data analysis process was not sufficient to address the research questions due to the open-ended and semi-structured nature of the data collection process.

Grounded Theory Analysis

Grounded theory analysis is less structured and more adaptable for qualitative data analysis, as it builds theory from the ground up (Yin, 2014). Data gathered consisted of the participants' own explanations and interpretations of the SDGs implementation targets. As such, grounded theory analysis was applicable in this study since it analysed the data from transcripts to identify relationships, patterns and themes, ultimately building a theory explaining the phenomenon being studied (Dourdouma & Mortl, 2012).

Transcription

Transcription is the process of converting audio recordings into written text (Ungarsohn, 1996). For this study, it involved converting the raw data obtained through grounded theory analysis into manageable formats for analysis, enabling the researcher to identify themes, subsequently coding the themes.

Thematic Coding

Thematic coding involves categorising segments of data into themes that can be summarised to extract meaningful insights (Creswell, 2013). Furthermore, thematic coding will begin with primary coding, where words, lines, segments and incidents are meticulously studied for their analytical value (Memela, 2020). Furthermore, thematic coding of the SDGs implementation targets was undertaken by applying the Braun and Clarke's (2006) process of thematic analysis. Likewise, the thematic analysis used for sustainability reporting required the researcher to identify themes mentioned during the interviews, generate codes of what was frequently mentioned and map out diagrams to understand the themes. Furthermore, the researcher organised chunks of the data into coherent SDG-related sections.

4.7.2 Thematic Analysis – Sustainability Reporting

The second preliminary data analysis method applied in this study was thematic analysis. Thematic analysis is a fundamental research method for qualitative data analysis since it provides critical skills and strategies for conducting many other forms of qualitative analysis (Braun & Clarke, 2006). Nowell *et al.* (2017) states that thematic analysis is a qualitative data analysis process widely applicable across various research questions and epistemological perspectives.

Table 4.6 outlines the six main phases of thematic analysis used in this study for the document analysis of sustainability reports, and social and labour plans.

Table 4.6: Thematic Analysis – Sustainability Reports

Analytical Phase	Description	Actions
Data familiarisation (Identifying)	The researcher was immersed in the data (documents) to understand the depth and breadth of the contents contained within.	1) The action with data familiarisation to read and re-read the sustainability reports as well as the social and labour plans of the PGM mining companies. 2) During the process, the researcher took notes as per the scale (SDG Compass, 2018).
	Patterns were searched among the reports and documentation handy to the researcher.	
Initial code generation (organising)	The researcher generated initial codes to organise the data.	3) This action included labelling and organising the data items into meaningful stratums. This was done with comprehensive and equal attention to each PGM mining company sustainability report, and social and labour plan.
Generating critical themes (Analysing)	The researcher mapped and diagrammed the themes. The writing of those themes and defining their properties was the next action undertaken.	4) This step entailed the researcher sorting out several codes using the SDG Compass as a framework on the sustainability reports, and the social and labour plans into themes. Identification of meaning and relationship among the initial codes on the reports was selected.
Theme review (Organising)	The study identified coherent patterns per the level of coded data. Furthermore, the studies reviewed the entire data set as a whole.	5) The researcher ensured that there is enough data on the SDG Compass published on the sustainability reports. 6) This required the researcher to review the themes and collapse all overlapping themes. 7) The data was obtained from the sustainability reports. This propelled the researcher to rework and refine several codes and themes that

Analytical Phase	Description	Actions
		immerged throughout the document analysis.
Theme defining and naming (Describing)	This analytical phase required the researcher to identify the story that was then articulated by each of the identified themes. As such, this broad story was footed to the data set to respond to the research questions.	8) The researcher cycled and wrestled between the data and identified themes to organise the story of PGMs, sustainability reporting, and social and labour plans used through the SDG Compass.
Report production (Reporting)	This stage required the researcher to present a concise and interesting account of the written story, both within and across themes.	9) The researcher scribed a compelling argument that addressed the research question; this is presented in Chapter 6.

Source: Braun & Clarke, 2006

In conclusion, preliminary data analysis discussed in this chapter provided an overview of what will be discussed in Chapter 5. This chapter provided an overview of the results from the semi-structured interviews and document analysis.

4.8 PILOT TESTING – SUSTAINABLE DEVELOPMENT GOALS

Piloting a research instrument prior to its administration to the actual study population is important (Berndt & Petzer, 2011). Thus, if a study is not piloted, there is a risk of a flawed data collection process that may be irreparable (Hassan *et al.,* 2006). As such, pilot testing requires conducting preliminary runs of the research instrument with a limited number of respondents (Zikmund & Babin, 2013). Considering the research designs for this study, document analysis and semi-structured interviews, the latter will be the only research design piloted. Moreover, the researcher debriefed the respondents by going through the study's aims and requesting feedback on the clarity and comprehension of the questionnaire.

Based on the feedback received, the researcher made the necessary refinements to the research instrument prior to the main data collection phase (Yator & Kwasira, 2020). Notably, the piloted participants needed to have the same characteristics as the main study sample but will be excluded from the final sample (Hassan *et al.,* 2006). For this study, which adopted 14 PGM mining companies, the pilot study employed two other mining companies, mining different minerals, located outside the Bushveld Igneous Complex. The table below indicates the pilot study schedule.

Table 4.7: Pilot Study schedule

Mining Company	Mining Operation	Minerals	Ownership Structure	Host Community	Province
Sasol Mining	Sasolburg	Coal	100%	Sasolburg – Zamdela	Free-State
Harmony Gold	Moab Khotsong	Gold	100%	Klerksdorp	North-West

Source: Author's construction

4.9 ETHICAL CONSIDERATIONS

When research is being conducted, the ethical considerations outline the responsibility of the researcher to be respectful and honest in their approach to all the individuals who are directly or indirectly affected by the research study (Marceta, 2019). Inherently, the main purpose of ethics in research is the avoidance of harm to the community, the environment, the participants and/or the institutions in which the research is being conducted (Tshabalala, 2022). Ethical principles may be categorised into four domains: (1) protection from harm, (2) informed consent, (3) confidentiality and privacy, and (4) equitable and just treatment (Diener & Crandall, 1978). These ethical principles aim to safeguard the interest of all the participants involved within the study, as well as ensuring that the research achieves the intended outcomes with minimal negative consequences (Tremaine *et al.*, 2005). Informed consent is the cornerstone of ethical research practice since it is about providing the participants with sufficient information and understanding of the research so that the participants are fully aware of what they are consenting to and can choose to withdraw at any time (Gravetter & Forzano, 2012). For this study, the measuring instruments successfully passed the committees' standards and was awarded the following ethics clearance number: **HSSREC/00007130/2024**.

4.10 SYNOPSIS

This chapter outlined the research design and methodology. Notably, most sections of this chapter that are deemed necessary (research design, scope, data collection, measuring instruments, sampling strategy and preliminary data analysis) were discussed and applied dually, since the study adopted two research designs. The chapter began by defining the research scope and provided a graphical presentation of the BIC, an area encompassing the platinum minerals in four of its limbs. The research approach and discussions on the qualitative research approach were clarified and discussions on the semi-structured interviews and the

document analysis were provided. The SDGs implementation targets were measured using the semi-structured interviews and the analysis of the sustainability reports via document analysis. Primary and secondary data collection methods were discussed.

This highlighted the measuring instruments that the study employed, semi-structured interviews being the SDGs' implementation targets and with document analysis, the SDG Compass. The sampling strategy then followed, wherein the chapter described the use of grounded theory analysis, transcription and coding appliable for the semi-structured interviews and thematic analysis applicable for the document analysis. Piloting of the interview schedule was also described. Lastly, the ethical considerations of the study were discussed. The next chapter presents the data analysis and interpretation of the study.

CHAPTER 5

DATA ANALYSIS AND INTERPRETATION

5.1 INTRODUCTION

Chapter 4 of this study detailed the research methodology followed to analyse the sustainable development goals implementation targets and the sustainability reports of South Africa's platinum mines. The empirical findings using the research questions are to report on and interpret the analysis of the SDGs and the current state of sustainability reporting practices in the PGM industry. To inform and refine the design of the main study, a pilot test of the semi-structured interviews was conducted with one non-PGM mining company.

Section 5.2 summarises the pilot testing of the semi-structured interviews. Section 5.3 will discuss the demographical information of the participants of the main study regarding the semi-structured interviews, as well as the main results. Section 5.4 will then elaborate on long-term implications of a social licence to operate. The document analysis follows in Section 5.5 according to the SDG Compass. The results of the pilot test follow in the next section.

5.2 PILOT STUDY – SUSTAINABLE DEVELOPMENT GOALS IMPLEMENTATION TARGETS

This section will outline the recommendations of the pilot study. This includes the recommendations gained from conducting the pilot study and the primary data collection method. Furthermore, the demographical information of the participants and the findings of the pilot study will be discussed.

5.2.1 Pilot study – brief overview

The pilot study was conducted in Zamdela, Free State province, measuring the SDG implementation targets by the company, Sasol Limited (oil and gas). As such, both the company and the community are outside the borders of the Bushveld Igneous Complex and do not have any associations with platinum. The participants for the pilot study encompassed the same characteristics as those of the main study. The main aim of the pilot study was to establish whether the research instrument to be used in the main study would deliver the desired results.

5.2.2 Pilot study – recommendations

Based on the pilot study's recommendations, the research instrument was refined. As such, the pilot study recommended two key points: reducing the word count of certain questions and deleting or merging repetitive questions. The pilot study recommended a reduction of words regarding questions A2 – A7 and A14. This recommendation was beneficial to ensure that questions presented to the main participants were clear and comprehensible, which would ensure minimal bias.

The second recommendation from the pilot study with respect to refinements of the research instrument included the deletion and merging of certain questions (A21, A24-A26, A29-A30, A32). Deleting and merging these questions would yield a more engaging and efficient data collection process, subsequently simplifying the analysis. Annexure A indicates the original questionnaire, type of refinement (if applicable) and the final questionnaire to be used in the main study.

Notably, the two main changes on the research instrument were not detrimental to its reliability, since they encompassed minor modifications to the phrasing of the items encompassed. As such, the main study was able to commence with confidence in the reliability of the research instrument.

5.3 MAIN RESULTS AND DEMOGRAPHICS

This section starts with the demographic characteristics of the participants that made up the sample in the main study. The intention was to interview 14 mining community stakeholders located in the Bushveld Igneous Complex. However, the study could only attain data from five mining community stakeholders. Therefore, an overall response rate of 35.7 percent for the semi-structured interviews. The response rate achieved in this study limits the generalisability of the findings and conclusions to be drawn from these interviews. Fortunately, given the scope of this study and its ability to undertake two qualitative approaches, the document analysis (92.8 percent – Section 5.5) complemented the limitation of the semi-structured interviews by analysing the sustainability reports. Thus, the overall response rate considering both qualitative approaches is an acceptable 64 percent. To this study, each mining community stakeholder that was interviewed will be referred to as MCS-1, MCS-2, MCS-3, MCS-4 and MCS-5.

Table 5.1 outlines the demographical information of the participants that were interviewed for the main study. This is followed by the demographic analysis in Table 5.2.

Table 5.1: Demographical Information – Mining community stakeholders

Demographics Analysis					
	MCS-1: 13 November 2024	**MCS-2: 03 November 2024**	**MCS-3: 14 November 2024**	**MCS-4: 23 November 2024**	**MCS-5: 09 December 2024**
Gender:	Male	Male	Female	Female	Male
Age:	30-39	30-39	40-49	30-39	50-59
Education:	Secondary Schooling	Some Tertiary Schooling	Post-graduate qualification	Post-graduate qualification	Post-graduate qualification
Population Group:	Black	Black	Black	Coloured	Black
Country of Origin:	South Africa	South Africa	South Africa	South Africa	South Africa
Length of Residence:	25 Years>	25 Years>	10-15 Years	25 Years>	25 Years>
Proximity to PGM:	1-5km	10-15km	15-20km	1-5km	1-5km
Employment Status:	Employed	Self-Empoyed	Employed	Employed	Employed
Occupation & Industry					
MCS-1:	Executive Assistant: NPO: Department of Social Development				
MCS-2:	Small-scale Farmer: Department of Agriculture, Land Reform and Rural Development				
MCS-3:	Medical Doctor: Department of Health				
MCS-4:	Stakeholder Engagement Practitioner: Department of Mineral Resources and Energy				
MCS-5:	Head Principal and Teacher: Department of Basic Education				
Mining Community & Operation Measured:					
MCS-1:	Mokopane, Limpopo: Ivanhoe Mines, Ivanplats Operation (IVANPLATS)				
MCS-2:	Lydenburg, Mpumalanga: Northam Platinum, Booyendal Operation (NPH)				
MCS-3:	Marikana, Northwest: Sibanye-Stillwater, Marikana Operation (SSW)				
MCS-4:	Ledig, Northwest: Wesizwe Platinum, Bakubung Operation (WESIZWE)				
MCS-5:	Mantsere, Northwest: Siyanda Resources, Siyanda Bakgatla Platinum (SIYANDA)				

Table 5.2: Demographical Analysis – Mining community stakeholders

Mining Community Stakeholders – Demographic Analysis
Gender:
Most of the participants included in this study were male, accounting for 60 percent of the sample size and only 40 percent are female.
Age:
Age was a key demographic requirement for this study; all participants had to meet the requirement of being an adult. Age is an important demographical aspect for any study. First, it assists in developmental stages and life courses, which influence attitudes and behaviours. Second, cohort effects, such that individuals born in the same period may have lived through similar social events. As such, this study employed participants who are aged 30 and above, with the oldest criteria being 50 years of age. Therefore, 60 percent of the participants were aged between 30-39 years, which is the most represented age cohort, followed by 20 percent who were aged between 40-49 years, and lastly, the participants falling within the 50-59 years age group.
Educational Background:
The level of education of the participants was also an important demographic characteristic that this study had to consider. Education level is influenced by cognitive abilities and skills. Hence, the study had to ensure that the participants had at least some primary schooling. This is because literacy and numeracy skills impact how an individual processes information and how they actively participate in a research study. As such, 20 percent of the participants indicated that they have secondary schooling experience. Another 20 percent of the study's participants had some tertiary schooling. Most of the sample's participants (representing 60%) hold a post-graduate qualification.
Population Group:
This study sought to only recruit mining community stakeholders who reside within the Bushveld Igneous Complex, which is a predominantly black population group area. As such, 80 percent of the participants were black while the remaining 20 percent were classified as coloured.
Country of Origin:
The study was conducted in the BIC, within the geographical boundaries of South Africa, 100 percent of the participants were South African citizens.
Length of Residence:
The length of residence for the participants is an important criterion. This study also considered community integration and the social networks. Typically, longer residence in a particular community is often associated with a higher degree of community integration as well as established social networks. This study found that 80 percent of the participants have resided in the Bushveld Igneous Complex for over 25 years, with the remaining 20 percent having stayed in the Bushveld Complex for a period of 10-15 years. Thus, both the 80 percent of the participants as well as the 20 percent in their respective communities have fostered community attachment and a sense of belonging, which influences their level of participation in community engagement initiatives.
Proximity to the operation:
The study examines how PGM mining companies are implementing the SDGs in the communities near their mines. A host community refers to the community living close to a mining area, which may be affected by the mining company's actions. The mining industry uses this term to suggest that the community welcomes the mine and will benefit from it. As such, the criteria for this demographic analysis were that all participants must reside within a 50km radius of

the operation. Therefore, 60 percent of the participants lived within a 1-5km radius of the operation. The remaining 40 percent lived either 10-15km (20%) or 15-20km (20%) from the operation
Employment Status:
The study included participants from different industries, all of whom were associated with the mining communities under review. MCS-1 is an executive assistant at an NPO registered with the Department of Social Development. MCS-2 is a small-scale farmer with his property registered under the Department of Agriculture, Land Reform and Rural Development. Although MCS-1 and MCS-2 work independently from these departments, there are associations thereof. MCS-3 is a medical doctor at the local hospital. MCS-4 works as a stakeholder and engagement officer for another mine registered with the Mineral Resources and Energy department. MCS-5 is a public-school teacher who now serves as the headmaster of a primary school, Department of Basic Education.
Mining communities and mining operations:
The mining communities were measured using the SDG implementation targets and SLP mining community element of their sustainability projects. The communities that were measured in this study include Mokopane (Limpopo), Lydenburg (Mpumalanga), Marikana, Ledig and Mantsere (Northwest). As such, the Northwest province accounted for 60 percent of the participants in this study, while the Limpopo and Mpumalanga provinces made up the remaining 20 percent and 20 percent, respectively. The operations included in this study include, Ivanhoe Mines (Ivanplats Operation), Northam Platinum Holdings Limited (Booysendal Operation), Sibanye-Stillwater (Marikana Operation), Wesizwe Platinum (Bakubung Operation) and Siyanda Resources (Siyanda Bakgatla Platinum).
Time:
The researcher undertook the research interviews towards the end of 2024, two months in the last quarter of the year. As such, Ivanhoe Mines' interviews were on 13 November 2024, Northam Platinum on 03 November, Sibanye-Stillwater, and Wesizwe Platinum had their interviews on the 14th and the 23rd of November 2024. The last interview was scheduled on the 09th of December for Siyanda Resources.

Table 5.3: Main Results – Mining community stakeholders

SDG-1: End Poverty in all its forms
A1) Has the PGM mining company in your area implemented any programmes to reduce any form of poverty in your community?
The study found that all the PGM mining companies indirectly address poverty by providing the community members with short- and long-term employment opportunities, skills development, vocational training and entrepreneurial support, particularly in Mokopane and Ledig (MCS-1; 1 Nov. 3&14, 2024:1). MCS-2 (Nov. 03, 2024:1) pointed out that NPH Booysendal provides Lydenburg residents with drilling and mining skills. MCS-3 (Nov.14, 2024:1) stated that the Marikana operation established a community trust to develop their enterprise supplier development program. A more direct yet not entirely sustainable, arguably, is an approach taken by the Siyanda Bakgatla Platinum operation, wherein MCS-5 (Dec. 09, 2024:1) mentioned that alongside educational opportunities, skills development and job creation, the company provides the vulnerable residents (children, sick, disabled and elderly) of the Mantsere community with food parcels.
A2) Are you aware of any pro-poor development policies used by the PGM mining company to accelerate investment in poverty-eradication?
The study discovered that pro-poor development strategies by all PGM mining companies are not publicly disclosed. Thus, there is a reliance on other sets of documentation such as a corporate social and responsibility (CSR) report (MCS-2, Nov. 03, 2024:2). Other forms of documentation include social and labour plans, purchase order forms (MCS-4, Nov. 23, 2024; MCS-5, Dec. 09, 2024:2) as well as internal HR policies. As such, the study deduced that PGM mining companies disclose high-level reporting, subsequently missing concrete manuals that clearly guide acceleration plans (if any) to eradicate poverty.
SDG-2: End hunger, achieve food security and improved nutrition, and promote sustainable agriculture
A3) Has the PGM mining operation assisted with growth of small-scale food producers in the community?
Several PGM groups address SDG-2 through consultations with small-scale food producers in Mokopane and Marikana (MCS-1, Nov. 13; MCS-3, Nov. 23, 2024:3) and school initiatives like Bakubung's vegetable gardens in Ledig and Siyanda Bakgatla's food vouchers in Mantsere (MCS-4, Nov. 23, 2024; MCS-5, Dec. 09, 2024:3). While some programs are beneficial, others lack long-term sustainability. NPH's Booysendal operation conducted a food security study but has not implemented any related initiatives (MCS-2, Nov. 03, 2024:3).
SDG-3: Ensure healthy lives and promote well-being for all at all ages
A4) Has the PGM mining company built or refurbished a health facility in your community as well as conducting health campaigns?
The common trend followed in building or refurbishing health facilities in mining communities is partnering with the local departments of health. As such, the study found that Ivanplats, per MCS-1's (Nov. 13, 2024:3) assertion, has refurbished the maternity ward in Mokopane. The Bakubung and Booysendal operations have refurbished and built clinics in both Ledig and Lydenburg as opposed to focussing on one health-related service (MCS-4, Nov. 23, MCS-2, Nov. 03; 2024:4). With health awareness campaigns, MCS-3 (Nov. 14, 2024:4) stated that the Marikana operation hosts annual HIV/AIDS and TB awareness campaigns, which demonstrated a commitment to ensuring an awareness in this respect. Additionally, Siyanda Bakgatla Platinum has, for several years, conducted health awareness campaigns amplified during the COVID-19 period and beyond (MCS-5, Dec. 09, 2024:4).
A5) Has the PGM mining company worked with the local department of health in training the health workforce?
None of the PGM mining companies in this study intervene in the recruitment and retention of the health workers; this responsibility lies with the local Department of health. Thus, financing of health awareness campaigns and infrastructure outlined in SLPs or Trust deeds, PGM mining companies will support but will not ensure the development of health workers.

SDG-4: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all
A6) Has the PGM mining company in the area built or upgraded education facilities in your community?
This study discovered that PGM mining companies are committed to developing educational infrastructures in their communities using various approaches. Ivanplats has invested in a science laboratory with a focus on STEM (Science, Technology, Engineering & Mathematics) education (MCS-1, Nov. 13, 2024:5). Booysendal in Lydenburg refurbished TVET colleges and rehabilitation centres (MCS-2, Nov. 03:2024:5). The Marikana operation prioritised school safety measures with security ITS (Information technology systems) and electric fencing (MCS-3, Nov. 14:2024:4). In addition, the Bakubung operation focused on sports equipment (MCS-4, Nov. 2024:5). Lastly, Siyanda Bakgatla Platinum supported schools in Mantsere with medical interventions (the constructing of a sick-room) (MCS-4, Dec. 09, 2024:6).
A7) Has the PGM mining company increased, locally, the number of scholarships and bursaries available to your community?
This study found that all five PGM mining companies offer scholarships and bursaries. To increase their intake, Ivanplats advertises them on local media platforms (MCS-1, Nov. 13, 2024:6). With Booysendal, MCS-2 (Nov.03, 2024:6) stated that initially, the company offered bursaries to persons external to Lydenburg, but this approach shifted when the company established a community trust specifically for mining villages surrounding the operation. SSW follows a different approach by partnering with their feeder schools and thus commences the bursary and scholarship journey (MCS-3, Nov.14, 2024:6). MCS-4 pointed out that the Bakubung operation offers artisan development programs alongside their bursary scheme (MCS-4, Nov. 23, 2024:6). With Siyanda Resources, the company prioritises Mantsere residents by providing mining-related bursaries (MCS-5, Dec. 09, 2024:6).
A8) Has the PGM mining company worked with the education local department to increase the number of teachers, through cooperation for teacher training development?
No PGM mining company in this study currently runs teacher training development programs in schools, as this is considered the key responsibility of government (education department). However, Siyanda Resources previously funded the coordinated such programs in partnerships with the local department of education but has since stopped (MCS-5, Dec. 09:2024: 7)
SDG-5: Achieve gender equality and empower all women and girls
A9) Has the PGM mining company in your area undertaken action to give women equal rights to the sub-economic resources that flow from the mine?
It has been highlighted in the study that PGM mining companies are demonstrating their efforts towards gender equality and women empowerment. However, male dominance persists both internally and externally within the communities. Ivanplats supports several women-led businesses, typically beadwork (MCS-1, Nov. 13, 2024:7). In Lydenburg, opportunities are awarded to predominantly men in the community (MCS-2, Nov. 03, 2024:7). Likewise, MCS-3 (Nov. 14, 2024) pointed out that the Marikana operation does not effectively deal with gate-keeping issues hindering women access to long-term contractual tenders and information. According MCS-4 (Nov 23, 2024:8), Wesizwe Platinum's contribution to Ledig women is a compliance exercise with the Mining Charter and thus superficial in nature. Siyanda Bakgatla Platinum on the other hand, per MCS-5 (Dec. 09, 2024), are fully supporting women-led businesses in Mantsere.
A10) Do you know of any social programs on which the PGM mining company has embarked, to promote the empowerment of women and girls in the community?
MCS-1 (Nov. 13, 2024:) informed the study that Ivanplats conducts regular gender-based violence programs (GBV) advocating for the protection of women in Mokopane. For Lydenburg, Marikana and Ledig, the PGM mining companies operating within these communities provide limited information on dedicated

programs for women, or simply tie such programs with national events such as South Africa's National Women's Day. One company that has a specific program to empower women and girls in Mantsere is Siyanda Bakgatla Platinum, wherein the company hosts annual 'girl-to-girl' chats, which provide women, girls and female guardians an area to discuss several societal issues in the community (MCS-5, Dec 09, 2024).
SDG-8: Promote sustained, inclusive, and sustainable economic growth, full and productive employment, and decent work for all
A11) Has the PGM mining company prioritised your community by providing access to full and productive employment and decent work for all?
Prioritising local employment is prevalent in all mining communities (Mokopane, Lydenburg, Marikana, Ledig & Mantsere) included in this study, thus positively impacting several livelihoods and families and boosting the local economy. Notably, in Marikana SSW prioritises close relatives with a family program of the deceased Marikana massacre miners (MCS – 3, Nov. 14, 2024:9). Beneficiaries obviously will provide documentation as proof.
A12) Does the PGM mining company provide the youth of this community with employment or training opportunities?
Likewise, with the employment opportunities for the entire communities (Mokopane, Lydenburg, Marikana, Ledig & Mantsere), PGM mining companies invest in youth employment through skills development and other related programs such as artisanship, with the aim of full employment at the mines. Nevertheless, challenges that persist include poor financial management skills (MCS-2, Nov. 03, 2024:10) and substance abuse (MCS-3, Nov. 14, 2024:10). Substance abuse is a key factor and contributes to warning and ultimately dismissals at SSW, since it is a mine and has zero tolerance on alcohol and drug abuse.
A13) Has the PGM mining company benchmarked with relevant stakeholders to discuss the termination of child labour in all its forms?
The general finding in the study regarding child labour indicates that it is not a prevalent matter. As such all the MCS's assumed that the PGM mining companies in their communities adhere to the South African Labour laws. Nevertheless, the historical context of child labour in the mining industry is acknowledged with some MCS's stating that child labour used to be a key issue in the primitive mining industry under the Apartheid government, however, this practice is not a material issue in 2024. MCS-3 (Nov. 14, 2024:12), however, stated that the possibility of child labour in Marikana is acquainted to foreign nationals, referred to Zama Zama's.
A14) Has this PGM mining company promoted sustainable tourism that will create secondary jobs?
Both MCS-1 and 2 (Nov. 13 & 3, 2024:12) stated that there are no partnerships with local authorities to boost the tourism in their communities. Wesizwe Platinum also has limited involvement with tourism, notwithstanding that their Bakubung operation is in proximity to Sun City resort, which will bring about secondary employment for the Ledig residents (MCS-4, Nov 23, 2024:12). However, in Marikana, SSW is constructing a museum to commemorate the Marikana massacre victims (MCS-3, Nov. 14, 2024:12). Siyanda Bakgatla Platinum has developed a tourist demarcation in the mine offering visitors' key insights of the mine's history, subsequently employing two Mantsere-based taxi associations to ferry the tourists in and around the mine (MCS-5, Dec 09, 2024:12).
A15) Has there been partnerships between the PGM mining company and local banks to encourage and expand access to banking?
While strategic partnerships may exist between the PGM mining companies and the local banks, the benefit is for employees at these mines (MCS-3, Nov. 14, 2024:13). As such, MCS-1 (Nov.13, 2024:13) stated that there are collaborations between two local banks and Mokopane residents to increase access to their services, however, this is independent from the mine. At Booysendal and Bakubung operations, both MCSs said that there are no partnerships between the banks and these mines to benefit their communities (MCS-2 & 4, Nov. 03 & 23, 2024:13).
SDG-10: Reduce inequality within and among countries

A16) Has the PGM mining company emphasised the need of representation from your community to assist its decision-making process for the strategy of how it will benefit your community?
Some PGM mining companies engage with their host communities regarding the company's sustainability and operational performance as well as the financials, yet the challenge remains in involving host communities in strategic decision-making. As such, MCS-1and 3 (Nov. 13 &14, 2024:14) both stated that Ivanplats and Marikana operations use various communication channels (media, community forum, roadshows) to convey mining developments in their companies, however, with limited decision-making powers for the communities. The same trend is followed in Lydenburg (MCS-2, Nov. 03, 2024:14) exemplified through the Tonteldoos high school project, where the mine's agenda was not aligning with the community needs. MCS-4 (Nov. 23, 2024:14) stated that tribal conflicts deter stakeholder engagement processes between Wesizwe Platinum and the Ledig community. On the contrary, MCS-5 (Dec 09, 2024:14) said that decisions
A17) Has the PGM mining company engaged with the local community regarding the facilitation of migrants and mobility of people in your community?
Mokopane, the mining community hosting Ivanplats, MCS-1 (Nov. 03, 2024:15) stated that the presence of migrants is not problematic since most migrants originate from nearby mining villages, thus speaking a common language (Sepedi and Xitsonga), reducing ethnic conflicts. With Booysendal and Marikana, MCS-2 and 3 (Nov 03, 2024:15) mentioned that both companies have not engaged their respective communities (Lydenburg & Marikana) regarding the influx of migrants. The same sentiments are echoed by MCS-4 (Nov. 23, 2024:14) with respect to the Ledig community. Lastly, MCS-5 (Dec, 09, 2024:15) pointed out that migrant-related issues are handled between the tribal council and Siyanda Bakgatla Platinum itself.
A18) Does the PGM mining company implement the principle of special and preferential treatment regarding the opportunities for your community?
MCS-1 (Nov. 13, 2024:15) stated that Ivanplats tailor their contributions to each mining village in Mokopane based on the current needs. MCS-2 (Nov. 03, 2024:16) highlighted that Booysendal established a community trust for Lydenburg residents alongside other mining villages around the operation. SSW on the other hand, disregards preferential treatment for Marikana residents in one area, which is that of awarding tenders, wherein, in most cases, long term tenders are given to externals (MCS-3, Nov. 14, 2024:16). According to MCS-4 (Nov. 23, 2024:16), the Bakubung operation focuses on skills development as a key mechanism for preferential treatment. Mantsere residents rely on the tribal council yet again to represent their needs to Siyanda Bakgatla Platinum, to the pleasure of MCS-5 (Dec 09, 2024:16), the tribal council actively monitors processes and practices undertaken by the mine.
SDG-11: Make cities and human settlements inclusive, safe, resilient, and sustainable
A19) Has the PGM mining company provided the community with adequate, safe, and affordable housing?
The study found that the provision of housing is mainly for the employees of the respective PGM mining operations. As such, the broader community members are likely secondary beneficiaries and again, this depends on whether a member of family member is employed by the operation. Thus, provision of houses for the wider community is limited; notably, this is not material since PGM mining companies are not obligated to provide housing beyond their employees. MCS-1 (Nov. 13, 2024:16) pointed out that there is a housing project underway in Mokopane, but it remains unclear if it is for the community or the employees. Other than that uncertainty, all mining community stakeholders (2-5) mentioned that any housing project undertaken in their communities by these PGM mining companies is for their employees.
A20) Has the PGM mining company assisted with improving the local roads in the community?
MCS-1 (Nov. 13, 2024:17) pointed out that Ivanplats invests significantly in road infrastructure within Mokopane and is currently upgrading the N11. Booysendal collaborated with several stakeholders in constructing Voortrekker Road (MCS-2, Nov 03, 2024:18). MCS-3 (Nov. 14, 2024:18) mentioned that

the road constructions undertaken by the Marikana operation are predominantly to benefit the company, with secondary benefits for the community at large. Furthermore, MCS-4 (Nov. 23, 2024:18) highlighted that the Bakubung operation has a minimal footprint with the main Bapong road being constructed by Sun City, obviously for their tourists. In Mantsere, Siyanda Bakgatla Platinum has constructed roads, however, not main roads but rather roads within the village (MCS-5, Dec. 09, 2024:14).
SDG-16: Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable, and inclusive institutions at all levels.
A21) Does the PGM mining company work with local authorities to reduce all forms of violence and related death rates in your community?
PGM mining companies do engage with the relevant authorities to address safety and security. Sibanye-Stillwater and Wesizwe Platinum work with law enforcement, however, with the primary focus on protecting company assets and employees within the premises of the mine (MCS 3-4, Nov. 4 & 23, 2024:19). With Booysendal and Ivanplats, collaborations with local authorities to reduce violence is prevalent, however, there is no evidence of tangible efforts to address the core issues within the community (MCS 1-2, Nov. 13 & 3, 2024:19). Siyanda Bakgalta with their security team have assisted the Mantsere community in responding to criminal activities (MCS-5, Dec.09, 2024:20).
A22) Has the PGM mining company conduct anti-corruption and bribery programmes in the community?
The participants in this study expressed that anti-corruption campaigns are typically conducted within the company. Thus, MCS-1 and 4 (Nov. 13&23, 2024: 20) state that anti-corruption campaigns are communicated on several platforms targeting employees and other stakeholders with minimal effort to engage the communities of Mokopane and Ledig. MCS-2 and 3, on the other hand, highlighted that the issue of employment trading and the zero tolerance thereof of such activities is what is communicated internally within PGM mining companies (MCS-2 & 3, Nov. 03&14, 2024:20). In Mantsere, per MCS-5 (Dec 05, 2024:20), Siyanda Bakgatla Platinum conducts several meetings with the community before an SLP project is underway wherein emphasis on anti-corruption measures and transparency are highlighted.
SLP Sustainability Projects
A23) Does the PGM mining company publicly share information on SLP community development projects and further consult the community about these projects?
PGM mining companies use various channels such as community meetings and online platforms to convey SLP-related information. Some companies effectively communicate with their host communities in person, thereby acknowledging the digital divide and employing translators during the meetings for residents who may not understand English (MCS-1, Nov. 13, 2024:20). Booysendal, Siyanda Bakgatla and Wesizwe Platinum rely on community forums and tribal councils to communicate SLP information pertaining to the development projects (MCS-2, 4-5, Nov & December 2024). This raises a concern of information potentially being diluted and filtered since it is not directly from these mines to the actual communities. Lastly, according to MCS-3 (Nov 14, 2024:20), SSW prioritises online platforms for information sharing; this too, is problematic since there are Marikana residents who have limited access to technology.
A24) Per the SLP of this PGM, are there any projects from which the community has directly benefited, particularly through their expertise of construction?
The consensus is that there are locals who benefit from construction-related projects. However, these benefits are not consistent nor equitable for the local businesses around the mining operation. As such, MCS-1, 2, 3 and 4 stated that the PGM mining companies in their respective community reward short-term construction projects with standard purchase orders (less than 6 months) to the community and mainstream projects are allocated to professionals outside the

community (Nov. 2024:22), thereby, excluding local businesses for major heavily financed construction projects. Lastly, MCS-5 stated (Dec 09, 2024:23) that there are conflicts and ethical issues that always arise in the local construction industry of Mantsere.
A25) Per the SLP of this PGM, are there any on-going sustainability projects that you are aware of?
The findings of this study indicate that all participants are generally aware of at least some of the SLP sustainability projects that are underway. In Mokopane, the participant mentioned the refurbishment of a clinic and drainage system (MCS-1, Nov 13, 2024:22). For the community of Lydenburg, MCS-2 (Nov. 03, 2024:22) is aware of construction of Voortrekker and Viljoen street. Current SLP projects that MCS-3 (Nov. 14, 2024:22) knows of are the construction of Majakaneng primary school and Leokeng high school. Lastly, in Mantsere MCS-5 (Dec. 09, 2024:23) pointed out there are seasonal winter school programs for the high school learners in preparation for the examination processes.
A26) Per the SLP of this PGM, are there any SLP sustainability projects that have been halted?
It is apparent that projects are not entirely halted but rather delayed and are likely to resume once all relevant stakeholders are informed. Ivanplats SLP projects that were delayed in Mokopane include a sports field and a drainage system. On both occasions, delays stemmed from non-compliance with the Integrated Development Plan (MCS-1, Nov. 13, 2024: 23). At both Northam and SSW, there were no stoppages of SLP sustainability projects, although disagreements occurred between the company and the community relating to procurement and tender processes (MSC 2-3, Nov. 3 & 23, 2024:23). Wesizwe Platinum constituted Section 189 (Downscaling and retrenchment), significantly impacting SLP projects, which is also a delay (MCS-4, November 23, 2024). Delays of SLP sustainability projects in Mantsere areas due to the lengthy engagements and associations with the tribal council (MCS-5, Dec. 09, 2024:24).
A27) Do you think that this PGM mining company ensures a fair distribution of benefits among other mining communities?
The study found that the PGM mining companies aim to distribute SLP benefits in a fair and just manner. MCS-1 (Nov. 13, 2024:24) pointed out that Ivanplats allocates different SLP projects per the diverse needs around Mokopane. For example, a clinic constructed in one village and school refurbishment taking place in another village. MCS-2 (Nov. 03, 2024:24) mentioned that Northam is not entirely fair, since Lydenburg benefits mostly from the community trust and not SLP sustainability projects which has more financial strength. In Marikana, there are power struggles between the mine and the residents, where outspoken individuals are seen as problematic making fair-benefit sharing difficult to achieve (MCS-3, Nov. 14, 2024:24). MCS-4 and 5 (Nov, Dec 2024) believe that both company's processes of demarcating which village receives which benefit are still lacking. This is because, both participants have noticed that the SLP projects undertaken are deemed as 'quick wins' rather than sustainable long-term solutions.
A28) Does this PGM mining company's Sustainability Report accurately reflect its contributions to the community's long-term needs?
The study found that there is a level of disconnect between what is presented and the different situations on the ground. Regarding SLP sustainability projects, the findings highlight that the reports are overly exaggerated as opposed to the reality experienced by the mining communities. As such, MCS-1 and 2 expressed the detailed sustainability reports rarely the communicates their experiences of hosting mining companies within their communities (Nov. 13&3, 2024:25). MCS-3 (Nov. 14, 2024:25) echoed the same narrative of oversharing information potentially obscuring real development issues. Lastly, MCS-4 and 5 stated that their community needs are met by the companies, however, both tend to do several projects that are short-term, thus failing to align with the community's evolving needs (Nov, Dec 2024:25).

5.4 LONG-TERM IMPLICATIONS AND SOCIAL LICENCE TO OPERATE

The concept of a social licence to operate has emerged as a critical principle for comprehending the complex relationships between local communities, mining companies and other stakeholders, which reflects the evolving landscape of corporate governance, corporate social responsibility, sustainable development and sustainability within the extractive industries (Pedro *et al.,* 2017). Furthermore, a SLO underscores the idea that mining companies require not only legislative and regulatory compliance, but the acceptance and ongoing support of the local communities that are directly or indirectly affected by their activities (Ofori & Ofori, 2018). Notably, the acceptance of the mining communities is an evolving dynamic event since mining communities play a crucial role in granting and potentially revoking the licence based on their perceptions of the mining company's environmental, social and economic performance (Omotehinse & Tomi, 2020).

As such, a company's ability to secure and maintain an SLO is recognised as a key determinant of mining project success, influencing mining project timelines, operational efficiency and performance, and ultimately, the long-term value of mining assets (Lunsford *et al.,* 2011). Therefore, a SLO necessitates a shift from traditional approaches, such as philanthropic investments and corporate social responsibility initiatives, towards a more integrated and geared business strategy that creates shared value for all stakeholders involved (Fraser *et al.,* 2020). Shared-value principles involve actively engaging with stakeholders to understand their concerns and aspirations and incorporating these insights into project design and operational practices, and lastly, ensuring that the benefits of mining are shared equitably among all parties involved.

Conclusively and fortunately so, this study found that the five PGM mining companies (Ivanplats, Northam Platinum, Sibanye-Stillwater, Wesizwe Platinum, Siyanda Resources) moderately address the SDGs and the implementation of the targets. As such, the mining community stakeholders involved in this study from Mokopane, Lydenburg, Marikana, Ledig and Mantsere did not echo sentiments of their communities' intentions of revoking the SLO in respect of the PGM mining companies that were measured in the given period.

Drastic measures that could potentially lead to a revocation of a SLO, to the very least, is a community unrest as depicted by MCS-2. Notably, the study gathered that mining community

stakeholders are willing to work with the PGM mining companies since they are all aware of the economic benefits that flow from the presence of a particular PGM in their community. Among the SDGs measured in this study, SDG-8 (Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all) was found to be a key determinant of satisfaction for mining communities. Nevertheless, in a situation where a SLO is revoked, both the community and the mine could be negatively impacted in several ways, as depicted in the table below.

Table 5.4: Implications of SLO revoked

Implications of revoked SLO			
Potential Implication	**Affected Stakeholders**	**Contravened SDG**	**Study's Findings**
Mining Projects delays	PGM mining company: increased costs and jeopardising the project economic viability	SDG-8	No findings in the period under review
	Mining communities: Minimal job opportunities.	SDG-8	No findings in the period under review
Operational disruptions	PGM mining company: Results in blockades and impacting production and the reputation of the PGM mining company.	SDG-8, 9, 16	No findings in the period under review
	Mining communities: Community members' potential of injuries and non-employment	SDG-3, 8	No findings in the period under review
Reputational Damage	PGM mining company: Loss time of production and loss of investor confidence.	SDG-8, 16	No findings in the period under review
	Mining communities: N/A		N/A
Compromised long-term value	PGM mining company: No production of minerals as there will be no mine. Resulting in legalities and poor reputation of not considering the mining communities.	SDG-8, 16	No findings in the period under review
	Mining communities: No production will result in non-employment	SDG-8	No findings in the period under review

Source: Author's construction

The next section outlines the summary of the findings with respect to the implementation of the SDG targets in mining communities.

The next section presents the results for the document analysis.

5.5 DOCUMENT ANALYSIS

This section examines PGM mining companies' usage of the SDG Compass as a reporting framework. Notably, the study intended to analyse 14 PGM mining companies (Table 5.1). However, 13 were analysed, the sustainability report for Siyanda Resources being inaccessible. Nevertheless, the study presents an acceptable response rate of 92.8 percent. The analysis was conducted using the PwC Challenge Framework (Table 5.5). Furthermore, the analysis of the reports is for FY2024, which covers the period 1 July 2023 to 30 June 2024.

Table 5.5: List of PGM mining companies

Keyword	PGM Company	Keyword	PGM Company	Keyword	PGM Company
ANGLO	Anglo American Platinum Corporation Limited	NKWE	Nkwe Platinum Limited	THARI	Tharisa Public Limited Company
ARM	African Rainbow Minerals	NORP	Northam Platinum Holdings Limited	WESI	Wesizwe Platinum Limited
BAUBA	Bauba Resources Limited	SSW	Sibanye-Stillwater Limited		
EAST	Eastern Platinum	SEDI	Sedibelo Platinum Mines Limited		
IMPLATS	Impala Platinum Holdings Limited	PGMS	Platinum Group Metals Limited		
IVAN	Ivanhoe Mines Limited	SIYA	Siyanda Mining Corporation (Pty) Limited		

Source: Author's construction

Table 5.6: PwC challenge framework

Scoring:
0 – SDG Implementation targets mentioned with no ambition (No ambition/plan for the company to act, only a general reference to the social SDG target)
1 – SDG implementation targets mentioned with a qualitative ambition (There is qualitative ambition for the company [narrative wording about the company plans to act on those targets] but no quantitative ambition)
2 – SDG implementation targets mentioned with a quantitative ambition (There is a quantitative ambition for the company [company has set quantified measures that are aiming for the future], but no reporting on progress towards the SDG targets) Notably, it is unlikely to attain a report on that is purely quantitative, as such reasonable amount of quantitative, as such, scoring #2 will be per the researcher's discretion.
3 – SDG implementation targets mentioned with quantitative reporting against ambitions (There is quantitative reporting on current progress as well as qualitative ambition towards the social SDG target)

Source: PwC (2019)

This study analyses how PGM mining companies address the SDGs using the SDG compass and the PwC challenge framework. The baseline score for this challenge is 'level 3'; hence, this score serves as the baseline in analysing the sustainability reports. Notably, this study

employed judgement sampling in its document analysis based on the researcher's judgement about which documents are most relevant to the research questions. As such, researcher will purposely select specific documents (sustainability reports) that are most relevant and allocate a score per the PwC challenge framework from that. Thus, the PGM mining company could either obtain 100 percent (3/3); 66.67 percent (2/3); 33.33 percent (1/3), or zero percent (0/3).

5.5.1 Sustainability Reporting – Results

Referring to the SDG Compass, this section presents the findings for each of the questions. The findings provide a general overview pertaining to the PGM mining companies' performance. Notably, B-15, which questions, 'Does the PGM Mining company have a separate SDG-Concentrated Report?', has no analysis, as the question is binary and the expected answer is one of two choices, 'yes' or 'no', as opposed to the other questions, which are also binary but give room for analysis.

Document analysis for this study was performed to answer the second research question as devised in Chapter 1, 'To what extent is the MCSA's PGM group, effectively applying the SDG compass to report on the SDGs?'. As such, the SDG Compass comprises five steps, namely, understanding the SDGs, defining priorities, setting goals, integrating, as well as reporting and communicating.

Therefore, the results will be presented in a split nature per the SDG Compass. Notably, due to the frequency of the 'Sustainability Report' in this section, it will be abbreviated as 'SR'. As such, the first step of the SDG Compass, understanding the SDGs, will follow.

5.5.2 Step1: Understanding the SDGs

The results with respect to Step 1 of the SDG compass will commence with B1, which questions a comprehensive level of understanding regarding the SDGs, followed by B2, which articulates the business case and lastly, B3, which seeks to unpack PGM mining companies' baseline responsibilities.

B1 – Does the PGM mining company indicate an in-depth level of understanding of the SDGs in their sustainability report?

PGM mining companies scoring zero percent include Eastplats, Nkwe Platinum, Sedibelo, Platinum Group Metals, Tharisa Resources and Wesizwe Platinum. These companies indicate a lack of understanding of the SDGs and how to address environmental and societal challenges. Northam Platinum, Impala Platinum and African Rainbow Minerals, at 66.6 percent, demonstrate an emerging understanding and moderate alignment between their sustainability strategies and the SDGs (ARM ESG Report, 2023:6; Northam Holdings, 2023:18; Implats ESG Report, 2023:23). Sibanye-Stillwater, Ivanhoe Mines and Anglo-American Platinum show a strong understanding, with robust stakeholder engagement and comprehension of the purpose behind the SDGs, thus all attaining 100 percent (Anglo American Platinum SR, 2023:22; Ivanhoe Mines SR, 2023:7; Sibanye-Stillwater SDG Report, 2023:1).

B2 – Does the PGM mining company refer to their business case in their sustainability report?

Anglo American Platinum, Impala Platinum, Ivanhoe Mines and Sibanye-Stillwater attained 100 percent since they considered the interconnections of sustainability to profitability and understand their respective material topics (Anglo American Platinum SR, 2023:25; Implats ESG Report, 2023:13; Ivanhoe Mines SR, 2023:31; Sibanye Stillwater Integrated Report, 2023:3). This was done by dedicating a section of the report to their business case articulating why investing in specific SDGs makes good business sense and providing quantifiable data. PGM mining companies that attained 66.67 percent, include African Rainbow Minerals, Northam Platinum, Sedibelo and Tharisa Minerals. It was identified that they are not explicit in their business case; however, they do present case studies and illustrations whereby SDG-alignment has led to tangible benefits for their communities (ARM ESG Report, 2023:81; Northam Holdings SR, 2023:10; Sedibelo Resources ESG Report, 2023:11; Tharisa Minerals SR, 2023:80) The remaining PGMs, Bauba Platinum, Eastplats, Nkwe Platinum and Platinum Group Metals, attained zero percent per this study since they did not present a cohesive business case that connects their sustainability efforts to their business strategy.

B3 – Does the PGM mining company clearly outline their baseline responsibilities in their sustainability report?

The study found that eight PGM mining companies (Anglo American Platinum, African Rainbow Minerals, Impala Platinum, Ivanhoe Mines, Nkwe Platinum, Northam Platinum, Sibanye-Stillwater and Sedibelo) attained 100 percent (Anglo American Platinum SR, 2023:78;

ARM ESG Report, 2023:81; Implats ESG Report, 2023:26; Ivanhoe Mines SR, 2023:32; Zijin Mining Group-Nkwe Platinum SR, 2022:11; Northam Holdings SR, 2023:38; Sibanye Stillwater Integrated Report, 2023:83). As such, these companies comply with human rights standards and frameworks, and stress human rights risks and mitigation measures, and also consider the social political context. Tharisa Minerals attained 66.67 percent (Tharisa Minerals SR, 2023:69), Wesizwe Platinum attained 33.33 percent (Wesizwe Integrated Annual Report, 2023:139), and the remaining PGM's (Bauba Platinum, Eastplats and Platinum Group Metals) attained zero percent.

The outcome obtained from step 1 is presented in Table 5.7, with scores adopted from the PwC Challenge Framework.

Table 5.7: SDG Compass – Understanding the SDGs

Step1: Understanding the SDGs	ANGLO	ARM	BAUBA	EAST	IMPAL	IVAN	NKWE	NORP	SSW	SEDI	PGMS	THARI	WESI
Does the PGM Mining company indicate an in-depth level of understanding of the SDGs in their Sustainability Report?	3	2	1	0	2	3	0	2	3	0	0	0	0
Does the PGM Mining company refer to their business case in their Sustainability Report?	3	2	0	0	3	3	0	2	3	2	0	2	1
Does the PGM Mining company clearly outline their baseline responsibilities in their Sustainability Report?	3	3	0	0	3	3	3	3	3	3	0	2	1

The next step to be outlined in the SDG Compass is Step 2, defining priorities.

5.5.3 Step 2: Defining priorities

This step of the SDG Compass has three items; B4 questions capture the notion that the PGM mining companies map out their value chains to identify impact areas; B5 delineates on specific indicators and data collection processes; and lastly, B6 attempts to identify SDGs that are mostly prioritised.

B4 – Does the PGM mining company map out their value chain to identify impact areas in their sustainability report?

A PGM mining value chain includes all the processes from extracting raw materials to delivering the products to the customers. As such, the study found that a commendable value chain incorporates the SDGs and uses them to identify impact areas. The laggards are Bauba Platinum, Eastplats, Nkwe Platinum, Sedibelo, Platinum Group Metals and Wesizwe platinum,

with all companies attaining zero percent, thus not securing an end-to-end account for all assets and related activities before the product reaches the customers. On the other hand, Anglo American Platinum, African Rainbow Minerals, Impala Platinum, Ivanhoe Mines and Sibanye-Stillwater (Anglo American Platinum SR, 2023:100; ARM ESG Report, 2023:111; Ivanhoe Mines SR, 2023:18; Sibanye Stillwater Integrated Report, 2023:83) achieved 100 percent and are thus not heavily focused on the immediate surroundings, thereby neglecting upstream activities. Moderate analysis depicted is that of Northam Platinum at 66.7 percent (Northam Holdings SR, 2023:28), with the company providing a comprehensive supply chain statement, which suggests that the company, to a certain extent, understands their broader impact. Tharisa Minerals attained 33.33 percent (Tharisa Minerals SR, 2023:54).

B5 – Does the PGM mining company refer to specific indicators and their data collection processes to measure the SDGs in their sustainability report?

Based on the analysis, Sibanye-Stillwater, Anglo American Platinum, Impala Platinum and Northam Platinum presented commendable sections on data collection processes and research methodologies in their sustainability reports (Anglo American Platinum Supplementary Information, 2023; Implats ESG Report, 2023:130; Northam SD Data Reporting Guideline, 2023; Sibanye-Stillwater Integrated Report, 2023:200). As such, these companies referenced several data sources that align with established sustainability frameworks, 100 percent achieved in this regard. Tharisa Minerals and African Rainbow Minerals (66.67%) on the other hand, demonstrated a commitment to data collection and reporting on their sustainability performance, yet their reports lack a clear connection between the selected indicators and specific SDGs (Tharisa Minerals SR, 2023:78; Wesizwe Integrated Annual Report, 2023:127). Companies that fall behind (zero percent) include Bauba Platinum, Nkwe Platinum, Eastplats, Sedibelo, Platinum Group Metals and Wesizwe Platinum.

B6 – Does the PGM mining company clearly make known their priorities regarding the SDGs in their sustainability report?

Most PGM mining companies miss the opportunity to directly link their actions to specific SDGs targets. To this end, PGM mining companies that emerge as leaders in clearly disclosing their prioritised SDG, attaining 100 percent, are African Rainbow Minerals, Impala Platinum, Ivanhoe Mines, Northam Platinum and Sibanye Stillwater (ARM ESG Report, 2023:15; Implats ESG Report, 2023:24; Ivanhoe Mines SR, 2023:8; Northam Holdings SR, 2023:9).

Anglo American Platinum attained 66.67 percent (Anglo American Platinum SR, 2023:22). Other PGM mining companies (Bauba Platinum, Eastplats, Nkwe Platinum, Sedibelo, Platinum Group Metals, Tharisa, Wesizwe Platinum) fall short of explicitly ranking and aligning specific SDGs to their overall business and sustainability strategy. Nevertheless, they do somewhat mention that SDG-8, 6 and 13, which demonstrates their actions to biodiversity conservation, decarbonisation as well as employee safety.

The outcome obtained from step 2 (Defining Priorities) of the SDG compass, which aimed to measure PGM mining companies' methods of prioritising the SDGs, are detailed in Table 5.8 (PwC Challenge Framework):

Table 5.8: SDG Compass – Defining priorities

Step2: Defining priorities	ANGLO	ARM	BAUBA	EAST	IMPAL	IVAN	NKWE	NORP	SSW	SEDI	PGMS	THARI	WESI
Does the PGM Mining company map out their value chain to identify impact areas in their Sustainability Report?	3	3	0	0	3	3	0	2	3	0	0	1	0
Does the PGM Mining company refer to specific indicators and their data collection processes to measure the SDGs in their Sustainability Report?	3	2	0	0	3	3	0	3	3	0	0	2	1
Does the PGM Mining company, clearly, make known their priorities regarding the SDGs in their Sustainability Report?	2	3	0	0	3	3	0	3	3	0	0	0	0

5.6.3 Step 3: Goal setting

Goal setting comprises four items. B7 brings forth the SMART parameters; followed by B8 and B9, which elucidate on baseline goals and setting the SDG ambition level. Lastly, B10 provides the results regarding the firm public endorsement of the SDGs.

B7 – Does the PGM mining company mention the 'SMART' rule when and if stating their strategic goals with respect to the SDGs in their sustainability report?

PGM mining companies scoring zero percent include Nkwe Platinum and Sedibelo Resources, as neither of these companies indicated any goal setting framework that provides feedback on what has been achieved, with no direction on how and when to achieve the remaining plans. Anglo American Platinum, Bauba Platinum, Impala Platinum, Northam Platinum and Sibanye Stillwaters all obtained 66.67 percent (Anglo American Platinum SR, 2023:24; Bauba Integrated Report, 2022:48; Implats ESG Report, 2023:25; Northam Holdings SR, 2023:11; Sibanye Stillwater Integrated Report, 2023:185). The remaining PGM mining companies, African Rainbow Minerals, Eastplats, Platinum Group Metals, Tharisa Minerals and Wesizwe

Platinum came as laggards, and thus obtained 33.33 percent. This is because these companies, to a certain extent, do not set goals that are focused and that evaluate the strengths and weaknesses of their operation.

B8 – Does the PGM mining company pinpoint baseline and select goals in their sustainability report?

PGM mining companies that fall behind on defining their baseline and select goals include Nkwe Platinum (zero percent), Bauba Platinum, Eastplats and Platinum Group Metals (33.33%). These companies defined no baseline goal, which raises a concern about their commitment to long-term sustainability and thus makes it impossible to track their progress. Wesizwe Platinum and Sedibelo (66.67%) outline and explain performance data in their sustainability reports but do not establish a clear baseline goal on which to improve in the future (Bauba Integrated Report, 2022:6; Wesizwe Integrated Annual Report, 2023:28). Leaders in pinpointing baseline and select goals, include Anglo American Platinum, African Rainbow Minerals, Impala Platinum, Ivanhoe Mines, Northam Platinum, Sibanye Stillwaters and Tharisa (100%); as such, most of their reports refer to the past and mention concrete actions on how to achieve the goals in a timely manner (Anglo American Platinum SR,2023:18; ARM ESG Report, 2023:12; Implats ESG Report, 2023:22; Ivanhoe Mines Sustainability Report, 2023:93; Northam Holdings SR, 2023:36; Sibanye Stillwater Integrated Report, 2023:247; Tharisa Minerals SR 2023:64).

B9 – Does the PGM mining company set a level of ambition regarding the SDGs by means of stakeholder engagement in their Sustainability Report?

The results regarding B9 on stakeholder engagement indicate that Anglo American Platinum, African Rainbow Minerals, Impala Platinum, Ivanhoe Mines, Northam Platinum and Sibanye-Stillwater (100%) incorporate stakeholder engagement perspectives into their sustainability strategies on all their relevant stakeholders (investors/shareholders, host communities, labour unions) (Anglo American Platinum SR,2023:12; ARM ESG Report, 2023:46; Implats ESG Report, 2023:40; Ivanhoe Mines SR, 2023:22; Northam Holdings SR, 2023:47; Sibanye Stillwater Integrated Report, 2023:71). PGM mining companies that have achieved the average rate of 66.67 percent, include Bauba Platinum, Eastplats, Sedibelo Resources and Tharisa Minerals. As such, these companies stress several risks of not effectively engaging with their stakeholders (Bauba Integrated Report, 2022:15; Eastplats, 2024; Tharisa Minerals SR,

2023:5). Lastly, with Nkwe Platinum, Platinum Group metals and Wesizwe Platinum (33.33%), the study found that these companies have adopted a 'check-the-box' approach to stakeholder engagement as opposed to a genuine commitment of engagement.

B10 – Does the PGM mining company make a firm public announcement that they endorse their commitment to the SDGs in their sustainability report?

The results indicate that four PGM mining companies publicly endorse the SDGs by making a formal public statement as well as aligning their sustainability pillars with the SDGs, thus 100 percent is attained (Anglo American Platinum, African Rainbow Minerals, Impala Platinum, Sibanye Stillwaters) (Anglo American Platinum SR, 2023:22; ARM ESG Report, 2023:6; Implats ESG Report, 2023:24; Sibanye Stillwater SDG Report, 2023). Bauba Platinum, Ivanhoe Mines and Northam Platinum, all stand at 66.67 percent. These reports typically mention phrases that indicate alignment, and to a certain extent, endorsement (Bauba Integrated Report, 2022:48; Ivanhoe Mines SR, 2023:7; Northam Holdings SR, 2023:9). Eastplats, Sedibelo, Platinum Group Metals, Tharisa Minerals and Wesizwe Platinum attained 3.33 percent.

Table 5.9: SDG Compass – Setting Goals

Step 3: Setting Goals	ANGLO	ARM	BAUBA	EAST	IMPAL	IVAN	NKWE	NORP	SSW	SEDI	PGMS	THARI	WESI
Does the PGM Mining company mention the 'SMART' rule when and if stating their strategic goals with respect to the SDGs in their Sustainability Report?	2	1	2	1	2	2	0	2	2	0	1	1	1
Does the PGM Mining company pinpoint baseline and select goals in their Sustainability Report?	3	3	1	1	3	3	0	3	3	2	1	3	2
Does the PGM Mining company set a level of ambition regarding the SDGs by means of stakeholder engagement in their Sustainability Report?	3	3	2	2	3	3	1	3	3	2	1	2	1
Does the PGM Mining company make a firm public announcement that they endorse their commitment to the SDGs in their Sustainability Report?	3	3	2	1	3	2	2	2	3	1	1	1	1

5.5.5 Step 4: Integrating

Step 4 will outline three elements with B11, outlining active leadership by the CEO's commitment to the SDGs; B12, embedding sustainability across all functions and departments of the PGM mining company; and lastly, engaging in partnerships (B13).

B11 – Does the PGM mining company's sustainability report indicate active leadership by the CEO or the executive committee to the SDGs?

The results represent 0 percent for all PGM mining companies since the CEOs focus on broader matters and leave behind the teething day-to-day sustainability issues on the ground.

B12 – Does the PGM mining company's sustainability report embed the SDGs across all functions?

Ivanhoe Mines and Sibanye-Stillwaters obtained 100 percent in embedding the SDGs across all functions (Ivanhoe Mines SR, 2023:9; Sibanye Stillwater Integrated Report, 2023:66). These two companies both showcased a non-centralised approach, where each department is given the liberty to contribute to the SDGs in a befitting way for each department. Anglo American Platinum, African Rainbow Minerals, Impala Platinum and Northam Platinum each obtained a final score of 66.67 percent (Anglo American Platinum SR, 2023:25; ARM ESG Report, 2023:151; Implats ESG Report, 2023:23; Northam Holdings SR, 2023:9). This is because these PGM mining companies somewhat integrate the SDGs across their entire groups; however, they lack empirical examples of how different departments integrate the SDGs into their day-to-day activities. Nkwe Platinum, Tharisa Resources and Wesizwe Platinum are the laggards, since the study suggests these companies lack granularity in how the SDGs manifest across different functions and levels within the PGM mining company.

B13 – Does the PGM mining company's sustainability report refer to other institutions or peer PGM groups to partner in achieving the SDGs?

The study found that Anglo American Platinum, African Rainbow Minerals, Impala Platinum and Sibanye-Stillwaters (100%) have explicitly stated partnerships with various stakeholders, including the Minerals Council South Africa and the European motor industry (Anglo American Platinum SR, 2023:105; ARM ESG Report, 2023:107; Implats ESG Report, 2023:26; Sibanye Stillwater Integrated Report, 2023:229). Eastplats and Ivanhoe Mines attained 66.67 percent, indicating moderate levels of strategic partnership initiatives. Northam Platinum and Nkwe Platinum (33.33%) do align with global frameworks such as the UN Global Compact; however, these two companies have emphasised 'internal efforts and commitment to achieving the SDGs' (Northam Holdings SR, 2023:41; Zijin Mining Group-Nkwe Platinum

SR, 2022:15). Sedibelo Resources, Platinum Group Metals, Tharisa Minerals and Wesizwe platinum obtained zero percent.

Table 5.10: SDG Compass – Integrating

Step 4: Integrating	ANGLO	ARM	BAUBA	EAST	IMPAL	IVAN	NKWE	NORP	SSW	SEDI	PGMS	THARI	WESI
Does the PGM Mining company's Sustainability Report indicate active leadership by the CEO or the executive committee to the SDGs?	0	0	0	0	0	0	0	0	0	0	0	0	0
Does the PGM Mining company's Sustainability Report embed the SDGs across all functions?	2	2	1	1	2	3	0	2	3	1	1	0	0
Does the PGM Mining company's Sustainability Report refer to other institutions or peer PGM groups to partner in achieving the SDGs?	3	3	0	2	3	2	1	1	3	0	0	0	0

The final step in the SDG compass is reporting and communicating, which is presented next.

5.5.6 Step 5: Reporting and communicating

Over the last decade, corporate sustainability disclosure has increased dramatically, in line with stakeholders' demands for information. The study devised B14 and B16, which aim to explain if PGM mining companies align their prioritised SDGs with the sustainability reporting frameworks and communicate the performance thereof. Notably, B15 simply asks whether the PGM mining company has a separate SDG report (requiring only a "yes" or "no" response); no further analysis of the answers was conducted.

B14 – Does the PGM mining company's sustainability report effectively report on the SDGs in alignment with sustainability reporting standards?

Regarding alignment of sustainability reports with the SDGs, the study revealed a tiered system of adherence. African Rainbow Minerals, Impala Platinum, Ivanhoe Mines, Northam Platinum and Sibanye-Stillwater demonstrated full alignment (100%) (ARM ESG Report, 2023:137; Implats ESG Report, 2023:2; Ivanhoe Mines SR, 2023:2; Northam Holdings SR, 2023:2; Sibanye Stillwater Integrated Report, 2023:2). Anglo American Platinum showed partial alignment (66.67%) (Anglo American Platinum SR, 2023:63). The remaining companies – Sedibelo, Platinum Group Metals, Siyanda Resources, Tharisa Minerals, Wesizwe Platinum, Bauba and Eastplats – showed no alignment (zero percent).

B16 – Does the PGM mining company's sustainability report communicate on their SDG performance?

Ivanhoe Mines, Sibanye-Stillwater, Anglo American Platinum and Impala Platinum (100%) emerge as leaders pertaining to B16 and their SDG journey as depicted in these reports. These PGM mining companies demonstrate a strong and mature understanding of the SDGs, and thus actively connect their initiatives and operations to specific SDGs. Furthermore, they provide data, thereby highlighting both their progress and challenges, which resemble a strong and resilient business case. African Rainbow Minerals, Wesizwe Platinum and Northam Platinum (66.67%) provide substantial data and information pertaining to their sustainability performance; however, they are not always explicit, hence, the study did consider various implicit articulations. Lastly, PGM mining companies that poorly indicated SDG performance, include Bauba Platinum, Eastplats, Sedibelo, Platinum Group Metals and Tharisa, all attaining 33.33 percent, and Nkwe Platinum attaining zero percent.

Table 5.11: SDG Compass – Reporting and communicating

Step 5: Reporting and communicating	ANGLO	ARM	BAUBA	EAST	IMPAL	IVAN	NKWE	NORP	SSW	SEDI	PGMS	THARI	WESI
Does the PGM Mining Company's Sustainability Report effectively report on the SDGs in alignment with sustainability reporting standards?	2	3	0	0	3	3	1	3	3	0	0	0	0
Does the PGM Mining company have a separate SDG-Concentrated Report?	3	1	1	1	1	2	0	0	3	0	0	0	0
Does the PGM Mining Company's Sustainability Report communicate on their SDG performance?	3	2	1	1	3	3	0	2	3	1	1	1	2

5.6 SYNOPSIS

This chapter provided the data analysis and interpretation for the study. As such, it began with information pertaining to the pilot by providing the setting of the pilot study and the recommendations thereof regarding the research instrument. Following these recommendations, adopted by the main study, commencement of the study could begin. Furthermore, since the study made use of two research designs, the semi-structured interviews and the document analysis, coding of these two instruments was in the same fashion, A1-A28 and B1-16, respectively.

Section 5.3 detailed the demographical information of the participants for the main study. Section 5.4 provided the results of the semi-structured interviews. Section 5.5 detailed a summary of the findings regarding the SDG implementation targets and SLP sustainability projects. Section 5.6 unpacked the second research design, document analysis measuring the PGM mining companies' usage of the SDG compass, subsequently scoring each PGM using

the PwC challenge framework. Lastly, Section 5.7 provided the summary of the findings, highlighting one PGM mining company that complied with the SDG Compass, and further provided an overview of other PGM mining companies' performance.

Chapter 6 will provide the overall conclusion of this study and the recommendations thereof.

CHAPTER 6

CONCLUSION AND RECOMMENDATIONS

6.1 INTRODUCTION

This chapter concludes this study. As such, Section 6.2 will provide an overview of the study, unpacking the objectives that were set forth in Chapter 1, along with classifications of each of the preceding five chapters. Section 6.3 presents the main findings in line with the three research questions, thus will include two sub-sections for the semi-structured interviews and document analysis. Section 6.4 will provide several recommendations. The limitations and proposed future research opportunities will be provided in Section 6.5, with the contributions of this study in Section 6.6. Lastly, the concluding remarks will be discussed in Section 6.7.

6.2 OVERVIEW OF THE STUDY

The study's primary objective was to analyse the SDGs and sustainability reports of South Africa's platinum mines. To achieve this objective, a literature review on the SDGs and sustainability reporting was undertaken. In this section, a summary of the preceding five chapters is provided.

Chapter 1 introduced the study's topic. The background on sustainable development and sustainability reporting and their associations with mining was presented, followed by a two-fold justification for this study. First, South Africa is a global PGM hub and a leader in mining sustainability reporting, yet their host communities bear the detrimental impacts of mining activities. The problem statement underpinned the lack of PGM mining companies' contribution to their host communities and how sustainability reports are one-sided. The chapter further devised three research questions and objectives followed by the research approach and designs. Data collection processes were introduced as well as the preliminary data analysis.

Chapter 2 presented the first literature review on the SDGs. The economics of sustainable development discussed the global challenges of economic prosperity, social equity and natural resource preservation. This laid a foundation to discuss the Hotelling's rule (exhaustible resource depletion) and the mineral case of sustainable development, which echoed the rate at

which non-renewable resources are being depleted. Hence, the Hartwick rule (resource rents generated from depleting natural resources should be reinvested in man-made capital to ensure a sustainable economic future) brings a solution to the antagonistic situation presented between the Hotelling's Rule and Sustainable Development. Thus, the chapter further discussed the theory on balancing sustainable development within the mining industry, the SDGs, the SDG in context of the mining industry, as well as the SDGs adopted by the Minerals Council South Africa (social and relationship capital).

Chapter 3 was the second literature review on sustainability reporting. It detailed sustainability reporting in the mining industry, followed by the frameworks thereof. Furthermore, frameworks in relation to the SDGs were then discussed, which introduced the SDG Compass (Understanding the SDGs, Defining priorities, Setting goals, Integrating, Reporting). The multiple sections that referred to the SDGs amplified the traditional objectives of mining corporate social responsibility, and the social and labour plan (mining community development).

Chapter 4 described the study's research methodology, starting with the research scope. A discussion on the dual-qualitative research approach followed (semi-structured interviews and document analysis). Thereafter, the data collection processes, which were both primary (semi-structured interviews) and secondary (literature review and document analysis). The measuring instruments for both the semi-structured interviews and document analysis were then discussed. The sampling strategy detailed stratified purposive sampling for the SDGs and purposive sampling for sustainability reporting. This study's preliminary data analysis employed grounded theory analysis, thematic coding and transcription for the semi-structured interviews, and thematic analysis on document analysis. The study piloted only one research design: semi-structured interviews. Lastly, the ethical considerations were discussed.

Chapter 5 reported on the data analysis and interpretation of the findings. Thus, the main findings of the study as outlined in Chapter 5 will be summarised in the following section, according to Section 1.4 of this study.

6.3 MAIN FINDINGS OF THE STUDY

These findings are in line with the three research questions as devised in Chapter 1:

- Research question 1 – To what extent is the Minerals Council South Africa's platinum group metals implementing the SDGs for their host communities?
- Research question 2 – To what extent is the Minerals Council South Africa's platinum group metals effectively applying the SDG Compass to report on the SDGs?
- Research question 3 – To what extent has the Minerals Council South Africa's platinum group metals progressed in their Social and Labour Plan sustainability projects?

Notably, research questions 1 and 3 will be outlined in Section 6.3.1 and research question 2 on sustainability reporting in Section 6.3.2

6.3.1 Semi-Structured interviews: Sustainable development goals implementation targets

In addressing the first research question, the study found that PGM mining companies address SDG-1 (no poverty) through skills development, training and employment; however, communication regarding these efforts is lacking. With SDG-2, the study found that there is minimal assistance for small-scale farmers. For SDG-3 (health), the study found that PGM mining companies invest in infrastructure and support health awareness campaigns but defer staffing to the local government. Likewise, in education (SDG-4), infrastructure investments are evident along with the provision of bursaries, but teacher training programmes remain the government's responsibility.

Additionally, PGM mining companies are working towards addressing gender inequality (SDG-5), prioritising local youth employment, with no efforts to end child labour as it is not prevalent (SDG8). Likewise, there are no efforts to promote sustainable tourism, and financial services are limited to employees as opposed to the entire mining community. As such, community engagement mechanisms vary regarding the integration of migrant workers (SDG-10). Furthermore, housing indirectly benefits the community if provided to an employee (SDG-11), and road infrastructure primarily serves roads that lead to PGM operations (SDG-11). Finally, PGM mining companies prioritise their own assets and employee safety as opposed to community safety. It is also worth mentioning that anti-corruption campaigns are internally focused (SDG-16).

In the third research question, the study revealed that PGM mining companies share SLP information online, which excludes community members with digital access limitations. Furthermore, SLP construction projects typically benefit the mining communities but face

several procurement challenges. Current SLP projects underway in mining communities are related to infrastructure educational initiatives. Halted projects result from non-compliance, operational performance and financial issues. Lastly, benefit distribution varies and sustainability reports and SLPs do not always reflect the lived experiences and realities.

6.3.2 Document analysis – Sustainability reporting

The document analysis summarised in Table 5.11 reflects SDG Compass results. The baseline score is 48 for each PGM mining company. Attaining 48 is rather hypothetical, and it is unlikely that any PGM would indicate 100% compliance with the SDG Compass. Thus, the study found variations leading to different scores for each PGM mining company. Table 5.11 shows the results of each PGM mining company.

Table 6.1 – SDG Compass and PwC Challenge Framework Results

	ANGLO	ARM	BAUBA	EAST	IMPAL	IVAN	NKWE	NORP	SSW	SEDI	PGMS	THARI	WESI
Scores	41	36	11	10	40	41	8	33	44	12	6	15	10
%	85.42	75	22.92	20.83	83.33	85.42	16.67	68.75	91.67	25	12.5	31.25	20.83

The second research question aimed to analyse the PGM mining companies' sustainability reports using the SDG Compass and the PwC challenge framework.

From the analysis, it is evident that most PGM mining companies exhibit a surface-level understanding of the SDGs. They refer to various sustainability topics but lack a structured framework for addressing the SDGs. Nevertheless, some articulate their long-term contributions to the SDGs and integrate them into their values (Anglo American Platinum, Ivanhoe Mines and Sibanye-Stillwater). Regarding the business case, it was revealed that PGM mining companies moderately connect sustainability to profitability, understand their material matters and align the SDGs with their core business objectives. On a positive note, the sustainability reports indicate that human rights are adequately addressed, with some disclosing their human rights policies.

The approach to defining priorities is substandard, as these companies fail to adequately outline their value chain map, instead focussing primarily on their direct operations. Additionally, the study found that sustainability-related data collection methods are diverse, leading some to fall short in providing accurate information. Nevertheless, it is apparent that SDG-6, 8 and 13 are

the most prioritised SDGs within the PGM industry. Furthermore, it was found that there is limited use of the 'SMART' terminology, thus weak SDG-connection. Moreover, the absence of baseline goals resulted in significant variations in the metrics and timeframes of the goals set. Furthermore, there is limited disclosure on stakeholder identification. In addition, most PGM mining companies make only a simple reference to the SDGs, which does not constitute a firm public endorsement.

As far as integration is concerned, PGM mining companies' CEOs tend to focus on broader ESG commitments, which are generally positive, but they rarely translate the SDG Agenda. Thus, CEOs prioritise strategic direction and safety metrics. Furthermore, SDG-implementation at PGM mines is evident; however, in a more siloed approach. Lastly, regarding reporting and communication, the study found that most PGM mining companies comply with the Global Reporting Initiative, and their performance is articulated in terms of environmental, social and governance elements.

Sibanye-Stillwater, per this study, is the most SDG-aligned PGM mining company (91.67%). As such, the company demonstrated a strong understanding of the SDGs, providing a clear business case linked to their overall strategy and showcasing responsible and mature mining practices. The second discovery stems from strong leadership commitment; while there is no explicit mention of the SDGs by the CEO, the companies' actions and reporting practices suggest a top-level buy-in approach for the SDGs.

6.4 RECOMMENDATIONS

6.4.1: Semi-structured Interviews – Sustainable Development Goals

The recommendations presented for the semi-structured interviews (SDG implementation targets) are based on the average finding for each PGM mining company operating in a mining community.

SDG-1: End poverty in all its forms

1.a	A1	Has the PGM mining company in your area implemented any programmes to reduce any form of poverty in your community?

Recommendation 1: PGM mining companies to work with several stakeholders (social and welfare department) in the community to provide immediate relief solutions to address the complexities of poverty.

Based on the findings of this study, poverty is indirectly addressed by the PGM mining companies. While entrepreneurial support, job creation and skills development are valuable, there are social ills that need to be addressed immediately. As such, while mining communities are waiting for sustainable initiatives, the study recommends immediate implementation relief solutions.

1.b	A2	Are you aware of any pro-poor development policies used by the PGM mining company to accelerate investment in poverty-eradication?

Recommendation 2: PGM mining companies to provide a detailed and accessible SDG playbook tailor made to each village surrounding the operation

Pro-poor development strategies not disclosed undermine the efforts taken by the PGM mining company in addressing poverty. Thus, the study recommends that PGM mining companies provide their host communities with documentation that directly affects them due to the presence of the operation in the area. A high levelled sustainability report is not entirely for the host communities, but mostly for other stakeholders (investors, government, shareholders).

SDG-3: Ensure healthy lives and promote well-being and SDG-4: Ensuring inclusive and equitable quality education

3.c	A5	Has the PGM mining company worked with the local department of health in training the health workforce?
4.c	A8	Has the PGM mining company worked with the education local department to increase the number of teachers, through cooperation for teacher training development?

Recommendation 3: A multi-stakeholder approach that includes the PGM mining company to co-fund training and development programmes for public servants (health and education)

All the participants in this study stated that training the health workforce and teachers is the responsibility of both the local departments of health and education, respectively. Furthermore, while respecting this division, this study recommends a multi-stakeholder approach that includes the PGM mining company, the department of health or education, key businesses in the mining community, as well as other stakeholders to co-fund training and development programmes for public servants in both health and education.

SDG-5: Achieve gender equality and empower all women and girls

5.a	A9	Has the PGM mining company in your area undertaken action to give women equal rights to the sub-economic resources that flow from the mine?
5.b	A10	Do you know of any social programmes on which the PGM mining company has embarked, to promote the empowerment of women and girls in the community?

Recommendation 4: A tailor-made entrepreneurship programme for funding women-led businesses and addressing social ills continuously

The study found that while supporting women entrepreneurs is a positive step, PGM mining companies should move beyond viewing this as a compliance exercise with the Mining Charter, and rather address the deeper issues of male dominance and gatekeeping. The study recommends that PGM mining companies should have a tailor-made entrepreneurship programme for women. As such, the PGM mining company, through a selection process, will empower only women for services of their interest. With respect to social programmes, Target 5.b, this study recommends that PGM mining companies should invest in long-term programmes that will address GBV and other social ills that women possibly face; as such, these programmes should not only be evident in December (GBV month) and August (National Women's month).

SDG-8: Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all

8.9	A14	Has this PGM mining company promoted sustainable tourism that will create secondary jobs?

Recommendation 5: Identify areas in which heritage markets are prevalent in the mining communities and engage with the entrepreneurs by conducting a needs analysis assessment

The results demonstrate varying levels of involvement to sustainable tourism. As such, the study recommends that PGM mining companies identify areas in which heritage markets are prevalent in the mining communities and engage the entrepreneurs by conducting a needs analysis; for more weight, this initiative can be in conjunction with the local tourism department.

SDG-10: Reduce inequality within and among countries

10.6	A16	Has the PGM mining company emphasised the need of representation from your community to assist its decision-making process for the strategy of how it will benefit your community?
10.7	A17	Has the PGM mining company engaged with the local community regarding the facilitation of migrants and mobility of people in your community?

Recommendation 6: An independent member(s) outside the community attends the engagement sessions between the tribal council and the mine, thus allowing an unbiased opinion. The same recommendation can be applied even in association with issues such as migrants in mining communities.

The study found that PGM mining companies do engage with the locals. However, this is more of an information-sharing session, wherein the community stakeholders do not have bargaining power to influence decisions. While communication is essential between the mining community and the PGM operation, the study also found that, typically, information is relayed by the tribal council or community forums. As such, to minimise the risk of misinterpreted information before it reaches the key beneficiaries, the study recommends that an independent member(s) attends the engagement sessions between the tribal council and the mine; in this way, the information will not be diluted before reaching the community.

With respect to the SDG-implementation targets, which were the data attained through semi-structured interviews, seven recommendations were provided; with all these recommendations per the SDGs, namely SDG-1 (No poverty), SDG-3 (Quality health), SDG-5 (Gender equality),

SDG-8 (Economic growth), and SDG-10 (Reduced inequalities). The next sub-section will continue with the contributions for sustainability reporting, using the SDG Compass.

6.4.2: Document Analysis – Sustainability Reporting

The recommendations for document analysis (sustainability reporting) will be based on the SDG Compass and address items scoring 1.5 and below on the PwC challenge framework, since the highest score that could have been achieved is 3. This will be averaged across 13 PGM mining companies.

SDG Compass – Understanding the SDGs

Step1: Understanding the SDGs	ANGLO	ARM	BAUBA	EAST	IMPAL	IVAN	NKWE	NORP	SSW	SEDI	PGMS	THARI	WESI	AVG.
Does the PGM Mining Company's Sustainability Report indicate an in-depth level of understanding of the SDGs?	3	2	1	0	2	3	0	2	3	0	0	0	0	1.23

Recommendation 7: Consult sustainability experts, particularly at an audit firm, to ensure infiltration of strong governance principles with the SDGs.

While some PGM mining companies (Anglo American Platinum, Ivanhoe Mines and Sibanye-Stillwaters) indicate a deep understanding of the SDGs, their inception and globality, some PGM mining companies exhibit no understanding. This could stem from resource constraints, thus small players in the PGM industry may not be in a strong financial position to incorporate the SDGs; thus, it is a concept that is entirely ignored. Therefore, it is recommended that PGM mining companies consult sustainability experts, particularly at audit firms, to ensure strong governance principles infiltrated with the SDGs, so that the PGM mining company can understand the SDGs inception from the MDGs, the relevance of the SDG Compass, and unpack the SDGs targets and indicators. This can be done through workshops and capacity-building sessions with external auditors.

SDG Compass – Defining Priorities

Step2: Defining priorities	ANGLO	ARM	BAUBA	EAST	IMPAL	IVAN	NKWE	NORP	SSW	SEDI	PGMS	THARI	WESI	AVG.
Does the PGM Mining Company's Sustainability Report map out their value chain to identify impact areas?	3	3	0	0	3	3	0	2	3	0	0	1	0	1.38
Does the PGM Mining Company's Sustainability Report clearly make known their priorities regarding the SDGs?	2	3	0	0	3	3	0	3	3	0	0	0	0	1.31

Recommendation 8: PGM mining companies to adopt the Value Chain Navigator, a digital platform which offers valuable insights of managing value chain indirect emissions.

The study concluded that six PGM mining companies do not map out their value chains to identify impact areas. As such, this could be a result of short-term focus, wherein priorities are placed on short-term financial gains over long-term sustainability concerns. To this end, this study recommends that Bauba Platinum, Eastplats, Sedibelo Resources, Platinum Group Metals and Wesizwe Platinum adopt the Value Chain Navigator (The Economist, 2025), which offers valuable insights of managing value chain indirect emissions that occur in the up- and downstream activities of an organisation. This can be achieved through training and developing the PGM mining companies' procurement department with how to use the Value Chain Navigator, which is a digital platform.

Recommendation 9: PGM mining companies conduct materiality analysis

The majority of PGM mining companies included in this study do not make known their prioritised SDGs. This could be for various reasons, such as the fear of scrutiny and criticism from several stakeholders as well as peer PGM groups, resource constraints and the perceived lack of materiality. Therefore, it is recommended that PGM mining companies conduct materiality analysis. Conducting a materiality analysis will involve PGM mining companies identifying SDGs that are most relevant to their business. This could be undertaken by having a stakeholder engagement process, where all parties who are directly and indirectly impacted by the mine can put forth their perspectives and concerns.

SDG Compass: Setting Goals

Step 3: Setting Goals	ANGLO	ARM	BAUBA	EAST	IMPAL	IVAN	NKWE	NORP	SSW	SEDI	PGMS	THARI	WESI	AVG.
Does the PGM Mining Company's Sustainability Report mention the 'SMART' rule when and if stating their strategic goals with respect to the SDGs?	2	1	2	1	2	2	0	2	2	0	1	1	1	1.31

Recommendation 10: Usage of the SMART acronym in sustainability reports to enhance clarity

It was determined that there is an implicit application of the SMART rule, wherein PGM mining companies integrate SMART principles, and thus use alternative frameworks and terminology that embody a similar concept. Nevertheless, the SDG Compass questions the mentioning of the SMART rule. Therefore, the study recommends the usage of this acronym in sustainability reports, which will enhance clarity, measurability and effectiveness, leading to improved outcomes and the ability to track progress. This can be done on a departmental basis, wherein several teams set weekly targets for employees and all the data aggregated at the end of month. This function can be typically run by the Human Resources office with the data provided to the Sustainability team for reporting purposes.

SDG Compass: Integrating

Step 4: Integrating	ANGLO	ARM	BAUBA	EAST	IMPAL	IVAN	NKWE	NORP	SSW	SEDI	PGMS	THARI	WESI	AVG.
Does the PGM Mining Company's Sustainability Report indicate active leadership by the CEO or the executive committee to the SDGs?	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Does the PGM Mining company's Sustainability Report embed the SDGs across all functions?	2	2	1	1	2	3	0	2	3	1	1	0	0	1.38
Does the PGM Mining company's Sustainability Report, refer to other institutions or peer PGM groups to partner in achieving the SDGs?	3	3	0	2	3	2	1	1	3	0	0	0	0	1.38

Recommendation 11: CEOs to explicitly interweave the SDGs in the welcome notes, fostering a top to bottom leadership style

This study found that none of the CEOs mention the SDGs in their welcome note. As such, it was determined that CEOs of a PGM mining company are likely to welcome the reader

(stakeholders) to the report, provide an overview of the financial and operational performance, safety measures and the future endeavours of the company. Therefore, the study recommends that the SDGs are interwoven from top to bottom, explicitly connecting them to the efforts mentioned in the welcome note. This is an indication of a commitment to global sustainability challenges beyond the mine.

Recommendation 12: Employing external auditors to educate all functionaries of the mine to work in an integrated manner or benchmark with Ivanhoe Mines and Sibanye-Stillwaters.

The SDGs are not embedded across all functions of certain PGM mining companies. Through the analysis, the study found that Ivanhoe Mines and Sibanye-Stillwaters are the only two companies that ensure all departments in the company adhere to SDG principles and the targets thereof. As such, the recommendation put forth by this study is that of the first recommendation of employing external auditors to educate all functionaries of the mine to work in an integrated manner to essentially achieve the SDGs daily. Another recommendation is to benchmark with Ivanhoe Mines and Sibanye-Stillwaters. Furthermore, this recommendation addresses the next item that also performed poorly, B14, questioning partnerships amongst PGM mining companies to achieve the SDG, specifically targeted to Bauba Platinum, Sedibelo Resources, Platinum Group Metals, Tharisa Minerals and Wesizwe Platinum.

Step 5: Reporting and communicating	ANGLO	ARM	BAUBA	EAST	IMPAL	IVAN	NKWE	NORP	SSW	SEDI	PGMS	THARI	WESI	AVG.
Does the PGM Mining company's Sustainability Report effectively report on the SDGs in alignment with sustainability reporting standards?	2	3	0	0	3	3	1	3	3	0	0	0	0	1.38
Does the PGM Mining company have a separate SDG-Concentrated Report?	3	1	1	1	1	2	0	0	3	0	0	0	0	0.92

Recommendation 13: PGM mining companies map their SDGs implementation targets with the current standards or indicators or have a standalone SDG concentrated report

While most PGM mining companies adhere to sustainability reporting standards, they typically miss the opportunity to link the SDGs to a sustainability reporting framework such as the GRI. As such, companies that did recognise this linkage, however, include African Rainbow Minerals, Impala Platinum Holdings, Ivanhoe Mines, Northam Platinum Holdings and

Sibanye-Stillwaters. Therefore, this study strongly recommends that PGM mining companies map their SDG-implementation targets with the current standards or indicators used in traditional sustainability reporting frameworks, explicitly stating the linkages thereof. This will encourage PGM mining companies to drill down to both the outcome and implementation targets and not just merely allocate an SDG in its entirety to a particular framework. Alternatively, PGM mining companies could also have a stand-alone SDG concentrated report, which too, will require in-depth knowledge of the SDGs. The company that has an SDG-concentrated report is Sibanye-Stillwater

6.5 LIMITATIONS AND FUTURE RESEARCH OPPORTUNITIES

Although the SDG implementation targets and the PGM mining company sustainability reports were analysed in this study, certain limitations should be noted. First, this study used stratified purposive sampling for the semi-structured interviews and purposive sampling for the document analysis. As such, both sampling procedures have the potential for bias due to the researcher's subjective selection of participants and reports based on specific criteria. Consequently, the findings may not be generalisable to the wider population.

The study's sampled participants, regarding the semi-structured interviews, were limited to mining community stakeholders (participants) who reside in the Bushveld Igneous Complex, a platinum-rich ore body. As such, this presents an opportunity to extend the study to other ore basins, such as the Witwatersrand basin (gold), the Kimberlites (diamonds), the Phalaborwa Igneous Complex (copper) and the Kalahari basin (manganese), potentially covering 73 members, as noted by the Minerals Council South Africa. Furthermore, the study used mining community stakeholders aged between 30 and 50. Future research could explore perspectives from other stakeholder groups and different generational cohorts.

6.6 CONTRIBUTIONS OF THE STUDY

This study contributes to knowledge pertaining to the SDGs, sustainability reporting and the associations thereof with the platinum mining industry. As such, this study contributes to two key areas of the literature. First, the SDGs, and secondly, sustainability and sustainability reporting. Thus, for SDGs, this study will add on to the works of Bongwe (2017), Cole & Broadhurst (2021), and Broadhurst (2019). Regarding sustainability, several studies have analysed the reporting and alignment of sustainability-related aspects, including Dukas (2021),

Mawonde *et al.* (2019) and Malesa (2023). This is in addition to Nyembo (2018) and Tilt (2007) in the context of South African mining.

However, none of these studies have segregated the SDGs measuring the implementation of specific SDGs (SDG-1, 2, 3, 4, 5, 8, 10, 11 and 16) adopted by a mining association. Furthermore, this study analyses how platinum mining companies implement these SDGs in host communities in the BIC. Lastly, this study will enhance the analysis of sustainability reports by applying an audit performance mechanism – the PwC challenge framework (2019) and the SDG Compass (GRI, UN Global Compact & World Business Council for Sustainable Development, 2015) – within the South African context.

The findings of this study could encourage senior sustainability employees at platinum mining companies to earnestly view their host communities as one of the most important stakeholders to the mine, thus treating them with the same priority as other stakeholders would be treated, amongst others, shareholders and investors. Furthermore, this study seeks to ensure that sustainability reports accurately reflect the lived experiences of mining community stakeholders and promote meaningful community engagement and shared value between platinum mines and their host communities.

6.7 CONCLUDING REMARKS

In conclusion, the PGM mining industry has a complicated relationship with sustainability, sustainable development and to a certain extent, the SDGs. This is because, inherently, mining can never be a sustainable activity. Thus, the PGM industry has developed a poor reputation due to ongoing criticism of its destructive environmental and social impacts. Given the inevitability of depleting non-renewable mineral resources while continuing to mine for economic and social benefits, the study concludes with the following key points. First, PGM mining companies must prioritise meaningful stakeholder engagement to help alleviate poverty in mining communities. In addition, PGM mining companies are to provide the necessary policies to their mining communities, detailing how they contribute to uplifting that community, furthermore co-funding initiatives and services that will benefit the community in the long run.

With respect to reporting – used as a mechanism to track depletion of non-renewable resources – PGM mining companies must communicate their sustainable development goals

transparently. Moreover, they should engage with stakeholders that can educate mining officials on effectively integrating sustainable development into their operations.

Key insights from the study are that while PGM mining companies implement several SDGs through various initiatives, limited community engagement is prevalent with a focus on internal priorities, hindering broader community impact. Furthermore, while SLPs address infrastructure-related projects, there is limited accessibility for all mining community stakeholders from which to benefit. Lastly, although PGM mining companies incorporate ESG aspects and some SDGs in their sustainability reports, there is a lack of structured frameworks that could assist in understanding the SDGs, defining and prioritising them, setting clear goals, integrating the goals, and finally, reporting and communicating sustainability performance in a concise manner.

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ANNEXURE A: COMMUNITY STAKEHOLDERS INTERVIEW SCHEDULE

SDGs Targets Interview Schedule		
SDG Target	**#B**	**Questions:**
SDG-1: End Poverty in all its forms		
1.a	A1	Has the PGM mining company in your area implemented any programmes to reduce any form of poverty in your community for the mining community?
1.b	A2	Are you aware of any pro-poor development policies used by the PGM mining company to accelerate investment in poverty-eradication?
SDG-2: End hunger, achieve food security and improved nutrition and promote sustainable agriculture		
2.3	3	Has the PGM mining operation assisted with growth of small-scale food producers in the community?
SDG-3: Ensure healthy lives and promote well-being for all at all ages		
3.8	4	Has the PGM mining company built or refurbished a health facility in your community as well as conduct health campaigns?
3.c	5	Has the PGM mining company, worked with the local department of health in training the health workforce?
SDG-4: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all		
4.a	6	Has the PGM mining company in the area, built or upgrade education facilities in your community?
4.b	7	Has the PGM mining company increased, locally, the number of scholarships and bursaries available to your community?
4.c	8	Has the PGM mining company worked with the education local department to increase the number of teachers, through cooperation for teacher training development?
SDG-5: Achieve gender equality and empower all women and girls		
5.a	9	Has the PGM mining company in your area, undertake action to give women equal rights to the sub-economic resources that flow from the mine?
5.b	10	Do you know of any social programs that the PGM mining company has embarked, to promote the empowerment of women and girls in the community?
SDG-8: Promote sustained, inclusive, and sustainable economic growth, full and productive employment, and decent work for all		
8.5	11	Has the PGM mining company prioritized your community by providing access to full and productive employment and decent work for all?
8.6	12	Does the PGM mining company, provide the youth of this community with employment or training opportunities?
8.7	13	Has the PGM mining company benchmarked with relevant stakeholders to discuss, the ending of child labour in all its forms?
8.9	14	**Has this PGM mining company promoted sustainable tourism that will creates secondary jobs?**
8.10	15	Has there been partnerships between the PGM mining company and local banks to encourage and expand access to banking?
SDG-10: Reduce inequality within and among countries		
10.6	16	Has the PGM mining company emphasized the need of representation from your community to assists its decision-making process for the strategy of how it will benefit your community?
10.7	17	Has the PGM mining company engaged with the local community regarding the facilitation of migrants and mobility of people in your community?
10.a	18	Does the PGM mining company implement the principle of special and preferential treatment regarding the opportunities for your community?
SDG-11: Make cities and human settlements inclusive, safe, resilient, and sustainable		
11.1	19	Has the PGM mining company, provided the community with adequate, safe, and affordable housing?
11.2	20	Has the PGM mining company, assisted with improving the local roads in the community?
SDG-16: Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable, and inclusive institutions at all levels		
16.1	21	Does the PGM mining company work with local authorities to reduce all forms of violence and related death rates in your community?
16.5	22	Has the PGM mining company conduct anti-corruption and bribery programmes in the community?
SLP Sustainability Projects		
-	23	Does the PGM mining company publicly share information on SLP community development projects and further consult the community about these projects?"
-	24	Per the SLP of this PGM, are there any projects that the community has directly benefited, particularly through their expertise of construction?
-	25	Per the SLP of this PGM, are there any on-going sustainability projects that you are aware of?
-	26	Per the SLP of this PGM, are there any SLP sustainability projects that have been halted?
-	27	Do you think that this PGM mining company ensures a fair distribution of benefits among other mining communities? –
-	28	"Does this PGM mining company's Sustainability Report accurately reflect its contributions to the community's long-term needs?"

ANNEXURE B: SDG TARGETS: RECOMMENDATIONS FROM PILOT

SDG Target	#B	Original Questions:	Type of Amendment	Refined Questions:
SDG-1: End Poverty in all its forms				
1.a	1.	Has the Mining company in your area implemented any programmes to specifically reduce any form of poverty for the mining community?	None	Has the PGM mining company in your area implemented any programmes to reduce any form of poverty in your community for the mining community?
1.b	2.	Are you aware of any policies (documentation) based on pro-poor development strategies that the Mining company has with certain stakeholders to accelerate investment in poverty-eradication?	Reduction	Are you aware of any pro-poor development policies used by the PGM mining company to accelerate investment in poverty-eradication?
SDG-2: End hunger, achieve food security and improved nutrition and promote sustainable agriculture				
2.3	3.	As a community stakeholder, do you think the mining operation in your area, has assisted with growth of small-scale food producers, particularly women, indigenous people, family farmers, pastoralists, and fishers?	Reduction	Has the PGM mining operation assisted with growth of small-scale food producers in the community?
SDG-3: Ensure healthy lives and promote well-being for all at all ages				
3.8	4.	Has the Mining company worked with the local department of health in ensuring access to quality essential health-care services (Building / refurbishing of a clinic / community wellness campaigns)	Reduction	Has the PGM mining company built or refurbished a health facility in your community as well as conduct health campaigns?
3.c	5.	Has the Mining company, worked with the local department of health in ensuring an increase of health financing, recruiting, developing, training and retention of the health workforce?	Reduction	Has the PGM mining company, worked with the local department of health in training the health workforce?
SDG-4: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all				
4.a	6.	Has the Mining company in the area, built or upgrade education facilities for the community that are child, disability and gender sensitive that provides a safe, non-violent, inclusive, and effective learning for all?	Reduction	Has the PGM mining company in the area, built or upgrade education facilities in your community?
4.b	7.	Has the Mining company increased, locally, the number of scholarships available to your community, for the enrolment of higher education, vocational training, information and technology, technical, engineering, and scientific programmes?	Reduction	Has the PGM mining company increased, locally, the number of scholarships and bursaries available to your community?
4.c	8.	Has the Mining company worked with the education local department to increase the number of teachers, through cooperation for teacher training development?	None	Has the PGM mining company worked with the education local department to increase the number of teachers, through cooperation for teacher training development?
SDG-5: Achieve gender equality and empower all women and girls				
5.a	9.	Has the Mining company in your area, undertake action to give women equal rights to the sub-economic resources that flow from the mine?	None	Has the PGM mining company in your area, undertake action to give women equal rights to the sub-economic resources that flow from the mine?
5.b	10.	Do you know of any social programs that the Mining company has embarked, to promote the empowerment of women and girls in the community?	None	Do you know of any social programs that the PGM mining company has embarked, to promote the empowerment of women and girls in the community?
SDG-8: Promote sustained, inclusive, and sustainable economic growth, full and productive employment, and decent work for all				
8.5	11.	Has the Mining company prioritized your community by providing access to full and productive employment and decent work for all women, men,	None	Has the PGM mining company prioritized your community by providing access to full and productive employment and decent work for all?

		persons with disability and equal pay for work of equal value		
8.6	12.	Does the Mining company, provide the youth of this community with employment or training opportunities?	None	Does the PGM mining company, provide the youth of this community with employment or training opportunities?
8.7	13.	Has the Mining company benchmarked with relevant stakeholders to discuss, the ending of child labour in all its forms?	None	Has the PGM mining company benchmarked with relevant stakeholders to discuss, the ending of child labour in all its forms?
8.9	14.	Has there been associations with the Mining company and local authorities to promote sustainable tourism that subsequently creates jobs and promotes local culture and products?	Reduction	Has this PGM mining company promoted sustainable tourism that will creates secondary jobs?
8.10	15.	Has there been partnerships between the Mining company and local banks to encourage and expand access to banking?	None	Has there been partnerships between the PGM mining company and local banks to encourage and expand access to banking?
SDG-10: Reduce inequality within and among countries				
10.6	16.	Has the Mining company emphasized the need of representation from your community to assists its decision-making process for the strategy of how it will benefit your community?	None	Has the PGM mining company emphasized the need of representation from your community to assists its decision-making process for the strategy of how it will benefit your community?
10.7	17.	Has the Mining company engaged with the local community regarding the facilitation of migrants and mobility of people in your community?	None	Has the PGM mining company engaged with the local community regarding the facilitation of migrants and mobility of people in your community?
10.a	18.	Does the Mining company implement the principle of special and preferential treatment regarding the opportunities for your community?	None	Does the PGM mining company implement the principle of special and preferential treatment regarding the opportunities for your community?
SDG-11: Make cities and human settlements inclusive, safe, resilient, and sustainable				
11.1	19.	Has the Mining company, provided the community with adequate, safe, and affordable housing?	None	Has the PGM mining company, provided the community with adequate, safe, and affordable housing?
11.2	20.	Has the Mining company, assisted with improving the local roads in the community?	None	Has the PGM mining company, assisted with improving the local roads in the community?
11.c	21.	Do you know of any local entrepreneurs that have benefited through their expertise of constructing buildings in the local community?	Deletion and Merge	See 26.
SDG-16: Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable, and inclusive institutions at all levels				
16.1	22.	Does the Mining company work with local authorities to reduce all forms of violence and related death rates in your community?	None	Does the PGM mining company work with local authorities to reduce all forms of violence and related death rates in your community?
16.5	23.	Has the Mining company conduct anti-corruption and bribery programmes in the community?	None	Has the PGM mining company conduct anti-corruption and bribery programmes in the community?
16.10	24.	Does the Mining company make available information regarding community development and other 'public accessed' information?	Deletion and Merge	See 25.
SLP Sustainability Projects				
-	25.	Per the SLP of this mining company, are there any consultative engagements regarding SLP sustainability projects	Deletion and Merge	Does the PGM mining company publicly share information on SLP community development projects and further consult the community about these projects?"
-	26.	Per the SLP of this mining company, are there any projects that the community has directly benefited?	Deletion and Merge	Per the SLP of this PGM, are there any projects that the community has directly benefited, particularly through their expertise of construction?

-	27.	Per the SLP of this mining company, are there any on-going sustainability projects that you are aware of?	None	Per the SLP of this PGM, are there any on-going sustainability projects that you are aware of? –
-	28.	Per the SLP of this mining company, are there any SLP sustainability projects that have been halted?	None	Per the SLP of this PGM, are there any SLP sustainability projects that have been halted?
-	29.	Per the SLP of this mining company, project x is on-going, have you heard of this project?	Deletion and Merge	See 27.
-	30.	Do you think that, overall, the sustainability projects of this Mining company contribute to the long-term needs of your community?	Deletion and Merge	See 32.
-	31.	Do you think that this Mining company ensures a fair distribution of benefits?	None	Do you think that this PGM mining company ensures a fair distribution of benefits among other mining communities?
-	32.	Viewing their Sustainability Report, what is encompassed in here, does it match what is the ground?	Deletion and Merge	"Does this PGM mining company's Sustainability Report accurately reflect its contributions to the community's long-term needs?"

ANNEXURE C: DETAILED RESULTS – SDG IMPLEMENTATION TARGETS

SDG-1: End Poverty in all its forms
A1) Has the PGM mining company in your area implemented any programmes to reduce any form of poverty in your community?
Ivanhoe Mines – Ivanplats Operation (MCS-1): MCS-1 stated that Ivanplats does not have any direct poverty-alleviation initiatives but does have indirect poverty-reduction measures. As such, MCS-1 reported that Ivanplats has provided Mokopane residents with permanent and short-term employment. Therefore, although no direct programs to address poverty are evident, several measures have been put in place to alleviate poverty in the region.
Northam Platinum Holdings Limited – Booysendal Operation (MCS-2): MCS-2 pointed out that NPH focuses on addressing the underlying issues and root causes that lead to poverty, such as lack of job opportunities and poor development skills. As such, with lack of job opportunities, NPH solves this underlying issue by employing mining community residents. Regarding poor skills development the solution that NPH that resorted was to empower the youth with basic mining and drilling skills. Lastly, NPH attempts to foster economic activities and growth by empowering local entrepreneurs.
Sibanye Stillwater – Marikana Operation (MCS-3): Consistent with other stakeholders included in this study, MCS-3 indicated that Sibanye Stillwaters' Marikana operation indirectly contributes to SDG-1 by addressing other SDGs, such as SDG-8 and SDG-11. Furthermore, MCS-3 stated that SSW's Marikana operation has implemented initiatives focused on enterprise and supplier development, as well as skills development, to empower local entrepreneurs in Marikana.
Wesizwe Platinum – Bakubung Operation (MCS-4): MCS-4 stated that the programmes aimed at reducing any form of poverty in Ledig would fall within the categories of skills development and vocational training, as well as enterprise and small business development support. Although these programs are not explicitly labelled as 'poverty-reduction programs', the components and impacts thereof suggest that poverty will be indirectly alleviated. Siyanda Resources – Siyanda Bakgatla Operation (MCS-5)
Siyanda Resources – Siyanda Bakgatla Operation (MCS-5): MCS-5 indicated that Siyanda Bakgatla Platinum contributes to the Mantsere community in several ways with various programmes and initiatives that are aimed at alleviating poverty within the community. First, MCS-5 mentioned that the company provides food parcels to the vulnerable in Mantsere, these persons include the elderly, sick, disabled, and young children. Second, the company provides access to education and related skills development training programmes. Lastly, and most importantly, MCS-5 alluded to the high rate at which the company provides employment opportunities to the younger generation in the Mantsere community.
A2) Are you aware of any pro-poor development policies used by the PGM mining company to accelerate investment in poverty-eradication?
Ivanhoe Mines – Ivanplats Operation (MCS-1): MCS-1 indicated that he is not aware of such policies and regulatory frameworks. As such, it was deduced that there are no pro-poor development policies disclosed to Mokopane residents. Nevertheless, MCS-1 indicated that possibly, Ivanplats does have policies in place with respect to pro-poor development strategies given the amount of work undergone by the company to alleviate poverty, which is evident on the ground, just not disclosed to the public.
Northam Platinum Holdings Limited – Booysendal Operation (MCS-2): A pro-poor development strategy is simply a policy that is aimed to reduce poverty and its multifaceted elements within a community. MCS-2 mentioned that NPH does not have explicit pro-poor policies but rather focuses on

corporate social responsibility programs. Furthermore, the regulatory environment in the region does not seem to have stringent requirements for mining companies to undertake poverty-eradication initiatives.
Sibanye Stillwater – Marikana Operation (MCS-3): MCS-3 indicates that there are no formal guidelines and policies that are made known to the community. This is because SDG-1 is indirectly dealt with, and to the best of MCS-3's knowledge, there is limited evidence of pro-poor development strategies regarding a policy to accelerate investment in poverty-eradication. As such, besides the SLP, there is no other policy that is made known to the community.
Wesizwe Platinum – Bakubung Operation (MCS-4): As far as Bakubung operation's policies on pro-poor development strategies outside the required government official documentation on mining community development, MCS-4 stated that there is no such 'document' made known to the community. Furthermore, MCS-4 pointed out that Wesizwe Platinum's efforts on pro-poor development strategies are reported on a high level such as various reporting suites and often miss the concrete information required on the ground. Nevertheless, on the ground, there are projects undertaken by the Bakubung operation that are rooted to some form of documentation such as an SLP, tender adjudication summary, purchase order forms, and an integrated development programs with the local authorities.
Siyanda Resources – Siyanda Bakgatla Operation (MCS-5): MCS-5 pointed that the Siyanda Bakgatla Platinum operation has not made any official documentation made known, particularly with respect to pro-poor development strategies. Nevertheless, the participant mentioned that action is taken to address poverty, amongst others, by means of employment opportunities presented to the Mantsere community. In addition, the company performs this noble act, assumingly, in line with their HR policies and strategies, yet no documentation or policy is evident on the ground regarding the surge of hires
SDG-2: End hunger, achieve food security and improved nutrition and promote sustainable agriculture
A3) Has the PGM mining operation assisted with growth of small-scale food producers in the community?
Ivanhoe Mines – Ivanplats Operation (MCS-1): MCS-1 stated that Ivanplats regularly hosts community feeding scheme programmes. In addition to the feeding schemes, predominantly ran by Ivanplats, stakeholder engagement and participation sessions with small-scale farmers also takes place of which MCS-1 is an attendee of such engagement sessions.
Northam Platinum Holdings Limited – Booysendal Operation (MCS-2): MCS-2 resonated with SDG-2 as he is currently a self-employed farmer. In a nutshell, MCS-2 stated that despite the scale and capabilities of NPH's Booysendal operation, there has been little tangible benefit support to grow small-scale food producers in the area. Thus, NPH's Booysendal operation has not assisted in the growth of small-scale food producers. According to MCS-2, NPH's Booysendal conducted a study on food security and putting in place mechanisms to ensure strong food security systems, however, was found to be a fruitless exercise thus, no investment was done in this respect.
Sibanye Stillwater – Marikana Operation (MCS-3): MCS-3 said that the Marikana is geographically located in an area that is extremely rich in natural resources for farming and agricultural activities. Evidence suggests, per MCS-3, that SSW's Marikana operation has partnered with commercial farmers as far as the distribution of land is concerned. However, MCS-3 could not comment on any explicit focus by SSW on supporting and empowering small-scale food producers, as she has not witnessed or been made aware of any specific programs implemented by SSW towards this purpose.
Wesizwe Platinum – Bakubung Operation (MCS-4): MCS-4 stated that the Bakubung operation has contributed to SDG-2 through the establishment of food security programs. Furthermore, the operation through their agricultural program conducted a feasibility study with respect to the developing of school gardens in Ledig. Thus, the company established various community gardens at schools to address any form of food insecurity for the learners and the broader schooling community. In addition, these vegetable gardens, MCS-4 noted, also cater for vulnerable members (elderly, child-headed families, disabled) of the Ledig community.

Siyanda Resources – Siyanda Bakgatla Operation (MCS-5): According to MCS-5, programmes that relate to ending hunger undergone by Siyanda Bakgatla Platinum mostly favour mining communities under the traditional authority of Bakgatla-Ba-Kgafela. In contrast, MCS-5 stated that SDG-2 programmes, particularly with respect to food security, are minimal or arguably unsustainable within the Mantsere community. For example, MCS-5 mentioned that one programme undertaken by Siyanda Bakgatla Platinum is the provision of food vouchers for school-going pupils. Wherein the mine provides breakfast packages by distributing daily vouchers to school children. Although this project is notable and appreciated by the Mantsere community, MCS-5 mentioned that the longevity of this programme is rather questionable.
SDG-3: Ensure healthy lives and promote well-being for all at all ages
A4) Has the PGM mining company built or refurbished a health facility in your community as well as conduct health campaigns?
Ivanhoe Mines – Ivanplats Operation (MCS-1): MCS-1 specified that there is a local clinic in Mokopane being upgraded with a maternity ward in partnership with Ivanplats. As such, there is evidence of regular stakeholder engagement processes between Ivanplats and the immediate health stakeholders. This is because, constructing or refurbishing any form of healthcare infrastructure will need specifications and approval from the local department of health.
Northam Platinum Holdings Limited – Booysendal Operation (MCS-2): MCS-2 noted that the NPH's Booysendal operation built a primary healthcare facility in Lydenburg. MCS-2 also expressed that the company annually hosts several health awareness campaigns to educate the mining communities about prevalent health defects and preventative. To this end, MCS-2 indicated that NPH's Booysendal operation showcases a well-coordinated health delivery model in Lydenburg.
Sibanye Stillwater – Marikana Operation (MCS-3): According to MCS-3, SSW's Marikana operation has conducted health awareness campaigns on several communicable diseases. The Marikana operation focuses their efforts on curbing HIV/AIDS And TB mostly, alongside other communicable diseases in Marikana community. As such, MCS-3 pointed out that most miners in Marikana, and subsequently the community members, are persons coming from Lesotho and the Eastern Cape. They would typically start a second family in Marikana since it is a labour-sending area. In the same vein, wives that are left back in Lesotho and the Eastern Cape could also have a second husband, which evidences infidelity through sexual acts, thus intensifying the spread of HIV/AIDS.
Wesizwe Platinum – Bakubung Operation (MCS-4): The Bakubung operation works with the department of health on various health-related short- and long-term projects. According to MCS-4, one flagship project was the refurbishing of the Moses Kotane hospital. Furthermore, the company hosts bi-annual 'Ledig wellness campaigns', conducting, amongst others, blood tests, cholesterol tests and eye examinations. These wellness campaigns are health roadshows, targeting mostly the elderly.
Siyanda Resources – Siyanda Bakgatla Operation (MCS-5): According to MCS-5 stated that Siyanda Bakgatla Platinum conducts educational campaigns, wherein the screening of health defects and first aid training are key priorities. Furthermore, MCS-5 pointed that the campaigns are in partnership with the local Department of Health. Moreover, MCS-5 stated that the company's presence was evidenced during the COVID period wherein they assisted Mantsere residents with PPE, sanitizers and other essentials.
A5) Has the PGM mining company, worked with the local department of health in training the health workforce?
Ivanhoe Mines – Ivanplats Operation (MCS-1): MCS-1 pointed out, that, apart from the refurbishing of the health-care facility, he is not privy to any training development programmes of the health-workforce undergone by Ivanplats and the local department of health.

Northam Platinum Holdings Limited – Booysendal Operation (MCS-2): MCS-2 indicated that NPH Booysendal operation does work with the local department of health, since the company has a clinic inside the mine, workforce is retained because the nurses and staff would typically work in two clinics, one in the mine for the employees and the other in Lydenburg.
Sibanye Stillwater – Marikana Operation (MCS-3): MCS-3 articulated that SSW, is not responsible for the human resources and retention of the health workforce within their Marikana operations. This responsibility lies with the local Department of Health, which should independently manage and oversee the recruitment, and retention of the health workforce serving the Marikana community.
Wesizwe Platinum – Bakubung Operation (MCS-4): MCS-4 pointed out that the Bakubung operation would typically finance any health-related project under their mandate per the SLP or a Trust deed. However, as far as recruiting retention of healthcare workers, the mine does not have the prerogative to intervene in the government's mandate. As such, MCS-4 categorically stated that Bakubung will provide primary healthcare services through a clinic or a hospital, but the operational management and oversight of this clinic or hospital will often, as it should, lie with the local department of health.
Siyanda Resources – Siyanda Bakgatla Operation (MCS-5): MCS-5 pointed out that Siyanda Bakgatla Platinum has not contributed to the retention and development of the health workforce. This function ought to be undertaken by the local department of health.
SDG-4: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all
A6) Has the PGM mining company in the area, built or upgrade education facilities in your community?
Ivanhoe Mines – Ivanplats Operation (MCS-1): MCS-1 said that Ivanplats contributes towards SDG-4 with respect to infrastructure. Firstly, the company has invested in the construction of a science and technology laboratory for all students who reside Mokopane. Secondly, the company constructed a reception area for one a primary school in Mokopane, further equipping it with the necessary office equipment.
Northam Platinum Holdings Limited – Booysendal Operation (MCS-2): MCS-2 pointed out NPH Booysendal operation has done several school refurbishment projects through a community trust and the SLP. Hence, this study found that Target 4.a is deemed a continuous process. To further strengthen NPHs commitment to the Lydenburg community, MCS-2 stated that the company is in the process of building TVET colleges and rehabilitation centres in the community.
Sibanye Stillwater – Marikana Operation (MCS-3): According to MCS-3, SSW's Marikana operation has erected electric fencing and installed security lighting to ensure safety in various educational facilities. Furthermore, the company has installed information technology systems in schools to enable virtual and remote learning. Addition to this, erection of local area network cables in schools for both teachers and learners, respectively.
Wesizwe Platinum – Bakubung Operation (MCS-4): According to MCS-4, the Bakubung operation focuses solely on education and sports. MCS-4 noted that the company has provided sports infrastructure and equipment for children in Ledig. There is no evidence of building or refurbishing a specific school, but rather, infrastructure developments for the entire Ledig community, with children being among the primary beneficiaries. Additionally, MCS-4 stated that the tennis and netball courts, as well as soccer pitches, are intended to create a safe environment for all the children and youth of Ledig.
Siyanda Resources – Siyanda Bakgatla Operation (MCS-5): MCS-5 stated that the company has not embarked on major school construction or refurbishment projects in Mantsere. However, it has assisted local schools in various other ways. For instance, Siyanda Bakgatla Platinum implements low-cost educational and sporting initiatives and medical services to benefit the children in Mantsere during the athletic season.
A7) Has the PGM mining company increased, locally, the number of scholarships and bursaries available to your community?

Ivanhoe Mines – Ivanplats Operation (MCS-1): In accord with MCS-1, Ivanplats has provided bursaries and scholarships to support further education for Mokopane residents. Furthermore, the company advertises their bursaries through the local media channels, ensuring that the information reaches a wide audience.
Northam Platinum Holdings Limited – Booysendal Operation (MCS-2): Initially, NPH Booysendal offered bursaries to external applicants. This concerned the Lydenburg community, which then engaged with the mine. The community stated that while bursaries could be granted to external applicants, local community members should be prioritized. After these engagements, MCS-2 reported that the prioritization of local community members had changed.
Sibanye Stillwater – Marikana Operation (MCS-3): SSW has actively partnered with feeding high schools and universities to identify talented students from Marikana and provide them with financial support to pursue a vocational training program or a higher education qualification. MCS-3 pointed out that, amongst the educational programmes that are funded, include mining and civil engineering alongside geology studies.
Wesizwe Platinum – Bakubung Operation (MCS-4): MCS-4 pointed out that the Bakubung operation does offer bursaries and scholarships to the Ledig community. In addition, MCS-4 said that the company also offers artisan development programs. The aim of an artisan program is to equip the residents with this skill set to improve their 'employability'. Furthermore, with artisanship being such a scarce skill, MCS-4 added that once an individual has acquired this skill, they are likely absorbed by Wesizwe Platinum. Alongside bursaries the Bakubung operation offers internships that are ringfenced for the Ledig community.
Siyanda Resources – Siyanda Bakgatla Operation (MCS-5): MCS-5 stated that Siyanda Bakgatla Platinum does provide the Mantsere community with bursaries. Consistent with other PGM groups analysed in this study, the company provides bursaries that are mining related. Thus, many students from Mantsere are pursuing degrees, diplomas or certificates in fields such as engineering and metallurgy.
A8) Has the PGM mining company worked with the education local department to increase the number of teachers, through cooperation for teacher training development?
Ivanhoe Mines – Ivanplats Operation (MCS-1): MCS-1 attests that there is no clear evidence of Ivanplats, implementing any development programs focused on teacher training and development for the ECD centres and schools in Mokopane.
Northam Platinum Holdings Limited – Booysendal Operation (MCS-2): MCS-2 stated that there are no formalized agreements between NPH's Booysendal mine and the education department to increase the number of teachers. As such, there is no standing teacher training development program in the Lydenburg community currently, particularly in association with NPH's Booysendal operation.
Sibanye Stillwater – Marikana Operation (MCS-3): MCS-3 stated that SSW's Marikana operation does work with the local department of education regarding various educational and community programmes. These engagement efforts would typically outline the building of new schools, and the refurbishing of old school infrastructure. However, MCS-3 stated that SSW would merely donate the school infrastructure but would not take on the responsibility of training teachers.
Wesizwe Platinum – Bakubung Operation (MCS-4): According to MCS-4, the Bakubung operation does not necessarily run a dedicated teachers training program. Since MCS-4's maternal parent is a teacher in Ledig, she could ascertain that there has never been a specific program from the Bakubung operation that focuses on teacher empowerment and training.
Siyanda Resources – Siyanda Bakgatla Operation (MCS-5): Initially, Siyanda Bakgatla Platinum coordinated and funded teacher development programs around Mantsere. MCS-5 stated that this program was done in collaboration with the local Department of Education. Furthermore, MCS-5 pointed out that the teachers were trained on various key elements, such as curriculum changes, classroom management, and other important teaching methodologies and

skills. Although the department of education is obligated to conduct monthly workshops, the association with Siyanda Bakgatla Platinum made the program more effective and consistent.
SDG-5: Achieve gender equality and empower all women and girls
A9) Has the PGM mining company in your area, undertake action to give women equal rights to the sub-economic resources that flow from the mine?
Ivanhoe Mines – Ivanplats Operation (MCS-1): MCS-1 pointed out that Ivanplats has taken some steps to address gender inequality in Mokopane and ensuring that women are, 'founders' of sub-economic resources. According to MCS-1, Ivanplats has made a concerted effort in the realms of women empowerment and employment diversity within their operation. In addition, MCS-1, is a direct beneficiary of a women-led business enterprise since his maternal parent owned a small-scale enterprise that was established through Ivanplats' corporate social responsibility initiatives.
Northam Platinum Holdings Limited – Booysendal Operation (MCS-2): It is clear from MCS-2 that women from the Lydenburg community are being employed by Booysendal in various positions although most jobs offered are dominated by men. Generally, there is a prevalent gender imbalance when it comes to opportunities from mining industries for women.
Sibanye Stillwater – Marikana Operation (MCS-3): According to MCS-3, SSW's Marikana operation has undertaken action to give women equal rights to the sub-economic resources that flow from the mine. However, MCS-3 stated that the process of accelerating women empowerment is delayed since the mine would typically present such opportunities to men. Another issue that MCS-3 pointed out was that some opportunities are 'gate-kept' for certain individuals and thus, are never made available to the entire community. Nevertheless, there has been a women-led steel business wherein SSW's Marikana operation empowered the individual to become a service provider to the mine.
Wesizwe Platinum – Bakubung Operation (MCS-4): MCS-4 pointed out that the Bakubung operation has prioritized women in this regard. Although most of these sub-economic resources is said to be standard and general, the women of Ledig have benefitted. Furthermore, MCS-4 mentioned that on paper women are overly prioritized for compliance purposes with the Mining charter. For instance, black females are said to score higher on the Mining charter matrix since they are the most vulnerable in society.
Siyanda Resources – Siyanda Bakgatla Operation (MCS-5): MCS-5 stated that strides are made at Siyanda Bakgatla Platinum with respect to giving women equal rights. Moreover, MCS-5 pointed out that the company prioritizes developing women both within their operation as well as the Manstere community. The company has put in top positions, women who ought to lead strategic departments from the board, executive management as well as operational management. MCS-5 further pointed out that several businesswomen in Mantsere benefit from key mining sub-contracting services.
A10) Do you know of any social programs that the PGM mining company has embarked, to promote the empowerment of women and girls in the community?
Ivanhoe Mines – Ivanplats Operation (MCS-1): MCS-1 stated that there are several GBV campaigns that are hosted by Ivanplats in a joint-venture with the local Department of Health. As such, MCS-1 understood the importance of hosting such events on a regular basis. For instance, it was highligted that there are women in the region who are now local entrepreneurs by opening bead-workshops, catering services and designing Sepedi items and clothing. All these women entrepreneurs were provided with support and training by Ivanplats through their SLP (enterprise development).
Northam Platinum Holdings Limited – Booysendal Operation (MCS-2): When it comes to social programs that are specifically targeted at women and girls in the Lydenburg community, MCS-2 pointed out that there are no such programs in the area.

Sibanye Stillwater – Marikana Operation (MCS-3): With respect to a special program that is tailor made for women in Marikana conducted by SSW, there is limited information available. As such, MCS-3 is not aware of any specific long-term initiatives by the company to address the needs and empower women and girls in the local community. Programs of this nature are often one-time occurrences that would be conducted nationally, such as the National Women's Day in South Africa on August 9th.
Wesizwe Platinum – Bakubung Operation (MCS-4): According to MCS-4, the Bakubung operation has implemented some women-oriented programs in the Ledig community, but these initiatives are often overshadowed by the company's other broader community development efforts.
Siyanda Resources – Siyanda Bakgatla Operation (MCS-5): One social programme ran by Siyanda Bakgatla Platinum aimed at empowering women and girls in Mantsere is the annual 'girl-to-girl' chat, according to MCS-5. This programme is a ceremony where girls from Mantsere, alongside their maternal parents or guardians, gather to discuss various societal and economic issues that impact the girls and women in Mantsere.
SDG-8: Promote sustained, inclusive, and sustainable economic growth, full and productive employment, and decent work for all
A11) Has the PGM mining company prioritized your community by providing access to full and productive employment and decent work for all?
Ivanhoe Mines – Ivanplats Operation (MCS-1): As highlighted by MCS-1, Ivanplats has prioritised local employment and can be referenced as a responsible corporate citizen since majority of the workforce is from the neighbouring mining communities. This is a notable achievement in contributing to SDG-8 and several other SDGs indirectly so, featured in this study. It was flagged during the interview that many lives and families and households have been positively impacted.
Northam Platinum Holdings Limited – Booysendal Operation (MCS-2): MCS-2 indicated that NPH's Booysendal operation has prioritized access to full and productive employment and decent work for all women, men, and persons with disability as well as equal and meaningful pay. Thus, the study found that this company has made positive strides in the community of Lydenburg, subsequently contributes to Target 8.5 of the SDGs.
Sibanye Stillwater – Marikana Operation (MCS-3): MCS-3 stated that indeed, the Marikana operation prioritizes the Marikana community with respect to employment opportunities. MCS-3 further mentioned that Marikana is a special place for the Sibanye Stillwater company, as it was the site of the tragic incident in 2012 where numerous miners were killed. As such, the company made a stern commitment to making sure that the community flourishes owing to the loss that has occurred. Furthermore, MCS-3 said SSW's Marikana operation implemented a family program through their Marikana Memorial Trust to fully employ, in place of the deceased, close relatives to ensure that there is a sustainable monetary flow in the families.
Wesizwe Platinum – Bakubung Operation (MCS-4): MCS-4 stated that Wesizwe platinum's Bakubung operation has provided access to full and productive employment for Ledig community members. Moreover, the stakeholder expressed that the company, before advertising outside the community, will ensure that the Ledig residents are given the information first-hand through community forums and kingship associations. However, to the dismay of what is noticed on the ground by MCS-4, more locals, since they are familiar with the community, the mine, and the surroundings, those employed by the Bakubung operation cannot retain their jobs for a reasonable amount of time.
Siyanda Resources – Siyanda Bakgatla Operation (MCS-5): MCS-5 pointed out that Siyanda Bakgatla Platinum has provided meaningful and decent employment opportunities for the local community of Mantsere. As such, MCS-5 mentioned that the company employs both skilled and unskilled residents within Mantsere, thereby contributing to alleviating poverty within the community as well as reducing the unemployment rate.
A12) Does the PGM mining company, provide the youth of this community with employment or training opportunities?
Ivanhoe Mines – Ivanplats Operation (MCS-1): According to MCS-1 most community beneficiaries with respect to employment at Ivanplats are the local youth. MCS-1 further elaborated that he personally knows many young people and acquaintances from the community who have been hired and provided

with valuable training opportunities by Ivanplats. The mining company has made a concerted effort to prioritize the employment and skills development of the younger generation within this region, recognizing the importance of investing in the future leaders and workforce of the community.
Northam Platinum Holdings Limited – Booysendal Operation (MCS-2): As stated by MCS-2, NPH's Booysendal operation does provide the youth of Lydenburg with employment as well as training opportunities. What is more, MCS-2 estimated that 80% of the community member employed at NPH's Booysendal operation are youth members. This is a positive development, as one can see the NPH's Booysendal operation strives to provide not just economic benefits to the community of Lydenburg including its youth members, but also skills development in this regard. Nevertheless, it follows that most of the youth employed by this company, by their very nature as, 'young people' lack the necessary financial management skills in managing their income.
Sibanye Stillwater – Marikana Operation (MCS-3): MCS-3 pointed out that indeed, the company, SSW prioritizes youth employment within the Marikana community. However, as a medical professional, MCS-3 stated that the very same youth members in the community misuse and abuse the job opportunities that SSW has provided. Particularly, MCS-3 noted that the youth often succumb to alcoholism and drug abuse, squandering the income from their jobs on risky and self-destructive behaviours. For instance, MCS-3 said that *'on a typical Monday, the clinic is busy because most of the patients waiting to consult with a doctor are the youth seeking sick notes due to the SSW alcohol-free zone policy'*. Furthermore, since SSW is a mining operation, safety is of paramount importance, and breathalysers are undertaken before every shift.
Wesizwe Platinum – Bakubung Operation (MCS-4): According to MCS-4, the Bakubung operation has prioritized the youth of Ledig with respect to the provision of employment opportunities. In addition, MCS-4 stated that she knows two young gentlemen who have been employed by the Bakubung operation and fortunately they were promoted to management positions because of their outstanding performance. Additionally, the company, since it is a mine, has many contractors, thus, many youth members around Ledig are indirectly employed by Wesizwe, however, through a third-party entity contracted by the mine. The Bakubung operation has also implemented training programs to upskill the local youth and prepare them for employment at the mine or with its contractors.
Siyanda Resources – Siyanda Bakgatla Operation (MCS-5): MCS-5 stated that the youth of Mantsere, particularly graduates, are given the opportunity to work for the mine. Moreover, MCS-5 pointed out that the company would employ the youth and, accordingly, place them in various operations, including their headquarters in Johannesburg. Furthermore, MCS-5 said that even though not all the youth are absorbed by Siyanda Bakgatla Platinum, the company has several sub-contractors that employ the youth in Mantsere in their respective businesses.
A13) Has the PGM mining company benchmarked with relevant stakeholders to discuss, the ending of child labour in all its forms?
Ivanhoe Mines – Ivanplats Operation (MCS-1): MCS-1 highlights that there is no public policy or media statements thereof, from Ivanplats on any effort to eliminate child labour in the Mokopane community. Moreover, although many young people in Mokopane are employed by Ivanplats, MCS-1, explicitly states, from the community's side 'there are aligned human resource protocols to award employment at Ivanplats'. In addition to this, child labour was evident in the primitive times of the South African mining landscape hence MCS-1 understood the narrative behind this question and could therefore resonate. Fortunately, he stated that there have not been any instances or occurrences of child labour in Mokopane with respect to Ivanplats.
Northam Platinum Holdings Limited – Booysendal Operation (MCS-2): MCS-2 has indicated that he is not aware of any initiatives by NPH's Booysendal operation that actively engages with the Thaba Chewu local municipality and the relevant stakeholders on the issues pertaining to child labour in the community of Lydenburg.
Sibanye Stillwater – Marikana Operation (MCS-3): As far as child labour is concerned, MCS-3 pointed out that SSW's Marikana operation follows the correct HR processes in line with the Employment Act of the Republic of South Africa. As such, there is no need to really benchmark with stakeholders to

end child labour. However, since mining in South Africa does have a history of human rights abuses, including incidents related to child labour, it is a primitive notion in 2024, especially for a PGM mining company listed on the JSE, to not take proactive measures to address this issue. MCS-3 further stated that Marikana, since it is a typical mining town, faces the challenge of many Zama Zama's who are illegal miners, some of whom may be children and under the age of 18, with most of them being foreigners.
Wesizwe Platinum – Bakubung Operation (MCS-4): MCS-4 pointed out that there have not been any discussions with the Bakubung operations with respect to ending any form of 'child labour'. Furthermore, as an active community stakeholder, she is aware of child-headed households in the area. However, as far as the children in these families 'working' or being employed in any way, such practices do not appear to be prevalent on the ground.
Siyanda Resources – Siyanda Bakgatla Operation (MCS-5): According to MCS-5, there has not been any official documentation or engagements with relevant stakeholders regarding child labour at Siyanda Bakgatla Platinum. As such, MCS-5 stated that labour practices are not prevalent at Mantsere, where the recipients are employed at Siyanda Bakgatla Platinum. Hence, MCS-5 concluded that, in his view, Siyanda Bakgatla Platinum employs the correct HR processes that are in line with South African labour law.
A14) Has this PGM mining company promoted sustainable tourism that will creates secondary jobs?
Ivanhoe Mines – Ivanplats Operation (MCS-1): With respect to sustainable tourism development in the Mokopane area, the associations with Ivanplats, MCS-1 states, he is not aware of any strong partnerships between Ivanplats and local authorities to promote sustainable tourism.
Northam Platinum Holdings Limited – Booysendal Operation (MCS-2): MCS-2 stated that there are no associations with NPH's Booysendal operation in terms of sustainable tourism development. Based on this, local culture and products may not be fully leveraged to create sustainable economic opportunities and diversify the local economy.
Sibanye Stillwater – Marikana Operation (MCS-3): The only tourism ventures that MCS-3 is aware of is a museum planned to be constructed by the company and the local department of tourism to commemorate the victims of the Marikana massacre in 2012. This museum will be built in the local community of Marikana to preserve the memory of those who lost their lives and to promote understanding and healing. Furthermore, MCS-3 stated that the construction of such a museum will bring several benefits to the community, including employment opportunities during the construction phase, as well as jobs for guides, curators, and cultural performers once the museum is operational.
Wesizwe Platinum – Bakubung Operation (MCS-4): Stated by MCS-4, Ledig is a community that is driven by both mineral resources and tourism. Since Ledig is located close to the Pilansberg National Park and Sun City resort, there is great potential for partnerships between the Bakubung operation and the community to contribute to Ledig's development. However, as MCS-4 has noted, Sun City Resort is a company under the Sun International Group, and thus its corporate social responsibility and corporate social investment activities are mainly driven at a group level. Furthermore, since Bakubung operation is a mine, its associations are primarily with relevant parties that align with the mining industry rather than the tourism industry.
Siyanda Resources – Siyanda Bakgatla Operation (MCS-5): MCS-5 stated that there have not been any formal associations with the local authorities in Mantsere to promote sustainable tourism in the community. However, the management of Siyanda Bakgatla Platinum has made some efforts to cater to the tourists and visitors who come to the mine. Within the mine, there are certain tourist attractions that the management has developed to a limited extent. Moreover, the demarcated areas within the mine provide visitors with a brief overview of the mine's inception, the minerals extracted, and the various developments that have occurred over the years
A15) Has there been partnerships between the PGM mining company and local banks to encourage and expand access to banking?

Ivanhoe Mines – Ivanplats Operation (MCS-1): Banking facilities are mostly located in concentrated areas such as business hubs and urban centres as well as concentrated townships. This poses a challenge for rural areas to access to financial services. Since Ivanplats is a mine and located in a remote area, MCS-1 points out there has been initiatives between two local banks and Ivanplats to increase the presence of banking in the Mokopane area.
Northam Platinum Holdings Limited – Booysendal Operation (MCS-2: MCS-2 pointed out that there are no partnerships that the community of Lydenburg is aware of with local banks to encourage and expand access to banking. Thus, mining community members are solely responsible for their incomes and debts with the NPH Booysendal not featured in the light. MCS-2 also stated that there is a need for NPH to assist mining local community members in Lydenburg with associating themselves with local banks and financial institutions to assist with financial matters collectively.
Sibanye Stillwater – Marikana Operation (MCS-3): MCS-3 mentioned that associations between the PGM mining and the local banks to expand access to banking services have been limited to employees of the mine and not necessarily the entire Marikana community. Furthermore, MCS-3 pointed out that these partnerships, typically would not include mainstream banking facilities. However, a long-standing banking partnership between SSW and their employees, which to a certain extent will include the Marikana residents, is that of Teba Bank. Teba Bank is a financial services provider targeted at serving the mining community. This bank was established post the second Anglo-Boer war in 1902 to support mines in meeting the country's national priorities of expanding universal production.
Wesizwe Platinum – Bakubung Operation (MCS-4): MCS-4 stated that there are no associations that she has observed linking the banks with the Bakubung operation for benefitting the Ledig community. Furthermore, she stated that much of the corporate social responsibility activities with respect to banks are done at a Group level and not localized within the specific communities, as such, there is no direct access or engagement between the banks and the Bakubung operation.
Siyanda Resources – Siyanda Bakgatla Operation (MCS-5): According to MCS-5, the company and the local banks collaborate through various campaigns and events. MCS-5 stated that the company regularly communicates with the local branches of major South African banks to showcase their latest offerings in terms of bank accounts and loans. These campaigns primarily target the employees of Siyanda Bakgatla Platinum, rather than the general Mantsere community. To some extent, the Mantsere community benefits indirectly, as the employees of Siyanda Bakgatla Platinum are also residents of Mantsere. However, it is noteworthy that not all Siyanda Bakgatla Platinum employees are residents of Mantsere.
SDG-10: Reduce inequality within and among countries
A16) Has the PGM mining company emphasized the need of representation from your community to assists its decision-making process for the strategy of how it will benefit your community?
Ivanhoe Mines – Ivanplats Operation (MCS-1): Target 10.6 questions the representation and involvement of affected communities in the decision-making processes for community initiatives aimed at benefiting those same communities impacted by mining operations. As such, MCS-1 pointed out that Ivanplats does regularly communicate with mining communities regarding the operational performance of the mine, its financial health, safety measures, as well as all ESG-related initiatives. This communication is facilitated through various channels, including community forums, live webcasts, and other stakeholder engagement mechanisms such as local media advertisements and roadshows, to ensure transparent and inclusive decision-making.
Northam Platinum Holdings Limited – Booysendal Operation (MCS-2: MCS-2 expressed that the mine does not directly or indirectly so, involve the community in making decisions. This is contrary to the expectations of the communities, who demand more participation in the mining company's decision-making processes, particularly regarding how the mining activities will benefit the local population. Moreover, MCS-2 made an example of a Tonteldoos

high school project, funded by the community trust, where the community of Lydenburg was consulted and part of the implementation but at a later stage, were overthrown and had limited influence on the project's outcome.
Sibanye Stillwaters – Marikana Operation (MCS-3): MCS-3 pointed out that there are active engagements between SSW's Marikana operation and Marikana. The methods of communication in this regard include "town hall meetings, one-on-one meetings, and/or site visits" with district councillors, ward councillors, as well as chairpersons of the business forums. However, the information shared with the communities is often diluted as it is second-hand to the original information conveyed to various governance leaders in the community. This breeds an element of untrustworthiness of ward councillors, among others.
Wesizwe Platinum – Bakubung Operation (MCS-4): MCS-4 has observed a high level of hostility amongst the villages located in Ledig, stemming from various grievances such as tribal tensions and benefit sharing. As such, MCS-4 pointed out that the Bakubung operation has, on several occasions, tried to convene multi-stakeholder dialogues and community meetings to solidify relationships and provide operational updates pertaining to the mine's activities. Moreover, MCS-4 mentioned that the tribal conflicts between the Tswana, Coloured, and Zulu nations have delayed the Bakubung operation in successfully conducting forums where meaningful representation from each tribe and village within Ledig is achieved.
Siyanda Resources – Siyanda Bakgatla Operation (MCS-5): According to MCS-5, the strategic decision-making processes to benefit the community of Mantsere are carried out by Siyanda Bakgatla Platinum through the tribal council. As such, any decisions made to benefit the community of Mantsere, which are the key beneficiaries must have the agreement of all parties involved, which is the mine and the tribal council. To this end, MCS-5 states that the ordinary residents of Mantsere are represented and have a voice through the tribal council structure.
A17) Has the PGM mining company engaged with the local community regarding the facilitation of migrants and mobility of people in your community?
Ivanhoe Mines – Ivanplats Operation (MCS-1): According to MCS-1, there has been no engagement between Ivanplats and the local Mokopane community to address the facilitation of migrants and people's mobility in the area. Furthermore, it was mentioned that in MCS-1's local village of Mokopane, there is an influx of members originating from other areas. As expected, these individuals ought to be employed by Ivanplats, but MCS-1 stated that the majority are coming from nearby villages around Mokopane, such as Masodi, Ga-Madiba, and Machikiri. Therefore, MCS-1 pointed out that there is no animosity or ethnic conflict, as many of these communities, for instance, share two common languages - Sepedi and Xitsonga.
Northam Platinum Holdings Limited – Booysendal Operation (MCS-2: MCS-2 mentioned that NPH's Booysendal Mine has not engaged with their community of Lydenburg with respect to managing the influx of migrants and mobility of people in the area. The mine's lack of engagement with the local community regarding the management of migrant workers and their mobility has led to challenges for the residents of Lydenburg, who feel the mine should take a more active role in addressing these issues and supporting the integration of new arrivals.
Sibanye Stillwater – Marikana Operation (MCS-3): As far as the facilitation of migrants and mobility of the people in the Marikana community, MCS-3 expressed that indeed the community is influxed with many outsiders, some being domestic and others foreign. Furthermore, MCS-3 said that the influx of people in their community has led to a significant increase in the population size of Marikana, which has put a strain on the available resources and infrastructure. To this end, MCS-3 pointed out that the mining company, Sibanye Stillwaters, has never engaged the native community on how to manage the facilitation of migrants and mobility in the community.
Wesizwe Platinum – Bakubung Operation (MCS-4): MCS-4 stated that the Ledig community has experienced a significant influx of migrant employees who subsequently form part of the villages and communities around Ledig. Furthermore, MCS-4 noted that the Ledig community is built with different

people from all over South Africa and beyond, which is representative of a diverse and inclusive community. Notably, MCS-4 pointed out that many migrants in the Ledig community originate from the Eastern Cape province as well as neighbouring countries such as Zimbabwe alongside Pakistani and Bangladeshi nationals. While the Ledig community has seen an influx of migrant workers, MCS-4 indicates that the mining company has not actively engaged with the local Ledig community regarding the facilitation of migrants and the mobility of people in the area.
Siyanda Resources – Siyanda Bakgatla Operation (MCS-5): Siyanda Bakgatla Platinum has not engaged the Mantsere community directly regarding the facilitation of migrants. As a result, according to MCS-5, the tribal council has intervened to ensure that the migrants are well-integrated into the community while considering the interests of Mantsere's residents.
A18) Does the PGM mining company implement the principle of special and preferential treatment regarding the opportunities for your community?
Ivanhoe Mines – Ivanplats Operation (MCS-1): MCS-1 noted that Ivanplats' approach demonstrates special and preferential treatment, aligning with the specific needs of each village within Mokopane. Furthermore, MCS-1 explained that the company's social and labour plan is tailored to the unique requirements of various villages. As a result, several villages are aware of the areas in which they will benefit, based on the community needs analysis. For example, a clinic built in Ga-Madiba is widely known throughout Mokopane, and residents from Masodi, among other villages.
Northam Platinum Holdings Limited – Booysendal Operation (MCS-2: The MCS specified that NPH's Booysendal operation does implement the principle of preferential treatment through many initiatives aimed at empowering and developing the local community. He also pointed out that, there are ring-fenced structures and programmes specifically for their community. Amongst other initiatives, the company has established a community trust, referred to as the Northam Booysendal Community Trust, which is a subsidiary under the NPH and is used as primary vehicle to address the needs of the local community of Lydenburg and ensure sustainable development.
Sibanye Stillwater – Marikana Operation (MCS-3): Regarding special and preferential treatment for the Marikana community, MCS-3 stated that it is a tricky situation as the companies sometimes have their own agenda and may not fully represent the interests of the community. Thus, she stated during this interview that on paper, it is expressed as if the Marikana community is given the special treatment or rather prioritized in many facets. However, for instance, when it comes to the construction awards, the main contractors will, in most cases, come from major cities such as Johannesburg and Pretoria which lie outside the community.
Wesizwe Platinum – Bakubung Operation (MCS-4): According to MCS-4, special and preferential treatment is granted to the Ledig community in such a way that the community feels that mining activities in the area have brought significant benefits to them. As such, the Bakubung operation has implemented various programmes that are tailor-made for the Ledig community. Amongst many other programmes, MCS-4 pointed out that the company has established an Enterprise and Supplier Development initiative alongside skills development programmes to uplift the economic situation in the community.
Siyanda Resources – Siyanda Bakgatla Operation (MCS-5): Matters with respect to preferential treatment for the Mantsere community residents surrounding the Siyanda Bakgatla Platinum operation are typically raised with the tribal council. According to MCS-5 and, as can be expected, the community leaders believe that outsiders, indeed, are welcome to Mantsere but should not be given preference over the residents particularly when it comes to business ventures and employment opportunities. Thus, MCS-5 informed the researcher that the tribal council actively monitors the recruitment of locals at Siyanda Bakgatla Platinum.
SDG-11: Make cities and human settlements inclusive, safe, resilient, and sustainable
A19) Has the PGM mining company, provided the community with adequate, safe, and affordable housing?

Ivanhoe Mines – Ivanplats Operation (MCS-1): MCS-1 said, Ivanplats is involved in several housing projects in the Mokopane area, including the construction of new homes and the renovation of existing housing units. However, with not much certainty, the stakeholder reiterated that these housing projects could be for the community or Ivanplats employees. Thus, housing projects are underway, but the stakeholder could not clarify if the main beneficiaries are community members or Ivanplats employees.
Northam Platinum Holdings Limited – Booysendal Operation (MCS-2: MCS-2 confirmed that NPH's Booysendal operation has provided adequate, safe and affordable housing, however, for the employees and not the community. MCS-2 also stated that NPH has assisted a few percentages of the public with respect to housing but not the entire mining community at large.
Sibanye Stillwater – Marikana Operation (MCS-3): SSW's Marikana operation, like any other mining company, does have a housing and accommodation scheme in place. The community is likely to benefit indirectly, as these houses are built primarily for the employees of the mining company, which subsequently extends to the family members who are part of the local community. Additionally, the construction of these houses provides short-term income-generating opportunities for the community members involved in the construction process. However, according to MCS-3, there is no specific housing scheme earmarked for the Marikana community.
Wesizwe Platinum – Bakubung Operation (MCS-4): MCS-4 stated that there are numerous housing projects underway in Ledig. It appears that these housing projects are predominantly driven by Wesizwe Platinum's Bakubung operation. Furthermore, one specific housing project witnessed by MCS-4 is a communal space that aims to provide sectional titles for the Ledig community, with some being apartments, other townhouses and small-scale free-standing homes. These housing projects have the potential to significantly improve the living conditions and access to affordable housing for the Ledig community, provided they are made available and accessible to all members of the community, not just mining company employees.
Siyanda Resources – Siyanda Bakgatla Operation (MCS-5): MCS-5 mentioned that there has not been a housing project undertaken by Siyanda Bakgatla to provide housing for the Mantsere community. This is expected since the company is not obligated to provide housing to the public. Consistent with the findings of other PGM groups, housing projects are typically limited to employees who reside in the mine and their immediate families.
A20) Has the PGM mining company, assisted with improving the local roads in the community?
Ivanhoe Mines – Ivanplats Operation (MCS-1): Since there is one main road between Ivanplats and Mokopane, the N11 is an essential transportation artery for both the mining company and the local population. Furthermore, the researcher noticed that there is construction on this road when travelling to conduct this interview, suggesting that the company may be assisting with road maintenance or improvements. With that in mind, MCS-1 did confirm that Ivanplats, to the best of his knowledge, invests huge chunks of funds towards road infrastructure development in the Mokopane area. This includes the ongoing maintenance and upgrades to the N11 road.
Northam Platinum Holdings Limited – Booysendal Operation (MCS-2: MCS-2 confirmed that NPH's Booysendal operation has provided the local community of Lydenburg with roads and infrastructure alike. It was further pointed out that these infrastructural projects pertaining to roads were done with multiple stakeholders including the local municipality and peer PGM mining companies in the area. MCS-2 further stated that he feels the NPH's Booysendal operation is aware of the damages made to the roads because of their truck fleet and transporting of material, hence, it acknowledges and supplements this by contributing heavily on roads.
Sibanye Stillwater – Marikana Operation (MCS-3): MCS-3 stated that there are currently road construction projects being undertaken by Sibanye Stillwater in the Marikana community. While these projects are primarily aimed at improving access to the mining operations, they may also provide some secondary benefits to the local community. The roads being fixed or built are not necessarily the main thoroughfares used by everyday commuters, as the

mining operation is located on the outskirts of the community. However, even the minimal effort in fixing and constructing some of these roads is likely to benefit the community to some extent, as it could improve overall mobility and accessibility within the area.
Wesizwe Platinum – Bakubung Operation (MCS-4): MCS-4 pointed out that the community is still in a 'village' state, and thus minimal efforts by the Bakubung operation and other stakeholders are evident on the ground. Furthermore, MCS-4 said that any road construction done in Ledig on the Bapong road, which is the main road, is carried out by the Sun City Resort group of Sun International for the benefit of their local and international tourists. This suggests that the PGM mining company has not undertaken significant programs to improve the local infrastructure, such as roads, in the Ledig community.
Siyanda Resources – Siyanda Bakgatla Operation (MCS-5): According to MCS-5, Siyanda Bakgatla Platinum has undertaken road construction projects in several villages around the mine itself including Mantsere. Furthermore, MCS-5 pointed out that the company, along with other stakeholders, constructed a main road connecting Mantsere to the local shopping centre and the primary clinic in the area. These amenities are located approximately 25 km from Mantsere.
SDG-16: Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable, and inclusive institutions at all levels.
A21) Does the PGM mining company work with local authorities to reduce all forms of violence and related death rates in your community?
Ivanhoe Mines – Ivanplats Operation (MCS-1): Regarding the reduction of violence and death rates, the evidence on the ground is mixed. Specifically, while there have been efforts by Ivanplats and local authorities to address violence and related issues, the overall impact and effectiveness of these efforts is unclear. As such, MCS-1 is not privy to detailed knowledge about the specific nature and outcomes of these collaborations. Thus, he stated that police presence and their alliances with Ivanplats was predominantly based on responding to past incidents of unrest and community violence.
Northam Platinum Holdings Limited – Booysendal Operation (MCS-2: MCS-2 indicated that the NPH Booysenal operation does work with local authorities for various reasons. However, there has not been any tangible work done on the ground to address violence and death rates, where the community can recall associations between the South African Police Services and NPH Booysendal to curb the violence and death rates in the community of Lydenburg.
Sibanye Stillwater – Marikana Operation (MCS-3): According to MCS-3, associations of Sibanye Stillwater's Marikana operation with the local authorities and law enforcement agents are primarily focused on protecting the company's property and employees. Furthermore, MCS-3 stated that the Marikana community is a dangerous one, and this is likely the reason why the company isolates itself from engaging in any crime preventive measures or community development initiatives.
Wesizwe Platinum – Bakubung Operation (MCS-4): Given the hostility in the Ledig community according to MCS-4, attempts to reduce all forms of violence are typically undertaken by those who are essentially responsible for it, the SAPS. As such, work with respect to security and reducing violence is often carried out in silos for the direct beneficiaries, as opposed to a collaborative manner. For instance, the Bakubung operation will beef up security to protect their assets, interests, employees, and minerals. Likewise, Sun City will focus on protecting its assets, customers, and tourists.
Siyanda Resources – Siyanda Bakgatla Operation (MCS-5): According to MCS-5, Siyanda Bakgatla Platinum does work hand in hand with the South African Police Services to reduce all forms of violence in the Mantsere community. However, MCS-5 stated that the community is more trusting of Siyanda Bakgatla Platinum security team as opposed to the SAPS. Hence, MCS-5 mentioned that when criminal activities are prevalent in Mantsere, the mine dispatches their security team to try and curb the situation before the SAPS arrives at the scene.
A22) Has the PGM mining company conduct anti-corruption and bribery programmes in the community?

Ivanhoe Mines – Ivanplats Operation (MCS-1): MCS-1 pointed out that anti-corruption and bribery programs and remedial actions are mainly attributed to employees since the information is made public on the company's website. Nevertheless, MCS-1 also stated that when stakeholder engagement community forums are undertaken, where skills from the community will be required, Ivanplats make known that fair, free, and just processes will be followed.
Northam Platinum Holdings Limited – Booysendal Operation (MCS-2: NPH does have its own policy on corruption and bribery within the company, however, nothing on behalf of the community to address these matters holistically between both the mine and the community, said MCS-2. He further mentioned that the corruption and bribery programs or policies are closely linked with the 'selling' of jobs. As such, it too, as with violence, are associations that exclude the Lydenburg residents.
Sibanye Stillwaters– Marikana Operation (MCS-3): Anti-corruption campaigns are done within the company's operation, said MCS-3. As such, these campaigns typically relate to fraud and the trading of employment opportunities. However, there is minimal information on whether the company has implemented any anti-corruption programmes specifically targeting the local community. To this end, MCS-3 pointed out that she does not know of any 'external' anti-corruption campaigns targeting the local community. The company has not indicated if it has any plans to expand its anti-corruption efforts beyond its own operations and into the broader community.
Wesizwe Platinum – Bakubung Operation (MCS-4): According to MCS-4, there are no specific anti-corruption and bribery programs in the community that have been undertaken by Wesizwe Platinum's Bakubung operation. She further stated that any form of anti-corruption programmes is predominantly run internally within the company, with no evidence of such initiatives being implemented at the community level.
Siyanda Resources – Siyanda Bakgatla Operation (MCS-5): Anti-bribery programmes and initiatives undertaken by Siyanda Bakgatla Platinum are evidenced on the ground. According to MCS-5, before any project undertaken in Mantsere, particularly, projects that require extensive amounts of money, the company holds a meeting to discuss the overall project alongside its objectives and desired outcomes. During these briefs, MCS-5 stated that the company places a great emphasis on the effects of corruption and how it will not be tolerated.
SLP Sustainability Projects
A23) Does the PGM mining company publicly share information on SLP community development projects and further consult the community about these projects?"
Ivanhoe Mines – Ivanplats Operation (MCS-1): Making available public information is done mostly via technological means, such as a company website, public reports, and press releases. According to MCS-1, this is a limitation on Ivanplats' side since the older generation may lack internet access and digital literacy. However, to address this challenge, Ivanplats, during its bi-annual community meetings, employs a translator who is always within the vicinity to help relay information from English to the local languages of Sepedi and/or Xitsonga.
Northam Platinum Holdings Limited – Booysendal Operation (MCS-2: MCS-2 pointed out that information disclosure flows from the NPH's Booyesendal operation to the various community forum leaders, who then relay the information to the broader community of Lydenburg and the surrounding areas. Furthermore, MCS-2 indicated the NPHs Booysendal operation encourages community forum leaders to have public meetings and engagements to disseminate information from the mine to the communities.
Sibanye Stillwater – Marikana Operation (MCS-3): Information pertaining to community development programs undertaken by SSW's Marikana operation to the Marikana residents is communicated on various online platforms, stated MCS-3. The online platforms would include, amongst others, the company's official social media platforms, website, and integrated annual reports. According to MCS-3, the company adheres to the principles of transparency

and advocates for the sharing of information with relevant stakeholders. However, there is minimal effort in making raw information available to the community, particularly those who do not have access to technology.
Wesizwe Platinum – Bakubung Operation (MCS-4): MCS-4 stated that in an unstable community, communication does not effectively reach the relevant community stakeholders, which are the residents themselves. According to MCS-4's assessment of Ledig, the establishment of community forums is evident. However, the information flowing from the Bakubung operation first starts with the community leaders in the forums and other relevant authorities before reaching the ordinary community members. This has the effect of 'washed and diluted information' reaching the community.
Siyanda Resources – Siyanda Bakgatla Operation (MCS-5): According to MCS-5, information sharing of SLP projects by Siyanda Bakgatla Platinum is information that is selective. MCS-5 pointed out that Mantsere residents understand that some information although SLP sustainability project related is deemed irrelevant for them. However, all information regarding SLP, Siyanda Bakgatla must communicate with the tribal council and only then will it flow to the community. MCS-5 further pointed out that the company's SLP is available on all online platforms, which is a compliance requirement by the DMR. Furthermore, the SLP available online is translated in the native languages that are spoken in Mantsere and the surrounding communities.
A24) Per the SLP of this PGM, are there any projects that the community has directly benefited, particularly through their expertise of construction?
Ivanhoe Mines – Ivanplats Operation (MCS-1): MCS-1 stated that there are Mokopane residents who have directly benefited from the SLP sustainability projects. Moreover, direct beneficiary in this instance is in both short-term and long-term capacities. Short-term benefits according to MCS-1 include, among others, access to skills development and capacity-building workshops, adult education programs, and other education-related initiatives, as well as enterprise development support. Long-term benefits, on the other hand, include infrastructure development, such as the construction of community centres, schools, and health facilities, which are designed to provide lasting solutions and improve the overall living conditions of the Mokopane community.
Northam Platinum Holdings Limited – Booysendal Operation (MCS-2: According to MCS-2 there are several SLP projects that their community, Lydenburg has benefitted directly. MCS-2 stated that there are many local entrepreneurs who have benefitted, through their expertise of construction and building in the local community. Yet, with construction employment is often temporary with the project running for a couple of months, at most, a year, so regarding employment, local mining residents benefit in this regard. Awarding of tenders to the local contractors by the NPH''s Booysendal operation NGOs has proven to be a challenge, as the company may have their own preferred contractors or simply lack the knowledge to identify local builders with the right qualifications. Nonetheless, post tender adjudications, local entrepreneurs with respect to construction are typically awarded.
Sibanye Stillwater – Marikana Operation (MCS-3): MCS-3 mentioned that she knows, personally, individuals who have benefitted from construction-related projects. In addition, MCS-3 stated that those who benefitted from construction businesses related to the building of schools, clinics, libraries, and roads were often on long-term contracts with continual purchase orders. Furthermore, these individuals exhibited higher degrees in civil engineering, construction, and mining engineering, amongst other relevant qualifications.
Wesizwe Platinum – Bakubung Operation (MCS-4): According to MCS-4, there are community members in Ledig that have benefitted directly from Wesizwe Platinum's Bakubung operation.The Bakubung operation has provided various training and employment opportunities, enabling community members to develop new skills and secure sustainable livelihoods. Additionally, the company has invested in local infrastructure projects, such as the construction of schools and healthcare facilities, which have had a positive impact on the community's access to essential services. In respect of local entrepreneurs that have benefited through their expertise of construction, MCS-4 pointed out that the Bakubung operation follows the national mining procurement policy that aims to give, at least 30% of contracts specifically to local entrepreneurs

Siyanda Resources – Siyanda Bakgatla Operation (MCS-5): Since construction-related projects are heavily financed through various sources, MCS-5 stated that there are conflicts and ethical issues that always arises in the local construction industry of Mantsere. As such, the prevalence of these conflicts on the ground are evidenced between Siyanda Bakgatla Platinum as the project owner alongside local entrepreneurs who want to be given priority. As such, considering the analysis presented in 10.a (SDG-10), the tribal council intervenes in these matters. Thus MCS-5 stated that, in many instances, local entrepreneurs have benefitted because of the tribal council's intervention and remedial mechanisms in place.
A25) Per the SLP of this PGM, are there any on-going sustainability projects that you are aware of?
Ivanhoe Mines – Ivanplats Operation (MCS-1): MCS-1 pointed out that there are several projects currently underway in Mokopane by Ivanplats. To his knowledge, the ongoing SLP sustainability projects include the refurbishing of a local clinic and the main road. Additionally, it was mentioned that a drainage system is being built alongside several water borehole projects across the villages in Mokopane. Per the SLP and the sustainability report of Ivanplats, the company had implemented several corporate social responsibility initiatives. One such program was a women empowerment initiative called 'Hello Sister', which aimed to provide business and entrepreneurial skills training to local women in the Mokopane community.
Northam Platinum Holdings Limited – Booysendal Operation (MCS-2: MCS-2 is aware of SLP projects that are currently undergone, it was mentioned that one route between the mine and the local community is currently under construction. The MCS stated that the mine is currently busy with Voortrekker and Viljoen Street in Lydenburg town.
Sibanye Stillwater – Marikana Operation (MCS-3): Current SLP projects that are ongoing and evident on the ground according to MCS-3 include the building and constructing of roads within the Marikana operation, as well as the establishment of a local enterprise development and small business support program. This program aims to provide training, mentorship, and access to financing for community members to start or expand their own businesses. Furthermore, also communicated in the sustainability report as well as the SLP, MCS-3 pointed out that the Marikana operation has constructed two schools, namely, Majakaneng primary school and Leokeng High school.
Wesizwe Platinum – Bakubung Operation (MCS-4): MCS-4 pointed out that she is aware of SLP sustainability projects in the local community around Ledig that are currently run by Wesizwe Platinum's Bakubung operation. In addition, MCS-4 stated that she is aware of a livestock farming project as well as a daily water supply initiative, amongst others. Therefore, according to MCS-4, it can be ascertained that Wesizwe Platinum have contributed, to some degree, towards achieving SDG-2 and SDG-6 through their local community initiatives.
Siyanda Resources – Siyanda Bakgatla Operation (MCS-5): According to MCS-5, Siyanda Bakgalta Platinum currently runs two projects under its Social and Labour Plan for the Mantsere winter school programme. This programme aims to provide teachers and learners in Mantsere and other mining communities with the necessary support and resources to improve the matric pass rate of the high schools. Furthermore, MCS-5 stated that the winter school programme has assisted in increasing the pass rate year on year.
A26) Per the SLP of this PGM, are there any SLP sustainability projects that have been halted?
Ivanhoe Mines – Ivanplats Operation (MCS-1): According to MCS-1, there have been two SLP sustainability projects that have been halted by the community. The first project that could not be completed within the timelines was the establishment of a sports field as well as one drainage system. Both these projects were essentially halted due to non-compliance with the RFQ set out by Ivanplats.
Northam Platinum Holdings Limited – Booysendal Operation (MCS-2: With the SLP applicable for a five-year term, there has not been any stoppage of a particular SLP project. MCS-2 further indicated that, although there might be some disagreements between the Booysendal and the community of Lydenburg, the issues tend to be resolved and the mine will continue with the project. However, to date and with the standing SLP, no project has been halted.

MCS-2 further mentioned that Booysendal is still in the early stages of the newly applied SLP, hence not many SLP projects have been undertaken in the Lydenburg community.
Sibanye Stillwater – Marikana Operation (MCS-3): According to MCS-3, there might have been some SLP projects that have been halted in the past for various reasons. However, to her knowledge, the only pertinent issue currently is the delayed timelines of certain SLP projects. Thus, the execution of these SLP projects is taking longer than initially expected for completion. Furthermore, MCS-3 stated that these delays primarily relate to construction-based SLP projects, with the ongoing projects deemed not to have a definitive timeframe for finalization. Despite these delays, MCS-3 noted that the Marikana operation remains committed to completing the SLP initiatives for the benefit of the local community.
Wesizwe Platinum – Bakubung Operation (MCS-4): As stated by MCS-4, Wesizwe Platinum, the group constituted a Section 189 notice under the Labour Relations Act, leading to retrenchments and downscaling of mineral production. As a result, the 'halting' of mining activity had a negative impact on the Ledig community, the host community of the Bakubung operation. Furthermore, MCS-4 pointed out that the halting scenario she is aware of in the area was not a result of community unrest or protests, but rather financial and operational challenges faced by Wesizwe Platinum, which subsequently affected the Bakubung operation. This delay impacted the labour plans of a typical Social and Labour Plan. During this period, housing and development programmes for employees, among other initiatives, were not necessarily halted but rather delayed due to the Section 189 process.
Siyanda Resources – Siyanda Bakgatla Operation (MCS-5): All projects listed on Siyanda Bakgatla Platinum's SLP has been executed accordingly. MCS-5 stated that there are delays in project implementation because of the lengthy engagements with the tribal council pertaining to procurement processes as well as public participation rates that need to meet the requirements set forth by the local IDP (Integrated Development Plan).
A27) Do you think that this PGM mining company ensures a fair distribution of benefits among other mining communities?
Ivanhoe Mines – Ivanplats Operation (MCS-1): MCS-1, said that Ivanplats does ensure this practice amongst the villages in Mokopane. Essentially, the SLP is supposed to plough back into the mining communities that are affected by the presence of the mine in the area. Thus, he mentioned that a good portion of the Ivanplats revenue is allocated to uplifting mining communities and therefore, the community needs analysis undertaken during the SLP process will, accordingly, allocate the different needs to different communities, however, to the benefit of the entire Mokopane region.
Northam Platinum Holdings Limited – Booysendal Operation (MCS-2: NPH's Booysendal operation ensures a fair distribution of benefits. However, should investigate the issue of which structure serves which community and how often it takes place. MCS-2 further pointed out that, 'it cannot be that our community is subjected to the community trust benefits only and not exposing our residents to SLP projects'
Sibanye Stillwaters – Marikana Operation (MCS-3): According to MCS-3, the Sibanye Stillwaters' Marikana operation is unlikely to distribute the benefits equally among the community. MCS-3 explained that this is due to power struggles and influence within the community. MCS-3 further clarified that outspoken individuals are seen as problematic, making it difficult to achieve fair benefit-sharing. As a result, these influential individuals are more likely to benefit from the operation's projects. To manage these outspoken individuals, the operation may strategically award certain Social and Labor Plan projects to them, potentially to placate or co-opt them.
Wesizwe Platinum – Bakubung Operation (MCS-4): MCS-4 believes that the company's processes of demarcating which village receives which benefit are still lacking. This is because, MCS-4 has noticed that the Social and Labor Plan projects undertaken by Wesizwe Platinum are deemed as 'quick wins' rather than sustainable long-term solutions that are aimed at improving the overall quality of life for the community members. For instance, the rise in construction mafias stems from one village receiving sustainable projects whilst other villages in Ledig are left with minor projects that are seen as philanthropic gestures rather than a genuine attempt to contribute to the long-term needs of the community.

A28) "Does this PGM mining company's Sustainability Report accurately reflect its contributions to the community's long-term needs?"
Ivanhoe Mines – Ivanplats Operation (MCS-1): MCS-1 asserted the researcher that what is included in the sustainability report of Ivanplats Operation in Mokopane, South Africa, may not fully reflect the reality on the ground. However, there are several sustainability projects undergone by the Ivanplats operation that do resonate with the stakeholder.
Northam Platinum Holdings Limited – Booysendal Operation (MCS-2: The MCS has viewed the annual Sustainability report of this PGM group and states that indeed, the report is detailed. However, at the cost of many teething issues between the mining community of Lydenburg and the company. Nevertheless, MCS-2 commends the company with all their sustainability initiatives and to a certain extent states what is encompassed in the report is somewhat, what is on the ground. MCS-2 has confirmed that NPH's Booysendal operation is contributing to the long-term needs of the Lydenburg community.
Sibanye Stillwater – Marikana Operation (MCS-3): After reviewing the sustainability report and the SLP for the Marikana operation, MCS-3 pointed out that the reality on the ground is somewhat different from the information presented. Furthermore, MCS-3 highlighted that the oversharing of information typically blurs the concrete message of the developmental issues. Additionally, MCS-3 stated that the real experiences of the community members are not adequately documented, as the company, as can be expected, will try to protect and maintain their reputation.
Wesizwe Platinum – Bakubung Operation (MCS-4): According to MCS-4, Wesizwe Platinum has implemented projects that were not really envisaged to being 'sustainable'. As such, MCS-4 argues that what is indicated in the sustainability report as well as the SLP is not entirely evidenced on the ground. Although few infrastructures as well as learning and development programs are somewhat implemented, the problem arises when these initiatives are not in line with the Integrated Development Plan of the local municipality. As such, MCS-4 pointed out that if there are misalignments with the IDP, then the community's evolving needs will not be adequately met.
Siyanda Resources – Siyanda Bakgatla Operation (MCS-5): As far as the long-term community needs being met, MCS-5 pointed out that the company does fulfil its obligation per the Social and Labor Plan and what is stated in the sustainability report. Moreover, MCS-5 said that the company Siyanda Bakgatla Platinum could have done more with social projects aimed at uplifting the community of Mantsere. However, he mentioned that with the low PGM prices which affects the company's profitability as well as operational performance, he understood that SLP projects will also be impacted with budget cuts. Nonetheless, to this end, MCS-5 mentioned that the company does contribute to the long-term needs of the Mantsere community.

ANNEXURE D: SDG COMPASS – THEMATIC RESULTS

Research Question (s)	
B#	**SDG Compass (2018) – Themes and Key Findings**
Step 1: Understanding the SDGs	
B1) Does the PGM Mining company in their Sustainability Report indicate an in-depth level of understanding of the SDGs?	
SDGs inception and global context: The study revealed: 'Surface-level understanding' - PGM mining companies that refer to several sustainability topics but lack a structured framework in addressing the SDGs. 'Emerging understating' - PGM mining companies demonstrate commitment to achieving the SDGs since the inception and understanding of the globality of the SDGs. 'Strong understanding' – PGM mining companies articulate their contribution to the SDGs in the long-term and integrated within their values.	
B2) Does the PGM Mining company in their Sustainability Report refer to their business case?	
Balance of the social, environmental, governance and economic pillars: The study revealed: Connecting sustainability to profitability - Probing whether PGM mining companies link their SDG-aligned activities to favorable business outcome circumstances. Understanding materiality assessment - PGM mining company pinpoint the SDGs that are most privy to their operations. And meets the needs of their immediate stakeholders. Strategic thinking - PGM mining companies not just merely having activities that are aligned with the SDGs but connecting them to the core business objectives.	
B3) Does the PGM Mining company in their Sustainability Report clearly outline their baseline responsibilities?	
Respecting human rights: The study revealed: PGM mining companies lack of a dedicated human rights policy. PGM mining companies limit their focus to 'labor rights' ignoring other important areas (health environment & land rights). Significant gaps in communicating human rights initiatives. PGM mining companies primarily focus on financial and operational performance.	
Step2: Defining Priorities	
B4) Does the PGM Mining company in their Sustainability Report map out their value chain to identify impact areas?	
Value Chain mapping: The study revealed: Restricted range beyond the 'life of mine' – With the focus on direct operations neglecting down and upstream initiatives on the value chain. Absence of a value chain graphical representation. Lack of stakeholder engagement.	
B5) Does the PGM Mining company in their Sustainability Report refer to specific indicators and their data collection processes to measure the SDGs?	
Sustainability-related data collection: PGM mining companies use different methodological approaches. PGM mining companies fall short in providing transparent and accurate information.	
B6) Does the PGM Mining company in their Sustainability Report, clearly, make known their priorities regarding the SDGs?	
Prioritized SDGs: SDG-6 – Ensure availability and sustainable management of water and sanitation for all. SDG-8 – Full and productive employment and decent work for all. SDG-13 – Take urgent action to combat climate change and its impacts.	
Step 3: Setting Goals	
B7) Does the PGM Mining company in their Sustainability Report mention the 'SMART" rule when and if stating their strategic goals with respect to the SDGs?	
SMART Goals: The study revealed: Limited use to the SMART terminology. Weak SDG connection and the absence of time-bound SDG targets. Superficial approach to goal setting.	

Lack of a goal-setting framework.
B8) Does the PGM Mining company in their Sustainability Report pinpoint baseline and select goals?
Timeframes: The study revealed: PGM mining companies indicate significant variation in the quality of the goals to be achieved alongside the metrics and timeframes
B9) Does the PGM Mining company in their Sustainability Report set a level of ambition regarding the SDGs?
Stakeholder Engagement: The study found the following: PGM mining companies limited transparency and disclosures on the information regarding how the stakeholders are identified. Unclear connection to the SDGs.
B10) Does the PGM Mining company in their Sustainability Report make a firm public announcement that they endorse their commitment to the SDGs?
Public endorsement: The study found the following: Most of the PGM mining companies, make a simple reference to the SDGs of which can be said, does not constitute a firm public announcement of their endorsement.
Step 4: Integrating
B11) Does the PGM Mining company in their Sustainability Report indicate active leadership by the CEO or the executive committee to the SDGs?
Leadership commitment: The study found the following: CEOs tend to focus on the broader ESG commitments and principles, to which all of them are positive but rarely translate a clear SDG Agenda message. CEOs discuss the overall strategic direction of the mine in their message. The study also found that CEOs emphasize their commitment to responsible mining by reporting on the safety metrics.
B12) Does the PGM Mining company in their Sustainability Report embed the SDGs across all functions?
Integration within the group: PGM mining companies in their sustainability report adopt a siloed approach, where the SDGs are treated as a separate compliance exercise rather than a holistic framework. Lack of empirical example, as such, most of the reports analyzed lack a specific examples or case studies.
B13) Does the PGM Mining company in their Sustainability Report, refer to other institutions or peer PGM groups to partner in achieving the SDGs?
Partnership: PGM mining companies mostly indicate in their sustainability reports internal efforts and commitment to achieving the SDGs. Alignment with the UN Global Compact and the ICMM.
Step 5: Reporting and communicating
B14) Does the PGM Mining company in their Sustainability Report effectively report on the SDGs in alignment with sustainability reporting standards?
Sustainability Reporting Frameworks: This study found that the majority of the PGM mining companies adhere mostly to the Global Reporting Initiative Standards (GRI)
B16) Does the PGM Mining company in their Sustainability Report communicate on their SDG performance?
SDG Performance: SDG performance (environment): Reporting was closely linked with greenhouse gas emissions, waste management, tailings, water preservation and usage. Societal elements were provided by means of data regarding employee health and safety, human rights and community development. Governance-related data provided by the reports include information on global sustainability frameworks, compliance and ethics

ANNEXURE E: LETTERS FROM THE LANGUAGE EDITORS

English language editing
SATI membership number: 1002595

05 February 2025

To whom it may concern

This is to confirm that I, the undersigned, have language edited the **dissertation** of

Thamsanqa Mangezi

Entitled:

ANALYSING THE SUSTAINABLE DEVELOPMENT GOALS AND SUSTAINABILITY REPORTS OF SOUTH AFRICA'S PLATINUM MINES

The responsibility of implementing the recommended language changes rests with the author of the document.

Yours truly,

[redacted]

Dr Linda Scott

[redacted]

This is to certify that the Master of Commerce dissertation titled,

ANALYSING THE SUSTAINABLE DEVELOPMENT GOALS AND SUSTAINABILITY REPORTS OF SOUTH AFRICA'S PLATINUM MINES

of

Thamsanqa Quincy Mangezi

has been edited by

Valerie Viljoen,

Editing Excellence

The entire dissertation was edited, excluding reference list

Date: 6 June 2025

SATI INDIVIDUAL MEMBER

MEMBER NO. 1003396

ANNEXURE F: SUPERVISOR'S PERMISSION TO SUBMIT FOR EXAMINATION

Date: 06 February 2025

Student name: Thamsanqa Quincy Mangezi

Student no: 221106883

Dissertation Title: **ANALYSING THE SUSTAINABLE DEVELOPMENT GOALS AND SUSTAINABILITY REPORTS OF SOUTH AFRICA'S PLATINUM MINES**

As the candidate's supervisors, I agree to the submission of this dissertation for examination. Based on the Turnitin report and to the best of our knowledge, the dissertation is primarily the student's work, and he has acknowledged all the sources he has used.

The student has also satisfied the requirements of English language competency.

Name of Supervisor: Dr Shaun Mowatt

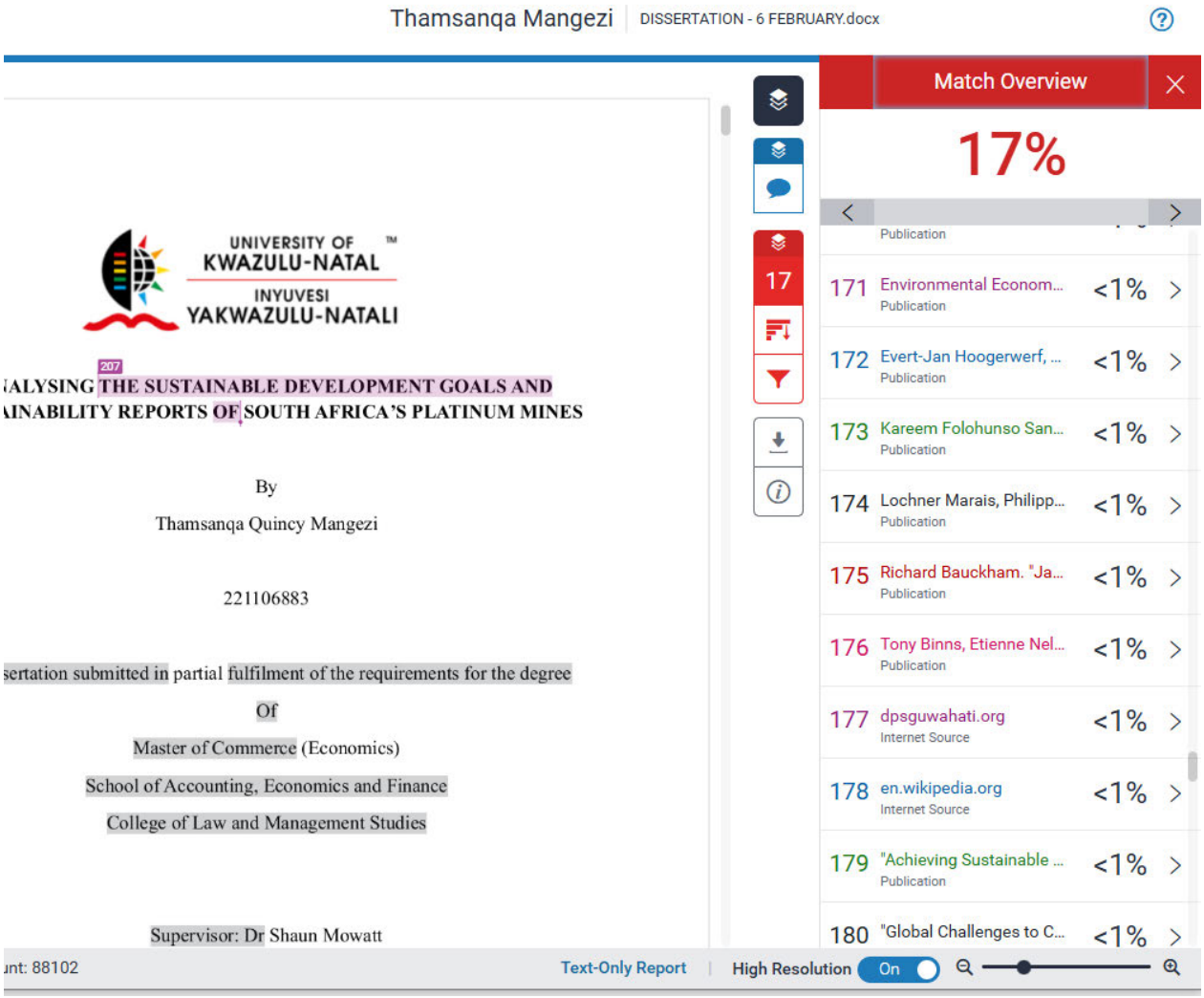
Signature [redacted]

Name of Supervisor: Prof Bruce Rhodes

Signature

[redacted]

ANNEXURE G: TURNIT IN REPORT



ANNEXURE H: ETHICAL CLEARANCE

UNIVERSITY OF KWAZULU-NATAL
INYUVESI YAKWAZULU-NATALI

27 September 2024

Thamsanqa Quincy Mangezi (221106883)
School of Acc Economics & Fin
Westville Campus

Dear TQ Mangezi,

Protocol reference number: HSSREC/00007130/2024
Project title: Analysing the sustainable development goals and sustainability reports in South of South Africa's platinum mines.
Amended title: Analysing the sustainable development goals and sustainability reports of South Africa's platinum mines
Degree: Masters

Approval Notification – Amendment Application

This letter serves to notify you that your application and request for an amendment received on 25 September 2024 has now been approved as follows:

- Change in title

Any alterations to the approved research protocol i.e. Questionnaire/Interview Schedule, Informed Consent Form; Title of the Project, Location of the Study must be reviewed and approved through an 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.

HSSREC is registered with the South African National Health Research Ethics Council (REC-040414-040).

Best wishes for the successful completion of your research protocol.

Yours faithfully

[redacted]

.....
Professor Dipane Hlalele (Chair)

/nng

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