Diversification for sustainable development in coal mining industry: A case of South African coal mining industry.

BY

Theresa Peta

Submitted in fulfilment of the requirements in respect of the Master's

Degree in

Development Studies

in the

Centre for Development Support

in the

Faculty of Economic and Management Science

at the

University of the Free State

Acknowledgement

Special mention goes to Professor Lochner Marais, my dissertation supervisor. Your patience and unwavering support was tremendous and saw me through this programme. Mohlophehi Mngomezulu; your timely coordination of events was instrumental in taking me this far. Ms. Mikateko Hoppener, Ms. Carmen Martinez- Vargas, Mr. Sevious Guviro, Dr. Anton De Witt, Mr. W. Ellis, Ms. Marinda Avenant, Ms. Anita Venter, Mr. Kholisa Rani, Dr. Mari Romijn my lecturers, thank you for taking me through the MDS 2019 programme. Your mentoring skills made learning exciting, thank you. University of Free State librarians- your prompt response to literature requests is unforgettable. MDS 2019 students- what a wonderful class to be in. I enjoyed all group work and group discussions. Your knowledge sharing is commendable and your contributions in group discussions was an integral part in taking me to the final stages of my academic journey. My children Cynthia and Adrian, thank you for your support.

Abstract

The study sought to investigate the diversification strategies that the South African coal mining industry can adopt when planning for its post-mining economy in order to achieve economic, social, and environmental sustainability. Literature has been reviewed on the rationale for mining sustainability, transparency, and diversification for sustainable development and on the benefits of combined reportage and disclosure in the mining industry in South Africa. Previous studies were also examined and they showed that mining decline and closures pose severe challenges to mining firms' sustainability in South Africa. Therefore, when making decisions, mining companies should consider and integrate issues around the economy, society, and the environment to achieve inter-generational equilibrium, which is key to sustainable development. The study employed a research design dependent on secondary data from published mining company reports. The study was confined to four coal mining companies in South Africa. Both qualitative and quantitative approaches were used in data analysis. Findings from the study revealed that whilst some companies made new acquisitions in the same coal mining industry, others expanded their markets into other industries and that form of diversity is imperative. Therefore, recommendations are that coal mining companies use diversity through acquisitions for coal mining and also that companies report environmental effects and resolutions for accountability and transparency.

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CHAPTER 1

INTRODUCTION

1.1 Introduction and background

Then

Coal is said to have been initially discovered in KwaZulu-Natal, Mpumalanga and the Eastern Province between 1838 and 1859 while the mineral's commercial mining started in 1864 in the Eastern Cape. The mining of coal thereafter expanded and has become a huge industry in the 21st century (Mining Technologies *et al*., 2022). The prospects for growth in the industry have always been vast and historically, the energy crisis in 1973 helped to accelerate the coal mining boon. For many years since then, coal has been central to the economy of South Africa as it helps generate power to drive the country's industries and remains one of the country's biggest exports.

Now

The coal mining industry plays a critical role in the growth of the economy of South Africa. The country depends on the coal mining industry for over 92% of its electric power needs and to produce close to 20% of its liquid fuels (Akinlabi *et al*., 2019; Strambo *et al*., 2019). The coal industry also significantly contributes towards the country's Gross Domestic Product (GDP). Over 224 million tonnes of coal are produced every year (Dunmade *et al*., 2019) and in 2017, coal export values amounted to ZAR61 billion or US$4.6 billion (Akinlabi *et al*., 2019). In terms of employment, the coal mining industry employs a significant number of South Africans and plays its part in reducing the unemployment rate in the country. Strambo *et al*.' (2019) study show that the South African mining industry employs close to 82,000 workers. Alone, Eskom, the country's power utility, employs an estimated 50,000 workers in its coal-fired power plants or power stations, accounting for almost 60% of the total workforce within the coal mining industry.

Despite having reserves of coal yet to be mined, which are close to 30 billion tonnes and which can produce energy for South Africa for the next 200 years (Akinlabi *et al*., 2019; Dunmade *et al*., 2019), the South African coal-mining industry still has to grapple with issues of sustainability. Even though the mining industry's reserves can meet the production of

electricity for the next 2 centuries, several operational coal mines are nearing the end of their lifespans (Strambo et al., 2019), and these will be closed soon. What has also been topical is the fact that the coal-mining industry in SA has been associated with environmental degradation and water and air pollution, which are all negatively affecting the profitability of the mines while also negatively impacting the living conditions of the general populace (Akinlabi *et al*., 2019), especially those in close proximity to the mines and to where coal is used. Strambo *et al*. (2019) reported that Eskom (national power utility) and Sasol (a chemical firm operating in SA) are the major contributors to environmental pollution. Eskom and Sasol account for over 50% of SA's greenhouse gas emissions, which causes global warming.

Lately, the notable sequence of changes within both the local and global energy landscape seem to be restructuring the South African coal-mining industry (Marais *et al*., 2018). The energy sectors across the globe are undergoing structural change, and the South African energy sector is not an exception. At the centre of these changes are calls to move from non-renewable energy sources like coal towards renewable and clean energy. This almost entails the imminent decline in both production and usage of coal in SA (Akinlabi *et al*., 2019). These changes make it imperative that the local coal mining industry transform to become better sustainable if it is to survive. Different researchers indicate how different forms of diversification can transform the mining industry, make it more competitive, and extend its life span (Hu, 2017; Le, 2019; Li *et al*., 2017; Marais *et al*., 2017; Pedro *et al*., 2017; Sonesson *et al*., 2016; Spencer *et al*., 2018). Existing evidence shows that top mining firms across the globe that have diversified their operations have become economically, environmentally, and socially sustainable (Voronets *et al*., 2019), something mining firms in SA have to seriously consider as well. Still, there are some who think the end is near and that the local coal industry and the country at large has to plan for a post coal -mining world (Strambo *et al*., 2019).

1.2 Problem statement

The South African coal mining industry has an uncertain future as it is faced with myriad challenges that are interfering with and hampering its sustainability. Several South African coal mines are nearing the end of their life spans; export demand for coal is expected to decline amid growing environmental concerns about the continued use of non-renewable (and 'dirty') energy sources; and there is irrefutable evidence that mining non-renewable energy sources is damaging the environment thus the growing calls for the use of renewable energy, which is clean and environmentally friendly (Akinlabi *et al*., 2019; Dunmade *et al*., 2019; Marais *et al*.,

2017; Strambo *et al*., 2019). This threatens the coal-mining industry and the country's future and this research seeks to explore, through focus on 4 selected mining-companies, how the challenges currently faced can be mitigated by diversification, together with how diversification secures the future of the industry and allows for sustainable development to be achieved. Beyond that, the research will benchmark these strategies with models applied in developed countries for sustainable guidance. The research then helps to guide South Africa' coal mining industry on diversification strategies that promote investing in diverse portfolios in furtherance of sustainable economic growth that does not short change the livelihoods of coal mine workers even when a mine's cycle is coming to the end.

1.3 Aim and objectives

1.3.1 Aim

This research investigates the diversification strategies the industry can adopt when planning for its post-mining economy with a view to achieving economic, social, and environmental sustainability.

1.3.2 Objectives

The dissertation seeks:

i) To make an assessment of the extent to which South Africa's coal mining industry can diversify its operations;
ii) To investigate the diversification strategies implemented in South Africa's coal mining industry in the quest for a sustainable economy;
iii) To assess how diversification in the South African coal mining industry can be used to achieve SDGs; and
iv) To recommend the diversification strategy that promotes the sustainable development of South Africa's coal mining industry.

1.3 Key terms

The following terms are important in this study:

Sustainability: Sustainable mining has been defined as "the reduction of negative environmental, social and governance impacts of mining operations" (Sustainable Mining- Pan

African Resources, 2022). It is centred around the practise of mining companies' stewardship of the environment for future generations while at the same time mining profitably.

Sustainable Development: is an approach to business and in this case to mining, which seeks to meet the goals of human development but managing this while also not compromising the ability of nature and natural systems to keep sustaining the environment and providing for the future. According to the International Institute for Sustainable Development (2022), sustainable development is able to satisfy present needs without any risk for the future generations.

Diversification is defined in this research as:

> a way for mining firms to spread risk, and is seen as a defensive strategy in the current challenging operating environment where companies are seeking to maintain profit margins during what could be a prolonged downturn, brought on by lower metal prices and persistent mining cost inflation (Mills, *et al.* 2022).

Diversification mostly involves focusing on mining more than two or more different minerals so as to spread the risk bought about by the changes of the prices.

1.4 Research methods

The study used secondary data to investigate the diversification strategies implemented in the South African coal industry to achieve sustainable development. The secondary data collected was obtained from mining reports from the relevant mining companies in South Africa. The dependence on these critical company documents was based on the fact that they are information laden and that they follow a best practice reporting format thus are reliable. The reports also have quantitative data which the researcher can depend on to make qualitative pronouncements.

1.4.1 The study area

A rise in the call for the use of renewable energy, which is clean and environmentally friendly, coupled with the steady approach of the coal mines' life span has brought about an uncertain coal mining industry in South African. According to Statistics South Africa (2015), this uncertainty is compounded by the reality that South Africa relies on coal for 77% of its energy. This points to the immense value of coal to the economy of the country, and the problems in

the industry become more pressing when gauged against the value of the industry. There is a clear realisation that the industry has to be remodelled so that it continues to serve the country. At the same time, in line with global gold standards as encapsulated within the SDGs, government has to make sure that that it regulates coal-mining so that it both sustains the country, and does so sustainably. The most appealing solution to this challenge seems to rest on the diversification of coal-mining companies which would then ensure their profitability and sustainability in line with the SDGs as outlined by the government; an area which this study is focusing on.

1.4.2 The research approach and the research design

The research used a case study design. Information was obtained through in-depth contextual analysis of the cases selected for this research.

1.4.2.1 Research approach

The research uses both qualitative and quantitative research approaches.

The study used a qualitative research approach to investigate and analyse the diversification strategies implemented in the South African coal industry with a view to achieving sustainable development. The study also used a quantitative approach to source raw data from the company reports which would then be used to evaluate the extend of companies' diversification approaches. Such data also helps to analyse the value of the company activities with regard to diversification and diversification related issues.

The main approach though is qualitative and is both exploratory and analytical, seeking to, first, understand the varied meanings of individuals or groups assigned to a human or social problem (Creswell, 2014; Rahman, 2017), and second, evaluating these within their environment and paying regard to their differences and specific realities. This involves recording, analysing, and making efforts to reveal the profound nature of human behaviour and experience, including contradictory beliefs, behaviours, and emotions, which allows researchers to gain a rich and complex understanding of people's experiences. The approach is regarded as part of an ideological study; that research of individual cases and events that has the aptitude to offer an understanding of various people's meanings of the world, voices and events (Creswell, 2014). Thus, the source of knowledge within this approach is the meaning

of diverse events which helps to understand diversification efforts by companies, but also how affected communities relate to these efforts.

1.4.2.2 Research design

The study employs a study design by working with the available reports. This involves an in-depth research of specified research problems and is unlike a mere sweeping statistical survey (Heale & Twycross, 2018). The design is mainly employed to narrow down a vast field of study into a single or limited researchable example. The approach has its advantages and disadvantages. The benefits came with giving the researcher a deeper understanding of a complex problem through analysing, at depth, the context of a few or limited numbers of conditions or events and their relationships. It allowed the researcher to employ different methodologies while also depending on a variety of data sources to investigate the diversification strategies implemented in the South African coal industry with the view to properly guide sustainable development. The design can also add strength or extend the experience within the studied area to what already exists and is known about the diversification strategies implemented in the South African coal industry (Creswell, 2014). The drawback is in the limited nature of depending on these company reports; the fact that they are the only source of data is a challenge considering the possibility that they can be compromised. There is little doubt in this regard that working with diverse sources would have added huge value to the study. The research was conducted during the COVID- 19 period when travel and socialisation was limited and this made it difficult for the researcher to travel and to seek other information on the ground, thus this reliance on what the mining companies availed for public consumption. To mitigate this, the company reports are used together with other literature for the sake of broader and rational assessment of companies and their activities.

1.4.3 Data collection methods

The researcher used secondary data from the published company reports of the four selected coal-mining companies in South Africa. The researcher was thus not involved in the actual data collection, choosing instead to depend on these company reports to extract information thjat is relevant to the research.

1.4.4 Data analysis

The researcher used both qualitative and quantitative data analysis, with qualitative being primal through thematic analysis. Braun and Clarke (2006) define thematic analysis as involving a search for data across availed data sets with a view to identifying, analysing, and reporting on repeated patterns. The analysis was subsequently divided into the following themes; new acquisitions, disclosure of environmental impacts, disclosure of mine closure, and the future of coal mining. Data was also quantified with respect to the number of new accusations and complaints received with regard to environmental effects of the mining activities, disclosure of mine closure, and also the time that was lost through injuries.

1.5 Research ethics

Research ethics refer to the use of rules of 'decency' together with professional codes of conduct that must be followed when gathering, examining, reporting, and publishing research information. The critical ethical issues mainly relate to the active recognition of a participant's right to confidentiality, privacy, and informed consent (Thakur & Lahiry, 2019). In other words, research ethics provide a guideline for the responsible conduct of a research (Bryman, 2012). For instance, University of St Andrews (2022) states that access to secondary data must always comply with what the data source wants. In addition, ethics demand that confidentiality of some information and some information sources must be respected at all times. Furthermore, the data must be accredited and have proper references. In this research, l used secondary data ethically and professionally as seen through citing and referencing sources properly and keeping the confidentiality of some of my informants whose input helped in thematic analysis. The analysed data and reported results in the research are also used without harming any stakeholder. They are used fairly and professionally. In addition to that, the study conforms to the degree-awarding University's code of ethics and its guidelines on ethical research.

1.6 Limitations

The researcher anticipated several limitations or challenges during the course of carrying out this research. One of the challenges was that of obtaining the secondary data relevant to the study against the fact that the researcher lives in Zimbabwe whilst the study was focusing on South African mining firms. The period of study also coincided with restrictions imposed to curtail the spread of COVID- 19 and this made movement research doubly difficult. The researcher resorted to Zoom meetings and e-mail communication to mitigate the challenge.

Further, from a technical perspective relating to the research design itself, there was likely to be information gaps resulting from the researcher's reliance on secondary data only. There are sometimes challenges with secondary data as it sometimes fails to match what the researcher seeks to do since that data would have been published for other reasons. To try and get around some of the challenges, the researcher had to continually consult the supervisor to get guidance on how to use the information obtained from the reports. This constant communication with the supervisor helped to successfully expedite the research. The use of the library in accessing published journal articles and other relevant literature to widen the research also helped researcher.

1.7 Study outline

Chapter 1: Introduction of the research sets the foundation through the background, statement of the problem, justification and it sets out the aim and study objectives which guide the research.

Chapter 2: Literature review on mining and sustainability, mining and transparency, and the South African mining industry. It also focused on literature on diversification and diversification for sustainable development, integrated reporting, and disclosure requirements within companies in South Africa together with the benefits of integrated reporting to the South African mining industry.

Chapter 3: Analysis of sustainable development within South Africa' coal mining companies assesses four coal mining companies in the Republic of South Africa's coal mining industry. The focus is on analysing how the coal mines envisage sustainable development by diversifying their mining processes.

Chapter 4: Findings, conclusion and recommendations focuses on the main findings and recommendations of the study. Findings will be reported in line with the objectives of this study and recommendations will be made for the mining companies and for future research.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

For many years, coal has been central to sustaining the economy of South Africa as it is used to generate the country's energy and some of it is exported. The coal industry plays a critical part in the economic growth and development of the country. On the other hand, coal mining has been associated with environmental degradation and water and air pollution, which are all negatively affecting the living conditions of the general populace (Akinlabi *et al*., 2019). This indicates the need to transform the local industry into a safe and sustainable practice. Most energy sectors across the globe are undergoing structural change to be able to be clean and profitable, and the same is happening in South Africa. This chapter reviews critical extant literature pertaining to the mining industry and related issues of sustainability, diversification, and transparency. The chapter also reviews the literature concerning integrated reporting and disclosure requirements within identified companies and the benefits of integrated reporting to the South African mining industry.

2.2 Mining and sustainability

Sustainability is a wide-ranging concept with many definitions. According to Klarin (2018: 69), the term sustainability refers to "a capacity to maintain some entity, outcome, or process over time and carrying out activities that do not exhaust the resources on which that capacity depends on". From this perspective, sustainability is a practice where a firm's production process is maintained for an indefinite period by replacing resources used with resources that are equal or more to the value of those used, without endangering or damaging the environment. Sustainability here means improving and sustaining a well-balanced economic, environmental, and social system; one which is conducive to human development. This concurrent pursuit of economic, social, and environmental sustainability is of huge strategic importance for firms across different sectors and geographical regions (Bini *et al*., 2017). The key factors compelling firms to incorporate sustainability into their business models and activities include the limited availability of resources, the ever-changing business environment, the importance of a company's social responsibilities, and the broader range of stakeholders engaging in debate over the industry and over sustainability in the industry.

Within South Africa's mining industry, there has been a commitment to rehabilitate the environment after mining activities have been carried out. Plantations have been put in place as a way to reclaim the environment. Also, the mining firms have shown that they are committed to sustainability by actively working to reduce the amount of water they have been using in their activities.

Regardless of these efforts, several factors are still hindering the sustainability of mining in the country. Coal mining contributes carbon dioxide emissions, water pollution through methane, land degradation, and health problems to people, especially those who live around coal mining towns and the employees who work in the mines (Akinlabi *et al*., 2019; Dunmade *et al*., 2019; Strambo *et al*., 2019). The coal-fired plants owned by Eskom and Sasol, a chemical manufacturing company, account for over 50% of South Africa's emissions of greenhouse gas (Akinlabi *et al*., 2019).

In South Africa, coal mining is also responsible for soil and land destruction. Coal is a fossil-fuel that is extracted through surface mine operations or strip mining and through underground mining's room-and-pillar support procedure. The strip coal extraction method destroys the country's landscape and the destruction then lowers the global value of the local natural environment (Akinlabi *et al*., 2019). The room-and-pillar support method employed for underground mining results in vast quantities of earth's waste and rocks being brought to the external land. When such waste mixes with external water and air, it produces substances which are toxic (Pedro *et al*., 2017; Wang *et al*., 2020). Consequently, this coal mining method pollutes and reduces the quality of the country's water, land and air. The method promotes overall land degradation and leads to severe damages to buildings (Akinlabi *et al*., 2019).

Another factor threatening mining sustainability in South Africa relates to mine decline and closure. Mine decline and closure severely impact on the economy as they directly result in unemployment (Strambo *et al*., 2019). Unemployment has adverse effects on people's social life as it leads to reduced incomes, consumption, and quality of lifestyle. Poverty levels will increase and this contradicts the Sustainable Development Goals (SDGs), notably SDG number 1 (No Poverty) (Robra & Heikkurinen, 2019). The above evidence relating to mine decline and closure and lack of proper diversification shows that coal mining in South Africa is not economically, socially, and environmentally sustainable. Coal-mining lacks these qualities which are key to sustainable development. For sustainability to be achieved, the coal mining companies should integrate social, environmental, and economic issues in their operations to

achieve inter-generational equilibrium, which is the key to sustainable development (Akinlabi *et al*., 2019; Mensah & Casadevall, 2019).

2.3 Mining and transparency

The need for transparency has been increasing within coal mining since the 1980s, mainly due to the global challenge of the closure of mines and mines coming to the end of their life cycles (Crous *et al*., 2020). Corporate reporting for long has been mainly concentrated on the financial aspects of the mining industry to the exclusion of issues around sustainability. Public accountability started in the late 1980s when the need for mining firms to report social and environmental issues became imperative. Alonso-Almeida *et al*. (2014) report that the increasing call for public accountability resulted in the introduction of behavioural codes and suggestions for transforming the operations and reporting mechanisms for large industrial sectors. Resultantly, firms started to support environmental and social factors in their business activities and reported the same in what is now termed social and environmental reports (Crous *et al*., 2020: 1). The main emphasis of sustainability reports is to reveal both the social and environmental factors for sustainability purposes (de Villiers *et al*., 2014). To make sure that there was consistency in sustainability reporting, institutional guidance emerged and the Global Reporting Initiative (GRI) was established in 1998 through the support of the United Nations Environment Program (UNEP) with the mission to help make companies both responsible and transparent in dealing with how they impact the environment and the people (Crous *et al*., 2020).

The study by Haufler (2010) indicates that the global promotion of transparency within the mining sector acts as a possible solution to weak governance, mainly in resource-rich developing states. The mining activities create substantial societal issues with respect to how they affect the environment and the health and safety of workers (Coetzee & van Staden, 2011). Haufler (2010) notes that if the mining firms disclose publicly the payments they make to the governments, then citizens will be capable of holding governments and the mining firms accountable for their impact on society and the environment. Both the disclosure and accountability will significantly improve natural resources management, lower corruption, and mitigate conflicts (Haufler, 2010: 53; Owen *et al*., 2020). These practices will facilitate sustainable development within the mining sector.

The need for greater transparency by mining firms is firmly rooted in liberal thinking (Crous *et al*., 2020: 2). Mine accidents, closures, and mining decline have been the central motivation for public disclosure requirements for mining firms. Put differently, the disclosure and transparency regulations were a response by governments to mine accidents, mine closures, and mining decline. Under these regulations, mine firms must publicly reveal their mining processes, activities, and the risks associated with these to enable the public to hold the government and the mining firms accountable (Jenkins & Yakovleva, 2006; Coetzee & van Staden, 2011). Thus, increased disclosure and transparency contribute substantially to behaviour change among mining firms and governments and creates a more comprehensive social benefit net since social and environmental issues will then be properly addressed (Owen *et al*., 2020).

Transparency, especially in the mining sector, has become a 'new global norm' (Haufler, 2010: 53) and is driven by concerns around safety and risks to the environment and the urgent need to handle issues of corruption, improve the management of natural resources, and mitigate conflicts among companies' stakeholders (Coetzee & van Staden, 2011; Haufler, 2010; Owen *et al*. 2020). Haufler (2010: 53) indicates that the Extractive Industries Transparency Initiative (EITI), which was a unilateral foreign policy effort by the United Kingdom (UK) under Tony Blair in 2002, has turned into a global program advocating for transparency. EITI is now a global template and there is a worldwide push towards the transparency of mining companies. Haufler (2010: 53) maintains that increased disclosure implies improved transparency, resulting in increased accountability, a key factor of sustainability development.

Disclosure and transparency are not a silver bullet though for addressing mine decline and closure challenges (Crous *et al*., 2020: 2). The authors insist the provision of information and then making decisions on the sole basis of this information is not as automatic as what transparency norms assume. Evidence concerning the success of disclosure requirements is mixed. For instance, Baraibar-Diez *et al.* (2016) show that the reason there are mixed findings concerning the success of disclosure regulations is the inability of decision-makers and societies to understand the complex cause and effect associations. While the cause and effect associations are a 'chain of steps' that can enhance transparency, several factors inhibit users from using the disclosed information. The lack of action associated with using the information or the lack of full disclosure can break this chain of steps (Crous *et al*., 2020: 2).

Transparency mechanisms depend on the degree of user embeddedness (Weil *et al*., 2006). The response by users to the disclosed information is not always apparent since several hindrances occur within the transparency action cycle. Crous *et al*. (2020) indicate that people might not use the disclosed information simply because what is revealed might not be relevant. Besides, Garcia-Torea *et al*. (2020) believe that communication modalities can affect the those who intend to use the information as they might not fully comprehend the reported information. Haufler (2010) talks of systematic aspects that can hurt the chain of steps. Owing to information asymmetry, there are high chances that mining firms can suppress information instead of disclosing it. Disclosure of too much information can also result in information overload and users might not be able to distinguish valuable information from mass and distractive reporting by mining companies.

2.4 The coal-mining industry in South African

The coal mining industry in the country is critical. Strambo *et al*. (2019) indicate that the industry accounts for 92% of South Africa' electricity and nearly 20% of the country' liquid fuels. Akinlabi *et al*. (2019) show that the South African coal mining industry generates over 77% of all primary energy. Eskom, South Africa's public utility, accounts for 90% of the country's electricity production and will see this rising after its new coal-fired plants at Kusile and Medupi are commissioned (Akinlabi *et al*., 2019). The country thus depends on coal for energy more than it does from any other sources. Apart from electricity generation and other liquid fuel production, coal is also SA's largest export. In 2017, coal export value amounted to ZAR61 billion or US$4.6 billion (Strambo *et al*., 2019). Thus, coal mining contributes significantly to the GDP of South Africa.

The country has vast deposits of fossil-fuel coal. South Africa' coal industry produces over 224 million tonnes of coal per year (Dunmade *et al*., 2019; Akinlabi *et al*., 2019). The country has about 30 billion tonnes of coal in reserves, evidence that the country is in a position to meet the energy output needs of its future generations for 200 years to come without necessarily reducing its energy generation output or discovering other coal deposits within the country. Sustainable and diversified mining would increase the lifespan of these reserves and make energy cleaner and more efficient.

Strambo *et al.* (2019) note that the country's coal mining industry employs close to 82,000 employees. Eskom alone employs approximately 50,000 workers in its coal-fired power plants

or stations. The coal mining industry is a significant employer in the country and helps reduce the unemployment rate in South Africa.

The coal industry is facing severe challenges, which have resulted in calls being made for the energy sector to produce clean energy. Strambo *et al*. (2019) reported that Eskom and Sasol are significant contributors to environmental pollution. The two account for over 50% of SA's greenhouse gas emissions through their supply and use of 85% of coal used in the local markets. Dunmade *et al*. (2019) mention that coal exploration poses detrimental effects on the South African environment. Coal extraction and electricity generation from fossil-fuel coal contaminate and pollute the environment, resulting in unsafe underground water due to air pollution and acid mine water. Furthermore, coal mining disturbs the natural ecosystem and all this negatively affects the locals who live close to the mines and power stations, together with those employed in the mines and power stations (Akinlabi *et al*., 2019).

The notable structural changes in the global and local energy landscape will have social, environmental, and economic impacts. In this context, Strambo *et al*. (2019) discuss the implications of the closure of coal mines. Strambo *et al*. (2019) further discussed how best the country could manage a transition to minimise the economic, social, and environmental disruptions associated with changes in the energy landscape and identify new opportunities that might come with such changes. Numerous coal mines are nearing the end of their operating timeframe and are becoming very costly to operate and maintain (Strambo *et al*., 2019). The need to have clean energy insinuates that closed coal mines will be gradually replaced by renewable energy sources which are more cost-effective, competitive, and sustainable (Kumar & Majid, 2020).

2.5 Diversification

The increasing rate of depletion of natural resources entails that there will be no raw resources for production in the future. As a result, it might be impossible for future generations to meet and satisfy their needs and wants. To safeguard the available resources and ensure their availability to future generations, firms must diversify their business lines. According to Le (2019: 93), diversification involves increasing the "market heterogeneity of enterprise products", while to Li *et al*. (2017: 3), it is "the growth of the final product categories, the enhancement of vertical integration, and the increase of industry covered by the products categories made by the enterprise". Diversification also refers to entrenching and growing an

already established business entity (Scur & de Queiroz, 2017: 207). Voronets *et al*. (2019) view diversification as a business growth strategy in which a company or business entity explores new business areas that promise to offer improved or increased profitability.

Diversification of the products in a particular business organisation' manufacturers is critical to advance complete diversification (Li *et al*., 2017) and this is proof that the diversification of business is regarded as an operation of different products or businesses. Thus, a diversified business is a business that covers various industries from an industrial perspective or it can be seen as a business that operates multiple markets from a marketing point of view. The definition of diversification depends on how those concerned define business, product, market, and industry (Li *et al*., 2017). Whichever perspective, diversification invariably results in physical and organisational changes within a business entity's structure, representing a distinct break with past business experience (Voronets *et al*., 2019).

Strambo *et al*. (2019) indicate that the demand for South African coal in Europe has fallen drastically since European states decarbonised their energy systems. The Pacific market currently stands as the critical coal export market for South Africa. However, India is also scaling down its coal energy production and use and is promoting clean, renewable, and sustainable energy (Barbara & Sluder, 2019). Thus, export demand for South Africa's coal in this market is now also uncertain and there are suggestions s that the exports of South Africa's coal, particularly to India, will decline within a short period, further impacting the coal mining industry. Mine decline and closures also pose severe threats to the sustainability of the mining industry and Voronets *et al*. (2019) indicate that mine decline and closures threaten mining firms' sustainability. These challenges can be addressed by diversifying the operations of mining companies. The growing demand from stakeholders and investors (which is crucial to diversification) is for mining firms to shift their focus from traditional mining towards improving operations to engineer superior results. The improvement in operations involves dealing decisively with "emissions, investing in differentiating technology and digitalisation, engaging more proactively with consumers and building brand" (Voronets *et al*., 2019: 2). Diversification seems to be the strategy that serves the South Africa coal mining industry best in its efforts to become sustainable.

2.6 Diversification for sustainable development: The coal-mining industry in South Africa

Closing coal mines comes with challenges related to sustainability (Akinlabi *et al*., 2019). Since 1980, an upsurge in coal mining decline and closure has been visible, with almost 36% of South Africa' coal mines closing whilst others are nearing the end of their lifespan (Strambo *et al*., 2019). These realities foretell the sustainability challenges of mining firms in the country. The key factors contributing to coal mine decline include resource diminution, loss of economic competitiveness, environmental apprehensions, unfavourable labour conditions, and organisation mismanagement. Calls have been made for South Africa's coal mining industry to make plans for the time when coal mining faces challenges and this is achieved by diversifying the economy (Barbara & Sluder, 2019). With this scenario in mind, during the planning phase and initiation of projects, coal mining firms must refrain from planning for the mining cycle while overlooking the close of the project. Overlooking this crucial aspect is bad for a sustainable development agenda that advocates for economic diversification as a buffer to curtail economic stress after mining cycles end (Voronets *et al*., 2019).

Diversification uses a more diverse portfolio and thus provides a backbone to fall back on during the mine's collapse. It also cushions the local community by giving them a source of livelihood post mine closure (Strambo *et al*., 2019). However, the ability to do so strongly depends on whether the industry's product will still be in demand and whether the resources will still be available. Owing to uncertainties that industries face nowadays and the need for sustainable production, it appears that specialisation is not the way to go. In this regard, industries need to diversify their operations. They have numerous end products that will enable economies to end poverty, improve access to food, health, clean water, equality, decent work and economic growth- factors vital for sustainable development. Thus, diversification will aid industries to be sustainable and economies to achieve SDGs.

Responses to mine downscaling or closure, especially in South Africa, have mostly been focusing on the environment. Very little response is given to the affected communities and those who need socio-economic rehabilitation (Marais *et al.,* 2017). Since there was an inadequate response to ex-mine workers' socio-economic welfare, there has been massive migration from closed mines towards other cities. This entailed a breakdown in the family set-up, reduced ex-workers' living conditions, increased prostitution and drug abuse cases as the affected try to cope with social distress. Strambo *et al*. (2019) believe that diversification can

help mining companies mitigate the economic, social, and environmental effects of mining decline. Thus, diversification of mining portfolios and strategic partnerships can result in sustainable development within the mining sector.

Owing to the benefits linked to sustainable development that mining companies enjoy through diversification, Voronets *et al*. (2019) state that the number of diversified mining companies stood at 8 in 2017. BHP Billion, Rio Tinto, and Glencore occupied the top three on the list of big corporations that diversified their operations. The number of mining firms that have since diversified their operations has increased to 13 by the beginning of 2019 (Voronets *et al*., 2019). Researchers who have explored worldwide movements within the mining sector state that diversified mines are more efficient in their main activities than mining industries that focus on a single type of mineral. Such industries are said to be sustainable and diversification can, in this case, be regarded as a pivotal and productive approach to mining in a free economy.

The number of diversified firms across the globe is increasing. Few coal mines in South Africa have diversified though. This is unfortunate, coming at a time when the country is recording a decline in the local and international demand for coal and the closure of coal mines, and with many coal mines also nearing their lifetime (Akinlabi *et al*., 2019; Strambo *et al*., 2019). Barbara & Sluder (2019), Dunmade *et al*. (2019), Le (2019), and Li *et al*. (2017) concur that diversification allows industries to spearhead sustainable development by giving them an opportunity to explore how best they can address the impact of their activities. This research was ignited by the lack of diversification by the local coal mines, the untoward impact of coal mining on society, the environment, and sustainable development. Given that diversification is a strategy that allows mining firms to become economically, socially, and environmentally sustainable and makes it possible for countries to achieve SDGs, this research explores how diversification can be operationalised to bring sustainable development within the coal mining industry in South Africa.

2.7 Integrated reporting and disclosure requirements within South African companies

There has been a dramatic shift over the past five years in developing integrated reporting globally (Atkins *et al*., 2015; du Toit *et al*., 2017). To Stent & Dowler (2015), integrated reporting is concerned with integrated thinking and improving stewardship and accountability. It aims to unveil information concerning a firm's strategy, corporate governance, and financial performance (du Toit *et al*., 2017) which then reveals a company's financial, social, and

environmental position. Therefore, the purpose of integrated reporting is to comprehensively reveal a company' long-term value creation approaches. Globally, integrated reporting has been successful. Authors like Atkins & Maroun (2015) believe that it will take a long time before integrated reporting is wholly established and accepted despite that it is the best way to show a company's aptitude to create long-term value for its investors and stakeholders.

Integrated reporting is crucial considering that additional information concerning all of the firm' activities and investments can offer important information on the value of a firm's intangible assets considering that the market value of several firms surpasses their book value by a significant margin (du Toit *et al*., 2017; Serafeim, 2015). In this regard, integrated reporting offers investors and different stakeholders, precisely decision-makers like prospective customers and potential employees, with information regarding its precise strategies, long-term prospects, and vision (Serafeim, 2015). According to du Toit *et al*. (2017), there is a growing tendency by businesses to divide environmental and social data and financial information into separate reports. Due to the need to meet the different business stakeholders' increasing expectations, firms report on varied issues, thereby making reporting a complex issue. Resultantly, there have been several initiatives try to integrate the environmental and social reports with the financial (Ighian, 2015).

Several firms released these integrated reports before the integrated framework was brough in. South Africa is seen as a pioneer in formalised reporting due to its crucial role in spearheading integrated reporting (Iredele & Moloi, 2020). du Toit *et al*. (2017) states that all the 400 Johannesburg Stock Exchange (JSE) listed companies in South Africa were expected to prepare an integrated report effective March 2010. The companies had two choices- to comply or explain. Authors like Corvino *et al*. (2020) maintain that the reason for the integrated reporting is to improve shareholders' understanding of the company and create value both in the short-term and long-term.

Firms nowadays have a moral requirement to report their activities, especially with the increase in how their activities impact societies and the economy (Iredele & Moloi, 2020). Authors such as Corvino *et al*. (2020), Ighian (2015), and Iredele & Moloi (2020) concur that with an increase in size and how its activities impact society, a company' moral responsibilities tend to increase as well. This is termed corporate social responsibility (CSR) (Ighian, 2015). Extant literature on integrated reporting shows that firms need to disclose both the negative and positive aspects

concerning the impact of their activities. The firm must also report on how they enhance and minimise the impact of their activities in communities.

2.8 The benefits of integrated reporting in South Africa's mining industry

Integrated reporting plays a crucial role in South African' coal mining industry. Melloni *et al*. (2017) indicate that integrated reporting enhances shareholders' and other stakeholders' understanding of a company (or a coal mining company in our case) and how it creates value both in the short and long term. Integrated reporting and sustainability are closely linked. Corvino *et al*. (2020) and Lee & Yeo (2016) agree that integrated reporting can represent how a business creates and sustains value. This indicates that within the mining industry in South Africa, integrated reporting will bring economic, environmental, and social aspects together, especially in response to mine closures and downscaling. This enhances transparency within the mining industry and allows mining firms to meet or align their activities to environmental goals, in the process facilitating or promoting sustainable development within the industry.

Integrated reporting makes it possible for South African coal companies to align their investor needs to the information they report on (Burton *et al*., 2018), make more non-financial information available, decide on the best way to allocate firm resources, and enhance the management of risk (Doni *et al*., 2016). Coal mines will be able to identify better opportunities that come their way, increase how they engage with investors and stakeholders, including the current and potential workers, in the process increasing the attraction and retention of skills within the coal firms. Integrated reporting can also see South African coal mines lower the cost of and access to capital due to economic, social, and environmental disclosure. South African coal firms can improve their transparency and align their activities to the needs of investors.

The literature on integrated reporting shows that for firms to flourish in a competitive environment, their decision-making must align with both the local community' and the environment' interests. (du Toit *et al*., 2017). As investors and shareholders in the mining industry now demand, mining firms must complement non-financial with financial reporting. Because of integrated reporting, the industry can now attract investors since it is now seen as socially and environmentally responsible.

2.9 Conclusion

Coal is the heart of South Africa' economy and it is associated with environmental degradation and water and air pollution, which are all negatively affecting the living conditions of the general populace. There is urgent need to transform and make the coal-mining industry in South Africa sustainable.

Extant literature shows that mining decline and closures pose severe challenges to mining firms' sustainability in South Africa. The mining companies should consider and integrate economic, social, and environmental issues in the decision-making process to achieve inter-generational equilibrium, which is key to sustainable development. The increasing call for mining firms to be transparent has resulted in sustainability reporting. While mining firms are disclosing their economic, social, and environmental activities, it is not clear whether users of the disclosed sustainability information get the necessary information to make informed decisions and are also able to understand the disclosed information.

Again, diversification has been seen as a cushion to the local community by providing a source of livelihood post mine closure. However, the ability to do so strongly depends on whether the industry's product will still be in demand and that those resources will still be available. Owing to uncertainties that industries face nowadays and the need for sustainable productions, it appears that specialisation is not the way to go. In this regard, industries need to diversify their operations.

CHAPTER 3

ANALYSIS OF SUSTAINABLE DEVELOPMENT WITHIN SOUTH AFRICA' COAL MINING COMPANIES

3.1 Introduction

Chapter 2 reviewed literature on sustainability, transparency, and diversification of coal mining activities in South Africa. The literature showed that mining decline and closures pose severe challenges to mining firms' sustainability in South Africa. It also showed that there are uncertainties that industries face nowadays and thus the need for sustainable production. The literature concluded that specialisation is not the way to go. In this regard, industries need to diversify their operations.

In this chapter, an analysis of four coal mining companies was carried out and the focus was on sustainability, diversification and transparency in their operations.

3.2 Sustainable development within South African coal mining companies

The mining sector is facing severe challenges in its efforts to diversify and meet sustainable development goals. This chapter assesses four coal mining companies in South Africa who are in coal mining. The study's focus is on analysing the coal mines' vision relating to sustainable development and how diversification of mining operations and processes aids their movement towards sustainability. The specific companies under study are:

- Buffalo Coal Corp
- Exxaro Resources Limited
- Glencore
- MC Mining Limited

3.3 Buffalo Coal Corp

3.3.1 Overview

Buffalo Coal Corp (BC Corp) is a firm that mines and supplies coal. The company is incorporated in Ontario, Canada and has coal operations in South Africa (Buffalo Coal Corp Consolidated Financial Statements, 2020). The company's shares were primarily listed on the

Toronto Stock Exchange (TSX) before being delisted in December 2015 and the company started trading on the TSX Venture Exchange (TSXV) (Buffalo Coal Corp Consolidated Financial Statements, 2015). BC Corp was also delisted from the Main Board of the JSE Limited (JSE) in 2015 and started trading on the Alternative Exchange ("AltX"), operated by JSE (Buffalo Coal Corp Consolidated Financial Statements, 2015). The BC Corp Management's Discussion and Analysis Report (2020: 2) shows that BC Corp wholly owns South Africa's Buffalo Coal Dundee Priority Limited (BC Dundee) with interests in two local coal mines.

The BC Dundee Properties comprise the Aviemore anthracite mine (Aviemore), the Magdalena bituminous mine (Magdalena), the Balgray anthracite project (Balgray) and the Aviemore North Adit anthracite project (North Adit) (BC Corp Management's Discussion and Analysis Report, 2020). BC Corp produces coal from two mines, Magdalena and Aviemore, with substantial coal resources in Kwa Zulu Natal, South Africa (http://www.buffalocoal.co.za). The Magdalena mine encompasses approximately 1,844 hectares, whilst Aviemore covers 5,592 hectares (BC Corp Management's Discussion and Analysis Report, 2015). The Balgray project is an expansion to the existing Aviemore reserve situated on the Mining Rights MR 301 and MR 10083 and coal mining at this project is expected to start in 2022 (http://www.buffalocoal.co.za). The North Adit project is an additional expansion project on MR301 and MR10083 at the Aviemore mine and is expected to be commissioned approximately four years after coal mining at Balgray has commenced (http://www.buffalocoal.co.za).

BC Corp has extensive coal reserves. According to the BC Corp Management's Discussion and Analysis Report, 2020: 3), Aviemore has, *in situ*, some 35.35 million tonnes of coal. BC Corp extracted a total of 3.7 million tonnes of Run-of-mine (ROM) from the Aviemore mine between October 2012 and December 2020. From January 2021, the Aviemore mine had 780,841 ROM tonnes in reserves which the company could mine in two years (BC Corp Management's Discussion and Analysis Report, 2020). The Magdalena mine had, in situ, approximately 50.29 million tonnes of as of October 1, 2012. 5.9 million ROM was extracted from the mine between October 2012 and October 2018 (BC Corp Management's Discussion and Analysis Report, 2020: 3). However, the company did not provide the total coal reserves for the Magdalena mine in December 2020. BC Corp strongly relies on revenue that the

company collects from the sale of coal. Table 3.1 below presents the coal revenue for BC Corp from 2015 to 2020.

Table 3.1: Coal Revenue for BC Corp

	Years					
	2015	**2016**	**2017**	**2018**	**2019**	**2020**
Coal Revenue (R million)	631.0	660.6	738.1	758.5	399.0	321.3

The table shows that coal revenue for BC Corp rose from R631.0 million in 2015 to R758.5 million by the end of 2018. The high coal revenues for 2017 and 2018 resulted from stable demand for bituminous and anthracite coal (BC Corp Management's Discussion and Analysis Report, 2017; 2018). The BC Corp Management's Discussion and Analysis Report (2018: 10) shows that BC Corp slowed down production of bitumen products from November 2018 and, by December of the same year, had exhausted its bitumen stocks. BC Corp supplied anthracite coal to export and domestic markets after having ceased production of its bituminous products in November 2018 (BC Corp Management's Discussion and Analysis Report, 2019: 4). This explains why the company recorded low coal revenues in 2019 and 2020.

In addition to ceasing production of bituminous coal at the Magdalena mine, BC Corp also had reduced demand from Brazil, which has traditionally been its major export market for its anthracite products (BC Corp Management's Discussion and Analysis Report, 2019). Like everyone else, BC Corp was impacted by the spread of COVID-19 and this and other factors contributed to the low coal revenue the company realised in FY2019 and FY2020 (BC Corp Management's Discussion and Analysis Report, 2020).

3.3.2 New acquisitions

BC Corp's vision in the long-term revolves around the construction of a 'gold standard' bitumen and metallurgy coal mining and supply company. A BC Corp Management's Discussion and Analysis Report (2015: 14) highlights that future growth will more than double through expansion and optimisation of current operations and also through envisioned acquisitions within the Southern African region". BC Corp did not make any new acquisitions

between 2015 and 2020. However, the coal firm made significant expansions to its Aviemore mine requiring huge capital investments. Owing to the depleted coal reserves at the Aviemore mine, BC Corp made medium and long-term expansions to this mine to prolong mine life. According to the BC Corp Management's Discussion and Analysis Report (2020), the Balgray project is a medium-term opportunity for BC Corp to provide access to sufficient Aviemore resources. The Balgray project is expected to extend the life of the Aviemore mine by approximately 6-7 years. The project requires approximately R120 million in capital for the Balgray Adit refurbishment and the requisite mining infrastructure. Thus, the Balgray project will ensure that BC Corp will continue mining anthracite coal at the Aviemore mine beyond 2022 when the coal reserves of this mine are expected to be exhausted.

BC Corp is also expanding the Aviemore mine through the North Adit project, whose pre-feasibility study was completed in 2017, with a bankable feasibility study completed in September 2018 (BC Corp Management's Discussion and Analysis Report, 2020). The North Adit project needs, on average, R335 million and its construction and commissioning will take up to 18 months and it is hoped this will extend the life of the Aviemore mine by 13-15 years.

3.3.3 Disclosure of environmental impacts

BC Corp is aware that its coal mining negatively impacts the environment. A BC Corp Management's Discussion and Analysis Report (2017: 18) statement reveals that the company is guided by its understanding relationship with the environment which it seeks to preserve and use responsibly with the future in mind. Resultantly, BC Corp seeks to keep the environment and make it better that it was when it commenced working on it. It is driven by, among other things, complying with legal and related environmental requirements, having proper environmental management plans., and adhering by requirements on water use licenses, and managing all environmental aspects. Besides, BC Corp also has its own units to manage the environment concerns, focusing on ISO 14001 and 9001 elements and ensuring the company keeps improving in its compliance.

While BC Corp works towards environmentally friendly and sustainable mining, it has failed to disclose the environmental impacts of its coal production in its annual reports. Instead, BC Corp discloses occupational fatalities resulting from coal mining. Table 3.2 below shows the lost time injuries (LTIs) BC Corp reported in its areas of operation between 2015 and 2020.

Table 3.2: Lost time injuries disclosed by BC Corp between 2015 and 2020

Area of operation	Lost Time Injuries					
	2015	**2016**	**2017**	**2018**	**2019**	**2020**
Magdalena	3	7	2	1	1	0
Aviemore	1	3	2	1	1	0
Coalfields	---	---	2	0	0	1
Total	**4**	**10**	**6**	**2**	**2**	**1**

In April 2017, BC Corp disclosed that a fatal accident took place at the Magdalena mine, resulting in one of its workers dying (BC Corp Management's Discussion and Analysis Report, 2017: 18). The report states though that the company applied to have the accident excluded from its fatal accident list on the basis that a post-mortem on the deceased suggested some other causes of death which were not related to initial work-place injuries.

3.3.4 Disclosure of mine closure

BC Corp discloses information about mine closure. The BC Corp Management's Discussion and Analysis Report (2015) disclosed that the Magdalena opencast mine had come to the end of its cycle in March 2015. On realising that production to date was declining, and that the high anticipated increase in ROM mining fee that the STA intended on charging would impact profits and cash-flow generation of operations, the company elected to close the Magdalena mine in the last quarter of 2018 BC Corp Management's Discussion and Analysis Report (2018: 3). The company disclosed that when Magdalena underground mining activities ceased, the company retrenched 125 employees and retained 27 to strip equipment and underground infrastructure; either to dispose or move to other operations. The retained workers were retrenched in February 2019 (BC Corp Management's Discussion and Analysis Report, 2018).

BC Corp also disclosed that the Magdalena underground mine was then placed on care and maintenance. In their report in 2018, management also disclosed that the company had two processing plants at Magdalena mine and Coalfields, BC Dundee's head office (The BC Corp

Management's Discussion and Analysis Report, 2018). After the BC Corp ceased underground mining activities at the Magdalena mine, the company disclosed that it put its processing plant on care and maintenance. The BC Corp Management's Discussion and Analysis Report (2019: 6) also disclosed that after mining was stopped at Magdalena, the place was placed under care and maintenance to further minimise losses incurred by BC Corp.

3.3.5 The future of coal mining

BC Corp believes that there is a future in the coal mining business. This is highlighted in its long-term vision, where BC Corp envisions building quality bitumen and metallurgy coal mining and supply operations. Management highlights that future growth in production will be achieved through expanding and optimising current BC Dundee operations, and second, through Southern Africa acquisitions (The BC Corp Management's Discussion and Analysis Report, 2015: 14). This shows that BC Corp believes in a future in coal mining. The company reported in its Management's Discussion and Analysis Report (2015) that it will keep pursuing attractive expansion opportunities which allow for synergies and which enhance value of current business; while also not side-tracking from current Dundee operations. In 2016, BC Corp reported that there were no reductions in exports and the company also reported that it did not expect its coal exports to reduce since contracts with customers stressed on using rail capacity allocated to those customers irrespective of the destination terminal.

The closure of underground mining activities at the Magdalena mine resulted in BC Corp relying mainly on the produce from the Aviemore anthracite mine. Since BC Corp sees a future in coal mining, the company sought to ensure Aviemore mine would operate sustainably by identifying short, medium and long-term opportunities/projects to extend the life-span of the mine (BC Corp Management's Discussion and Analysis Report, 2018). The Balgray project is a medium-term opportunity for BC Corp to provide access to sufficient Aviemore resources. The Balgray project is expected to extend the life of the Aviemore mine by approximately 6-7 years. The project requires approximately R120 million capital for the Balgray Adit refurbishment and the requisite mining infrastructure (BC Corp Management's Discussion and Analysis Report, 2020). Thus, the Balgray project will ensure that BC Corp will continue mining anthracite coal at the Aviemore mine beyond 2022, when the coal reserves of this mine are expected to be exhausted.

There is a long-term expansion opportunity for the Aviemore mine to the North Adit project, whose pre-feasibility study was completed in 2017 and whose bankable feasibility study was completed in September 2018 (BC Corp Management's Discussion and Analysis Report, 2020). The North Adit project construction and commissioning needs about R335 million and takes up to 18 months, and once completed, will extend the life of Aviemore mine by 13-15 years. These expansions show that BC Corp believes that there is a future in coal mining and they also guarantee that the company will continue to mine and sell coal to its domestic and export markets in the future.

3.3.6 Conclusion

The discussion shows that BC Corp is a coal mining and supply company which is not diversified. Hence, BC Corp strongly relies on the company's revenue from selling bituminous and anthracite coal to domestic and foreign countries. The company's revenue figures rose sharply between 2015 and 2018 before declining in 2019 and 2020 following the cessation of bituminous coal production at the Magdalena underground mine in the last quarter of 2018 as the company had to rely on anthracite coal at the Aviemore mine. The findings show that as of December 31 2020, the remaining anthracite coal reserves at the Aviemore mine could be mined for two years. This means that the coal reserves at the Aviemore anthracite mine could sustain BC Corp up to the end of 2022. Since the company sees a future in coal mining, it made the medium term and long-term expansion projects at the Aviemore mine to extend the life of the mine. It can be concluded from these expansions that BC Corp believes that there is a future in coal mining and supply.

The findings discussed in this paper highlight that BC Corp tries to do business in line with conserving the environment for the future. BC Corp is aware that the coal mining and supply business negatively impacts on the environment. It seeks to preserve the environment and to make it better. However, BC Corp did not disclose the environmental impacts of its coal production between 2015 and 2020. The findings indicated that BC Corp discloses information concerning mine closures and also about assets it places on care and maintenance. The disclosure of such information is vital since it reflects some degree of transparency in how the company conducts its coal production. BC Corp sees a future in coal mining as evidenced by the medium- and long-term expansion projects at the Aviemore anthracite mine, which are all aimed at extending the life of this mine beyond 2022, thereby guaranteeing continued coal revenue mining and inflows.

3.4 Exxaro Resources

3.4.1 Overview

Exxaro Resources Limited (Exxaro) is a public company that is incorporated in South Africa and is listed on the Johannesburg Stock Exchange (JSE) (Exxaro Group and Company Annual Financial Statements, 2017: 16). The company is one of the country's biggest black-empowered resource companies and ranks in the top 5 of the biggest producers of coal in the country (www.exxaro.com). Exxaro is a diversified resources company operating out of South Africa. The company has interests in coal, titanium dioxide and Alkali chemicals, ferrous, zinc, and renewable energy commodities. The firm operates in Mpumalanga and Limpopo provinces, where coal resources are highly concentrated.

Exxaro has several coal operations in Mpumalanga and Limpopo regions with the majority of the coal operations of Exxaro are located in the Mpumalanga region. However, most of the company's coal reserves are located in the Limpopo region at Grootegeluk coal operation with 2. 628 Mt and Thabametsi with 130Mt as of December 31 2020. In terms of the life of mine, Exxaro has three coal operations; Thabametsi, Grootegeluk, and Dorstfontein Complex, with life spans of over 15 years as of December 31 2020. Besides coal, Exxaro had base metal reserves at BMM Deeps mine in Northern Cape with a total of 3.9Mt ROM reserve and the mine has a life span of three years; BMM Swartberg mine in Northern Cape with a ROM reserve of 25.4Mt and a life span of three years as at December 31 2020 (Exxaro Resources Limited Consolidated Mineral Resources and Mineral Reserves Report, 2020). Even though Exxaro's business is segmented into four, the company strongly depends on coal revenue. Table 3.3 below presents the firm's coal revenue from the sale of coal between 2015 and 2020.

Table 3.3: Coal Revenue from 2015 to 205

	Years					
	2015	**2016**	**2017**	**2018**	**2019**	**2020**
Coal Revenue (R million)	18 093	20 673	22 553	25 302	25 582	27 875

The table shows that much of the revenue of Exxaro comes from the sale of coal. The coal revenue increased from R18,093 million recorded in 2015 to R27,875 million recorded in 2020.

3.4.2 New acquisitions

Exxaro took over Total Coal South Africa (TCSA) in 2015 for a purchase consideration of R4.3 billion. The company then changed TCSA to Exxaro Coal Central (ECC). No other new coal acquisitions were made between 2015 and 2020. However, the company reported acquiring the Alkali chemicals business through Tronox in 2015. In 2020, the company acquired the remaining 50% of Centre for a purchase consideration of R1,739 million.

3.4.3 Disclosure of environmental impacts

Exxaro is aware that its coal mining business is associated with negative impacts on the environment (Exxaro Integrated Report, 2015: 14). The company reports Level 1, 2 and 3 environmental incidents at its operation sites and has undertaken corrective measures. Level 1 incidents have minor impacts, while Level 2 and 3 have intermediate and major environmental impacts respectively. Exxaro witnessed a high number of Level 1 environmental incidents in 2019 when it recorded 373. Level 1 environmental incidents witnessed between 2015 and 2020 were 994. Exxaro did not report any level 2 environmental incidents during 2019 and 2020. The ones reported between 2015 and 2018 were dealt with and in an extreme case, the activity was abandoned. The company reported no level 3 environmental incidents between 2015 and 2020.

3.4.4 Disclosure of mine closure

Exxaro discloses information concerning any mine closures and also its plans to close its mines that would have reached their life span. In 2015, Tshikondeni, Durnacol and Hlobane were under closure and closure plans were send for review by authorities (Exxaro Supplementary Report, 2015: 176). In 2016, 2017, 2018, and 2019, the company reported that it had six operations that were in inactive closure, namely Arnot, Tshikondeni, Durnacol, Hlobane, Strathrae, and Gravelotte coal operations (Exxaro Supplementary Report, 2019: 39; 2018: 71; 2017: 61; 2016: 67). The Arnot coal operation was successfully closed during the year 2020.

3.4.5 Future of coal mining

Exxaro reported that the global coal market was unstable in 2015 on the back of import restrictions in China and efforts to contain global warning under the 21st Conference of Parties (COP) in Paris" (Exxaro Supplementary Report, 2015: 95). The year saw a decline in the global seaborne demand for metallurgical and thermal coal, the first such double-fold decline since the 2008 financial crisis. In 2016, Exxaro reported a high performance necessitated by higher coal selling prices (Exxaro Group and Company Annual Financial Statements, 2016: 9). The company expected the supportive market conditions for domestic and international coal markets to continue in 2017. Exxaro expressed confidence in the possible opportunities for the future in its diverse coal product portfolio. The hope was that growth would be driven by stable trading conditions in the domestic markets and higher coal prices in the international market.

In 2017, Exxaro reported that its coal business performed the best mainly due to the high global economic growth rate witnessed in seven years, supported by sound macro-economic policies that enabled world economies to grow (Exxaro Group and Company Annual Financial Statements, 2017). The company expected this favourable environment to continue in 2018. The company reported in 2018 that it was on track and within budget to deliver value on its coal capital projects. Exxaro reported that the international market for coal remained bearish due to market oversupply following China's ban on exports of coal. However, the company is optimistic that the demand for coal in India will drive Exxaro's exports

In 2019, Exxaro reported that it was cautiously optimistic about the domestic economic reforms, uncertain local exchange rate, and domestic demand for coal, together with uncertain prices (Exxaro Integrated Report, 2019). However, the company reported that the coal business would remain at the core of its operations (Exxaro Integrated Report, 2019: 36). With the current and projected South African electricity requirements, there is belief that coal remains relevant and will remain a source for affordable electricity generation in the country (Exxaro Integrated Report, 2018: 70). The company maintains that it is best positioned to supply coal for electricity generation to Eskom in the medium to long term. This evidence suggests that Exxaro sees a future in the coal business.

3.4.6 Conclusion

The discussion above shows that Exxaro is a highly diversified company interested in coal, titanium dioxide and Alkali chemicals, ferrous, zinc, and renewable energy commodities. The

company has numerous coal reserves in South Africa. Exxaro strongly depends on the income it generates from the production and marketing of coal to its domestic and international coal markets. Between 2015 and 2020, Exxaro made a huge coal acquisition of TCSA that highlighted that Exxaro still believes in coal production and marketing.

There is sufficient evidence contained in Exxaro's integrated reports and supplementary reports to show that the company is aware that its coal production at its coal operations impact the environment through land degradation, air pollution, and water pollution. The company reports these negative environmental impacts and the measures taken to address, reverse or minimise them. For instance, the company reported that it was significantly reducing carbon dioxide gas emissions from its coal mines to minimise air pollution and rehabilitate the land that Exxaro's activities disturb.

The study findings highlight that Exxaro discloses information about mine closures. The disclosure of such information is vital since it reflects some degree of transparency in how the company conducts its coal business. It can be concluded that the disclosure of mine closures ensures that operational closure is inclusive and within the legal framework parameters, allows the company to proactively manage environmental impacts to minimise residual liabilities, and makes it possible for the company to leave an alternative legacy on positive and sustainable land use for employees and local communities.

It can also be concluded from the study findings that Exxaro sees a future in coal mining mainly due to the expected demand for coal as an alternative cheap and affordable source of energy locally and abroad. From Exxaro's perspective, the present and projected outlook for electricity requirements in the country shows that coal remains relevant as a source of affordable electricity generation in South Africa. Exxaro maintains that it is best-positioned to supply coal for electricity generation to Eskom in the medium to long-term, thereby guaranteeing coal revenue for the company.

3.5 Glencore

3.5.1 Overview

Glencore is one of the leading producers and exporters of bituminous thermal coal in South Africa and worldwide. The company is also a huge producer of premium hard and semi-soft coking coal used in the iron-making process (Glencore Annual Report, 2019). Glencore is

diversified and produces over 90 commodities within several sectors, namely metals and minerals, energy, and agriculture.

Besides, the company is diversified by commodity, geography and activity. The Glencore Annual Report (2017: 8) showed that in terms of diversification by commodity, the company is into copper, zinc, nickel, ferroalloys, coal, and oil production and marketing. Glencore has production in the Americas, Europe, Asia, Africa, and Oceania (Glencore Annual Report, 2019: 5). The company is also diversified by activity since it carries out different activities, namely metals and minerals production, energy production, and agriculture production (Glencore Annual Report, 2018: 2).

Between 2015 and 2018, Glencore's overall investments totalled US$32,943 million in metal and minerals products, US$17,182 million in energy products and US$10,288 million in agriculture products (Glencore Annual Reports, 2015: 128; 2016: 145; 2017: 143).

Glencore has coal reserves in Australia, South Africa and Colombia. At the end of 2015, the company reported that its coal mines had total marketable thermal coal reserves amounting to 3,539 metric tonnes (Mt) (Glencore Annual Report, 2015: 199). At the end of 2020, Glencore indicated that it had total marketable thermal coal reserves amounting to 2,672Mt (Glencore Annual Report, 2020: 242). Besides coal reserves, Glencore has copper ore, iron ore, zinc ore, chrome, nickel, vanadium, and manganese reserves.

Glencore strongly depends on revenue from coal production. Between 2015 and 2020, the company recorded US$50,669 million coal operating revenue (Glencore Annual Reports, 2015: 60; 2016: 70; 2017: 75; 2018: 85; 2019: 67; 2020: 63). These figures show that Glencore depends heavily on its thermal coal production income.

3.5.2 New acquisitions

In 2016, Glencore acquired a controlling interest in Newlands Collinsville Abbot Point Joint Venture (NCA) and then paid US$167 million for the remaining 45% interest in NCA (Glencore Annual Report, 2016: 177). Glencore made a US$300 million investment in Yancoal in 2017: "In 2018, Glencore acquired 49% of Hunter Valley operations coal mine in New South Wales ("HVO"), 82% of Hail Creek and 71% of Valeria coal resource in Queensland ("Hail Creek")" (Glencore Annual Report, 2018: 191). In 2019, Glencore acquired an additional 10% in Ulan coal and acquired 2.7% of the Hail Creek coal mine.

Glencore continues to diversify its operations and in 2016, the company made new acquisitions in agriculture by acquiring a controlling stake in Prokon Pflanzenöl GmbH rapeseed crushing plant, 50% in Barcarena grain handling port facilities, and also acquired Becancour oilseed crushing plant with the acquisitions costing US$301 million (Glencore Annual Report, 2015: 41). In 2017, Glencore acquired Chevron's South African and Botswana mid/downstream oil business, acquired 42.3% majority of voting class shares in Volcan, and increased its non-voting shares in Volcan from 7.7% to 23.3% and acquired 9.75% of OSJC Rosneft Oil. Besides, Glencore acquired the remaining 31% interest in Mutanda Mining Sarl and increased its interests in Katanga from 75.3% to 86.3%. In 2018, Glencore acquired a 78% interest in a fuel distributor in Brazil, ALE Combustiveis ("Ale"). In 2019, Glencore took over a 75% controlling stake in Chevron South Africa Proprietary Limited and a 100% interest in Chevron Botswana Proprietary Limited (together "Astron Energy"), and a 42.9% additional interest in Polymet Mining Corp" (Glencore Annual Report, 2019: 200). The additional interest acquired in Polymet Mining Corp resulted in Glencore increasing its voting interest in Polymet from 28.8% to 71.7% through a rights issue with a total consideration of US$243 million.

3.5.3 Disclosure of environmental impacts

Glencore discloses the environmental impacts of its coal mining in its yearly reports. The company aims to protect the environment (land, air, water) from its coal mining activities. In 2015, the company received 1 742 complaints from communities surrounding most of its coal mines mostly concerning reduced access and damage to property, noise and various pollutions. (The Glencore Sustainability Report, 2015: 46). In 2016, the company recorded 963 complaints mostly from Australia, Africa and North America concerning noise, dust and odour.

In 2017, Glencore reported that the company received 52 complaints from Australia, with the majority of complaints received related to noise (Glencore Sustainability Report, 2017: 50). In 2018, the company received complaints from Australia for noise from coal mining (Glencore Sustainability Report, 2018: 53). Glencore reported that its coal business has the largest land footprint across the company accounting for 39% of its land disturbance in 2017 (Glencore Sustainability Report, 2017: 74). The company reported that 55,000 hectares (almost 10%) of its land had been disturbed. Glencore rehabilitates most of the land where its coal mines are closed to reverse the negative environmental impacts. In 2018, Glencore disclosed that it substantially rehabilitated its Rolleston mine and got it certified, the second such mine to achieve this in Australia. The company completed the rehabilitation of 108 hectares in

Colombia's Pedeco operations and a record of 1 435 hectares in Australia which were disturbed during 2018 (Glencore Sustainability Report, 2018).

3.5.4 Disclosure of mine closures

Glencore discloses information concerning mine closures and its plans to close its mines that would have reached their life span. Over the last five years, the company reported several mine closures. In 2016, the company reported the closure of one of its Alumina operations in the United States, which decreased its carbon emissions. In the same year, Glencore reported $28 million in closure costs as it finalised the disposal of Optimum Coal in South Africa and some smaller scheduled mine closures in South Africa whose details were not provided. At the end of 2017, the company reported that its coal business had 12 operations placed in care and maintenance and five coal operations moving to closure.

In 2018, Glencore reported the closure and sale of its underground coal mines in Australia but did not give details on the names of the closed coal mines. Glencore reported in 2018 that it would close its Raglan Mine in northern Canada within the next years and the company has already started working on the closure plan. Besides, the company reported that it was successfully closing Glencore's Macquarie complex situated in the Lake Macquarie region of New South Wales. This project encompassed The West Wallsend Underground, the former Macquarie Coal Preparation Plant, the former Westside Open Cut Mine, and the former Teralba Colliery Northgate Southgate sites.

3.5.5 The future of coal mining

Concerning the future of coal mining, Glencore reported in 2015 a decline in Chinese import demand for seaborne thermal coal. The decline in the demand for thermal coal was due to slowed growth of economies, movement from manufacturing, rising hydro and nuclear power supply, and increased domestic coal supply for coastal ultra-high voltage transmission. The Glencore Annual Report cited that despite the decline in Chinese thermal coal import demand, there has been significant coal demand from the Mediterranean, Africa, the sub-continent and South East Asia, where the need for low-cost, stable power supply continues to grow (Glencore Annual Report, 2015: 59). The Chinese thermal coal imports increased in 2016 by over 40 million tonnes due to the growing demand for thermal coal in emerging economies in South East Asia. Glencore cited a general decline in the supply volumes of higher energy coal export products, precisely from Indonesia and South Africa, due to the depletion of high-grade coal

reserves. Glencore then reported that this would result in a tighter supply of high-energy coals in the coming years, supporting market segmentation and price differentiation (Glencore Annual Report, 2016: 69).

Glencore state that the rapid growth and mechanisation of world economies, especially in Asia, will drive growth in global energy, electricity, steel and cement (Glencore Annual Report, 2018: 85). The South-East Asian economy is likely to soon triple in growth, demanding more energy by 2040 which coal will avail. Coal is expected to remain a key ingredient in many industrial processes and a key provider of competitive, safe, secure, and reliable baseload energy source in the foreseeable future. The demand for thermal coal will thus be on the rise and this guarantees coal revenues for Glencore in the future.

3.5.6 Conclusion

The discussion above shows that Glencore is a highly diversified company by geography, commodity, and activity. The company has numerous coal reserves in Australia, South Africa, and Colombia. Glencore still strongly relies on the income it generates from the production and marketing of coal worldwide. Between 2015 and 2020, the company made seven new coal acquisitions, indicating that Glencore still believes in thermal coal production. Concerning new acquisitions, it can be concluded that Glencore continues to diversify its operations by increasing its range of commodities in its areas of operation. There is sufficient evidence in Glencore's annual reports and sustainability reports that the company is aware that production of coal in Australia, South Africa, and Colombia negatively impacts the environment through land degradation, air pollution, and water pollution. The company reports these negative environmental impacts and measures are being taken to address, reverse, or minimise such impacts

The study findings indicated that Glencore discloses information about mine closures and the placement of its coal assets in care and maintenance for sustainability purposes. The disclosure of such information is vital since it reflects some degree of transparency in how the company conducts its production. It can be concluded that the disclosure of mines which are closing and information on mines which are under care and maintenance enables sustainable post-mining land use. Glencore sees a future in coal mining because of developing economies' increasing industrialisation and urbanisation. The demand for coal will keep driving the growth of global energy, electricity, steel, and cement, which all require thermal coal. Thus, from Glencore's

perspective, coal will remain critical to industries and as a source of energy, and this guarantees coal revenue for the company.

3.6 MC Mining limited

3.6.1 Overview

MC Mining Limited (MCM) is a limited company incorporated in Australia and has common shares that are listed on the Australian Securities Exchange (ASX), the AIM Market of the London Stock Exchange (AIM), and the Johannesburg Stock Exchange (JSE) in South Africa (MCM Annual Report, 2018). The company used to operate as Coal of Africa Limited before 2018 and the name was changed to MC Mining Limited in 2018 (MCM Annual Report, 2018: 7). The company is into acquisition, exploration, development, and operation of metallurgical and thermal coal projects in South Africa (Coal of Africa Integrated Report, 2015: 56). MCM produces three coal products, namely metallurgical coal, hard coking coal, and thermal coal (MCM Annual Report, 2020). The company's metallurgical, coking, and thermal coals assets are in Limpopo and KwaZulu-Natal. MCM has coal reserves at its operations at Vele Colliery, Mooiplaats Colliery, Makhado Project, and Uitkomst Colliery. It has 542,656 million minable tonnes and 526,416 million minable tonnes of proven and probable reserves *in situ* as of 2015 and 2020, respectively.

Revenue for MCM is driven by the sale of coal (MCM Annual Report, 2020: 82). MCM did not record any sales revenue for 2015, 2016 and 2017. According to the company reports, the company did not generate any revenue for the three years due to all operations being on care and maintenance (Coal of Africa Integrated Report 2015; 2016; 2017). In 2018, the company reports indicate that coal which generated US$32 693 000 was produced at Uitkomst Colliery and that: "Metallurgical and thermal coal markets were favourable during the twelve months with coking coal prices increasing due to weather-associated disruptions in Australia but softened towards the end of FY2018 while thermal coal prices improved due to steady demand" (MCM Annual report, 2018: 50). Thus, the company's high coal revenue in 2018 was attributed to favourable metallurgical and thermal coal markets and the increasing coking coal prices.

In 2019, the company highlighted that the reduced coal revenue of 26,403 for the company in that year caused by reduced demand for thermal coal in the northern hemisphere (The MCM Annual Report, 2019: 52). The low coal revenue of 17,155 for 2020 resulted from COVID-19

restrictive measures that the South African government implemented in a bid to curtail the spread of COVID-19.

3.6.2 New Acquisitions

MCM made a few coal acquisitions between 2015 and 2020 and in 2017 when it acquired "Uitkomst Colliery (Uitkomst), situated in the Utrecht coalfields, on 30 June 2017 for US$21.1 million. Uitkomst is a high grade, thermal, export quality coal deposit with metallurgical applications" (Coal of Africa Integrated Report, 2017: 3). MCM also made a settlement of the final US$18.2 million owing to Rio Tinto for the historic acquisition of Greater Soutpansberg coal assets (Coal of Africa Integrated Report, 2017: 9). In 2018: "The Group purchased the business operations of Khethekile Mining (Pty) Ltd (Khethekile), the independent mining contractor at the Uitkomst Colliery" at the cost of US$4.9 million (MCM Annual Report, 2018: 50).

3.6.3 Disclosure of environmental impacts

MCM is concerned with the environmental impact of its coal operations. The company's environmental management strategy mitigates and minimises impacts by using technological advancements, engineering, and environmental expertise. Their focus is on best practices to design and operate their mines with the environment in mind (Coal of Africa Integrated Report, 2015: 26).

In 2015, MCM reported that a complaint was formally lodged in the Makhado Project area concerning the possible impact bulk sample pit had on the quality of the community water and air quality (Coal of Africa Integrated Report, 2015: 29). Investigations revealed the pit had no impact on the environment around the community (Coal of Africa Integrated Report, 2015: 29). MCM reported that in 2016, 2017, 2018, 2019 and 2020, the company did not receive any complaints on environmental matters. However, the company reported that regular dust, surface, and groundwater monitoring continues mainly at Makhado Project despite it being inactive. The company further indicates that there remains no threat to the environment of the surrounding community (MCM Annual Report, 2020: 28).

3.6.4 Disclosure of mine closure

In 2015, MCM reported that its two coal operations, the Mooiplaats and Vele Collieries have been placed on care and maintenance since October 2013 and are currently undergoing a formal disposal process (Coal of Africa Integrated Report, 2015: 23). MCM reported that Vele Collieries was placed in care and maintenance awaiting plant modifications but remained on track for the colliery's Social and Labour Plan local economic development projects (Coal of Africa Integrated report, 2015: 23). In 2016, MCM reported that its two main operations, Mooiplaats and Vele Collieries, remain on care and maintenance. The company indicated that Vele thermal and semi-soft coking coal colliery remains on care and maintenance until outstanding regulatory approvals are received and coal prices improve (Coal of Africa Integrated Report, 2016: 3). In 2017, MCM also reported that its two operations, Mooiplaats and Vele Collieries, remain on care and maintenance (Coal of Africa Integrated Report, 2017: 37). In 2018, MCM reported that Vele Colliery remained on care and maintenance whilst Mooiplaats was successfully disposed (MCM Annual Report, 2018: 29). Other reports indicated that Vele remained on care and maintenance in 2019 and 2020 (MCM Annual Report, 2019; 2020). Uitkomst Colliery was on temporary care and maintenance due to a lockdown declared by the South African government.

3.6.5 The future of coal mining

Concerning the future of coal mining, MCM reported in 2015 that global markets remained volatile and coal prices were on a downward trend. The company hinted that the lower prices would remain for longer, on the back of lower coal demand, especially from China, and supply outstripping demand (Coal of Africa Integrated Report, 2015). Due to the low coal prices, the two operations of MCM remained on care and maintenance and no mining and sale of coal took place. Nevertheless, the company is still the premier hard coking coal producer in South Africa producing about 6.7 million tonnes in 2020. In 2016, MCM hinted that coal is responsible for close to two-thirds of the world's power and, as such, reliance on coal supplies will continue both in the short and medium-term (Coal of Africa Integrated Report, 2016). The company views coal as one of the key inputs into the world's power requirements, future energies that include other elements. Hence, from MCM's perspective, there is a future in coal mining in South Africa since the product will continue to be demanded globally.

3.6.6 Conclusion

The discussion presented above shows that MCM relies on coal revenue. The company is not diversified. This explains why the company failed to generate revenue in 2015, 2016 and 2017 when its coal operations, namely Vele and Mooiplaats Collieries, were placed on care and maintenance. The company has numerous coal reserves at Vele Colliery, Makhado Project and Uitkomst Colliery. The Uitkomst Colliery is regarded as a "cash generative asset" by MCM since the acquisition of this asset in 2018 enabled the company to start generating revenue which was not the case in 2015, 2016 and 2017. Thus, the acquisition of this "cash generative asset" was an indication that the company still believes in coal production. Besides acquiring Uitkomst Colliery, MCM also acquired Khethekile Mining (Pty) Ltd, which indicates that MCM still believes in coal production.

There is sufficient evidence in the integrated reports and annual reports of MCM to show that the company is aware that its coal production at all its operation sites leaves negative environmental impacts like land degradation, air pollution, and water pollution. The company does report these negative environmental impacts and the measures taken to address, reverse or minimise such impacts.

MCM discloses the assets it places in care and maintenance for sustainability purposes and intends to dispose of. The disclosure of such information is vital since it reflects some degree of transparency in how the company conducts its coal production. It can be concluded that MCM sees a future in coal mining. The company believes that the contribution of coal to energy needs will remain, especially in South Africa, itself a unique and complex case with its developed infrastructure, an increasing demand for energy, and with optimum quality and quantity of coal resources. Thus, from MCM's perspective, coal is expected to be one of the key inputs into the world's power requirements despite movement towards future energies that incorporate other elements.

Table 3.4: Comparisons

	BC Corp	**Exxaro**	**Glencore**	**MC Mining Limited**
Overview	It operates the Aviemore anthracite mine (Aviemore), the Magdalena bituminous mine (Magdalena), the Balgray anthracite project (Balgray) and the Aviemore North Adit anthracite project (North Adit). BC Corp produces coal from two mines, Magdalena and Aviemore, with substantial coal resources in Kwa Zulu Natal, South Africa. BC Corp has extensive coal reserves.	It is the largest black-empowered resource company and it is among the top five coal producers in South Africa. Exxaro is a diversified resource company. It has several coal operations the Mpumalanga and Limpopo regions of South Africa.	It is one of the leading producers and exporters of bituminous thermal coal in South Africa and worldwide. The company is also a significant producer of premium hard and semi-soft coking coal used in the iron-making process. Glencore has productions in several sectors, including metals and minerals, energy, and agriculture.	MC Mining Limited (MCM) is a limited company incorporated in Australia and has common shares that are listed on the Australian Securities Exchange (ASX), the AIM Market of the London Stock Exchange (AIM) and the Johannesburg Stock Exchange (JSE) in South Africa. The principal activities of the company and its subsidiaries are the acquisition, exploration, development and operation of metallurgical and thermal coal projects in South Africa.
Diversification	The company is not diversified. It only focuses on coal mining only.	The company is diverse. It has interests in coal, titanium dioxide and Alkali chemicals, ferrous, zinc and renewable energy commodities.	The company is highly diversified and it produces and markets over 90 commodities within three different business segments: metals and minerals, energy and agriculture production.	The company relies on coal revenue. It is not diversified.
New Acquisitions	No new accusations were made between 2015 to 2020.	Acquired Total Coal South Africa (TCSA) in 2015 and the Alkali chemicals business through Tronox in 2015. In 2020, the	Glencore acquired Chevron's South African and Botswana mid/downstream oil business. In 2019, Glencore acquired a	MCM made a few coal acquisitions between 2015 and 2020. The Company acquired Uitkomst Colliery (Uitkomst), situated in the

		company acquired the remaining 50% of Centre.	75% controlling interest in Chevron South Africa Proprietary Limited.	Utrecht coalfields. The Group purchased the business operations of Khethekile Mining (Pty) Ltd (Khethekile), and the independent mining contractor at the Uitkomst Colliery.
Disclosure of environmental aspects	They failed to disclose any information concerning environmental aspects.	They disclose environmental incidents witnessed between 2015 and 2020 and there were 994.	Glencore discloses the environmental impacts of its coal mining in its yearly reports. The majority of complaints dealt with were of lack of access, and damage, to property; noise; odours or fumes; water; and dust.	The company does report these negative environmental impacts and measures taken to address, reverse or minimise such impacts.
Disclosure of mine closure	The company disclosed that when Magdalena underground mining activities ceased, the company retrenched a total of 125 employees.	Exxaro discloses information on mine closure. Five Exxaro operations were in active closure in 2020: Tshikondeni, Durnacol, Hlobane, Strathrae and Gravelotte. The Arnot coal operation was successfully closed during the year 2020.	Glencore discloses information concerning mine closures and its plans to close its mines that would have reached their life span. They disclosed the disposal of Optimum Coal in South Africa and some smaller scheduled mine closures in South Africa.	MCM discloses information on mine closure. It reported that its two coal operations, the Mooiplaats and Vele Collieries were on care and maintenance. In 2018, MCM reported that Mooiplaats was successfully disposed of. During the same period, the Company integrated the Uitkomst Colliery and the Mooiplaats Colliery, previously on care and maintenance, was sold while Vele remained on care and maintenance.
Future of coal	The company still has a future in coal mining. The company holds 780 841 ROM tonnes in	Exxaro has indicated that coal business would remain at the core of their operations. The company	The company foresees a future in the coal mining. The industrialisation and urbanisation of developing	The company sees a future in coal mining. They have remained the premier hard coking coal producer in South Africa and

	reserves which the company could mine in two years. There is also expansion and optimisation of the existing BC Dundee operations and second through acquisition in the Southern African region.	maintains that it is best positioned to supply coal for electricity generation to Eskom in the medium to long term. This evidence suggests that Exxaro sees a future in the coal business.	economies, precisely in Asia, is seen as a drive that will cause demand for coal to continue. Coal is expected to be a key input to industrial processes as a competitive, safe, secure and reliable baseload energy source for this time horizon in Asia.	produced approximately 6.7 million tonnes of coal per annum by 2020. In 2016, MCM hinted that coal provides almost two-thirds of the world's power and, as such, reliance on coal supplies will continue both in the short and medium-term.
Main conclusions	BC Corp believes that there is a future in coal mining and supply. Thus, the company is aware that the coal mining and supply business has negative impacts on the environment and the company aims to leave the environment in a better state than it was before the start of its operations.	Exxaro is highly diversified. It sees a future in coal mining mainly due to the expected demand for coal as an alternative cheap and affordable source of energy locally and abroad. The disclosure of mine closures allows the company to proactively manage environmental impacts to minimise residual liabilities and makes it possible for the company to leave a positive legacy of alternative sustainable land use for employees and local communities.	Glencore still strongly relies on the income it generates from the production and marketing of coal worldwide. The acquisitions it made indicates that Glencore still believes in thermal coal production and also because of developing economies' increasing industrialisation and urbanisation, the future looks bright.	MCM relies on coal revenue. The company believes that coal's contribution to the energy mix will remain important for some time, particularly in South Africa, a unique and complex case with its developed infrastructure, the country's increasing demand for energy, and the quality and quantity of coal resources.

CHAPTER 4

FINDINGS, RECOMMENDATIONS AND CONCLUSIONS

4.1 Introduction

The chapter presents chapter summaries and findings in literature and in the study and this is followed by the interpretation of findings and then the recommendations from this study will be given. Findings will be reported in line with the set objectives as outlined at the start. The research sought to investigate diversification strategies that the coal mining industry can adopt for its post-mining economy, to achieve economic, social, and environmental sustainability.

The research objectives were; to assess the extent to which South Africa' coal mining industry can diversify its operations; to investigate the diversification strategies implemented in the local coal mining industry for a sustainable economy; to assess how transparency in the South African coal mining industry can be used to achieve SDGs; and to recommend the diversification strategies that promotes sustainable development within the industry.

4.2 An overview of the chapters

Chapter 1 is the introduction and it sets out the background. The study is based on the significance of the coal mining industry as the main indigenous source of energy in South Africa. This is confirmed by the fact that electricity generation in SA uses 95% of coal and exports of coal stand at 28% of production (Mills, 2022). Coal mining is also a significant contributor to employment in South Africa with about 82,000 employees (Strambo *et al*., 2019). However, the coal industry is under threat due to the ending of the lifespan of the current mines (Strambo *et a*l., 2019) and decreasing export demands (Akinlabi *et a*l., 2019). This leads to questions on whether the coal mining industry can sustain itself through diversification. The chapter outlined the research objectives with the view of seeking to find out how best the coal mining industry can diversify to achieve post mining sustainability.

Literature review was done in chapter 2. The chapter described key words in this study, which were sustainability, transparency, and diversification. The chapter reviewed literature on the South African coal mining industry and other coal mining studies that diversified for sustainability. The literature review chapter divided the strategies into literature on mining and sustainability, mining and transparency, South African coal mining, and lastly reporting and

closure. This literature will be compared with finding in this study to come up with recommendations.

An analysis of the selected coal mines was carried out in Chapter 3. The aim was to draw on findings on the coal mining operations and diversification strategies for sustainability. The selected mines were; Buffalo Coal Corp, Exxaro Resources Limited, MC Mining Limited and Glencore. The analysis of the mines was done in categories of the mine's overviews, new acquisitions, disclosure of environmental impacts, disclosure of mine closure, and the future of the coal mines. A comparative analysis was done on the four mines in each of the categories laid out. This will be compared with findings in the literature review.

4.3 Main findings

4.3.1. Coal mining and environmental transparency reporting in South Africa

The main findings in literature outlined that coal mining companies in South Africa are not completely complying with transparency regulations on reporting about the environment. Transparency in the coal mining industries requires disclosing both social and environmental issues for sustainability purposes (de Villiers *et al*., 2014). Haufler (2010) noted that if the mining firms disclose their financial standing publicly, then citizens will be capable of holding governments and the mining firms accountable for the impacts caused by mining activities.

The findings showed that Exxaro mine was awarded the highest ranking as it not only revealed what others did, but went on to separately report damage assessments and rehabilitation funds for their different operations (Cassey, 2018). The company was nominated for awards for Best Sustainability Reporting and Best Climate-Related Reporting (Exxaro Powering Disability, 2021). Metals & Mining Reports on MC Mining Limited showed that the mine discloses information in its yearly statements on annual funds for rehabilitating the environment (Sage Fund, 2022). However, while MC Mining's disclosures are in sync with other mines, the company neglects to extend the same information to its stakeholders (Sage Fund, 2022). Although Glencore mine claims to comply with issues of compliance, there has been court cases where the company has been investigated for non-compliance of foreign Corrupt Practices Act and U.S. money laundering statutes (Scales, 2018). Glencore has also been accused of other offences such as the supplying of substandard coal to utility company Eskom, and was even accused by the government of Ghana in 2017 of illegally importing and reselling petroleum products (Pantland, 2018).

According to reports, water and air pollution, the destruction of arable land, biodiversity loss are caused by poor regulations within the mining industries and coal power generation in South Africa. The impacts of these end up violating the rights of local communities to food, culture, water, health, and a clean and productive environment (Centre for Human Rights, 2016). In the face of such abuse of rights, the government has not taken a leading role of enforcing the relevant environmental standards. In this respect, the government has been complicit in allowing mining companies to pollute the environment (Centre for Human Rights, 2016). Palesa (2016) concurs that under the watch of the government, the mining industry has failed to be as transparent as expected.

4.3.2 Government efforts in promoting coal mining reporting transparency

Findings in literature confirm that South Africa has many regulations, including environmental ones, which mining companies must comply with (Full Bright, 2022). These include the regulations include in the King IV report which foregrounds the way companies function, with respect to the society and the environment as captured through the Carbon Tax Act and the National Environmental Management Act 107 of 1998 (Centre for Human Rights, 2016). However, despite such regulatory frameworks, Vanderpoll (2021) insists that coal-mining continues to pollute the environment daily through the production of acid mine drainage and other waste and this calls for better management.

Corruption Watch (2021) published reports focusing on transparent and accountable operations of companies with respect to how mining communities benefit financially. This comes because local communities, on whose land mining is taking place, are unease and claim local mining companies are corrupt and not transparent of what they get from the mining. The reports show the many challenges the communities face in improving themselves financially and economically, despite being in close proximity to lucrative mining industries. Shongwe (2018) states that the changes in legislation, together with better social and environmental performance by the industry have not allayed fears over the impacts and conflicts in coal mining, notably community and civil society claims of negative health ramifications, together with livestock deaths and destruction of livelihoods. Vanderpoll' (2021) study showed that more training is needed in South Africa. From the reports, it became clear that there is a need for the harmonisation of production and environmental management activities.

The above findings confirm that there is a lot that the government and responsible stakeholders need to do to push the coal mines in South Africa to comply with the set regulations on compliance.

4.4. Diversification and new acquisitions for coal mines in South Africa

A study by Voronets *et al*., (2019) states that by 2019, eight (8) coal mines were confirmed to have diversified. Of these, three (3) BHP Billion, Rio Tinto, and Glencore were at the top of the list (Voronets *et al*., 2019). Researchers have explored global trends within the mining industry and concluded that those that have diversified appear to be more efficient within their core business than those that focus on a single type of mineral (Voronets *et al*., 2019). Industries that have diversified are said to be sustainable, and diversification can, in this case, be regarded as part of the pivotal and fruitful efforts made to manage mining within a free economy. Akinlabi *et al*., (2019) and Strambo *et al*., (2019) stated that there is no indication that coal mines in South Africa have diversified, despite there being a decline in the local and international demand for coal, together with an increase in the coal mines nearing their lifetime. Barbara and Sluder (2019), Dunmade *et al*. (2019), Le (2019) and Li *et al*. (2017) advocate for diversification and state that it spearheads sustainable development by making firms explore how best they can address the social and environmental impacts of their operations.

Findings in the study revealed that the selected mines under study had all diversified except one, which is BC Corp. The selected mines in this study adopted acquisition as their main strategy for sustainable development. This enhances sustainability by securing jobs for the community, contributing to the economy, and boosting output for the company. This is supported by Reuters (2012) where Forbes & Manhattan Coal Corp acquired two mines in South Africa with the motive of boosting the company's output. Navajo Nation Council Bill CAP (2013) reported that Navajo Nation bought Navajo Mine from Australian energy giant BHP Billiton with the aim of preserving employment for the community and the economy. However, findings in this study suggested that whilst some companies made new acquisitions in the same coal mining industry, others expanded their markets into other industries such as agriculture and energy products. This is supported by Ching-Mao-Li *et al*. (2017) who stated that China's coal industry diversified by expanding into other coal industries such as coal equipment manufacturing, logistics, and coal chemicals. One of the three selected coal mines in this study did not engage in acquisition but relied on expansion and optimisation of its current operations.

Diversification is shown to be imperative in this study. This may be done through extending into other mining sectors or working within the same industry but pursuing different operations. Other coal mines also diversified by engaging into totally different industries such as agriculture. This study shows that diversification enhances sustainability and efficiency.

4.5. Recommendations

4.5.1 Diversity for sustainability

This study recommends diversity through acquisition for coal mining companies in South Africa. This should not only include acquiring other coal mining operations but extends to other mining subsidiary sectors such as logistics operations. The study also recommends that in instances where the mine is not able to diversify through acquisition, the option of expansion and optimisation within the same coal mining company can be adopted. Diversity enhances sustainability for both the business operations and the communities they serve.

4.5.2 Transparency on mine closure reporting and environmental

The study recommends that coal mining companies report environmental effects and resolutions for accountability and transparency. This helps employees to plan ahead considering that the industry is a big employer in the country. In this way also, the coal mines adhere to the SDG's.

4. 6 Conclusions

This chapter summarised the chapters of this study from chapter 1 to 3. This was done to connect with the findings in this study. The chapter summaries were followed by literature findings. This was discussed under the study objectives of mining sustainability, transparency, and diversification. Findings found in literature informed what was found out in this study. Conclusions were drawn from this study in response to the set objectives. Recommendations for this study concluded this study. Further suggestions on topics for further research were suggested.

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