

School of Mining Engineering



UNIVERSITY OF THE
WITWATERSRAND,
JOHANNESBURG

**INCREASED INVESTOR INTEREST IN
ENVIRONMENTAL, SOCIAL AND GOVERNANCE
REQUIREMENTS AND ITS IMPACT ON HOW THE
SOUTH AFRICAN MINING SECTOR PRIORITIZES
SUSTAINABILITY.**

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I declare that this research report is my own unaided work. It is being submitted for the degree of Master of Science Mining Engineering at the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination to any other university.

Johannesburg, 2025

DECLARATION

I have familiarised myself with the University of the Witwatersrand Student Academic Misconduct Policy (SAMP). I hereby declare that the work I am submitting for assessment is my original work. I affirm that I have not plagiarised, misrepresented, or colluded with any other person or source. I have properly acknowledged, cited, and referenced all the sources that I have used in my work. I also declare that where I have used artificial intelligence (AI) tools it has only been as a means of guidance. The ideas and arguments presented in my work are my original thoughts and interpretations. I acknowledge that any academic misconduct, such as plagiarism or collusion will result in serious consequences. According to the SAMP, these consequences may include a reduced grade, a fail mark, or disciplinary action. The Faculty of Engineering and the University of the Witwatersrand have my consent to investigate any potential academic misconduct in my work. This investigation may include the use of similarity and AI detection software to check the originality of my work. I undertake to abide by the decision of any such investigation.

Tendani Lukhaimane

6th day of June, 2025

“Becoming a leader is synonymous with becoming yourself. It is precisely that simple, and it is also that difficult.”

Warren Bennis

ABSTRACT

This study critically evaluates the environmental, social, and governance (ESG) efforts and performance of South Africa's top 10 mining companies from 2012 to 2022 to determine the trend by reviewing changes in reported parameters under these topics in public reports. The mining companies examined in this research include Anglo-American Platinum, Kumba Iron Ore, Impala Platinum, Gold Fields, Sibanye-Stillwater, Exxaro Resources, Northam Platinum, African Rainbow Minerals, Royal Bafokeng Platinum and Harmony Gold. Through analysis (desktop study) of their ESG reports as well as an online survey with mining-sector stakeholders, this report assesses these companies' adherence to global standard reporting and their alignment with the United Nations (UN) Sustainable Development Goals (SDGs) and whether there have been changes in reporting over the years in line with global developments relating to sustainability. In terms of reporting standards, this study found that all of South Africa's top 10 mining companies, excluding Sibanye-Stillwater, complied with GRI reporting standards from 2012 to 2022. Findings also reveal since 2018 most of these companies have started prioritising SDGs in areas like diversity, clean energy, economic growth, climate action, and life on land. However, variations in reporting formats and data reporting challenge stakeholders' ability to track ESG progress over time. The online survey analysis identified ongoing challenges, including regulatory inconsistencies, limited funding, and insufficient stakeholder engagement. Although most of these mining companies have significantly reduced carbon emissions and water and energy usage, progress remains hindered by financial and regulatory constraints. To enhance ESG integration, this study recommends greater stakeholder collaboration, cross-functional teams within companies, and strategic partnerships with external organizations.

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LIST OF ABBREVIATIONS AND SYMBOLS

Abbreviation	Description
CDP	Carbon Disclosure Project
CDSB	Climate Disclosure Standards Board
CSR	Corporate Social Responsibility
ESG	Environmental, Social and Governance
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GRI	Global Reporting Initiative
ICMM	International Council on Mining and Metals
IIRC	International Integrated Reporting Council
ISSB	International Sustainability Standards Board
JSE	Johannesburg Stock Exchange
KPI	Key Performance Indicator
kL/tonne	Kilolitres per tonne milled
kt CO ₂ e	Kilotonnes of carbon dioxide equivalent
LIFTR	[Verify if this is correct or a typo for LTIFR — likely a typo]
LTIIIR	Lost Time Injury Incidence Rate
LTIFR	Lost Time Injury Frequency Rate
m ³	Cubic metre
ML	Megalitre
Mm ³	Million cubic metres
NVivo	NVivo qualitative data analysis software
RIFR	Reportable Injury Frequency Rate
SASB	Sustainability Accounting Standards Board
SDG	Sustainable Development Goal
S&P 500	Standard & Poor's 500 Index

SEC	Securities and Exchange Commission
TJ	Terajoule
TRCFR	Total Recordable Case Frequency Rate
TRIFR	Total Recordable Injury Frequency Rate
UN SDGs	United Nations Sustainable Development Goals
ZAR	South African Rand
TJ	Terajoule
TRCFR	Total Recordable Case Frequency Rate

1 INTRODUCTION

1.1 Research Background and Context

The South African mining industry is critical to the growth of the country’s economy. Minerals Council South Africa (2023) indicates the sector employed over 479, 228 people and contributed over R85 billion in taxes to South Africa, making mining a significant part of the country’s economy. However, according to Möncks et al. (2023), although the industry is still a significant contributor to the country’s growth, it is not without challenges. Mining’s contribution to South Africa’s GDP in 2022 increased to over R480 billion. When accounting for inflation, the sector’s contribution has been declining in real terms. If the sector is to remain sustainable, large-scale investments and strategic partnerships will be required. Figure 1 indicates mining contribution at R202 billion measured at constant 2015 prices, which is a 15.83% decline from 2023 (Statistics South Africa, 2024).

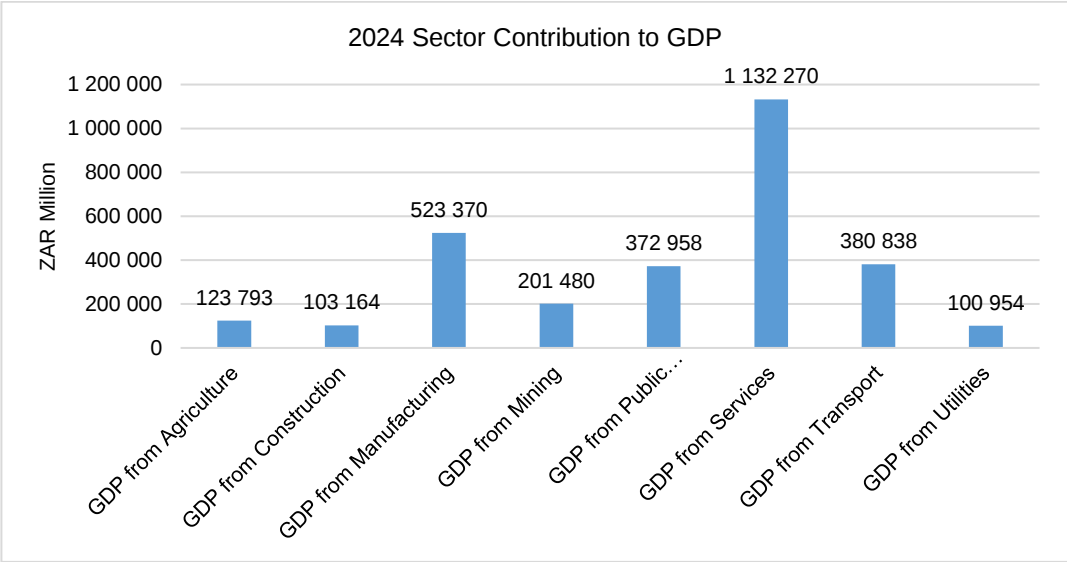


Figure 1: The distribution of the gross domestic product (GDP) across economic sectors in South Africa in 2024 (Trading Economics, 2024).

Mining is a primary operation and has historically been seen as one of the major contributors to ESG impacts due to the environmental intensity of its operations and its deep interaction with communities and regulatory bodies (Vera-Bureau et al., 2025; Steele-Schober, 2021). A legitimate organisation, as defined by Fu et al. (2024), has an acceptable balance between two systems, one being the social values associated with the organisation’s core business and the other being the acceptable behavioural norms within the area they operate. In this context, mining companies are increasingly required to demonstrate alignment with environmental, social, and governance expectations to retain legitimacy.

ESG guidelines, also referred to as sustainability guidelines, are used to assess an organisation's impact beyond financial performance. These considerations can impact an organisation's ability to meet its primary objectives and deliver against its strategy. ESG factors, although non-financial, affect various performance areas such as (Friede et al., 2015; Li et al., 2019):

- Access to capital;
- Cost savings and productivity;
- Risk management;
- Revenue growth and market access;
- Brand value and reputation;
- License to operate;
- Human capital;
- Employee retention and recruitment;
- Company value as an acquisition target and
- Ability to acquire other high-quality companies.

1.2 Problem Statement

Goodman et al., (2019) list “shifts in investor sentiments” as one of the top emerging global trends that pose a challenge to the South African mining industry. The paper indicates that investors are becoming more risk averse and the declining regulatory perception the country holds has put South Africa in an unfavourable position.

South Africa is a developing country and heavily relies on the mining industry as a key contributor to the economy. This makes sustaining foreign direct investment (FDI) into the industry crucial and a key component to manage. Investors are increasingly placing pressure on companies to engage in ESG not only looking to understand the industry response but to see how mining organisations are embedding ESG principles into their business strategies and objectives.

The research aims to understand how the South African mining industry has responded to the sustainability requirement and if this has had any impact on mining priorities.

1.3 Justification for Research

This research was undertaken in response to the growing importance of ESG performance in shaping the reputation, competitiveness, and long-term viability of companies within the South African mining sector. Mining is both a critical driver of economic activity and a sector with significant environmental and social impacts, making transparent and credible ESG reporting essential for

responsible governance and stakeholder trust. Despite global advances in sustainability reporting, there has been limited research focused specifically on the evolution of ESG practices among South African miners over an extended period. This study addresses that gap by providing a structured analysis of trends over a full decade, offering valuable insights for academics, policymakers, investors, and industry practitioners seeking to strengthen ESG outcomes in the sector.

1.4 Research Objectives

The aim of this study is to evaluate the extent to which investor interest in Environmental, Social, and Governance (ESG) performance has influenced the strategic and operational priorities of the South African mining sector over the past decade

1. Examine how ESG considerations have been integrated into the business strategies of South Africa's top ten mining companies.
2. Analyse which ESG dimensions—such as environmental management, socio-economic development, labour relations, and stakeholder engagement—have been prioritized by the mining sector.
3. Identify the challenges faced by mining companies in meeting ESG expectations, particularly in response to shifting investor demands.

1.5 Research Methods

This study utilized both qualitative and quantitative research methodology.

1.5.1 Qualitative research

semi-structured interviews were conducted with different stakeholders in the mining industry in varying capacities, including, employees in mining organizations, employees from mining suppliers, employees from investment firms and independent consultants.

1.5.2 Quantitative research

A desktop study of secondary data related to ESG practices from the top 10 mining companies in South Africa.

1.6 Sources of Data

For the qualitative study, data will be sourced from literature to determine questions to ask. For the quantitative study, data will be extracted from the annual reports published by the top 10 mining companies that form part of the study.

1.7 Research Validation

The validity of this research was supported through a structured and transparent approach to data collection and analysis. The study drew on publicly disclosed ESG, sustainability, and integrated reports published by the top 10 South African mining companies, ensuring that the data reflected what is available to investors and other stakeholders. To enhance reliability, the research applied consistent criteria when reviewing and comparing key ESG indicators across companies and years. In addition, a complementary stakeholder survey provided further validation of the report's findings, offering insights from practitioners and industry experts to contextualise the trends observed in the desktop analysis. While recognising the inherent limitations of secondary data, the use of established reporting frameworks such as the GRI and reference to independently assured disclosures further supports the credibility of the results presented.

1.8 Structure of the Research Report

This thesis consists of seven chapters. Chapter 1 is the introduction and covers the background of the research topic, the problem statement, the justification for the research, and the research objectives. The research methodologies followed by this study and the sources of the information are introduced. The research validation criteria, as well as the contribution to knowledge, are discussed.

Chapter 2 presents a review of literature relevant to the topic. It covers the global evolution of ESG, key risks associated with ESG in mining, disclosure practices, the link between ESG and financial performance, and the theoretical frameworks underpinning ESG analysis.

Chapter 3 outlines the research methodology. It explains the approach adopted for this study, describes the sources of data (including ESG reports and an online stakeholder survey), and details how the data were collected, analysed, and ethically managed.

Chapter 4 details the data used for the research and includes, sources of data, types of data and the raw data from the desktop study that was analysed.

Chapter 5 presents the findings and discussion from the desktop study of ESG disclosures across South Africa's top ten mining companies. This includes how these companies report on ESG issues, what they prioritise, and how their performance has evolved over time. The chapter also presents the interview results and provides stakeholder perspectives on ESG implementation in the mining sector, including perceptions of progress, gaps, and ongoing challenges.

Chapter 6 concludes the report and provided the section Introduction, summary of chapters, research observations, research contributions, research Limitations and recommendations for future research work.

2 LITERATURE REVIEW

2.1 Introduction

This chapter explores the evolution and relevance of ESG within the mining industry. It highlights key risks associated with mining, trends in ESG disclosure and reporting, and the relationship between ESG and financial performance. The chapter also draws on stakeholder, legitimacy, resource-based and trade-off theories to frame the analysis, and reviews key international reporting standards that shape ESG practices in mining.

There is a notable gap between ESG disclosures in developed and developing countries. Research comparing mining companies across these regions indicates that firms in developed nations produce higher-quality ESG reports, with stronger correlations to market performance, compared to those in developing countries (Huang & Ge, 2024; Friede et al., 2015). Despite extensive research into ESG disclosures and financial performance, limited studies have focused on the South African mining sector's ESG practices.

ESG refers to criteria used to evaluate corporate performance from a sustainability perspective (Eccles et al., 2020). Although widely discussed in academic and business contexts today, the concept traces its roots to a 2004 UN report titled "Who Cares Wins: Connecting Financial Markets to a Changing World." In the report, then-UN Secretary-General Kofi Annan encouraged executives from global financial institutions to develop principles for integrating ESG considerations into securities research, asset management, and brokerage services (United Nations, 2004). This initiative laid the groundwork for the "Principles for Responsible Investment" (PRI), a framework linking ESG considerations to financial performance. Leading financial institutions like Morgan Stanley, Goldman Sachs, Credit Suisse, and Deutsche Bank endorsed PRI, recognizing the significant impact of ESG factors on corporate financial outcomes.

Maybee et al. (2023) affirmed the material impact of ESG issues on financial performance, urging asset managers to include ESG disclosures as part of their fiduciary responsibilities (United Nations Environmental Program, 2005). Over the years, the importance of ESG ratings in investment decision-making has been highlighted in numerous reports supported by global organizations, such as the CFA Institute (2015) and Principles for Responsible Investment (2018).

The growing demand for ESG data has fueled the rise of an industry dedicated to providing ESG-related insights (Eccles et al., 2020). By 2017, over 500 organizations globally were collecting ESG data for purposes such as developing standards (Mooij, 2017), creating indices (Lydenberg & White, 2015), presenting awards (Bowen, 2014), and compiling rankings (Branding Institute, 2016).

However, the methods and data sources used by ESG rating agencies vary significantly, with some organizations keeping their methodologies proprietary to maintain a competitive edge. As a result, discrepancies in ESG ratings across vendors are common, with no universal metrics currently established (Eccles et al., 2020; Maybee et al., 2023). These inconsistencies make it challenging for stakeholders to evaluate the credibility of companies with high ESG ratings but questionable practices (Eccles et al., 2020).

2.2 Key Concepts, Theories and Studies

2.2.1 ESG Risks in the Mining Industry

The mining industry has long been linked to ESG risks. Research has examined the implications of ESG-related practices within the sector (Garnett et al., 2018; Maybee et al., 2023). Commonly identified risks in the industry include issues related to climate change (Garcia-Zavala et al., 2023), obligations to Indigenous communities (Bradshaw & Caitlin, 2014; Pelosi & Adamson, 2016), and environmental management (Garcia et al., 2017; Hoang, 2018; Sharma et al. 2020). Two decades ago, traditional market indicators largely reflected these risks (Garcia-Zavala et al., 2023). Additionally, ESG risks vary across different stages of the mining lifecycle, with their severity and consequences fluctuating over time (Owen et al., 2021; Vintró et al., 2012).

Despite the long-standing presence of ESG risks, many mining companies have historically struggled to address them effectively (Cole & New, 2017). According to a report, several large mining corporations have failed to meet or transparently report on progress toward their ESG commitments (Responsible Mining Foundation, 2020). Short-term profit motives for shareholders often overshadow the focus on ESG concerns (Maybee et al., 2023). Companies frequently address operational risks while neglecting those that affect local communities (Owen et al., 2021). Violations of environmental regulations, resource mismanagement, and worker safety breaches have been observed across the sector (Dzakpata et al., 2021; Owen et al., 2021; United Nations, 2004). Weak enforcement of ESG-related government policies further enables non-compliance (Cole & New, 2017). Nevertheless, investor and shareholder demand has recently prompted some mining companies to integrate ESG concerns into their strategic frameworks (Chicksen et al., 2018; De Villiers et al., 2014).

2.2.2 ESG Disclosure

Over the last 20 years, publicly traded companies have increasingly incorporated ESG topics into their annual reports, with notable improvements in the depth and quality of disclosures, especially in the past five years. These reports typically cover topics like workplace health and safety, human resources, environmental performance and community engagement (De Villiers et al, 2014). Studies exploring the relationship between ESG disclosures and market value have yielded mixed results,

reporting insignificant correlations (Vera-Burau et al. 2025; Cordazzo et al., 2020), negative correlations (Ruan & Liu, 2021; Yoon et al., 2018), and positive correlations (Lin et al., 2017; Qureshi et al., 2020). However, the majority indicate a positive relationship between ESG disclosures and market value (Friede et al. 2015; Huang & Ge, 2024).

Further research highlights strong links between ESG disclosures, financial markets, and stock price movements (Coetzee & Van Staden, 2011; Ouyang et al., 2017; Qureshi et al., 2020). Nevertheless, factors influencing these disclosures remain unclear, with some studies pointing to literacy levels, civil liberties, institutions, and income per capita as key drivers (Loannou & Serafeim, 2017). Variations in economic development, research methodologies, and data sources contribute to contrasting findings (Gerald, 2019). As large-scale comparisons among mining firms across diverse regions are limited, globally consistent drivers of ESG disclosure remain uncertain.

ESG reporting trends in mining align closely with those in other industries (De Villiers et al., 2014). Numerous studies have explored ESG practices and their effect on market performance within mining (Ouyang et al., 2017; Wirth et al., 2016). Researchers have investigated various factors, including governance (Prno & Slocumbe, 2012), environmental impacts (Deegan & Unerma, 2014; Financial Accounting Theory, 2009), and worker safety (Yongvanich & Guthrie, 2007), finding significant correlations with mining firm performance. ESG disclosures are often used to demonstrate openness and assure stakeholders that ESG risks are being managed (Coetzee & Van Staden, 2011).

Stakeholder responses to ESG disclosures are subject to the nature of the information disclosed. For example, studies on safety disclosures in 21 Chinese companies revealed negative market reactions to incidents (Ouyang et al., 2017). Similarly, Vale S.A.'s 2019 tailings dam disaster, which resulted in nearly 300 deaths, led to a sharp decline in its stock price (Watson et al., 2019). Conversely, routine disclosures mandated by the Dodd-Frank Act had little market impact (Olsen et al., 2021). These findings suggest a need for further studies to determine the optimal level of ESG disclosure that influences financial performance and market trends.

2.2.3 ESG and Financial Performance

Extensive research has explored the interplay between environmental, social, and governance (ESG) performance and corporate financial performance (CFP). Despite significant attention, findings from these studies remain mixed (Friede et al., 2015; Huang & Ge, 2024). Historically, the prevailing belief was that investments in corporate social responsibility (CSR) activities did not yield meaningful returns for businesses. This perspective was notably articulated by Friedman (2017), who argued that CSR activities diverted resources away from the core goal of maximizing shareholder profits. According to Friedman, businesses exist primarily to generate returns for their

owners, and any focus on stakeholder interests outside this remit was considered inefficient and counterproductive (Freeman & Dmytriiev, 2017). Similarly, Fu et al. (2024) found that ESG initiatives could negatively impact financial performance by redirecting funds from profit-generating activities.

Conversely, other researchers have presented a more neutral view. For instance, Vera-Burau et al. (2025) found no statistically significant relationship between Corporate Social Responsibility (CSR) investments and CFP. These varied perspectives dominated academic and business discourse until the early 2000s, when a paradigm shift began to occur. Today, most scholars emphasize a positive link between ESG performance and financial outcomes, driven by growing evidence and changing societal expectations.

Modern research overwhelmingly supports the notion that strong ESG performance correlates with improved financial results. For example, Li et al. (2019) found that companies with high ESG scores demonstrated greater financial stability and sustained profitability. Similarly, Hong and Minor (2016) discovered that firms engaging in CSR activities experienced enhanced earnings and resilience. Within the mining sector—a field often characterized by heightened environmental and social risks—researchers have identified critical connections between ESG practices and financial performance. Fu et al. (2024) analysed quarterly reports from Chinese mining companies listed on stock exchanges between 2009 and 2021, revealing that robust ESG performance significantly reduced financial risks for these firms.

In industries like mining, where societal and environmental scrutiny is intense, ESG scores have become essential metrics for investors and financial institutions assessing creditworthiness and investment potential (Friede et al., 2015). A high ESG rating enhances corporate legitimacy, signalling to stakeholders that a company complies with regulatory requirements in key areas, such as labour rights, environmental protection, and product safety (Freeman & Dmytriiev, 2017). It also demonstrates that the firm prioritizes community well-being, minimizes environmental damage, and upholds strong governance standards (Hong et al., 2016; Li et al., 2019). Conversely, a low ESG score can signal vulnerabilities, such as governance weaknesses, poor stakeholder relations, or environmental risks, which may deter investors and increase the likelihood of financial instability (Williams, 2016). For these reasons, ESG metrics are increasingly influencing investment decisions in sensitive industries like mining (Lydenberg & White, 2015).

2.3 Theoretical Overview

Scholars have employed various theoretical frameworks to explain the relationship between ESG and CFP. Among these, stakeholder theory, legitimacy theory, resource-based theory, and trade-off theory are the most frequently cited (Azmi et al., 2021). Each theory provides unique insights,

although the trade-off theory remains the primary framework arguing for a negative relationship between ESG investments and financial outcomes.

2.3.1 Stakeholder Theory

Stakeholder theory, advanced by Freeman, suggests that companies have a moral and strategic obligation to address the interests of all stakeholders, including customers, employees, suppliers, local communities, and regulators (Freeman & Dmytryiev, 2017; Phillips et al., 2003). Proponents of this theory argue that addressing stakeholder concerns can drive profitability by fostering goodwill, improving brand reputation, and minimizing risks (Friede et al., 2015). This perspective is particularly relevant in industries like mining, where operations are heavily scrutinized by local communities and regulatory bodies.

Engaging with stakeholders on sustainability issues can lead to numerous benefits, including stronger relationships with regulators, increased access to funding, enhanced customer loyalty, and greater resilience during crises (de Silva Lokuwaduge & de Silva, 2020). For instance, mining projects that integrate ESG considerations often enjoy broader community support and face fewer operational disruptions (Mudd, 2007). Companies with strong ESG performance also attract environmentally conscious investors, further solidifying their market position.

Despite its merits, stakeholder theory has faced criticism. Critics point out that it lacks clarity on how companies should prioritize competing stakeholder demands and fails to provide objective measures for stakeholder satisfaction (Freeman & Dmytryiev, 2017). Furthermore, attempting to balance diverse stakeholder interests can slow decision-making and create internal conflicts, which may negatively impact profitability (Freeman & Dmytryiev, 2017). Nonetheless, the theory remains a vital framework for understanding why businesses invest in ESG initiatives.

2.3.2 Resource-Based Theory

The resource-based view (RBV) posits that a company's internal resources and capabilities are the primary drivers of competitive advantage (Russo & Fouts, 1997). This theory suggests that organizations can achieve superior financial performance by leveraging unique resources, such as expertise in sustainability, to address environmental and social challenges (Barney, 1991). For example, companies that invest in green technologies or adopt innovative sustainability practices can differentiate themselves from competitors, attract environmentally conscious stakeholders, and enhance profitability (Sharma et al., 2019).

Studies applying the RBV framework have demonstrated positive correlations between ESG investments and CFP. Weber (2014) found that ESG reporting by large firms enhanced their financial performance by creating intangible value, such as brand loyalty and goodwill. However, smaller firms

may struggle to realize these benefits due to resource constraints, leading to a negative relationship between ESG investments and financial outcomes (Sharma et al., 2019).

2.3.3 Trade-Off Theory

The trade-off theory supports that investments in ESG have an inverse relationship with financial performance, as they divert resources away from profit-generating activities (Devinney, 2009). Proponents of this view, such as Friedman (1970) and Fu et al. (2024), argue that allocating funds to ESG initiatives imposes opportunity costs, limiting a company's ability to maximize shareholder value. Although this perspective was widely accepted in the past, it has lost prominence in contemporary discourse, as more evidence supports the financial benefits of strong ESG performance.

2.3.4 Legitimacy Theory

Legitimacy theory, grounded in the concept of a "social contract," posits that organizations must align their activities with societal norms and expectations to maintain legitimacy (Suchman, 1995). This framework emphasizes that compliance with ESG standards is essential for securing societal acceptance, which is critical for long-term business survival (Deegan & Unerma, 2009). Failure to meet societal expectations can result in reputational damage, regulatory penalties, or operational disruptions.

This theory has been widely used to explain voluntary ESG disclosures. For example, Lokuwaduge and Heenetigala (2017) argued that Australian mining companies disclosed ESG information to gain societal legitimacy and secure stakeholder trust. However, legitimacy theory has limitations, as it does not specify the actions required to achieve legitimacy or evaluate the authenticity of a company's ESG programs (Tilling, 2004).

2.4 ESG Reporting

ESG reporting has become a central practice for assessing, documenting, and communicating a company's environmental, social, and governance impacts. Academics, businesses, and non-profit organizations alike have emphasized its role in advancing sustainable practices, improving stakeholder relationships, and supporting environmental policies (Koh & Leong, 2017). Nonetheless, the existence of multiple reporting guidelines with varying standards has created uncertainty and challenges, making it difficult for stakeholders to evaluate corporate ESG efforts effectively (Sulkowski & Jebe, 2022). The prevalence of voluntary reporting standards has led to significant pressure on organizations to comply with diverse frameworks, which in turn has increased the time and financial resources needed to produce these reports (CDP, 2023; Koh & Leong, 2017).

The responsibility for shaping ESG reporting frameworks has largely rested with private standard-setting bodies, as governments have shown limited interest in regulating and standardizing these disclosures (Sulkowski & Jebe, 2022). This lack of regulatory oversight has allowed non-governmental entities to develop various standards for ESG disclosures. Among these, the most widely recognized are the "Group of Five": the Global Reporting Initiative (GRI), the Climate Disclosure Standards Board (CDSB), the Carbon Disclosure Project (CDP), the International Integrated Reporting Council (IIRC), and the Sustainability Accounting Standards Board (SASB), (Sulkowski & Jebe, 2022). While these key players have recently signalled a commitment to harmonizing ESG standards to address growing calls for consistency (Eltogby & Guillot, 2021), achieving such consolidation remains complex. The alignment of ESG reporting standards is more likely to succeed with government regulation that enforces universal frameworks (Baldini et al., 2018; Sulkowski & Jebe, 2022).

2.4.1 Global Reporting Initiative (GRI)

Established in 1997 by the Tellus Institute in collaboration with the UN Environmental Program and the Coalition for Environmentally Responsible Economies, the Global Reporting Initiative (GRI) introduced a framework aimed at promoting transparency and accountability through triple-bottom-line reporting (Williams, 2016). Today, GRI remains the most widely utilized ESG reporting framework, adopted by over 16,000 organizations worldwide (Boerner, 2013). Its central focus lies in the disclosure of material ESG information that impacts company performance and influences stakeholder decision-making, forming the foundation of its guidelines.

2.4.2 Climate Disclosure Standards Board (CDSB)

The Climate Disclosure Standards Board (CDSB) was founded in 2007 by a consortium of international businesses and non-profit environmental organizations to integrate ESG considerations into companies' annual or financial reports. It mandates that organizations include material climate-related information affecting their financial and operational outcomes (Gary, 2019). The CDSB framework is designed to improve consistency and transparency in reporting climate-related risks and opportunities (Andrew & Corinne, 2013; Thistlethwaite, 2015).

2.4.3 Carbon Disclosure Project (CDP)

The Carbon Disclosure Project (CDP) offers a standardized system for reporting environmental impacts, focusing particularly on carbon emissions and climate change. The CDP collects and analyzes climate data from thousands of organizations globally using tailored questionnaires to evaluate their environmental performance (Matisoff et al., 2013). With over 24,000 European companies using this framework, the CDP plays a significant role in environmental reporting. However, its primary limitation lies in its narrow focus on environmental aspects, without addressing broader ESG concerns (Sulkowski & Jebe, 2022).

2.4.4 International Integrated Reporting Council (IIRC)

The IIRC framework, introduced in 2010 through a collaboration between the Prince of Wales' Accounting for Sustainability initiative and GRI, promotes a holistic approach to reporting that combines financial and non-financial data (Bigeni, 2013). The framework emphasizes integrating ESG considerations with traditional financial reporting, targeting financial capital providers and focusing on governance, risk, and stakeholder relationships (Bose, 2020; Sulkowski & Jebe, 2022). Although the framework provides a comprehensive perspective, its adoption often requires significant business model restructuring, making it more challenging to implement compared to GRI (Bose, 2020).

2.4.5 Sustainability Accounting Standards Board (SASB)

Founded in 2011 by Jean Rogers, the Sustainability Accounting Standards Board (SASB) seeks to embed ESG information into financial reporting by focusing on the material sustainability issues relevant to investors (Hales, 2021). SASB developed the "SASB Materiality Map," which categorizes sustainability issues by sector, allowing investors to evaluate material risks and opportunities specific to their industries (Parfitt, 2022; Bose, 2020). By tying sustainability metrics to financial materiality, SASB's framework is particularly tailored to the U.S. market and investor-focused disclosures.

2.5 Key Debates and Controversies

A study by Maybee et al. (2023) on companies listed on the Standard and Poor's Five Hundred (S&P 500) Index ranking revealed that companies with high sustainability ratings were perceived to have high returns. They indicated a lower risk as compared to the companies with poor ESG ratings (Atkins, 2020). Given this, organisations that have sustainable methods of production are more likely to gain investor confidence as they are seen as less risky investments. This suggests that investors may consider and/or select companies with higher ESG ratings for investment as may be deemed as safer and less risky investment options. According to KPMG (2019), environmental and climate change mitigation and adaptation, as well as social and solidarity-related issues, were among the screening strategies that investors used when deciding on investment opportunities. This finding is consistent with the report of Clark (2021) who indicated that although social concerns were gaining traction due to the Covid-19 pandemic, environmental issues particularly climate change remained the main ESG focus of many investors.

Some companies have been moving towards adopting a circular economy approach in which the production and consumption activities involve re-using, repairing, refurbishing and recycling to reach ESG targets (Mbere, 2022). In this regard, many organisations are moving towards the use of more renewable energy with the first step being adopting a diverse energy mix. But in some areas around the world, mining companies' ESG performance has not yet reached the level that society expects.

Some mining companies have resorted to greenwashing to paint a positive picture of ESG issues considering the public eye (Steele-Schober, 2021). Furthermore, other studies have identified that many mining communities still have poor health support and infrastructure as well as a lack of access to adequate and proper education and employment opportunities (Mbere, 2022). On the other hand, the availability and accessibility of mine-level data, which is of interest to the government, investors, and society is a cause of great concern (Steele-Schober, 2021). Hence, the ESG performance rating that many mining companies have may not reflect the true sustainability picture leading to the loss of potential investment as these companies may be deemed as much riskier investments. Besides, Pucker (2021) argued that ESG performance reporting does little to improve global sustainability issues as it depletes resources that could have been channelled toward the actual management of sustainability issues.

Many organisations are adopting socially responsible investment practices in response to the above risks. For instance, in South Africa, many investors are shying away from the coal mining industry, a topical subject that relates to climate change and air pollution. Investors seem to show a preference for investing in alternative energy sources and renewable energies as they are perceived as a high-risk investment area (Clark, 2021).

The purpose of this study is to understand the extent, if any to which South African mining operations have embraced the environmental, social, and governance (ESG) agenda because of pressure (perceived or real) from investors. This will include understanding which ESG requirements have been prioritised by the sector and how they have impacted routine mining practices.

Historically, mining investment decisions were primarily based on the asset's potential to generate good financial returns within a reasonable time frame. This decision was made with little to no consideration of the negative impact on the environment or social aspects (Clark, 2021). Over the years, guidelines in different government and industry bodies such as the Minerals Council South Africa, Johannesburg Stock Exchange (JSE), International Sustainability Standards Board (ISSB), as well as the US Securities and Exchange Commission (SEC) have been published to encourage the mining sector to focus on Environmental, Social and Governance (ESG) factors.

In mid-2015, the United Nations (UN) published seventeen (17) Guiding Principles on Business and Human Rights which includes Sustainability Goals. The extraction of minerals, underground or open cast has catastrophic impacts on the environment, the workforce, or the broader community if it is not managed correctly. The specific ESG risk to each company is dependent on the organisation's commodity portfolio, size, and local context, leading to different ESG focus areas for different organisations (Rahm, 2013).

The adverse environmental and social impacts of mining operations have been identified and are apparent to regulators, operators, communities, and investors. Table 1 shows environmental and social impacts of mining across different commodity groups.

Table 1: Overview of environmental and social impacts of mining operations by type of mineral.¹

Commodity Group	Main characteristics	Impacts	
		Environmental	Social
Precious Metals	- Underground mining - Aggressive chemicals - Sulphide-rich rocks - Deep operations (platinum)	Air pollution Acid mine drainage Mercury pollution (gold) Water pollution	High labour intensity Greater safety issues
<i>Base Metals</i>	<i>Mainly open pit with a trend towards underground</i> <i>Sulphide-rich rocks</i> <i>Carbon-intensive processing</i> <i>Large tailings (copper and zinc)</i> <i>Lower average concentration (nickel)</i>	<i>Landscape</i> <i>Air pollution (nickel)</i> <i>Acid mine drainage</i>	<i>Lower labour intensity</i> <i>Safety issues</i>
Bulk Metals (iron, coal)	- Extensive operations given large volumes. - Mostly open pit	Landscape and deforestation Acid mine drainage Air pollution	Infrastructure development (rail, ports, etc) Mechanisation with better safety controls
Aluminium	- Extensive operations - Mostly open pit - Energy-intensive chemical treatment - Recycling potential	Landscape and deforestation High carbon intensity Leakages	Infrastructure development (rail, ports, etc) Mechanisation with better safety controls

¹Adapted from Rahm, 2013, p.5.

ESG investing has risen over the past few years and now has been incorporated in many organisations with over \$17.5 trillion worth of professionally managed portfolios that have been integrated with key ESG elements (Global Sustainability Investment Alliance, 2018). This shift in focus and interest by investors in ESG factors suggests that they can affect the long-term viability of their investments; hence, the need to balance expectations of returns and risks through consideration of ESG factors in investment decision-making.

Evidence shows that, on a global scale, investors have been embracing these recommended considerations and moving away from just looking at the financial aspect of an organisation. They have also started having a focus on company culture, environmental impact, and ethics of mining organisations (Steele-Schober, 2021) when making their investment decisions. This change has seemingly placed additional pressure on mining companies to focus on mining sustainably and reporting on how they are deliberate in supporting the ESG requirements. It is unclear how South Africa has interpreted the ESG agenda and whether this has translated to a change in the way the country's industry operates.

2.6 Literature Review Summary

The importance of ESG considerations in the mining industry is undeniable and has been emphasized in previous studies (Coetzee & Van Staden, 2011; De Villiers et al., 2014). Mining companies that neglect their ESG responsibilities—such as managing pollution, reducing greenhouse gas emissions, and restoring mined areas—risk losing investor confidence and facing penalties from environmental regulatory agencies (Clark, 2021; Steele-Schober, 2021). Nonetheless, they largely focus on a combined view or assessment of ESG take-up and does not explicitly address trends within a specific industry and country. This knowledge gap provides an opportunity to assess the movement in trends for the mining industry in South Africa and understand, what the focus areas are, where the challenges lie and any risks to ESG implementation plans.

3 RESEARCH APPROACH

3.1 Introduction

This chapter outlines the research methodology. It explains the approach adopted for this study, describes the sources of data (including ESG reports and an online stakeholder survey), and details how the data were collected, analysed, and ethically managed.

3.2 Research Design

This study utilized both qualitative and quantitative research methodology. This approach is rooted in pragmatism, which emphasizes using the most effective methods to address the research which is to understand the impact of ESG requirements in South Africa from the experiences of mining industry stakeholders. This approach allowed the researcher to address research questions that only a rather qualitative method might not fully capture. Overall, this method enhanced the validity and reliability of the results.

3.3 Data Collection Process

The research methodology was comprised of two parts: desktop study and a survey. The desktop study involved the assessment of the annual reports of the top 10 mining companies in South Africa. The annual reports of each company were downloaded and then perused to understand and extract relevant information from the text. This approach is similar to Jenkins and Yakovlev (2006) who analysed corporate social responsibility trends using the top 10 mining companies in the world.

The data extracted from the 2012-2022 annual report and sustainability report of the companies included Water Usage/Withdrawal, Environmental - CO₂ Emissions, Energy Usage, Social Investment, and Injury Frequency Rate. Apart from these key performance indicators (KPIs), this study noted whether each company's annual or ESG report contained information about employee health and safety, environmental protection, social community and support, governance and ethics, sustainability development, diversity and equity, UN SDG, and independent assurance for ten (10) years between 2012 and 2022. These aspects were selected because they consistently appear as priority themes in ESG frameworks and mining company disclosures. They reflect key impact areas where mining operations intersect most visibly with environmental and social outcomes, and they align with both investor concerns and the UN SDGs. Focusing on these areas allowed for a meaningful comparison across companies and ensured the analysis was grounded in globally recognised ESG pillars.

Additionally, semi-structured interviews were online conducted, and 14 responses were received from different stakeholders in the mining industry in varying capacities, including, employees in mining organizations, employees from mining suppliers, employees from investment firms and independent consultants. The survey aimed to capture diverse stakeholder insights into the role of mining companies in achieving ESG goals, the prioritization of sustainability objectives, and the barriers to effective ESG performance. The survey process centred around five key questions designed to understand stakeholders' views on the role of mining companies in achieving sustainability goals, particularly within South Africa's environmental and social context.

Participants were asked:

- What role do mining companies play in advancing ESG/sustainability goals?
- Are there specific sustainability goals that should be prioritized given South Africa's environmental landscape?
- What are the main challenges for mining companies in attaining robust ESG performance, and how are these being addressed?
- Do stakeholders possess sufficient understanding of ESG requirements and their roles in achieving them (Yes/No)?
- What improvements would aid mining companies in achieving sustainability objectives?

3.4 Data Validation Process

This research adhered to all standard ethical guidelines recommended by the University of the Witwatersrand (Protocol Number: EMINN/2023/95). Only the data found in the annual and ESG reports of South Africa's top 10 mining companies were used in this study. Individuals who participated in the survey were also informed about the study's purpose, procedures, and potential risks and benefits. The real names of the participants were not requested but some participants did indicate their names while completing the questions, this information has not been used in the report to protect their privacy and anonymity. They were also informed that they had the right to voluntarily withdraw from the survey without providing any reasons. Equally importantly, the survey data were kept confidential post the online survey. These measures helped ensure that the study upheld the highest standards of integrity.

3.5 Data Analysis Approach

Content analysis was performed on both primary and secondary data using NVivo, a qualitative data analysis tool. The report data were broken down into segments based on their similarity, and similar information was grouped into KPIs, Water Usage/Withdrawal, Environmental - CO2 Emissions,

Energy Usage, Social investment, and Injury Frequency Rate. Similarly, the survey data were analyzed, and responses with similar ideas were grouped into themes. This segmentation allowed for a more precise result analysis. Charts and tables were used to summarize the secondary data, while the survey data were summarized in a text format, as there were few survey responses.

3.6 Ethical Guidelines

This research adhered to all standard ethical guidelines recommended by the University of the Witwatersrand (Protocol Number: EMINN/2023/95). Only the data found in the annual and ESG reports of South Africa's top 10 mining companies were used in this study. Individuals who participated in the survey were also informed about the study's purpose, procedures, and potential risks and benefits. The real names of the participants were not requested but some participants did indicate their names while completing the questions, this information has not been used in the report to protect their privacy and anonymity. They were also informed that they had the right to voluntarily withdraw from the survey without providing any reasons. Equally importantly, the survey data were kept confidential post the online survey. These measures helped ensure that the study upheld the highest standards of integrity.

4 DATA FOR THE STUDY

4.1 Introduction

This chapter details the data used to complete this research report, it includes the sources of the data, the type of data and the raw data extracted for analysis.

4.2 Chapter Summary

4.2.1 Sources of data

The data used to perform the desktop study was extracted from annual reports published by the top 10 companies. The reports used were those that contained ESG parameters reported. Most companies include these in their integrated reports and sustainability reports, and a few have introduced ESG reports as a substitute to sustainability reports specifically covering ESG reporting. Table 2 shows the types of reports used to analyse the ESG reporting styles and performance.

Table 2: Types of annual reports used by the top 10 mining companies.

Company	2012-2016 Reporting Method	2018-2020 Reporting Method	2022 Reporting Method	Reporting Standard
Anglo-American Platinum	Integrated Report and Sustainability Report	Integrated Report and Sustainability Report	Integrated Report and Sustainability Report	GRI
Kumba Iron Ore	Integrated Report + Sustainability Report	Integrated Report + Sustainability Report	Integrated Report + Sustainability Report	GRI
Impala Platinum	Integrated Report + Sustainability Report	Integrated Report + Sustainability Report	Integrated Report + Sustainability Report	GRI
Gold Fields	Integrated Report	Integrated Report	Integrated Report	GRI
Sibanye-Stillwater	Not applicable for 2012 / Integrated Report (2013 onward)	Integrated Report	Integrated Report	SASB
Exxaro Resources	Integrated Report	Integrated Report	Integrated Report + ESG Report	GRI
Northam Platinum	Integrated Report + Sustainability Report	Integrated Report + Sustainability Report	Integrated Report	GRI
African Rainbow Minerals	Integrated Report + Sustainability Report	Integrated Report + Sustainability Report	Integrated Report + ESG Report	GRI
Royal Bafokeng Platinum	Integrated Report + Sustainability Report	Integrated Report + Sustainability Report + ESG Report (2020)	Integrated Report + ESG Report	GRI
Harmony Gold	Integrated Report	Integrated Report + ESG Report (2020)	Integrated Report + ESG Report	GRI

4.2.2 Type of data

Five KPIs were selected to analyse the trend of ESG related parameters. The table below show what each company used as a unit of measure to report on water usage/withdrawal (Table 3), greenhouse gas emissions (Table 4), energy usage (Table 5), social investment (Table 6), and injury frequency rate (Table 7).

Water Usage/Withdrawal

Table 3: Unit of measure used for water usage/withdrawal.

Company	Unit of Measure	Consistency Over Years
Anglo American Platinum	Megalitres (ML)	Consistent
Kumba Iron Ore	Megalitres (ML)	Consistent
Impala Platinum	Kilolitres per tonne milled (kL/tonne)	Consistent
Gold Fields	Megalitres (ML)	Consistent
Sibanye-Stillwater	Megalitres (ML)	Consistent
Exxaro Resources	Megalitres (ML)	Consistent
Northam Platinum	Cubic meters (m ³)	Consistent
African Rainbow Minerals	Million cubic meters (Mm ³)	Consistent
Royal Bafokeng Platinum	Megalitres (ML)	Consistent
Harmony Gold	Megalitres (ML)	Consistent

The 10 companies were consistent in using the units of measure indicated in table 3 across the 10-year period that was analysed. Water usage reporting for most companies is done in megalitres (ML) apart from three companies. Impala Platinum uses kilolitres per tonne milled (KL/tonne) showing they focus on usage in relation to production, Northam Platinum reports in cubic meters (m³) which is a standard unit which is part of the International System of Units (SI) and African Rainbow Minerals uses million cubic litres which is a standard SI unit for reporting large volumes of water.

Greenhouse Gas Emissions

Table 4: Unit of measure used for greenhouse gas emissions.

Company	Unit of Measure	CO ₂ e Scope Reporting	Consistency Over Years
Anglo American Platinum	Kilotonnes CO ₂ e (kt CO ₂ e)	Scope 1, Scope 2	Consistent

Company	Unit of Measure	CO ₂ e Scope Reporting	Consistency Over Years
Kumba Iron Ore	Kilotonnes CO ₂ e (kt CO ₂ e)	Scope 1, Scope 2	Consistent
Impala Platinum	Kilotonnes CO ₂ e (kt CO ₂ e)	Scope 1, Scope 2	Consistent
Gold Fields	Kilotonnes CO ₂ e (kt CO ₂ e)	Scope 1, Scope 2, Scope 3	Consistent
Sibanye-Stillwater	Kilotonnes CO ₂ e (kt CO ₂ e)	Scope 1, Scope 2	Consistent
Exxaro Resources	Kilotonnes CO ₂ e (kt CO ₂ e)	Scope 1, Scope 2, Scope 3	Consistent
Northam Platinum	Kilotonnes CO ₂ e (kt CO ₂ e)	Scope 1, Scope 2	Consistent
African Rainbow Minerals	Kilotonnes CO ₂ e (kt CO ₂ e)	Scope 1, Scope 2	Consistent
Royal Bafokeng Platinum	Kilotonnes CO ₂ e (kt CO ₂ e)	Scope 1, Scope 2	Consistent
Harmony Gold	Kilotonnes CO ₂ e (kt CO ₂ e)	Scope 1, Scope 2	Consistent

Under the GRI 305: Emissions Standard (2016), Scope 1 emissions are defined as direct GHG emissions from sources that are owned or controlled by the company—for example, emissions from diesel-powered trucks, on-site fuel combustion, or explosives used in mining. Scope 2 emissions, on the other hand, are indirect emissions from the generation of purchased electricity, heating, or cooling consumed by the company. Scope 3 emissions refer to any other emissions not included in Scope 1 and Scope 2 that occur in an organisation's value chain. In the South African mining context, Scope 2 is particularly significant due to the industry's reliance on carbon-intensive grid electricity from Eskom. GRI guidelines require the disclosure of both scopes to enable consistency in emissions reporting and allow stakeholders to benchmark environmental performance across companies using comparable boundaries (Global Reporting Initiative, 2023).

The 10 companies were consistent in using kilotonnes of carbon dioxide equivalent (Kt CO₂e), Kt CO₂e is used as indicated in table 3 across the 10-year period that was analysed. Many industrial processes (like mining) emit not only carbon dioxide (CO₂), but also other greenhouse gases and this unit of measure allows them to measure their total contribution to global warming even though they emit a variety of gases. Kilotonnes is also better as large mining houses emit hundreds of thousands of tonnes making it an easier reporting unit.

Energy Usage

Table 5: Unit of measure used for energy usage.

Company	Unit of Measure	Consistency Over Years
Anglo American Platinum	Terajoules (TJ)	Consistent
Kumba Iron Ore	Terajoules (TJ)	Consistent
Impala Platinum	Terajoules (TJ)	Consistent
Gold Fields	Terajoules (TJ)	Consistent
Sibanye-Stillwater	Terajoules (TJ)	Consistent
Exxaro Resources	Terajoules (TJ)	Consistent
Northam Platinum	Terajoules (TJ)	Consistent
African Rainbow Minerals	Terajoules (TJ)	Consistent
Royal Bafokeng Platinum	Terajoules (TJ)	Consistent
Harmony Gold	Terajoules (TJ)	Consistent

Mining operations consume large amounts of energy (Fu et al., 2023) and hence report in terajoules (Tj), the sources of energy consumption are from various areas such as diesel for fuel and electricity. All 10 companies report using terajoules as a unit of measure and this is consistent across all the years analysed.

Social Investment

Table 6: Unit of measure used for social investment.

Company	Unit of Measure	Consistency Over Years
Anglo American Platinum	ZAR (million)	Consistent
Kumba Iron Ore	ZAR (million)	Consistent
Impala Platinum	ZAR (million)	Consistent
Gold Fields	ZAR (million)	Consistent
Sibanye-Stillwater	ZAR (million)	Consistent
Exxaro Resources	ZAR (million)	Consistent
Northam Platinum	ZAR (million)	Consistent

Company	Unit of Measure	Consistency Over Years
African Rainbow Minerals	ZAR (million)	Consistent
Royal Bafokeng Platinum	ZAR (million)	Consistent
Harmony Gold	ZAR (million)	Consistent

All mining companies report social investment in rands which is the national currency in South Africa.

Injury Frequency Rate

Table 7: Unit of measure used for social investment.

Company	LTIFR Reported?	TRIFR Reported?	RIFR Reported?
Anglo American Platinum	Yes	Yes	No
Kumba Iron Ore	Yes	Yes	No
Impala Platinum	Yes	No	No
Gold Fields	Yes	Yes	No
Sibanye-Stillwater	Yes	Yes	No
Exxaro Resources	Yes	No	No
Northam Platinum	Yes	No	Yes
African Rainbow Minerals	Yes	Yes	No
Royal Bafokeng Platinum	Yes	No	No
Harmony Gold	Yes	No	No

Companies report injury frequency rate using different metrics, all 10 companies report Lost-Time Injury Frequency Rate (LTIFR) which measures the number of lost-time injuries per specified hours worked, some companies additionally report Total Recordable Injury Frequency Rate (TRIFR) includes all recordable injuries, not just those resulting in lost time and a few companies also report Reportable Injury Frequency Rate (RIFR) encompasses injuries that are legally required to be reported, which may include both lost-time and medical treatment cases.

For the purposes of this report, we will complete the analysis using LTIFR because all companies report on this measure which will allow for comparison.

4.2.3 Raw Performance Data

The tables below indicate the data used from the reports.

Water Usage (ML)

All companies reported water usage using the same unit of measure and no conversions were required to enable comparisons.

Table 8: Values reported for water usage/withdrawal for mining companies.

Company	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Anglo American Platinum	5415	5249	5199	5286	5110	5205	5272	5141	5295	5363	5388
Kumba Iron Ore	4852	4251	4727	4204	4430	4481	4282	4685	4038	4229	4429
Impala Platinum	5541	5781	5415	5198	5964	5650	5523	5561	5182	5362	5667
Gold Fields	6717	5965	6752	6183	6210	6519	6756	5985	6250	6493	6566
Sibanye-Stillwater	7747	7891	7478	8177	8212	8151	7568	7552	7836	8171	8125
Exxaro Resources	4525	4051	3944	3851	4370	4456	3638	3809	4403	4184	4192
Northam Platinum	6901	7006	7079	7086	6856	6401	6867	7185	6214	6309	6855
African Rainbow Minerals	6174	6493	6202	6487	6500	5920	6385	5975	6280	6133	6274
Royal Bafokeng Platinum	7868	7536	7977	7986	7810	8028	7891	7600	7951	7964	7949
Harmony Gold	4571	4781	5247	4644	4370	4725	4428	4487	4984	5166	4466

Greenhouse Gas Emissions (Kt CO₂e)

Greenhouse gas emissions for all companies were reported in Kt CO₂e and did not require any conversions for comparability.

Table 9: Values reported for greenhouse gas emissions for mining companies.

Company	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Anglo American Platinum	882	840	762	866	902	813	739	800	840	755	705
Kumba Iron Ore	788	792	800	779	822	845	767	871	731	822	773
Impala Platinum	738	755	661	758	776	675	696	792	761	631	702
Gold Fields	1147	1138	1104	1215	1200	1156	1122	1162	1172	1005	1196
Sibanye-Stillwater	145	169	221	211	130	315	226	251	175	216	133
Exxaro Resources	1085	1047	1019	936	1034	931	973	1066	1037	977	1095
Northam Platinum	1064	1092	1068	1152	1139	1137	1151	1133	1094	1188	1215
African Rainbow Minerals	704	674	645	641	631	572	646	627	676	682	660
Royal Bafokeng Platinum	661	611	580	700	550	525	532	549	639	513	515
Harmony Gold	874	789	816	806	714	759	833	904	767	777	821

Energy Usage (Tj)

All 10 companies reported energy usage in Tj so no conversions were required for comparative analysis.

Table 10: Values reported for energy usage for mining companies.

Company	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Anglo American Platinum	606	562	332	386	461	667	282	535	584	734	497
Kumba Iron Ore	2273	2366	2331	2263	2323	2080	2165	2526	2550	2442	2432
Impala Platinum	1741	1661	1753	1497	1748	1729	1715	1480	1652	1776	1469
Gold Fields	3063	2933	3189	2577	2846	2721	2785	2696	2854	2826	2949
Sibanye-Stillwater	975	1086	1004	869	785	908	979	872	871	792	785
Exxaro Resources	1819	2058	1985	1832	1822	1680	1702	1746	1965	2024	1914
Northam Platinum	1956	2105	2061	2017	1856	1990	1775	1787	1945	1960	2050
African Rainbow Minerals	2215	2349	2373	2245	2114	2123	2002	2049	1947	2297	2261
Royal Bafokeng Platinum	2088	2181	2257	2216	2120	2144	1885	2157	2085	2203	2108

Company	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Harmony Gold	524	707	438	777	835	571	679	386	433	588	533

Social Investment (ZAR million)

All the 10 companies report social investment in ZAR millions and no conversions were required for comparative analysis.

Table 11: Values reported for social investment for mining companies.

Company	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Anglo American Platinum	440	456	478	481	487	471	467	481	460	522	475
Kumba Iron Ore	318	329	351	353	345	321	358	269	316	333	304
Impala Platinum	373	422	401	416	410	398	420	399	412	380	387
Gold Fields	461	461	494	500	476	463	465	497	489	547	456
Sibanye-Stillwater	346	301	273	314	333	299	349	306	334	298	283
Exxaro Resources	460	491	447	462	421	501	462	477	448	443	469
Northam Platinum	368	307	358	333	345	410	315	346	377	305	325
African Rainbow Minerals	131	137	124	99	122	166	153	119	155	138	140
Royal Bafokeng Platinum	117	156	147	122	186	134	161	129	136	90	112
Harmony Gold	60	92	73	68	121	72	92	134	78	62	74

Injury Frequency Rate (LTIFR)

Operations reported on different metrics that can be used to measure injury frequency rate, however only LTIFR was consistently reported on by all company and no conversions were required for comparative analysis.

Table 12: Values reported for injury frequency rate for mining companies.

Company	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Anglo American Platinum	4.65	4.8	4.67	4.37	4.97	4.62	4.32	4.21	4.29	4.77	4.76
Kumba Iron Ore	2.42	2.25	2.04	2.69	1.8	2.1	2.07	2.25	2.83	2.19	2.15
Impala Platinum	2.79	2.19	2.3	2.59	3.01	2.51	2.18	2.25	2.44	2.17	2.38
Gold Fields	5.98	5.16	5.49	5.67	6.07	5.71	5.49	5.74	5.54	5.93	5.83
Sibanye-Stillwater	1.88	1.82	1.82	1.98	1.77	2.09	2.16	1.81	1.7	1.59	1.82
Exxaro Resources	4.32	4.56	4.42	4.06	4.53	4.6	4.1	4.3	3.98	4.08	4.69
Northam Platinum	4.56	3.97	4.27	3.9	3.98	4.48	4.25	4.42	4.32	3.93	4.77
African Rainbow Minerals	4.81	4.47	4.72	4.74	5.01	4.71	4.37	4.94	5.1	5.05	5.22
Royal Bafokeng Platinum	3.77	3.91	4.13	3.73	4.34	4.07	4.22	3.9	4.03	4.07	3.9
Harmony Gold	5.94	6.05	5.57	5.56	5.55	5.44	5.79	5.66	5.76	5.95	5.52

5 ANALYSIS AND FINDINGS

5.1 Introduction

This chapter presents the findings and discussion from the comparative analysis of ESG disclosures across South Africa's top ten mining companies. This includes how these companies report on ESG issues, what they prioritise, and how their performance has evolved over time. The chapter also presents the interview results and provides stakeholder perspectives on ESG implementation in the mining sector, including perceptions of progress, gaps, and ongoing challenges.

Findings and Discussions of the Desktop Study

5.2 Methods of Reporting

All the top 10 mining companies had similar methods of reporting. Their report formats ranged from integrated reports, sustainability reports, and ESG reports. Between 2012 and 2022, all the mining companies published integrated reports in which they presented their financial and non-financial performance, respectively. However, in recent years, there has been a change in the publication of sustainability reports. From 2020 to 2022, some companies replaced their sustainability reports with ESG reports, focusing on ESG factors that impacted their long-term competitiveness and financial performance, such as Harmony Gold, Exxaro Resources, Royal Bafokeng Platinum, and Impala Platinum. Only African Rainbow Minerals (ARM) started this practice in 2022. While Sibanye-Stillwater and Gold Fields did not publish either ESG or sustainability reports from 2012 to 2022, others continued to publish only integrated reports and sustainability reports between 2012 and 2022, such as Anglo-American Platinum, Kumba Iron Ore, Impala Platinum, Gold Fields, and Sibanye-Stillwater.

In terms of reporting standards, all the mining companies except Sibanye-Stillwater complied with GRI reporting standards. Within this period, their reporting content included key topics such as material issues, human rights, labour practices, employee health, safety, and well-being, environmental protection, social or community support, governance and ethics, sustainability CSR, diversity, equity, and inclusion, independent auditing and assurance, and KPIs. Although Sibanye-Stillwater followed the SASB reporting guideline, the company's reports between 2012 and 2022 included all the issues, metrics, or components typically found in the GRI-based reports of other mining companies.

To enable consistent comparison of ESG disclosure quality across companies, this study introduced a simplified internal classification comprising two categories: "**mature**" and "**deluxe**" ESG reporters.

These terms were developed specifically for the purposes of this research and are not drawn from existing ESG rating agencies or external benchmarks.

- **“Mature”** ESG reporters are defined in this context as companies that have demonstrated consistent ESG disclosures over the ten-year period across core themes—such as carbon emissions, water use, energy efficiency, and social investment—while adhering to globally accepted frameworks such as the Global Reporting Initiative (GRI) (GRI, 2021).
- **“Deluxe”** ESG reporters, on the other hand, are those that not only meet the criteria for maturity, but also show a higher level of strategic integration by aligning disclosures with Sustainable Development Goals (SDGs), obtaining third-party assurance of their data, and explicitly linking ESG performance to business outcomes through integrated reports, in line with IIRC and SDG best practices (IIRC, 2021; UN, 2015).

This classification enabled a structured assessment of ESG progress in the absence of standardized local ESG scoring and allowed for a more nuanced discussion of disclosure depth and impact.

Although the top 10 organizations had varying reporting formats and reporting styles, their reporting style (deluxe) and reporting type (mature) were identical. From 2012 to 2022, all the mining companies provided a detailed, comprehensive analysis of their business performance and ESG material issues impacting their business operations, using formal languages and visual aids such as graphs and charts to present their integrated report, sustainability report, or ESG report. Overall, the sustainability, CSR, or ESG policies in their reports were well-structured, highly coherent, and strictly formal. A summary of the mining companies’ methods of reporting is presented in Table 13.

Table 13: Top 10 mining companies' methods of reporting.

Company	Year	Methods of Reporting			
		Reporting format	Reporting Style	Reporting Types	Reporting Standards
Anglo-American Platinum	2022	Integrated Report, Sustainability Report	Deluxe	Mature	GRI
	2020	Integrated Report, Sustainability Report	Deluxe	Mature	GRI
	2018	Integrated Report, Sustainability Report	Deluxe	Mature	GRI
	2016	Integrated Report, Sustainability Report	Deluxe	Mature	GRI
	2014	Integrated Report, Sustainability Report	Deluxe	Mature	GRI
	2012	Integrated Report, Sustainability Report	Deluxe	Mature	GRI
Kumba Iron Ore	2022	Integrated Report, Sustainability Report	Deluxe	Mature	GRI
	2020	Integrated Report, Sustainability Report	Deluxe	Mature	GRI
	2018	Integrated Report, Sustainability Report	Deluxe	Mature	GRI
	2016				
	2014				
	2022	Integrated Report, Sustainability Report	Deluxe	Mature	GRI
Impala Platinum	2022	Integrated Report, Sustainability Report	Deluxe	Mature	GRI
	2020	Integrated Report, Sustainability Report	Deluxe	Mature	GRI
	2018	Integrated Report, Sustainability Report	Deluxe	Mature	GRI
	2016	Integrated Report, Sustainability Report	Deluxe	Mature	GRI
	2014	Integrated Report, Sustainability Report	Deluxe	Mature	GRI
	2012	Integrated Report, Sustainability Report	Deluxe	Mature	GRI
Gold Fields	2022	Integrated Report	Deluxe	Mature	GRI
	2020	Integrated Report	Deluxe	Mature	GRI
	2018	Integrated Report	Deluxe	Mature	GRI
	2016	Integrated Report	Deluxe	Mature	GRI
	2014	Integrated Report	Deluxe	Mature	GRI
	2012	Integrated Report	Deluxe	Mature	GRI
Sibanye-Stillwater	2022	Integrated Report	Deluxe	Mature	SASB
	2020	Integrated Report	Deluxe	Mature	SASB
	2018	Integrated Report	Deluxe	Mature	SASB
	2016	Integrated Report	Deluxe	Mature	SASB
	2014	Integrated Report	Deluxe	Mature	SASB
	2012				

Company	Year	Methods of Reporting			
		Reporting format	Reporting Style	Reporting Types	Reporting Standards
Exxaro Resources	2022	Integrated Report, ESG Report	Deluxe	Mature	GRI
	2020	Integrated Report, ESG Report	Deluxe	Mature	GRI
	2018	Integrated Report	Deluxe	Mature	GRI
	2016	Integrated Report	Deluxe	Mature	GRI
	2014	Integrated Report	Deluxe	Mature	GRI
	2012	Integrated Report	Deluxe	Mature	GRI
Northam Platinum	2022	Integrated Report	Deluxe	Mature	GRI
	2020	Integrated Report, Sustainability Report	Deluxe	Mature	GRI
	2018	Integrated Report, Sustainability Report	Deluxe	Mature	GRI
	2016	Integrated Report, Sustainability Report	Deluxe	Mature	GRI
	2014	Integrated Report, Sustainability Report	Deluxe	Mature	GRI
	2012	Integrated Report, Sustainability Report	Deluxe	Mature	GRI
African Rainbow Minerals (ARM)	2022	Integrated Report, ESG Report	Deluxe	Mature	GRI
	2020	Integrated Report, Sustainability report	Deluxe	Mature	GRI
	2018	Integrated Report, Sustainability report	Deluxe	Mature	GRI
	2016	Integrated Report, Sustainability report	Deluxe	Mature	GRI
	2014	Integrated Report, Sustainability Report	Deluxe	Mature	GRI
	2012	Integrated Report, Sustainability Report	Deluxe	Mature	GRI
Royal Bafokeng Platinum	2022	Integrated Report, ESG Report	Deluxe	Mature	GRI
	2020	Integrated Report, ESG Report	Deluxe	Mature	GRI
	2018	Integrated Report, Sustainability Report	Deluxe	Mature	GRI
	2016	Integrated Report, Sustainability Report	Deluxe	Mature	GRI
	2014	Integrated Report, Sustainability Report	Deluxe	Mature	GRI
	2012	Integrated Report, Sustainability Report	Deluxe	Mature	GRI
Harmony Gold	2022	Integrated Report, ESG Report	Deluxe	Mature	GRI
	2020	Integrated Report, ESG Report	Deluxe	Mature	GRI
	2018	Integrated Report	Deluxe	Mature	GRI
	2016	Integrated Report	Deluxe	Mature	GRI
	2014	Integrated Report	Deluxe	Mature	GRI
	2012	Integrated Report	Deluxe	Mature	GRI

5.3 Policy of ESG Disclosure

The ESG disclosure of the mining companies comprises many components that are increasingly important to investors, customers, and other stakeholders. As shown in Table 3, they include employee health, safety and well-being, environmental protection, social or community support, governance and ethics, sustainability CSR, diversity, equity, and inclusion, UN SDGs, independent auditing and assurance, and KPIs. Each component is described in the following sections:

5.3.1 Employee Health, Safety, and Well-Being

All the top 10 mining companies presented policies and KPIs aimed at promoting their employees' health, safety, and well-being in their reporting between 2012 and 2022 (Table 2). They emphasized workers' safety in their policies and indicated annual investments made to protect their workforce from the impacts of COVID-19, air pollution, water pollution, noise pollution, and other hazards through the provisions of workplace health programs and health and safety training programs as well as through partnerships with external organizations focused on health and wellness. Below is an example of statements made by the executives of these companies to show their commitment to employee's health, safety, and well-being.

"Nothing is more vital than ensuring that every person who works for and with Anglo-American returns home safe at the end of every day.... We remain unconditional about safety, and every loss of life is tragic. We will not rest until major safety incidents are a thing of the past, and zero harm is achieved and sustained across our business. We have shown it can be done for long periods and now we must make it permanent." (Anglo-American Sustainability Report, 2020).

5.3.2 4.2.2 Environmental Protection

All the top 10 mining companies prioritized the protection of the planet in their integrated, sustainability, or ESG reports. From 2012 to 2022, the firms stated the measures they took to improve energy efficiency, conserve natural resources, minimize waste generated, recycle limited resources, reduce the emissions of pollutants and greenhouse gases, and protect biodiversity and ecosystems (Table 3). However, most of these mining companies' environmental protection efforts within this period had been geared towards energy consumption/generation, water consumption/withdrawal, and GHG emissions, as reflected in their sustainability goals and KPIs.

5.3.3 Social or Community Support

Information about social or community support was presented in the annual report of the top 10 mining companies between 2012 and 2022. In the integrated reports, sustainability reports, or ESG reports, the top mining firms described their efforts to provide jobs, training, infrastructure, social amenities, and other forms of support to the locals. They also highlighted programs and partnerships

to support the initiatives of the local communities. The top 10 mining companies often highlight their social efforts with statements such as:

“This year, Kumba contributed R5.4 billion in support of our local host community businesses (up from R506 million in 2017), as well as R399.5 million to community development.” (Kumba Integrated Report, 2022).

5.3.4 Governance and Ethics

Details regarding governance and ethics are present in the annual reports of the top 10 mining companies. In the annual reports published between 2012 and 2022, the companies comprehensively described their business conduct, corporate culture and values, corporate governance structure, anti-corruption measures, and risk management and compliance (Table 2). They provided information about their board diversity, director qualifications, succession planning, codes of conduct, and the composition of their board of directors, board committees, and executives to prevent conflicts of interest, promote transparency, and combat corruption. The companies often demonstrated their commitment to good corporate governance and ethics with statements such as:

“The board is responsible for overseeing the Group’s risk management and internal control systems, which management is responsible for implementing. The board committees consist of a majority of independent non-executive directors, supporting a strong risk governance framework.” (Implant Integrated Report, 2022).

5.3.5 Sustainability Development

In the reviewed annual reports, all the mining companies demonstrated their commitment to sustainable practices and responsible business conduct. They highlighted their most significant sustainability issues for stakeholders and explained the strategies, programs, partnerships, and initiatives to be used to address the challenges (Table 2). Implats Integrated Report, 2022, p. 33, states that “Ringfencing investment to provide for future rehabilitation expenditure over life-of-mine and post-closure liabilities.”

5.3.6 Diversity, Equity, and Inclusion

Between 2020 and 2022, all the mining companies discussed their commitment to equity and fairness in their employment practices, including career development, compensation, promotion, and recruitment. They highlighted initiatives and programs aimed at diversifying their workforce and fostering an inclusive working environment where all employees would feel respected, valued, and empowered to contribute their ideas and skills (Table 2). However, before this period, two mining firms failed to disclose or emphasize such issues, such as Exxaro Resources (2012-2016), Northam Platinum (2012-2014).

5.3.7 United Nations Sustainable Development Goals (UN SDGs)

As shown in Table 2, most of the mining companies incorporated UN SDGs into their annual reports between 2018 and 2022 and showcased innovative products, services, and solutions that contributed to SDG implementation. Companies that fall within this category include Anglo-American Platinum, Kumba Iron Ore, Impala Platinum, Sibanye-Stillwater, Royal Bafokeng Platinum, and Exxaro Resources. In contrast, some mining firms started integrating UN SDGs into their business reporting in 2016 (i.e., African Rainbow Minerals) and 2020 (i.e., Gold Fields, Harmony Gold, and Northam Platinum).

5.3.8 Independent Auditing and Assurance

All the mining companies disclosed the scope of their assurance process, stating the auditing companies that provided independent assurance for their sustainability information. The assurance companies included PWC (PricewaterhouseCoopers), KPMG (Klynveld Peat Marwick Goerdeler), and Deloitte. The following assurance statement is often found in their annual report:

“KPMG has provided independent reasonable assurance over selected sustainability information in this report, which is prepared in accordance with the GRI G4 guidelines. As a member of the ICMM, we are committed to obtaining assurance in line with the ICMM Sustainable Development Framework: Assurance Procedure. KPMG has provided assurance over our statement on compliance with the ICMM Sustainable Development Framework, Principles and Reporting Requirements.” (Gold Fields Integrated Report, 2016).

5.3.9 KPIs

All the top 10 mining firms presented various KPIs used to measure the performance of their sustainability efforts (Table 14). The metrics include carbon emissions, energy consumption, water usage, employee diversity, board diversity, social spending, GHG emissions, lost time injury frequency rate, and total recordable incident rate. However, measurements of each KPI vary over the years. While some used litres to measure volume, others used cubic meters to do so.

	Year	Employee Health, Safety, and Well-Being	Environmental Protection	Social or Community Support	Governance and Ethics	Sustainability Development	Diversity, Equity, and Inclusion	UN SDGs	Independent Auditing and Assurance	KPIs
	2017	✓	✓	✓	✓	✓	✓	✓	✓	✓
	2018	✓	✓	✓	✓	✓	✓	✓	✓	✓
	2019	✓	✓	✓	✓	✓	✓	✓	✓	✓
	2020	✓	✓	✓	✓	✓	✓	✓	✓	✓
	2021	✓	✓	✓	✓	✓	✓	✓	✓	✓
	2022	✓	✓	✓	✓	✓	✓	✓	✓	✓
	2022	✓	✓	✓	✓	✓	✓	✓	✓	✓
Gold Fields	2012	✓	✓	✓	✓	✓	✓	x	✓	✓
	2013	✓	✓	✓	✓	✓	✓	x	✓	✓
	2014	✓	✓	✓	✓	✓	✓	x	✓	✓
	2015	✓	✓	✓	✓	✓	✓	x	✓	✓
	2016	✓	✓	✓	✓	✓	✓	x	✓	✓
	2017	✓	✓	✓	✓	✓	✓	x	✓	✓
	2018	✓	✓	✓	✓	✓	✓	x	✓	✓
	2019	✓	✓	✓	✓	✓	✓	✓	✓	✓
	2020	✓	✓	✓	✓	✓	✓	✓	✓	✓
	2021	✓	✓	✓	✓	✓	✓	✓	✓	✓
	2022	✓	✓	✓	✓	✓	✓	✓	✓	✓
	2022	✓	✓	✓	✓	✓	✓	✓	✓	✓
Sibanye-Stillwater	2012	The company was established in 2013 following a spin-off from Gold Fields.								
	2013	✓	✓	✓	✓	✓	✓	x	✓	✓
	2014	✓	✓	✓	✓	✓	✓	x	✓	✓
	2015	✓	✓	✓	✓	✓	✓	x	✓	✓
	2016	✓	✓	✓	✓	✓	✓	x	✓	✓
	2017	✓	✓	✓	✓	✓	✓	✓	✓	✓
	2018	✓	✓	✓	✓	✓	✓	✓	✓	✓
	2019	✓	✓	✓	✓	✓	✓	✓	✓	✓
	2020	✓	✓	✓	✓	✓	✓	✓	✓	✓
	2021	✓	✓	✓	✓	✓	✓	✓	✓	✓
	2022	✓	✓	✓	✓	✓	✓	✓	✓	✓
	2022	✓	✓	✓	✓	✓	✓	✓	✓	✓
Exxaro Resources	2012	✓	✓	✓	✓	✓	x	x	✓	✓
	2013	✓	✓	✓	✓	✓	x	x	✓	✓

	Year	Employee Health, Safety, and Well-Being	Environmental Protection	Social or Community Support	Governance and Ethics	Sustainability Development	Diversity, Equity, and Inclusion	UN SDGs	Independent Auditing and Assurance	KPIs
	2014	✓	✓	✓	✓	✓	x	x	✓	✓
	2015	✓	✓	✓	✓	✓	x	x	✓	✓
	2016	✓	✓	✓	✓	✓	x	x	✓	✓
	2017	✓	✓	✓	✓	✓	x	x	✓	✓
	2018	✓	✓	✓	✓	✓	✓	✓	✓	✓
	2019	✓	✓	✓	✓	✓	✓	✓	✓	✓
	2020	✓	✓	✓	✓	✓	✓	✓	✓	✓
	2021	✓	✓	✓	✓	✓	✓	✓	✓	✓
	2022	✓	✓	✓	✓	✓	✓	✓	✓	✓
Northam Platinum	2012	✓	✓	✓	✓	✓	x	x	✓	✓
	2013	✓	✓	✓	✓	✓	x	x	✓	✓
	2014	✓	✓	✓	✓	✓	x	x	✓	✓
	2015	✓	✓	✓	✓	✓	x	x	✓	✓
	2016	✓	✓	✓	✓	✓	x	x	✓	✓
	2017	✓	✓	✓	✓	✓	x	x	✓	✓
	2018	✓	✓	✓	✓	✓	✓	x	✓	✓
	2019	✓	✓	✓	✓	✓	✓	✓	✓	✓
	2020	✓	✓	✓	✓	✓	✓	✓	✓	✓
	2021	✓	✓	✓	✓	✓	✓	✓	✓	✓
	2022	✓	✓	✓	✓	✓	✓	✓	✓	✓
African Rainbow Minerals (ARM)	2012	✓	✓	✓	✓	✓	✓	✓	✓	✓
	2013	✓	✓	✓	✓	✓	✓	x	✓	✓
	2014	✓	✓	✓	✓	✓	✓	x	✓	✓
	2015	✓	✓	✓	✓	✓	✓	x	✓	✓
	2016	✓	✓	✓	✓	✓	✓	✓	✓	✓
	2017	✓	✓	✓	✓	✓	✓	✓	✓	✓
	2018	✓	✓	✓	✓	✓	✓	✓	✓	✓
	2019	✓	✓	✓	✓	✓	✓	✓	✓	✓
	2020	✓	✓	✓	✓	✓	✓	✓	✓	✓
	2021	✓	✓	✓	✓	✓	✓	✓	✓	✓
	2022	✓	✓	✓	✓	✓	✓	✓	✓	✓

	Year	Employee Health, Safety, and Well-Being	Environmental Protection	Social or Community Support	Governance and Ethics	Sustainability Development	Diversity, Equity, and Inclusion	UN SDGs	Independent Auditing and Assurance	KPIs
Royal Bafokeng Platinum	2012	✓	✓	✓	✓	✓	x	x	✓	✓
	2013	✓	✓	✓	✓	✓	x	x	✓	✓
	2014	✓	✓	✓	✓	✓	x	x	✓	✓
	2015	✓	✓	✓	✓	✓	x	x	✓	✓
	2016	✓	✓	✓	✓	✓	x	x	✓	✓
	2017	✓	✓	✓	✓	✓	x	x	✓	✓
	2018	✓	✓	✓	✓	✓	✓	✓	✓	✓
	2019	✓	✓	✓	✓	✓	✓	✓	✓	✓
	2020	✓	✓	✓	✓	✓	✓	✓	✓	✓
	2021	✓	✓	✓	✓	✓	✓	✓	✓	✓
	2022	✓	✓	✓	✓	✓	✓	✓	✓	✓
Harmony Gold	2012	✓	✓	✓	✓	✓	✓	x	✓	✓
	2013	✓	✓	✓	✓	✓	x	x	✓	✓
	2014	✓	✓	✓	✓	✓	✓	x	✓	✓
	2015	✓	✓	✓	✓	✓	x	x	✓	✓
	2016	✓	✓	✓	✓	✓	✓	x	✓	✓
	2017	✓	✓	✓	✓	✓	x	x	✓	✓
	2018	✓	✓	✓	✓	✓	✓	x	✓	✓
	2019	✓	✓	✓	✓	✓	✓	✓	✓	✓
	2020	✓	✓	✓	✓	✓	✓	✓	✓	✓
	2021	✓	✓	✓	✓	✓	✓	✓	✓	✓
	2022	✓	✓	✓	✓	✓	✓	✓	✓	✓

5.3.10 Summary of ESG Disclosure Results (Table 14)

An analysis of Table 3 reveals that ESG disclosure among South Africa's top ten mining companies has steadily improved in both breadth and consistency between 2012 and 2022. This observation supports the first objective of the study, which aimed to examine how ESG considerations have been integrated into mining business strategies over the past decade.

In the early years of the review period, disclosures were often general and lacked alignment with internationally recognised frameworks such as the UN SDGs. For instance, prior to 2016, several companies, including Kumba Iron Ore and Royal Bafokeng Platinum, omitted disclosure on diversity, equity, and inclusion (DEI), and had yet to embed SDGs into their reporting frameworks. This was not surprising given that the SDGs were only formally adopted by the United Nations in 2015 (UN, 2015). However, from 2018 onwards, the industry showed a clear shift towards enhanced transparency, driven by investor expectations, regulatory alignment, and competitive differentiation (Clark, 2021; GRI, 2021).

By 2022, all ten companies disclosed across nearly all key ESG indicators, with many having achieved "P" ratings across the board in Table 3. Notably, companies like Anglo American Platinum, Gold Fields, and African Rainbow Minerals demonstrated consistently high levels of disclosure throughout the entire period. Their reports frequently included third-party assurance, detailed KPI metrics, and integration of governance principles—suggesting a strategic effort to embed ESG into core business operations, in line with the "deluxe" reporting classification used in this study.

Meanwhile, companies like Exxaro and Northam Platinum showed progressive improvement over time. Although they had initially lagged in certain social indicators, particularly DEI and SDG integration, they closed this gap by 2020. These trends underscore a growing industry consensus on the value of aligning ESG disclosures with global standards, especially among JSE-listed firms that recognise investor demand for sustainability-linked transparency (Sulkowski & Jebe, 2022).

Interestingly, Sibanye-Stillwater, which did not publish a 2012 report due to its 2013 spin-off from Gold Fields, rapidly scaled its ESG reporting post-establishment. By

2021, it had adopted a full suite of disclosures comparable to its peers, despite following the SASB rather than GRI framework. This supports the view that regulatory flexibility has not necessarily hindered the depth of ESG engagement (IIRC, 2021; SASB, 2020).

Overall, Table 3 illustrates that ESG disclosure in South African mining has evolved from a compliance-driven process into a strategic differentiator. The steady adoption of SDG targets, KPIs, and third-party assurance suggests that firms are no longer just responding to regulation or investor pressure—they are actively seeking to legitimise their operations through sustainability commitments, as proposed by legitimacy theory (Deegan & Unerma, 2009).

This shift aligns strongly with the second and third objectives of this research, namely: identifying the prioritised ESG dimensions and evaluating the challenges mining firms face in responding to investor expectations. As reporting practices mature, ESG frameworks are no longer seen as peripheral but are now central to investor engagement, stakeholder legitimacy, and long-term competitiveness.

Table 3 provides comprehensive information about the performance of the mining companies' KPIs over the years. The KPIs include water usage/withdrawal, greenhouse gas emissions, energy usage, social investment, and injury frequency rate, this can be Total Recordable Case Frequency Rate (TRCFR), Lost Injury Frequency Time Rate (LIFTR) or Lost Time Injury Incidence Rate (LTIIR). A discussion of the KPI results is presented in the following sub-sections.

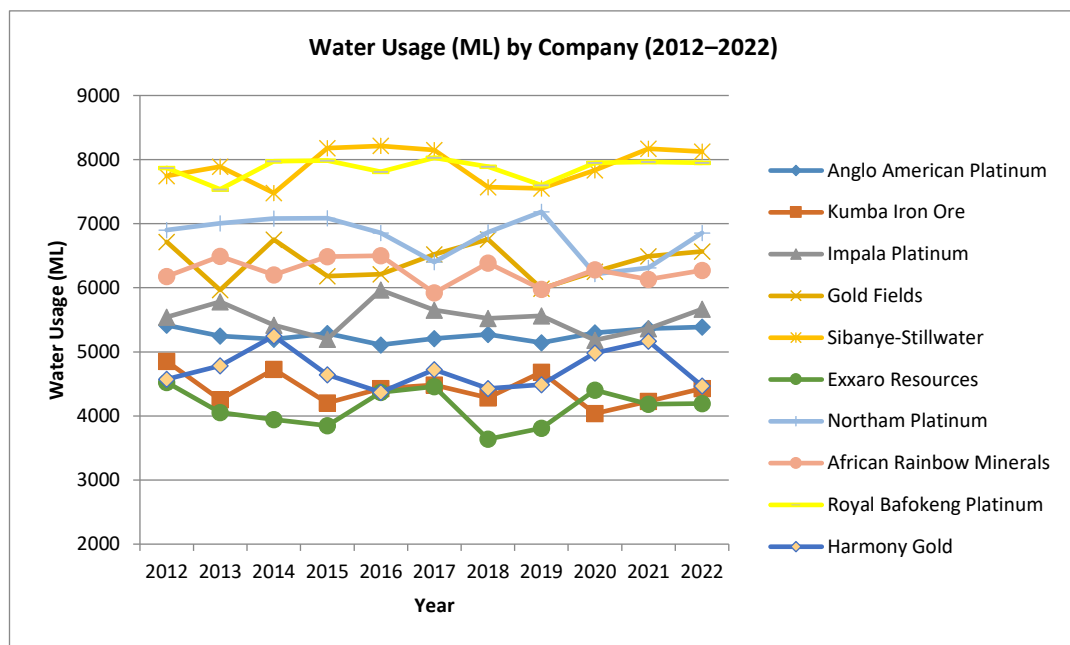
Over the ten-year period from 2012 to 2022, ESG performance reporting across South Africa's leading mining companies has evolved from basic compliance into a more deliberate, strategy-linked effort. The figures presented in the preceding visualisations provide a quantitative basis for evaluating the sector's progress. This section unpacks the key findings across five core ESG dimensions, each chosen for its relevance to mining operations and its frequency of disclosure across all ten firms.

5.3.1 Water Usage/Withdrawal

Water usage declined modestly by 1.2% over the period, a signal that although operational demand remained high, firms have marginally improved their water

efficiency or recycling practices. Companies such as Gold Fields and Anglo-American Platinum consistently reported higher usage levels, often above 7,000 ML per annum, due to their scale and metallurgical processing needs. In contrast, Royal Bafokeng Platinum and Kumba Iron Ore displayed relatively lower figures, under 4,000 ML, with incremental improvements likely tied to the installation of closed-loop systems and water reclamation investments. The overall flat trend suggests that while there is awareness, water-related risks have not triggered dramatic behavioural shifts, even in drought-prone provinces.

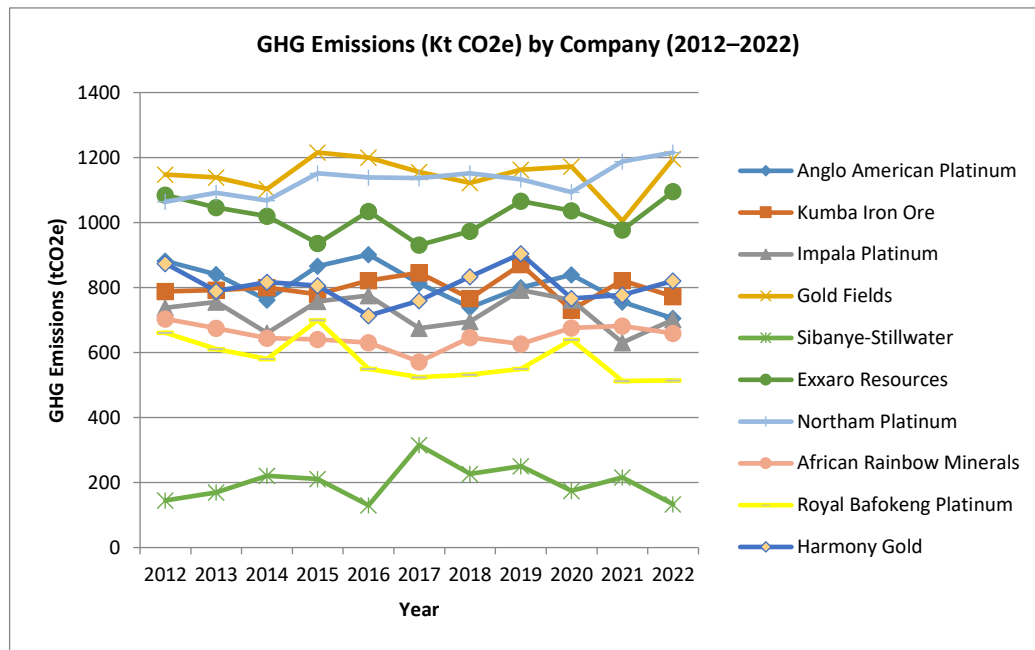
Figure 2: Top 10 mining companies' water usage growth rate.



5.3.2 Greenhouse Gas Emissions

Greenhouse gas emissions fell slightly by 0.8% over the 10-year period with average emissions hovering around 600,000–800,000 metric tons CO₂e. Kumba Iron Ore was the most intensive emitter, with some annual totals exceeding 1 million tons, while firms like Harmony Gold showed a lower emissions footprint. The marginal decrease is not reflective of a large-scale decarbonisation effort, but rather operational efficiencies, fuel switching, and in some cases, production slowdowns. Although several companies now report on Scope 1 and 2 emissions under GRI guidelines, few have begun quantifying Scope 3 emissions, suggesting the sector is still early in its climate reporting maturity curve.

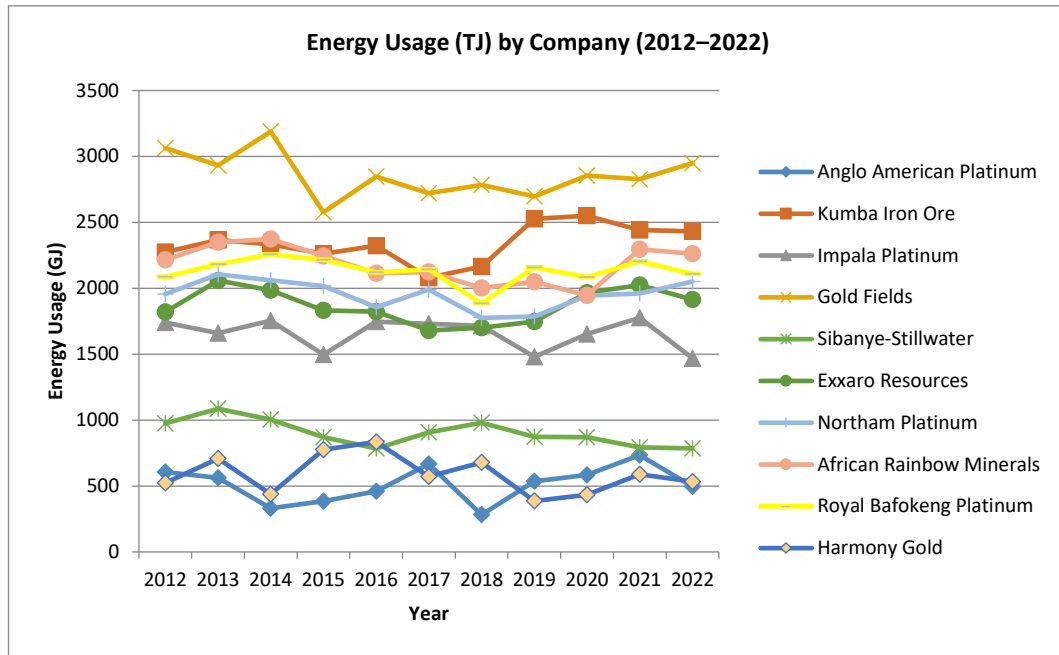
Figure 3: Top 10 mining companies' greenhouse gas emissions.



5.3.3 Energy Usage

Energy usage increased by 6.5%, with Anglo American Platinum and Impala Platinum leading in absolute consumption, often exceeding 2.5 million gigajoules annually. The increase can be partially explained by operational expansion and deeper ore bodies requiring more energy to access. Despite industry claims of efficiency gains, the figures highlight that the sector remains heavily reliant on fossil-fuel-based electricity, particularly Eskom-supplied power, with only minimal penetration of renewables. This stagnation could pose reputational and operational risks if national energy policy or investor demands shift further towards green expectations.

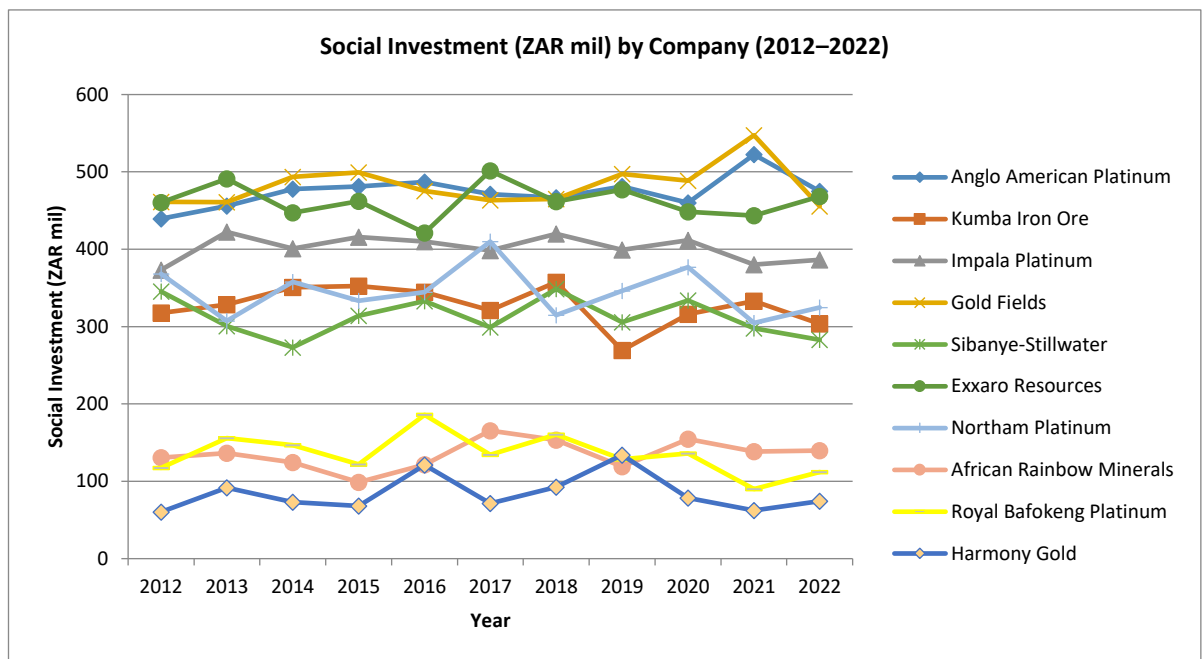
Figure 4: Top 10 mining companies' energy usage.



5.3.4 Social Investment

Social investment grew by 0.9% (not adjusted for inflation), with consistent high contributions from Kumba Iron Ore, Gold Fields, and Anglo-American Platinum. Spending ranged from ZAR 100 million to ZAR 500 million annually depending on the company, with funds directed towards infrastructure, education, and health programmes in mining-affected communities. While smaller firms such as Royal Bafokeng Platinum and Northam Platinum contributed less in absolute terms, they still demonstrated intent in areas like enterprise development and housing. Notably, investment levels were resilient even during down cycles, suggesting that social performance is now perceived as integral to business continuity rather than an optional expenditure.

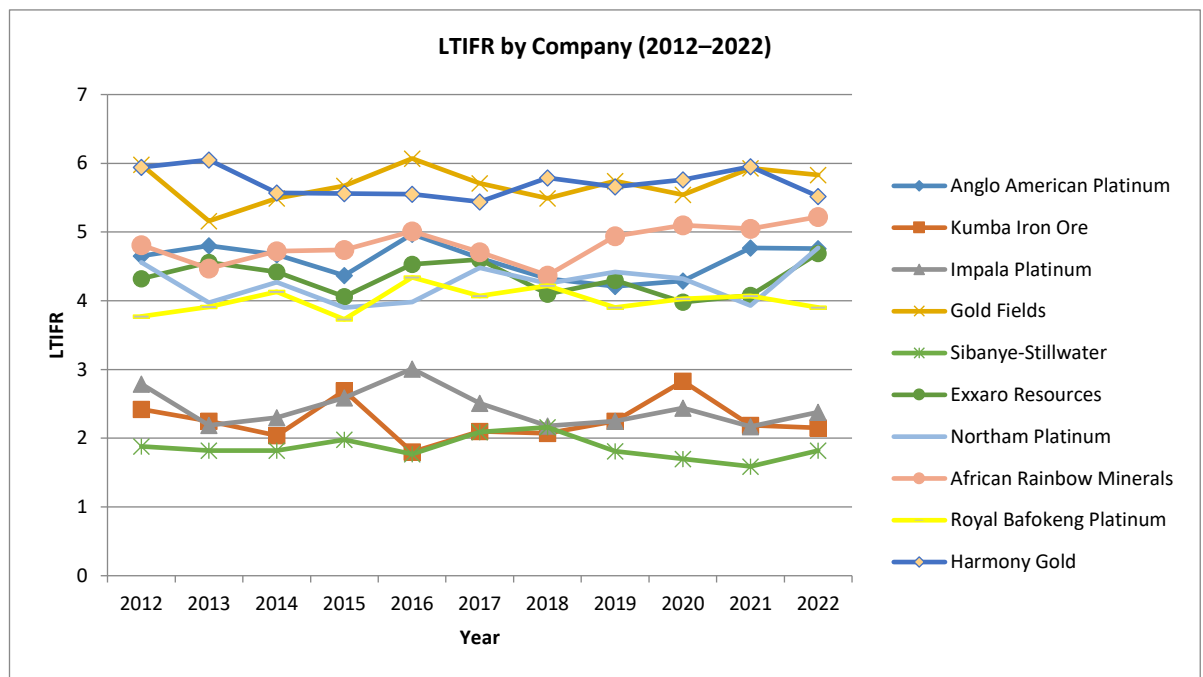
Figure 5: Top 10 mining companies' social investment.



5.3.5 Injury Frequency Rate (TRCFR/LIFTR/LTIIR)

Injury Frequency Rate (LTIFR) showed the most encouraging trend, falling by 1.8%. Companies such as Sibanye-Stillwater and Impala Platinum showed notable improvement, bringing LTIFR figures down to around 1.0 or lower in recent years. Anglo American Platinum and Kumba Iron Ore remained above 4.0, reflecting perhaps the limits of technological or procedural controls in high-risk environments. This divergence underscores the critical role of safety culture, training, and contractor oversight. While no company reported a continuous downward trajectory, the general trend confirms the sector's growing emphasis on worker safety and the legitimacy-building effects of credible safety records in public ESG disclosures.

Figure 6: Top 10 mining companies' LTIFR.



5.4 Discussion

The ESG performance findings presented in Section 4.3 indicate progressive but inconsistent integration of ESG factors across South Africa's leading mining companies over the ten-year review period from 2012 to 2022. While compliance with disclosure frameworks such as the GRI has improved, the results suggest that deeper operational shifts have not kept pace with improvements in reporting quality. These findings reinforce the earlier assertion by Koh and Leong (2017) that ESG practices in emerging markets tend to evolve unevenly due to a lack of industry standardisation and inconsistent regulatory pressure.

Water usage remained largely stable across the decade, with a marginal average decline of 1.2% observed across the sample. This points to incremental efficiency improvements, especially by companies like Kumba Iron Ore and Royal Bafokeng Platinum, which consistently reported below-average usage. Conversely, Anglo American Platinum and Gold Fields continued to report high volumes, reflecting the water-intensive nature of their refining processes. Although there were no sharp drops or spikes, this stability suggests that water resource management has reached a level of operational maturity, albeit without transformative reductions.

In terms of greenhouse gas emissions, the data revealed a modest 0.8% decrease in average Scope 1 and 2 emissions, with significant year-on-year improvements seen from Impala Platinum and Exxaro Resources, particularly after 2017. This aligns with increased investment in fleet upgrades and energy-efficiency programmes. However, Kumba Iron Ore remained the sector's highest emitter throughout the decade. A major limitation remains the absence of Scope 3 data, which limits the sector's ability to present a full emissions profile. As highlighted in the 2023 GRI Mining Sector Standard Exposure Draft, future disclosures should include mine-site-level emissions and Scope 3 outputs to enhance transparency and comparability.

Energy usage across the sector increased by 6.5%, contradicting public statements by some firms regarding energy efficiency improvements. The increase appears linked to lower ore grades, deeper mining, and limited progress in transitioning away from Eskom-supplied electricity. Anglo American Platinum and Impala Platinum remained the largest energy consumers. This trend affirms concerns raised by Moneva et al. (2006), who cautioned that increases in sustainability reporting often occur independently of actual environmental improvements.

Social investment, while not adjusted for inflation, increased by 0.9% in nominal terms. Importantly, this investment remained steady even during periods of commodity price volatility. Kumba Iron Ore, Gold Fields and Anglo-American Platinum were among the most consistent contributors, focusing on housing, infrastructure, and enterprise development. More fluctuation was noted from Northam Platinum and Royal Bafokeng Platinum, likely due to revenue variation and project timing. These patterns suggest that while social investment has become embedded in operational planning, it remains vulnerable to broader economic pressures.

The most promising improvements were seen in health and safety. LTIFR declined by 1.8% on average, with Sibanye-Stillwater and Impala Platinum recording the most pronounced year-on-year improvements. This reflects increased board-level attention to safety and more rigorous internal audit mechanisms. However, Anglo American Platinum and Kumba Iron Ore maintained slightly elevated LTIFR levels, suggesting that entrenched operational risks remain. These results support

legitimacy theory (Deegan & Unerman, 2009), as firms respond to safety incidents not just with disclosure but with measurable performance gains.

In summary, ESG performance in South Africa's mining sector has improved, but the pace remains uneven. The greatest gains have occurred in health and safety, followed by social investment, while energy and carbon-related indicators reflect slower progress. Some firms have integrated ESG into their business models more deeply than others. The results align with concerns raised in literature (Pucker, 2021; Steele-Schober, 2021) that ESG success cannot be measured by reporting alone—performance outcomes must match disclosure depth. Without broader policy incentives and stakeholder engagement, ESG in the sector risks plateauing at a compliance level rather than driving innovation and long-term impact.

ESG Trend Comparison – South African Mining Companies vs International

The South African mining sector has made visible progress in ESG reporting and compliance, particularly over the last decade. Firms such as Anglo-American Platinum and Gold Fields have demonstrated sustained investment in social development and health initiatives, and several companies have made commitments to reduce their environmental impact. However, when these efforts are benchmarked against international peers, significant disparities remain in the depth of ESG integration, the ambition of sustainability targets, and the degree of transparency in disclosures.

Internationally, Vale, one of the world's largest diversified mining companies, has embedded ESG deeply into its business strategy. Following reputational damage from two major tailings dam failures, Vale has strengthened its social and environmental performance frameworks. Its 2022 Sustainability Report outlines aggressive decarbonisation targets, including a 33% reduction in Scope 1 and 2 emissions by 2030 and a 15% cut in Scope 3 emissions. In addition, Vale has adopted rigorous tailings management protocols and invested heavily in community relocation, biodiversity restoration, and real-time monitoring technologies (Vale, 2022).

Similarly, BHP's 2024 Climate Transition Action Plan outlines a commitment to achieving net-zero operational emissions by 2050, with interim targets of a 30% reduction by 2030. The company has implemented electrification strategies for its

mining fleet and continues to increase its use of renewable energy sources at major operations. In its 2024 Annual Report, BHP also details partnerships with Indigenous communities, and social investment in health, education, and infrastructure development, particularly in Australia and Latin America (BHP, 2024). Governance standards in South Africa are generally aligned with King IV principles, yet leading international firms are adopting more comprehensive and externally assured mechanisms. Rio Tinto's 2024 Sustainability Report highlights a governance architecture built around board-level ESG oversight, enhanced stakeholder dialogue, and transparent grievance mechanisms.

In addition, Rio Tinto has pledged to improve its Scope 3 emissions reporting and collaborate with customers on decarbonising steel production—a downstream impact often underreported by South African miners (Rio Tinto, 2024). While local firms are making gains, South African miners often lack the capital, policy incentives, or global pressure that drive innovation in ESG abroad. The comparison underscores that ESG leadership is not only about policy alignment but also about the capacity to operationalise sustainability goals into measurable outcomes.

Together, Vale, BHP, and Rio Tinto illustrate how ESG can evolve from compliance-based reporting into an integrated value creation strategy that shapes investor confidence, community trust, and long-term viability. For South African firms to close this gap, there must be a continued shift towards outcome-based performance, more transparent assurance processes, and credible emission reduction pathways that are independently verifiable.

Findings and Discussions of the Interviews

5.5 Interview Responses

The study conducted interviews to understand ESG impacts and challenges. Fourteen participants who are stakeholders in the mining industry knowledgeable about sustainability and ESG trends were asked five questions:

(i) What role do you think mining companies play in achieving ESG/sustainability goals? (ii) In South Africa, do you believe some sustainability goals should be prioritized based on the state of the environment? (iii) What are the key challenges mining companies face in achieving strong ESG performance, and how are they

addressing them? (iv) Do all stakeholders understand the ESG requirements and their role in achieving them (Yes/No)? (v) What do you think needs to be improved to assist mining companies in achieving sustainability goals? The presentation and discussion of the survey results in this chapter revolve around these five survey questions.

A total of fourteen (14) respondents participated in the survey through an online survey platform. One (1) of the respondents did not indicate their full details. Since their involvement in the South African mining industry could not be confirmed, their responses were not considered for the discussion. This leaves thirteen (13) responses that were used for insights in this chapter and compared to literature and the desktop study. The valid responses are all individuals that are stakeholders in the mining industry, either directly working at a mining organization, are a supplier to the mining industry, part of a mining investment firm or a consulting firm in the mining space.

The respondents are listed below.

Table 15: List of survey respondents

Respondent Identifier	Role	Sector
Respondent 1	Manager - Energy	Energy
Respondent 2	Decarbonisation Lead	Mining Organisation
Respondent 3	Divisional CEO	Investment firm
Respondent 4	Urban Planner	Consultant
Respondent 5	Closure and Rehabilitation Manager	Mining Organisation
Respondent 6	Consultant	Consultant
Respondent 7	Project Manager	Mining Organisation
Respondent 8	Lead: ESG Reporting	Mining Organisation
Respondent 9	Environmental Specialist	Mining Organisation
Respondent 10	General Manager	Mining Organisation
Respondent 11	Senior Mining Engineer	Mining Organisation
Respondent 12	Prefer not to say	Response not valid
Respondent 13	Environmental Officer	Mining Organization
Respondent 14	Head of Sustainability	Mining Organization

5.6 Interview Responses Analysis

5.6.1 Role of Mining Companies in ESG Sustainability

Data analysis indicates that mining companies are major players in pursuing ESG goals. Respondents admitted that mining firms in South Africa had provided crucial resources in achieving ESG objectives:

“Mining companies need to play a leading role as they can potentially have the most significant impacts. If they do is another question, some do take the lead and do invest significant resources to endure they are working towards sustainability”
– Respondent 5

“In South Africa, mining has given rise to many residential villages and some of these have become industrialized towns. For these towns, mining companies provide income, social cohesion, and access to education, sanitation, water etc. So, mining companies can and do have an important role to play in achieving sustainability goals.” – Respondent 14

This finding aligns with the results of previous studies and reports on ESG. Researchers have long argued that because mining companies are the major contributors to environmental pollution, they should be compelled to adopt ESG practices and protect indigenous communities (Garnett et al., 2018; Maybee, Lilford, and Hitch, 2023). This view, however, is not only shared by ESG researchers and climate change experts. Some studies have shown that investors and financial institutions often expect forward-thinking mining companies to incorporate, for instance, UN SDGs, into their business operations as their mining activities, especially those involving the extraction and crushing of ore, generate large amounts of environmental waste and pollution (Chatterji, Durand, Levine, and Touboul, 2016; Delmas, Etzion, and Nairn-Birch, 2013).

5.6.2 Prioritization of Sustainability Goals

The respondents mentioned that South Africa's mining companies should prioritize sustainability goals. Based on their responses, they were not pleased with mining firms' current ESG efforts:

“Yes. Firstly, a full root and branch investigation needs to be done to understand which operations are in breach of their permits. Second, those permits need re-evaluating. Third, institutional capacity in all levels of government needs to be increased. Fourth policy certainty over the next 20 years will allow investments in innovation to deliver environmental aims.” – *Respondent 6*

“The state of the environment in South Africa is not satisfying and from where I’m standing, it is a lack of awareness and a lack of understanding what is sustainability.” – *Respondent 13*

The ESG literature agrees with this finding. A report by the Responsible Mining Foundation (2020) revealed that many large mining companies have not effectively implemented or disclosed their progress in meeting their established ESG policies and standards. Often, they have been found guilty polluting the environment, mismanaging water and electricity, and compromising worker safety directly or indirectly (Dzakpata, Qureshi, Kizil, and Maybee, 2021; Owen, Kemp, and Marais, 2021; United Nations, 2004). The reason for their cosmetic effort can be traced partly to companies’ focus on financial gains for shareholders. (Maybee, Lilford, and Hitch, 2023).

Moreover, most of the study’s participants revealed that a holistic solution was needed to address climate change challenges. They recommended that UN SGs and nature-based solutions should be prioritized in South Africa to mitigate ESG risks.

“Climate change goals have received good attention, biodiversity and nature-based solutions need to be focused on and prioritized “– Respondent 5

“Even more so over the environment, as a country with over 30% unemployment, the country should prioritize UNSDGs – 1, 2, 3, 4, 8.” – Respondent 14

The participants’ recommendations are compelling and align with research showing a positive relationship between ESG implementation and financial performance (Friede, Busch, & Bassen, 2015; Huang & Ge, 2024). While much of

the focus in the mining sector remains on the costs of ESG compliance, evidence increasingly shows that nature-based ESG actions—such as biodiversity protection, land rehabilitation, and emissions reductions—not only reduce climate risks but can also enhance profitability. For example, companies that prioritise ecosystem restoration and reduce their reliance on water-intensive processes lower long-term operational costs and regulatory exposure. In this sense, climate- and nature-aligned strategies serve as both a sustainability imperative and a financial lever. Moreover, firms with higher ESG ratings—including environmental stewardship—are viewed more favorably by private and institutional investors (Fu, Yu, Guo, & Zhang, 2024).

5.6.3 Challenges in Achieving ESG Performance

In the survey, financial and governance issues were often mentioned as major hurdles preventing program initiation and implementation of ESG programs. Respondents indicated that mining companies lacked the financial resources to deliver ESG goals:

“Key challenges include Financial capacity to achieve some of the ESG goals.” – Respondent 11

“The biggest challenge is trying to preserve funds and maximize on profits due to the external challenges various mining industries are facing.” – Respondent 13

On governance, respondents indicated that operations focus on the measures that are tracked by investors which can impact what the real need is:

“Funding and mining focused decision makers. Mines need to partner with ESG partners and only fund the programs” – Respondent 9

“ESG performance is typically measured by the holders of financial capital based in other jurisdiction who are interested in measuring metrics that may not be as important for companies based in South Africa for instance. e.g., prioritizing environmental metrics over social performance.” – Respondent 14

This study's result is consistent with the findings of previous studies. The mining industry is highly competitive, capital-intensive, and sensitive to variations in commodity prices (Mbere, 2022). A drop in commodity prices often accompanies periods of economic downturns or global uncertainties, and they need to adopt cost-cutting measures over ESG investments to remain competitive (Maybee, Lilford, and Hitch, 2023). These challenges make it hard for mining companies to allocate more funds for non-core activities like initiatives (Muhirw et al., 2021; Pucker, 2021).

5.6.4 Stakeholders Understanding of ESG Requirements

The participants were asked whether stakeholders understood ESG requirements and how they could be achieved. Some participants indicated that there is some understanding, however the majority of responses indicated that ESG is a complex matter and there is a need to understand a broad spectrum of topics:

“ESG and sustainability are used interchangeably, which of course is very convenient. ESG is a simpler part of a complex ecosystem.” – Respondent 6

“No, absolutely not. The implementation of sustainability is as much about technical solutions as it is internal organizational and change management” – Respondent 2

Previous studies have provided various reasons why many stakeholders, including employees and community members, have a shallow understanding of ESG requirements. These reasons include the complexity of ESG requirements, the communication gap between ESG policymakers and broader stakeholder groups, the need to understand a broad spectrum of topics. To address these problems, Respondent 1 suggested that mining companies in the country should educate “South Africans on what is and why sustainability.” However, this suggestion only addresses one aspect of the problems (Atkins, 2020).

5.6.5 Improvements Needed for Achieving Sustainability Goals

Most respondents emphasized the importance of involving all levels of an organization in sustainability initiatives rather than relying solely on senior management. More specifically, they suggested that apart from business leaders,

employees should also participate in developing and implementing ESG objectives and organizations should have teams solely dedicated to driving Sustainability:

"Internal organizational and change management is key because sustainability projects cannot be pushed top down." – Respondent 2

" The addition and expansion of ESG departments (full teams) within the mining companies. The teams brought on board would also need to be creative in their approach, as much as documentation and reports are required, some of their roles should trickle down to the different levels of employees, to ensure that all stakeholders have sufficient understanding of ESG within their respective companies." – Respondent 13

The participants' statements reflect popular views in the research community. Addressing sustainability challenges, which are known to be complex and multifaceted, requires creative solutions. Studies have shown that engaging employees at all levels has the potential to make them committed to sustainability goals and proffer creative solutions on how to implement sustainability initiatives efficiently (Mbere, 2022). Besides, employees working at the operational level have valuable insights into the ESG challenges and solutions, and their involvement ensures that ESG initiatives are pragmatic and feasible (Steele-Schober, 2021). It's clear from the participants' comments that a holistic and innovative approach is not just a suggestion, but a necessity for achieving sustainability goals.

In addition, the participants indirectly pointed out the issues of limited resources and fragmented regulatory requirements. They advised key stakeholders to provide more financial and human resources, improve ESG requirements, and remove regulatory restrictions to achieve sustainability goals:

"Provision of more resources. This includes people and funding to execute projects..." – Respondent 8

" Reporting of the ESG status needs to be improved so that all relative parties are aware of where they are and where they need to be..." – Respondent 7

Most ESG issues have been documented in the literature to be inextricably linked to finance (i.e., Muhirw et al., 2021). Mining companies need adequate funds to purchase new equipment and tools, hire skilled personnel, and fund community programs, all of which are necessary for supporting ESG projects (Atkins, 2020). The alignment of South Africa's regulatory requirements with UN SDGs can also help mining companies in the country to focus on critical areas and achieve more holistic and impactful ESG results in the long term (Cole and Broadhurst, 2021). Other sustainability improvements suggested in the literature but not mentioned by respondents include the promotion of biodiversity around mining sites, implementation of water-saving technologies, finding ways to repurpose mining waste, full transition to renewable energy, active community engagement, and supply chain transparency (i.e., Atkins, 2020; Mbere, 2022; Muhirw et al., 2021).

6 CONCLUSIONS AND RECOMMENDATIONS

6.1 Introduction

This study critically examines the ESG performance, challenges, and impacts of the top 10 largest mining companies in South Africa. The companies include Anglo-American Platinum, Kumba Iron Ore, Impala Platinum, Gold Fields, Sibanye-Stillwater, Exxaro Resources, Northam Platinum, African Rainbow Minerals (ARM), Royal Bafokeng Platinum, and Harmony Gold. These companies' sustainability/ESG reports published between 2012 and 2022 were assessed, and findings reveal that these mining companies have a robust ESG framework in place to achieve UN SDGs and provide environmental protection, social or community support, governance and ethics, independent auditing, and sustainability development.

6.2 Summary of Chapters

This report has presented six chapters that cover the following:

- Introduction to the research paper
- Literature review
- Research approach
- Data for the study
- Analysis and findings
- Conclusion and Recommendations

6.3 Research Observations

6.3.1 Initial and complimentary studies

This research provides an initial step towards understanding how South Africa's leading mining companies have responded to growing expectations around ESG reporting and performance over the past decade. There remain, however, important areas that warrant deeper exploration. Future studies could examine the growing but inconsistent disclosure of Scope 3 emissions, unpack the reasons behind variations in injury reporting practices, and assess how companies are strengthening the assurance of their ESG data. Building on this work will help

deepen the understanding of sustainability progress in South African mining and contribute to more meaningful comparisons across companies and over time.

6.3.2 Key findings and observations

Since 2018, the top 10 largest mining companies in South Africa have intensified their focus on five key areas of UN SDGs: diversity, equity and inclusion, affordable and clean energy, decent work and economic growth, climate action, life on land, and life on land. This focus shows their commitment to a triple bottom line, ensuring that their mining operations contribute to economic prosperity, social equity, and environmental stewardship. However, there are variations in the reporting standards and formats used by the mining companies. All but Sibanye-Stillwater adopted the GRI standard. Even though all the mining companies provided a detailed, comprehensive analysis of their business performance and ESG material issues impacting their business operations, the presentation of key information in the reports remained inconsistent over the years, making it difficult for investors, researchers, and other stakeholders to track their ESG progress over a long duration.

6.4 Research Contributions

This research contributes to the growing body of work on ESG reporting and performance within the mining sector by providing a focused analysis of South Africa's top 10 mining companies over a full decade. It offers new insights into how reporting practices have evolved, how companies are aligning with international frameworks, and how consistent key performance indicators have become across the industry. In doing so, the study supports a clearer understanding of where progress has been made and where further improvements are needed, providing a useful reference point for both academic research and practical industry benchmarking.

6.5 Research Limitations

While this study provides valuable insights, it also has several limitations. The analysis relied primarily on publicly available company reports, which vary in detail and completeness, particularly in earlier years of the review period. Additionally,

although most companies report on core ESG indicators, variations in definitions and units of measure limit the degree of comparability across certain metrics. Finally, while Scope 1 and Scope 2 GHG emissions were well covered, Scope 3 emissions reporting remains inconsistent and incomplete, reducing the ability to assess full value chain impacts. These limitations suggest opportunities for further research using more granular data and broader stakeholder inputs.

6.6 Recommendations for Future Research Work

To tackle these challenges, this study recommends a holistic approach in which both internal and external stakeholders actively collaborate and participate in developing and managing ESG initiatives. Internal stakeholders should implement ongoing training programs to build ESG-related skills and knowledge across the organization and create cross-functional teams that include members from different departments (HR, operations, finance, and sustainability) to ensure a comprehensive ESG approach. External stakeholders should form strategic partnerships with mining companies, providing these firms with human and financial resources to accelerate ESG projects. Partnerships with external stakeholders can enable mining companies to access additional resources, such as non-governmental organizations (NGOs), investors, governments, and local communities. In addition to this recommendation, this study recommends that future studies examine the relationship between ESG performance and financial outcomes in the South African mining sector, considering factors like cost of capital, stock performance, and profitability. In the future, researchers should investigate the underlying causes for the inconsistencies in ESG reporting among these mining companies and suggest practical ways of improving the quality, consistency, and transparency of ESG disclosures in the mining sector. These recommendations can help scholars and industry professionals to better understand and improve ESG practices within the mining sector.

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