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University of the Witwatersrand
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THE STATE OF SOUTH AFRICA'S MINERAL EXPLORATION SUB-INDUSTRY AND WHAT THE FUTURE HOLDS

MSc (50/50)	MSc Dissertation	PhD
X		

Supervisor: Mr P. Leeuw

DECLARATION

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ABSTRACT

Global exploration expenditure has been on the increase over the last decade. Although the increase bodes well for the exploration sub-industry, exploration budgets are still off the levels experienced during the first decade of this century. Exploration expenditure cycles are like mining cycles and are largely influenced by metals demand, but the increase in exploration expenditure has not been in line with commodity price increases. Exploration and evaluation costs are the first to be cut when prices decline but are not necessarily the first budget allocations to be reinstated. The lack of exploration and new mining development could be detrimental in the future as the pipeline dries up. With ever-increasing demand, resources are being depleted faster than they can be replaced. Many countries are neither exploring the development of new projects nor concentrating on the development of projects for the exploitation of resources that will satisfy the increase in demand in the future. The South African mining industry contributes approximately 8 percent to the country's gross domestic product (GDP) but exploration expenditure, which underpins the industry growth has been on the decline over the past decade. Major mining companies have cut greenfield exploration budgets significantly and are rather concentrating on the sustainability of existing projects and re-assessing projects that require less capital investment. Investment in new projects is also impacted by political, legislative, policy and operational uncertainty. This research seeks to establish if South African exploration expenditure is in line with the global trend and to determine the factors that influence investment in the sub-industry. The research analyses current publications on the sub-industry both from a global and local perspective and analyses the current perceptions of major stakeholders and role-players in the South African exploration sub-industry. The intention is to strategically inform role-players on the outlook for the South African exploration sub-industry and to lend insight

into the reforms required to ensure the sustainability of the mining industry as a whole.

In memory of my grandmother

Poppie Storm

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LIST OF ABBREVIATIONS

AIM	Alternative Investment Market
DMRE	Department of Mineral Resources and Energy
GDP	Gross Domestic Product
JSE	Johannesburg Stock Exchange
NI	National Instrument
PDAC	Prospectors & Developers Association of Canada
PGM	Platinum Group Metals
SEDAR	System Electronic Document Analysis and Retrieval
TSX	Toronto Stock Exchange
TSX-V	Toronto Stock Exchange – Venture Exchange

1 CHAPTER 1

1.1 Introduction

Mineral exploration plays a pivotal role in ensuring the sustainability of the mining industry in various countries. It entails the prospecting of known deposits and the search for undiscovered resources to aid in resource estimation and further project development. Compared to the first decade of this century, global exploration drilling expenditure and investment have declined substantially and are way off the levels experienced during the last mining supercycle. This has occurred while the demand for minerals has increased with growing populations and the continued development of new technologies.

There are signs of growth in the sub-industry outside South Africa, most notably in Canada and Australia. The same recent upward trend elsewhere in the world is not being observed in South Africa. Once ranked first in exploration expenditure and investment on the African continent, South Africa is now ranked sixth and the outlook is bleak. This is a concerning trend as the country claims to boast the world's fifth-largest mining industry in terms of its GDP contribution.

The sustainability of the mining industry locally is thus heavily dependent on the exploration sub-industry for future project development. Global giants of the industry, such as Canada and Australia, as well as the growing trend in other large African countries, are driven by financial and regulatory mechanisms that make prospecting an attractive investment vehicle.

The available literature on the sub-industry in South Africa is often disaggregated and seldom discusses the issues at hand in-depth. The situation

also has an influence on the stakeholders and role-players within the sub-industry and on their perceptions of what the future holds.

The research explores the reasons behind the lack of investment in the sub-industry and attempts to draw a comparison between those countries that have realised recent growth and South Africa. It explores mechanisms and tools that encourage investment from a global perspective and attempts to highlight the local issues that hinder the growth of the sub-industry. Through a thorough review of available literature, the catalysts required for growth and where opportunities exist locally to bolster the sub-industry were established.

Further, through the conceptual analysis of source literature, the main themes and sub-themes that are being discussed in global and local contexts and their relationships and interconnectedness to one another were established. Further, the perceptions of major stakeholders and role-players of the sub-industry were gauged through their responses to a closed-ended survey. The results obtained were used to develop a perception index indicative of the current outlook within the sub-industry.

1.2 Research Motivation

Available data indicates that the budget allocations for mining exploration have steadily declined in South Africa. While there is a global increase in recent years in mineral exploration expenditure, South Africa is not experiencing the same trend. This is concerning as the South African economy relies significantly on the mining industry and, in a country blessed with a vast mineral endowment, the lack of mineral exploration does not bode well for the sustainability of the mining industry.

The specific internal and external factors that affect the investment climate in mining and exploration in South Africa and how big an impact they have had

on exploration and new project development in the country has been unclear. It was also unclear if the current investment climate with the various factors that influence it has created an environment where investing in mineral exploration and new project development is the preferred vehicle for medium- to long-term sustainable mining in South Africa.

1.3 Purpose of the Research

The purpose of this study is to determine what internal and external factors have an impact on the investment climate of the exploration industry both globally and locally. This is achieved through the conceptual analysis of quantitative secondary data gathered from available literature and qualitative primary data gathered from an online questionnaire completed by industry role-players and stakeholders.

The research lends insight into the current strategic direction of the major mining companies with regards to exploration expenditure and how many of their decisions are influenced by the factors established through the analysis of the data. The research indicates whether the current appetite for investment into the exploration sub-industry is conducive to the sustainability and growth of the mining industry in South Africa.

Once the main factors are determined, the study aims to understand the critical influences and relationships that these factors have on investment in the sub-industry and discusses the difference between the South African sub-industry and that of other countries globally.

The literature available in most cases addresses a single internal or external force that affects the industry and its lack of growth and seldom compares the current position of the South African exploration sub-industry to the rest of the world. Stakeholder perception, shaped by forces in the South African sub-industry, was deemed to be negative but it was unclear which factors have the

largest impact on exploration expenditure. Using the data gathered to establish the underlying problems and concerns should inform what change is required to steer the sub-industry in the right direction.

This report establishes how these factors will affect the long-term sustainability of the mining industry in South Africa unless urgent reform takes place. A comparison is drawn between the policies, programmes and systems in South Africa and the systems implemented by countries that have seen significant growth in the sub-industry. Recommendations to improve the current situation in South Africa are made. This will inform what the government of South Africa needs to implement and develop to encourage investment.

The report will aid the well-established major mining companies, exploration drilling companies and suppliers in South Africa in formalising their strategic direction and could potentially motivate new entrants into the business. By better understanding the underlying issues that stifle growth in the sub-industry, these can be addressed with time and recovery can be realised.

1.4 Problem Statement

With an ever-increasing demand for mineral products globally and taking into consideration South Africa's strong position to compete due to its vast mineral endowment, the country is not positioned well to increase its current mineral output and compete on the global market.

To compete in the global market, countries need to focus not only on increasing output but also on the long-term sustainability of their mining industry through investment in the exploration sub-industry and new project development. It is unclear if South Africa is investing enough in mineral exploration and new

project development to ensure the long-term sustainability of the mining industry.

To ensure the long-term sustainability and growth of the mining industry in South Africa, changes are required to stimulate investment in the mineral exploration sub-industry. Factors, including regulatory and policy uncertainty, corruption and lack of access to capital, are stifling the growth of the South African exploration industry and, due to these factors, the outlook is bleak.

The literature available seldom explores the relationship between various forces that, when combined, create an environment in which the mining industry thrives or not. Inadequate systems, policies and regulations or lack thereof have created an environment in which stakeholders and role-players in the sub-industry have a negative perception of and outlook on the sustainability of the sub-industry in South Africa; this negative perception further exacerbates the problem.

The relationship between these influencing internal and external forces needs to be determined and the impact thereof established. Establishing where the areas of concern are and their relationship to one another lends guidance to the government on where focus and change are required to create an environment where investment is encouraged. Robust regulation and policy frameworks, curbing corruption, ease of access to capital for new entrants and tax incentives are urgently needed to change the perceptions of role-players and stakeholders and encourage investment in the sub-industry.

1.5 Research Objectives

Various factors affect mining investment globally and include, among others, access to capital, economic growth, productivity of capital, mineral demand, metal price indices, global trade agreements, skilled labour and policy and regulatory stability. The main objective of the research is to identify the specific

critical external and internal factors that influence investment appetite and draw a comparison between those factors locally and globally. The research also explores the systems implemented by countries that have seen significant growth in the exploration industry and it determines how these vehicles can improve the investment appetite in South Africa.

The research establishes the current perceptions of major stakeholders and role-players in the industry through a qualitative analysis of results received from a closed-ended survey. This gives insight into how much of an impact the internal and external forces have on mineral exploration investment in South Africa and, through a global comparison, illustrates those factors unique to the South African sub-industry.

The research aims to identify the most prevalent themes from the literature and the degree of relevancy of the related sub-themes. This is achieved through analysing a vast amount of available literature using data mining software. The results are used to identify which themes are frequently discussed within a South African context and within a global context. This is important as certain themes have been identified in a global context as being fundamental to the development and sustainability of the mining industry. The research objective is to illustrate if the themes discussed in a local context are aligned with those themes that lead to increased investment elsewhere.

1.6 Research Questions

This research project answers the following questions:

- What are the factors that influence the mineral exploration investment climate in South Africa and are these factors unique to South Africa or are they comparable to those of other countries?

- What are the themes and sub-themes discussed in mineral exploration expenditure literature and how do they compare locally and globally?
- What are the current perceptions of major role-players and stakeholders in the South African mineral exploration sub-industry of the sustainability of the industry?

1.7 Research Limitations

For the research, due to the scarcity of disaggregated investment amounts, total expenditure data obtained for the exploration sub-industry in South Africa will be used as proxies to deduce the investment climate of the exploration sub-industry locally. The Department of Mineral Resources and Energy (DMRE) does not track nor regularly report any exploration statistics.

The sample size of the close-ended survey was small due to the limited number of contacts the author had at his disposal. It was unlikely that respondents from government, applicable departments and organised labour unions who were asked to participate in the survey would respond.

The accuracy of the conceptual analysis of the data mining software was unclear. This was largely because it is not well known and has not been widely used in analysing mining-related literature for the purposes as outlined in this research report.

There was a risk that the timing of the survey and the respondents' responses could be significantly influenced by the situation caused by COVID19. Although the impact of the pandemic on the economy cannot be ignored, a negative perception of the future of the industry should not be rooted solely in the economic impact of the pandemic.

1.8 Report Structure

This research report is divided into six chapters including Chapter 1. Chapter 2 presents the literature review, which contains the expenditure data for the last two decades and discusses the internal and external factors that influence investment into the exploration sub-industry in South Africa and compares these to those in the rest of the world. The chapter draws a comparison between the differing approaches, systems, policies, and regulations.

Chapter 3 gives a detailed overview of the research methodology applied. This includes the conceptual analysis of source literature using data mining software and the closed-ended survey used to collect responses from stakeholders and role-players in the sub-industry.

Chapter 4 includes the results of the conceptual analysis of the vast amount of literature on the subject both locally and globally using Leximancer data mining software. It establishes the main themes that the material addresses and the relationships among the different themes. This allows for the establishment of whether the external and internal factors identified in Chapter 2 are prevalent, discussed and addressed and whether there are underlying relationships among the different themes.

Chapter 5 includes the analysis of the results of the closed-ended survey prepared from the review of the literature and sent to major stakeholders and role-players in the industry. The responses are analysed to establish the perceptions of these role-players within the sub-industry. The data gathered indicated whether the external and internal factors identified and included in the survey have a positive or negative influence on exploration investment in South Africa. The chapter also illustrates the concerns of the role-players in the industry and gives insight into the future sustainability of both the exploration

sub-industry as well as the larger mining industry. Chapter 6 concludes and summarises the report.

2 LITERATURE REVIEW

2.1 Chapter Overview

Exploration investment and expenditure, in recent, is on the rise globally. South Africa has however seen a steady decline over the past decades and is not in line with the recent global trend. Mining exploration (referred to as prospecting in South Africa) plays a pivotal part in ensuring the sustainability of the mining industry.

This chapter introduces the current state of the exploration sub-industry in South Africa and compares this to the global trend. It creates an understanding of the major factors, both internal and external, that influence exploration investment and expenditure and compares these factors globally and in South Africa.

Recent developments in the South African mining industry indicate that there is growing concern over the health of the exploration sub-industry and the sustainability of the mining industry at large. However, more needs to be done to stimulate growth.

2.2 Background to the Mining Industry in South Africa

South Africa is a country well known for its mining. The country is rich in mineral resources, some of which account for a significant portion of the total world reserves. The resources of the country are estimated to total R35 trillion (Vegter, 2019a). The country boasts of having the world's fifth-largest mining industry in terms of its GDP value and, in 2019, mining contributed R226.6 billion to South Africa's GDP (Galal, 2020). The mineral resources of the

country include precious metals and minerals, energy minerals, non-ferrous metals and minerals, ferrous minerals and industrial minerals (Tennant, 2018).

The mining industry is critical to South Africa's socio-economic development and, in 2019, directly employed 460,015 people and contributed R24.2 billion in taxes and R143 billion in direct employee earnings which further contributed significantly to the economy (Minerals Council South Africa, 2019). Figure 2.1 shows the mining contribution to the GDP of South Africa from 2014 until the end of 2019. A decline from 2017 to 2018 and through to 2019 is noticeable.

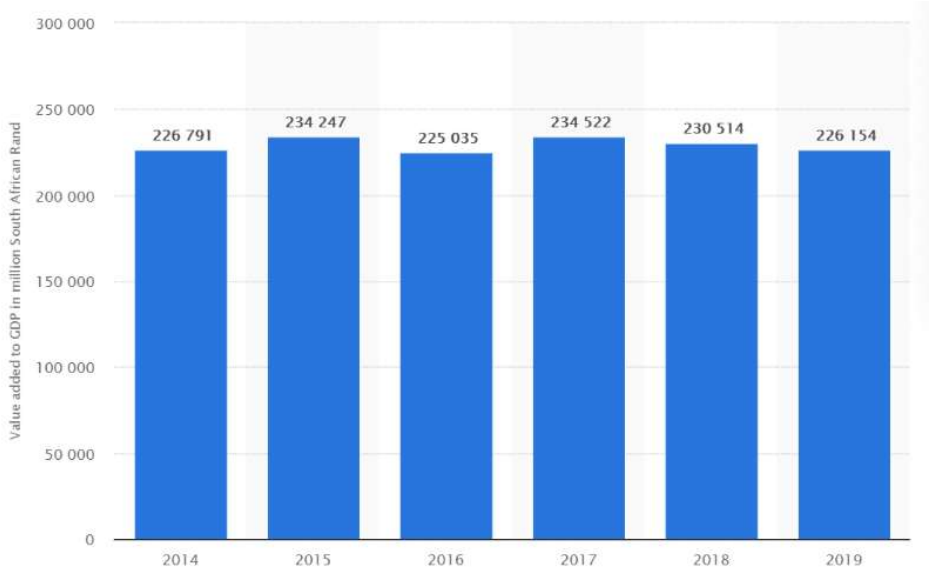

Figure 2.1: Value added to GDP in million South African Rands (Galal, 2020).

Mining remains one of the most important earners of foreign exchange in South Africa with many of the commodities mainly exported. The country produces numerous commodities, including gold, coal, manganese, chrome, platinum and diamonds. South Africa is the world's largest producer of platinum and is ranked among the largest diamond producers in the world (Tennant, 2018). While boasting of the world's largest reserves of platinum group metals

(PGM's), the country has vast potential for the discovery of other significant resource deposits not yet explored (Tennant, 2018).

Rare earth minerals are increasing in demand globally and the country has shown interest in developing projects for the exploitation of these minerals in the Namaqualand region. According to the Department of Trade and Industry, the rare earth minerals exploitation is currently dominated by China, which boasts of approximately 90 percent of the current world supply (Turner, 2019).

2.3 Exploration Expenditure Trend, Locally and Globally

Exploration drilling expenditure can provide useful insights into the health of a country's economy and the investment attractiveness of mineral producing countries (Jara et al., 2008). In addition to a country's geological potential, the investment climate is an important factor that affects investment in exploration drilling. Political and policy instability and uncertainty as well as legislative structures, which affect investment conditions, might cause mining companies to limit growth, divest and move elsewhere (Khindanova, 2015).

Mining exploration drilling, therefore, plays a very important role in establishing a pipeline for future mining developments (Minerals Council South Africa, 2018). South Africa's exploration budget declined by R4.4 billion between 2007 and 2017. The budget decreased from a high of R5.6 billion in 2007 to a low of R1.2 billion in 2017 (Makgala, 2019). Figure 2.2 shows South Africa's exploration spend over the past 60 years. This is a concerning trend and reflects a lack of new local investment driven by policy, regulatory and operational uncertainties that have inhibited new investment and exploration.

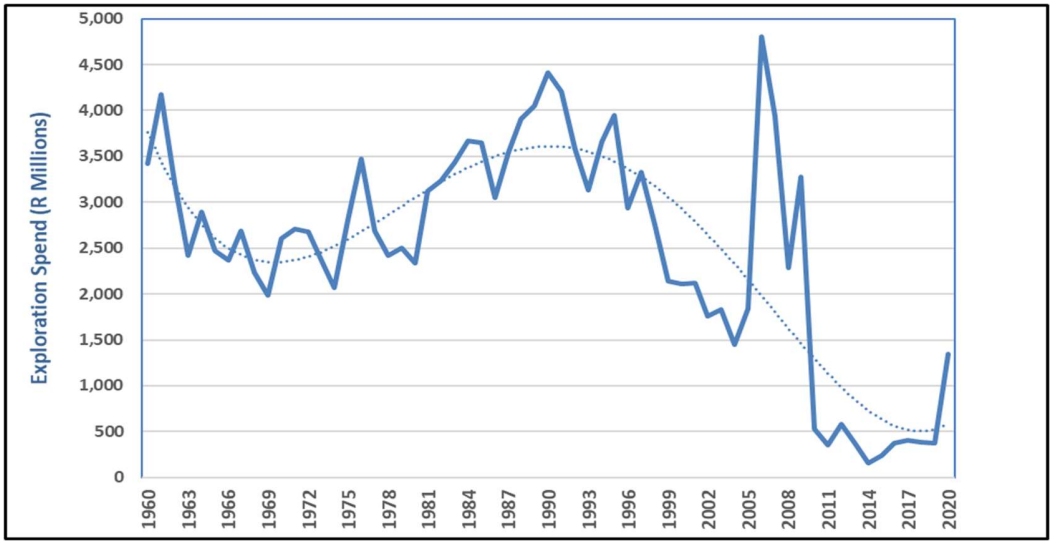

Figure 2.2: South African exploration spend in million South African Rands (Minerals Council South Africa, 2018).

Lim (2019) reported that global exploration expenditure grew by 15 percent from US$7.1 billion in 2016 to US$8.4 billion in 2017 and by another 19 percent in 2018 to US$10.1 billion. The forecasted growth for the year 2019 was estimated at between 5 percent and 10 percent but spending fell by 3 percent to US$9.8 billion.

S&P Global Market Intelligence's state of the market report from quarter one of 2020 forecasted a decline of 29 percent in global exploration expenditure. The outlook improved through the course of the year with expenditure data in October showing a decline of 19 percent for 2020 (McKay, 2019).

While exploration expenditure is on an upward trend in recent years globally, allocated budgets are still off the levels experienced during the most recent mining supercycle between the years 2000 and 2014, when the demand for raw materials was high (Ernst & Young Global Limited, 2018; Schwartz & Creswell, 2019). Table 2.1 indicates the fixed capital formation by type of

assets from 2000 to 2019. The average fixed capital formation is well below that experienced in the first decade of this century.

Table 2.1:Gross fixed capital formation, mineral exploration and evaluation 2000–2019

Period	Gross fixed capital formation by type of asset: Mineral exploration and evaluation (Million Rands)	Percentage change year on year
2000	549	-2%
2001	675	1%
2002	673	-17%
2003	691	4%
2004	533	-21%
2005	754	27%
2006	2 419	161%
2007	2 420	-18%
2008	1 795	-42%
2009	2 945	44%
2010	525	-84%
2011	369	-33%
2012	650	65%
2013	451	-36%
2014	196	-58%
2015	313	56%
2016	513	57%
2017	573	6%
2018	578	-4%
2019	579	-3%

Source: Minerals Council South Africa (2020)

The global trend in exploration drilling expenditure, like mining cycles, is mainly driven by metal prices. An increase in metal demand usually leads to an increase in exploration expenditure (Ferguson et al., 2018). However the observation now is that expenditure globally has been declining overall over the past two decades as resource demand increased and reserves were depleted. Figure 2.3 shows the mining industry market capitalisation, indexed metal prices and the pipeline activity index in a single plot.

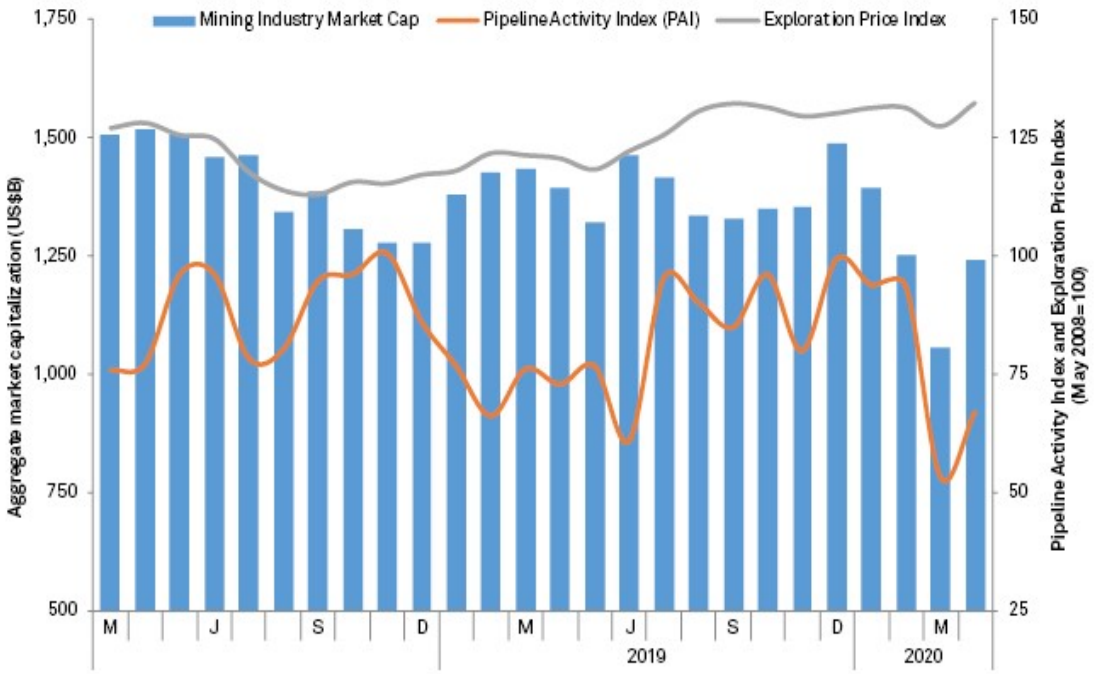

Figure 2.3: Global pipeline activity index and exploration price index, March 2018 – April 2020 (S&P Global Market Intelligence, 2020).

Known reserves of some of the most widely used metals, such as gold, are estimated to last only another 20 years with the current trend in increasing demand (Turner, 2019). Further exacerbating the current difficulties, the mining industry experienced a sudden negative economic outlook and commodity prices were pushed to multi-year lows by the end of the first quarter of 2020 due to a decrease in demand after the onset of the global Covid19 pandemic.

However, gold was the exception and has benefitted due to its investment attractiveness in volatile times.

Although projections for economic activity and commodity prices are still being revised downward, the recovery from the COVID19 pandemic remains uncertain. Metals' demand was expected to rebound in the second half of 2020 as industrial activity resumed (Murphy, 2020).

The fact that exploration budgets have been declining overall over the past two decades inherently poses a risk to the global mining industry. According to Ernst & Young Global Limited (2018; 2019), two of the top ten business risks the industry is facing are resource replacement and a lack of investment in New World commodities.

A clear growth strategy through the cycle will ensure sustainability and dividends at the top of the mining cycle (PricewaterhouseCoopers, 2017). The proportion of exploration budgets allocated in 2016 by major mining companies is only a quarter of those allocated by the same in 1997 and down to 2 percent in 2018 (Ferguson et al., 2018).

Globally, over the past five years, expenditure on resource replacement has decreased by 66 percent. Mining companies are allocating the funds they have to keep current projects sustainable rather than prospecting for new resources (PricewaterhouseCoopers, 2017).

According to an article published by PricewaterhouseCoopers (2017), the top 40 mining companies globally were relatively comfortable with current exploration expenditure and confident that they can acquire smaller projects with ease at competitive prices. However, the current levels of exploration will

need to be addressed to deliver on the long-term increase in demand for traditional resources as well as the demand for New World commodities.

South Africa's place atop the list on the African continent for the ease in attracting early-stage funding for exploration programmes and project development between 2000 and 2009 is now occupied by several other African countries. Currently, exploration investment places the country in the sixth position, with a total of US$77.4m spent in 2020 – its lowest level since 2002 (Steyn 2021). South Africa is placed behind the Democratic Republic of the Congo, Burkina Faso, Ghana, Côte d'Ivoire and Mali with the Democratic Republic of the Congo reporting more exploration investment than South Africa to the value of approximately US$269.5 million in 2018 (Vegter, 2019b).

There has been a 7.8 percent decline in overall exploration spending in Africa to just more than US$1bn in 2020, accounting for 12.4 percent of the global exploration spend. The South African share of the African exploration spend continues to decline (Steyn, 2021). Figure 2.4 illustrates the top ten African countries over the past two decades; the decline in South African expenditure is noticeable.

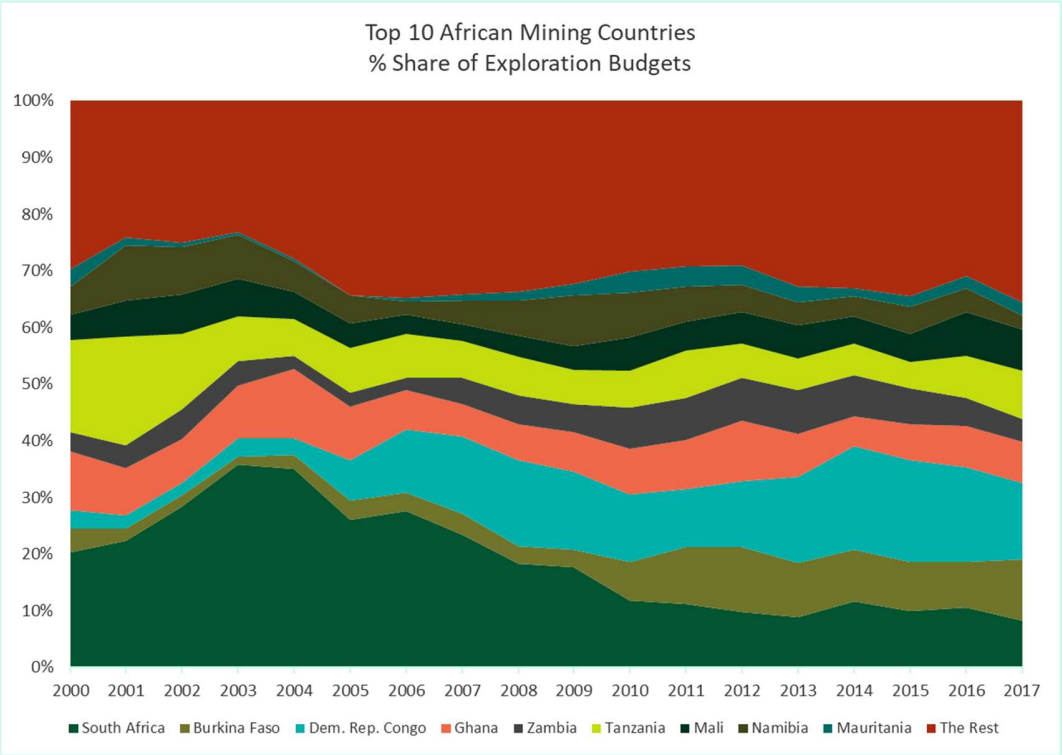

Figure 2.4: Top ten African mining countries percentage share of exploration budgets 2000–2017 (S&P Global Market Intelligence, 2020).

For South African mining to remain relevant beyond 2030, mining companies will need to undertake large scale exploration into untapped resources, such as those in the Northern Cape, which include 80 percent of the world's high-grade manganese resources and very large iron ore deposits. To be able to generate long-term investment for the increase in greenfield exploration expenditure, a conducive and stable regulatory framework must exist (Cassim et al., 2019).

2.4 Creating an Attractive Investment Environment

The biggest opportunity in revitalising the exploration industry lies in investing in junior mining companies. The growth of junior miners in the mining industry

has been underwhelming due to poor policy and regulatory decision making. Junior mining is primarily driven by the discovery of resources, innovation and growth of projects to generate maximum equity returns, which have been, historically, hindered by costly regulatory and policy compliance issues (Müller, 2019).

The Minister of Mineral Resources published the revised Mining Charter in 2018. The charter includes regulatory changes (discussed below), which aim to improve the investment climate by ensuring policy and regulatory certainty while bolstering the effectiveness of the charter in terms of transformation and ensuring increased competitiveness in the sub-industry.

In terms of policy perceptions, South Africa ranks third to last in interests among 15 African countries with significant mining (Vegter, 2019b). Globally, it ranks 56th out of 91 countries ranked by the Fraser Institute's Annual Perception Survey 2019 Investment Attractiveness Index. This is an improvement nonetheless from the 81st position in 2017. It is ranked 21st in the world for mineral potential in 2019.

The revised Mining Charter states that prospecting rights fall outside the Broad-Based Economic Empowerment obligations and only at the start of any development would the requirements become effective. This should motivate venture capital companies to invest in exploration and new project development. The investors who provide the capital, at high risk, own 100 percent of the prospecting right until a mining right is granted for a feasible project (Seccombe, 2018). These investors could then sell their rights to other potential investors at a profit and, in this way, the exploration industry would be well positioned to experience growth.

Additional support measures have also been put in place. The DMRE and Minerals Council have set up a programme, namely the DMRE's Junior Miners' Programme and Junior and Emerging Miners' Desk to assist new entrants in the mining industry. The DMRE minister has also dedicated a national investment of R20 billion to an integrated and multidisciplinary mapping programme to boost global investment in local exploration. The R20 billion dedicated by the minister is expected to be made available over the next ten years (Cavvadas et al., 2020).

Other global mining jurisdictions record and publish exploration-related statistics as an important leading indicator of the health of their mining industry. Those exploration statistics do not only reflect spending but also operational metrics such as metres drilled per month. South Africa neither tracks nor regularly reports any exploration statistics. It is believed that there are between 4 500 and 5 000 prospecting rights granted in South Africa that should be active but due to the disaggregated information and information not published by the Department of Mineral Resources and Energy, it is not possible to establish how many prospecting rights are being worked (Steyn, 2021).

The South African Minerals Resource minister stated in 2019 that the department would develop an integrated licensing system to improve application turnaround time and address the current backlog in licence applications. The plan to improve the turnaround time for granting and approving licences transparently and fairly is more in line with international best practice and can be compared to Botswana which, in 1999, revised its existing laws to align with international best practices. This approach has worked well for the country and its policies are predictable and clear; this attracts investment (McKay, 2019).

Time frames for decision making are also significantly shorter in Botswana with turnaround times of 60 days for prospecting licences and 20 days for large scale mining licences. Very strict qualifying criteria, including the applicants having the required financial resources, technical experience and competence to manage efficient and profitable mining operations, are also used (Vegter, 2019b).

The lack of tax incentives, more so than political instability and legislative uncertainty, is being heralded as the major driver behind the investment decline in South Africa (Greve, 2019).

Greenfield's exploration budget share is at an all-time low and, in 2018, 1.6 percent of major mining companies' budgets was allocated to prospecting, a slight increase from 1.4 percent in 2017. The exploration expenditure of established mining companies far outweighs the expenditure of junior miners largely due to the lack of access to funding by junior mining companies (Lui, 2019).

One of the main challenges to the sustainability of small and medium junior mining companies is access to equity finance. To assist these companies in procuring financing for new projects, the South African government has implemented a tax incentive scheme for investors through venture capital companies (Cavvadas et al., 2020). The incentive scheme is based on highly successful incentive schemes such as the Canadian Flow-through Share Scheme. In Australia, exploration companies receive grants from the government for projects for smaller growing companies and the London Stock Exchange's Alternative Investment Market (AIM) receives capital gains tax advantages for investing in exploration (Greve, 2019).

The South African Section 12J (Section 12J of the Income Tax Act No. 58 of 1962) tax legislation was introduced in 2009 to provide tax incentives to companies and individuals who invest in venture capital companies. These companies then fund small and medium-sized enterprises with long-term growth potential in industries where financing is usually hard to secure. Investors will receive a tax benefit in the form of a tax deduction with respect to money invested to acquire shares in the approved venture capital companies (Cavvadas et al. 2020).

Section 12J of the Income Tax Act is like the United Kingdom's venture capital trust regime. It allows investors to benefit from tax concessions of up to a 100 percent deduction of the amount invested, arising from their investment in a mining company in the period before it generates sufficient taxable income from production. The incentive thus far has not yielded a significant increase in exploration financing in South Africa and has more commonly been used in other industries (Cavvadas et al. 2020).

In February 2021, the Minister of Finance in his annual budget speech announced that Section 12J of the Income Tax Act, which was scheduled to expire in June 2021, would be abolished since it was not achieving its intended outcome. Treasury is currently reviewing the tax incentives for research and development but, without an alternative in place, this is a major setback for the industry.

The Canadian Flow-through Share Scheme in comparison has led to large numbers of listed junior miners; there are over 1 200 juniors listed in Canada and over 700 in Australia. In comparison, there are only ten in South Africa (Greve, 2019). The holders of flow-through shares are entitled to certain tax benefits. They become ordinary tradable shares of the issuer once bought by an investor and when the tax benefits are conferred.

In contrast, in the venture capital companies' programmes, such as Section 12J, flow-through shares allow junior or emerging mining companies to obtain funding for exploration. The company directs certain expenses to the holder of the shares. The expenses are then deemed to be incurred by the investor and not the company and accordingly reduce the investor's taxable income.

The Canadian programme is further supported by an additional mineral exploration tax credit available to individual investors for grassroots exploration. The Prospectors & Developers Association of Canada (PDAC) believes that the flow-through shares programme has propelled Canada to be a global leader in mineral exploration and mining. Between 2011 and 2017, 68 percent of the funds raised on the TSX and the TSX-V were raised through flow-through shares (Cavvadas et al., 2020).

Junior mining companies are listing where there is easier access to the funding required to develop projects. While there are opposing views on whether the new Mining Charter relies too much on junior miners to revitalise the industry, there is consensus that junior mining companies in the industry are vital to transformation and ensuring the sustainability of the mining industry and that more favourable policies and funding models are crucial to reversing job losses and unlocking South Africa's mineral potential (James, 2019).

The introduction of a flow-through share scheme in South Africa was recommended well ahead of the implementation of Section 12J of the Income Tax Act No. 58 of 1962. South Africa is now closer to finally introducing a flow-through share scheme following discussions involving the Minerals Council South Africa, the DMRE, the South African Revenue Service and the National Treasury (Creamer, 2020). The JSE has, in support of the direction of the

government, offered to unpack its listing requirements and consider removing barriers to entry into the market (Cavvadas et al., 2020).

In an article in Creamer Media 2020, Paul Miller, the director of AmaranthCX, stated that the flow-through share scheme alone will not revitalise the sub-industry and a holistic approach that entails several systems and programmes needs to be implemented for South Africa to enjoy the success of Canada within this sub-industry.

Miller stated that the following should also form part of the approach: "… comprehensive stock exchange involvement, the imposition of national instrument (NI) mineral project disclosure standards, the implementation of system electronic document analysis and retrieval (SEDAR) that reports securities-related information, the availability of pre-competitive geological data, the curation and re-use of competitive geological data and setting up of proper prospecting administration" (Creamer, 2020).

Most of the exploration funding in South Africa is allocated to brownfield exploration thereby avoiding the risks associated with greenfield exploration. The bulk of brownfield's exploration capital is spent on existing mines and the larger, well-known mining companies (Greve, 2019).

As much as a stable regulatory framework is required to generate long-term investment for exploration and new project development, other factors influence the ease with which investments are made in the sub-industry in South Africa. One of the largest contributing factors as to why companies choose to invest in existing projects for risk aversion is the fact that South African mining is highly exposed to currency and metal price volatility (Cassim et al., 2019).

The declining productivity and current cost position of existing mines in South Africa further impact long-term investment in exploration. In South Africa, 42 percent of mining revenue and 47 percent of jobs are in the bottom quartile of global cost competitiveness (Cassim et al., 2019). The industry's brief profitability in 2017 has been lost. Higher input cost countered the rise in revenue in 2017 resulting in an R11 billion overall loss for the industry in South Africa (Vegter, 2019a).

The lack of operational and cost competitiveness in the South African mining industry is largely due to the country's ageing mines with declining grades and operating difficulties as well as the disconnect between commodity pricing, productivity and employee earnings. Even when adjusting for inflation, employee earnings have grown 5 percent per year since 2005 (Schwikkard, 2021). This leaves no room for additional funding to be allocated to exploration and new project development. The lack of investment in greenfield exploration and the development of new projects could be directly contributing to the declining cost competitiveness as the cost of mining older assets increases.

This cost position is further exacerbated by social and community-related obligations such as employment restrictions within the surrounding local communities where specific skills are often difficult to find. Onerous supplier and manufacturing ownership agreements and procurement requirements are often untenable. What makes greenfield exploration even more difficult is that many of the sites are often located in remote areas and lack easy access to equipment suppliers, fabrication and service providers and training facilities.

South Africa could look to increase labour flexibility and curb union powers. Organised labour is increasingly putting mining companies under pressure and stoppages, exuberant wages and employment demands are further eroding the potential profitability of mining operations and thereby having a direct impact

on future investments. With the current cost of mining and the commodity prices not ideal, the margins of some emerging miners are of such a nature that frequent stoppages have significant potential to bring a project to its knees (Vegter, 2019b).

In South Africa, curbing corruption has also become a focal point. Multiple stakeholders and role-players have indicated that the regulations and policies themselves are not always the biggest hurdle but how they are regulated and implemented are. Corruption runs rampant and junior and emerging miners are easier targets than large mining companies (Mazumdaru, 2017).

2.5 Chapter Summary

While exploration expenditure outside South Africa is on the rise, locally it remains in decline. South Africa now ranks sixth in terms of exploration expenditure on the continent while boasting of some of the world's largest reserves of a range of minerals. The mining industry is critical to South Africa's socio-economic development and mining remains one of the most important earners of foreign exchange in South Africa. The threat to the sustainability of the industry is of real concern.

The decline is a concerning trend and reflects a lack of new investment driven locally by policy, regulatory and operational uncertainties that have inhibited growth in the industry. Declining productivity and the cost position of existing mines in South Africa further impact long-term investment in exploration.

For South African mining to remain relevant, mining companies will need to undertake large scale exploration into untapped resources and focus on new project development. Mechanisms that have driven growth in the industry

include increased tax incentives, access to capital, policy and regulatory certainty, technology and better cost positions.

The current tax incentive programmes in South Africa, such as Section 12J of the Income Tax Act, are not being utilised for their initial intended purposes. There are no flow-through share schemes and, currently, there are no tangible tax breaks that would motivate private investment in the sub-industry. These mechanisms have proved to boost the sub-industry in other countries such as Canada and Australia and have become prevalent in developing countries on the African continent, which have now surpassed South Africa in annual exploration expenditure.

Access to capital remains a barrier to increased growth in the sub-industry. Without tangible flow-through programmes and tax incentives, access to capital, which would otherwise motivate new entrant into the sub-industry, is heralded as the biggest barrier to growth in the industry. Hundreds of junior miners are listed on Canadian and Australian stock exchanges while only a handful is listed in South Africa.

Current policy and regulatory structures play a major role in the investment climate of the sub-industry. The revised South African Mining Charter includes changes that deal with regulatory and policy uncertainty. Additionally, the Broad-Based Economic Empowerment obligations fall outside prospecting and they are only enforced in the development stage as a way of motivating private investment in the sub-industry.

Prospecting rights can be sold off to mining investors for a profit, which could be an attractive investment vehicle for investment companies. Changes to licensing requirements and turnaround time as well as a sizeable investment

into the geological database of South Africa could contribute to making South Africa competitive in the global market.

The South African exploration sub-industry is under pressure due to a lack of investment by major mining companies. Mining companies prefer to allocate prospecting budgets to brownfield exploration, taking a more risk-averse approach and focusing on current assets rather than new project development. South Africa's exposure to metal price volatility because of a weak currency might also explain the risk-averse approach of mining companies in the country.

The declining productivity and current cost position of existing mines in South Africa place the industry in a position where it cannot be competitive in the global arena. This is largely driven by the country's ageing mines with declining grades and operating difficulties as well as the disconnect between commodity pricing, productivity and employee earnings.

Social development requirements and organised labour demands exacerbate the financial difficulties of mining companies and exploration budgets are the first to be cut.

It remains unclear if the revised Mining Charter with its reliance on junior miners will revitalise the industry. The mechanisms and tools that have proven to stimulate growth in the sub-industry outside of South Africa need to be explored and implemented.

The next chapter will discuss the methodology used to analyse the literature sources from both global and local perspectives to establish what the main themes and sub-themes are that are being discussed with regards to the exploration sub-industry, its growth and sustainability. The method applied to

establish what the perceptions of the sub-industry are in South Africa by engaging with industry role-players and stakeholders is also outlined.

While South Africa remains reliant on the mining industry's contribution to the economy, a healthy investment climate would motivate further investment into exploration and the development of new projects that would ensure the sustainability of the mining industry.

3 RESEARCH METHODOLOGY

3.1 Chapter Overview

This chapter outlines the methodology used in establishing the main themes and sub-themes discussed in global and local literature sources by making use of text analysing qualitative software. It also outlines the methodology applied in establishing the perceptions of stakeholders and role-players in South Africa on the current health of the sub-industry. The influence of factors identified in the research can be determined through the analysis of questionnaire responses submitted by the respondents.

3.2 Conceptual Analysis of Exploration-Related Literature

A conceptual and relational analysis of exploration-related literature was undertaken using Leximancer, an advanced text analysing qualitative software program. The aim of the source literature analysis was to establish the main themes related to exploration expenditure that were being discussed in the source literature. The software highlights the main themes and illustrates how these themes and sub-themes are interconnected and interdependent on one another. This approach allows themes discussed in the literature to emerge from the data rather than to predefine themes to obtain the desired outcome.

The source literature chosen was divided between local and global contexts and included 31 global and 30 local context articles. The source literature used for the analysis included both primary and secondary sources sourced through the global search engine Google. Articles were also sourced from the social media platform LinkedIn. These sources were reviewed and included media publications, material from professional associations, peer-reviewed articles, conference papers, official reports and opinion pieces. Care was taken during

the review to include all articles related to exploration expenditure to achieve an unbiased result from the analysis.

Once the programme has read the source literature, a visual concept map is created to accurately capture the nature of the content. The concept seeds were generated by the first step in the analysis. A thesaurus was then generated. All standard operational settings in Leximancer were set to default except for removing the identification of name-like words and merging word variants such as South Africa and South African, world and global. Word-like concepts with similar meanings were merged and concepts of low semantic meaning such as page and overview were removed. Finally, the results were generated to construct the visual concept map, a count of the concepts and the relevance within the sources.

Within the visual map, concepts are clustered into higher-level themes and are depicted as coloured circles based on their frequency of use and relation to each other. The themes are also heat-mapped to indicate importance with the more dominant themes appearing in red and orange and those less dominant in colder colours such as green and blue.

The location of the themes and concepts on the map also indicates relationships among the themes, with overlapping spheres indicating the strongest relationship and themes on opposite ends of the map demonstrating a lesser relationship. Additionally, the size of the circles indicates the prominence of themes within the dataset being analysed. The grey network of lines between concepts indicates the most likely connection between concepts.

3.3 Quantitative Analysis of Survey Data

A descriptive research method through a closed-ended survey was carried out to investigate if the perceptions of major stakeholders and role-players in the industry were positive or negative.

The survey was published through the commercially available online platform SurveyMonkey®. The list of potential respondents was compiled through the known contacts of the researcher and those additionally supplied by colleagues in the sub-industry. Organised labour and government official contact details were obtained online through LinkedIn or government websites such as the DMRE website. The respondents had to be directly involved or to have had an influence on the exploration industry and were carefully chosen to include both globally and locally affiliated respondents.

The survey consisted of 23 questions and the link was sent to 31 potential respondents. It was conducted between 2 October 2020 and 30 October 2020. A copy of the questionnaire is attached to this report as Appendix 1. The respondents included projects managers, project geologists, equipment suppliers, contracting company owners, academics, industry experts, organised labour and government representatives and mineral resource managers of large mines in South Africa.

The link was shared with the selected respondents. The first three questions asked the respondents about their role, experience and affiliation, whether global or local. Two questions thereafter asked the respondents to indicate whether the budget allocation for exploration mining in South Africa had increased or decreased according to their knowledge and whether the current declining productivity and cost position of existing mines had an impact on exploration investment in South Africa.

The following 17 questions were formulated as a closed-ended survey to include the factors that are perceived to have the largest influence on exploration investment and mining development in South Africa. This supported the review of available literature discussed in Chapter 2 and the relationships between the various factors. For each of the 17 factors, respondents were asked to select one of the following five responses that best described their perception of the impact the factor had on the industry:

- Encourages exploration investment in South Africa
- Does not influence investment at all in South Africa
- Has a minor influence on exploration investment in South Africa
- Has a major influence on exploration investment in South Africa
- Would not invest in exploration in South Africa due to this factor

The last question asked the respondents to provide a short written response to indicate whether they are concerned about the sustainability of the mining industry as a whole and provide a reason for their opinion (see Appendix B).

Except for responses to the impact of mineral endowment on exploration investment, the responses to the 16 other factors perceived to have the largest influence on exploration investment were quantitatively analysed. A determination of the factors, which were perceived as having the smallest or largest and most positive or negative impact on exploration investment in South Africa was made. The responses were plotted on a distribution graph with the skewness indicating whether the perceptions of the current state of the sub-industry and the larger industry in South Africa were positive or negative.

3.4 Summary

The questionnaire which was formulated and sent to role-players and stakeholders in the sub-industry and the subsequent analysis of responses will enable the formulation of a perception index. By analysing the responses on the perceived influence of factors identified in the research and the impact they have on investment in the sub-industry, areas of concern that should be addressed can be identified. By using text analysing software to analyse large volumes of literature, the identification of the main themes and sub-themes and their interconnectedness to one another within the text is enabled.

In the next chapter, the establishment of the themes that are discussed in global and local literature lends insight into whether the identified themes contribute or act as barriers to growth within the sub-industry and if they are known and being addressed.

4 CONCEPTUAL ANALYSIS OF EXPLORATION-RELATED LITERATURE

4.1 Chapter Overview

A conceptual analysis of exploration literature on both global- and local-focused sources was undertaken using Leximancer text analysing software. This was done to lend insight into the main themes that are contained and discussed in these sources. Globally, exploration expenditure has been improving over the past few years, but, in South Africa, it is still declining. Countries such as Canada and Australia have tools and mechanisms in place that encourage investment, but the current focus in South Africa seems to be misaligned.

4.2 Background to the Analysis

A large amount of literature regarding mining exploration investment and expenditure is available online. Most of the articles focus on exploration investment and expenditure globally are within larger jurisdictions and regions. The focus of the available literature is often varied. The purpose of the Leximancer analysis was to efficiently review all the selected literature about exploration investment and expenditure both globally and locally. The analysis included 31 articles with a global focus and 30 articles with a local focus.

The review then allowed the researcher to identify the most prevalent themes from the literature and the degree of relevancy of the related sub-themes. The results were used to identify which themes were frequently discussed within a South African context and which within a global context. This is important as certain themes have been identified in a global context as being important to the development and sustainability of the exploration sub-industry.

4.3 Results

4.3.1 Global literature perspective

The themes map generated by Leximancer on the literature sources within the global context of mining exploration, displayed in Figure 4.1 and summarised in Table 4.1, resulted in 11 major themes.

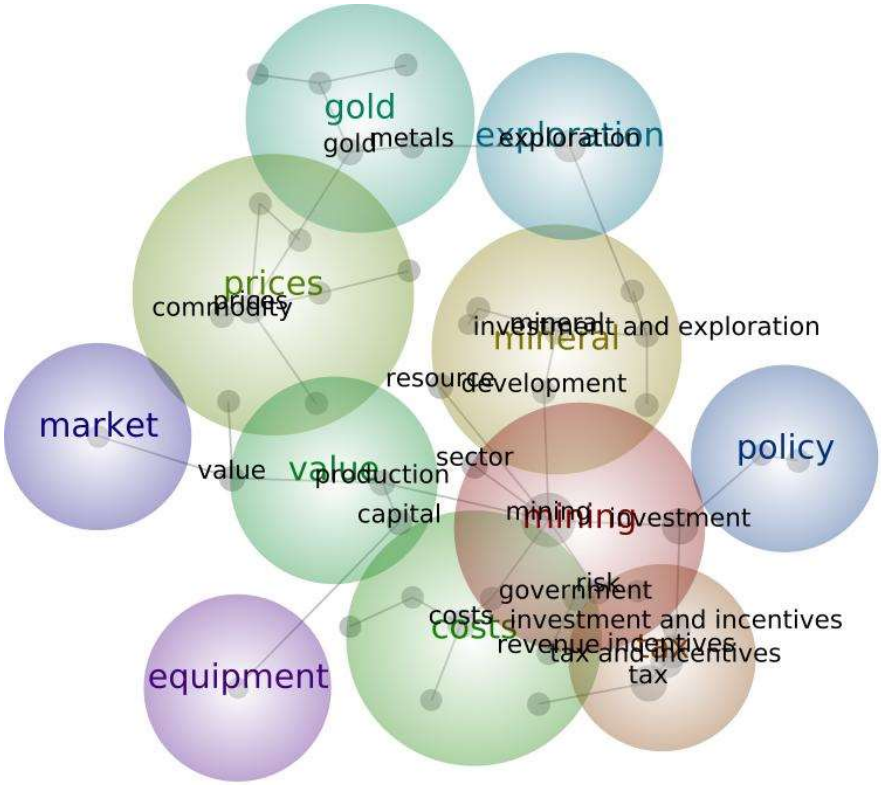

Figure 4.1: Theme map generated by Leximancer, resulting in 11 major themes from the global context sources.

Table 4.1: Main themes and sub-themes generated by the conceptual analysis of globally focused literature sources.

Rank	Main themes	Sub-themes
1	**Mining**	Mining
		Investment
		Government
		Risk
		Sector
2	**Mineral**	Investment and exploration
		Resource
		Development
3	**Tax**	Investment and incentives
		Revenue and incentives
		Tax and incentives
4	**Cost**	
5	**Policy**	
6	**Value**	Production
		Capital
7	**Equipment**	
8	**Market**	
9	**Prices**	Commodity
		Prices
10	**Gold**	Gold
		Metals
11	**Exploration**	Exploration

In Figure 4.1, the most prevalent and important theme is *mining* in red with a sizeable sphere. This is as expected because the predominant theme in the literature used for this research was *mining*.

The relationship of the *mining* theme to other themes within the map is worth noting. The *tax* theme is coloured in a warm orange colour, indicating significant importance. The size of the *tax* sphere is not as prominent as that of *mining* but the overlap between the *mining* sphere and the *tax* sphere is indicative of a strong relationship between the two themes. Within the *tax*

theme, the related sub-themes are *incentives* and *investment* which indicates that tax incentives influence investments.

The *costs* theme is shaded in green, which is indicative of its lesser importance within the literature analysed although there is a clear relationship between it and the *mining* and *tax* themes. The related sub-themes within these themes include *incentives*, *revenue*, *risk*, *government*, *cost* and *investments*; all are connected by the grey network lines indicative of their relationships to one another. *Mining* and *exploration* were connected 236 times with an 84 percent likelihood of being related to each other within the literature sources.

Another prominent theme shaded in yellow, which has a strong relationship to the *mining* theme is *mineral*. Sub-themes related to the *mineral* theme include *investment* and *exploration* and *resource* and *development*. It can, therefore, by extension be concluded that investment in exploration and resource development are important to the *mining* theme within the source literature. It is worth noting that although the *policy* theme is shaded in blue, which is indicative of minimal importance within the source literature, a relationship between the *mining* and *policy* themes nonetheless exists.

The *prices*, *market*, *gold* and *exploration* themes are all connected by the grey network lines. Within the *prices* theme, related sub-themes of *commodity* and *prices* are present. These are connected to the *gold* theme, with a related sub-theme of *metals*, which in turn is connected to the *exploration* theme. From the source literature analysed, exploration investment is strongly linked to commodity prices and the metal price index and value has a clear relationship to cost, which is to be expected.

4.3.2 Local literature perspective

The theme map generated by Leximancer on the literature sources of mining exploration within the local context, seen in Figure 4.2 and summarised in Table 4.2, resulted in 13 major themes.

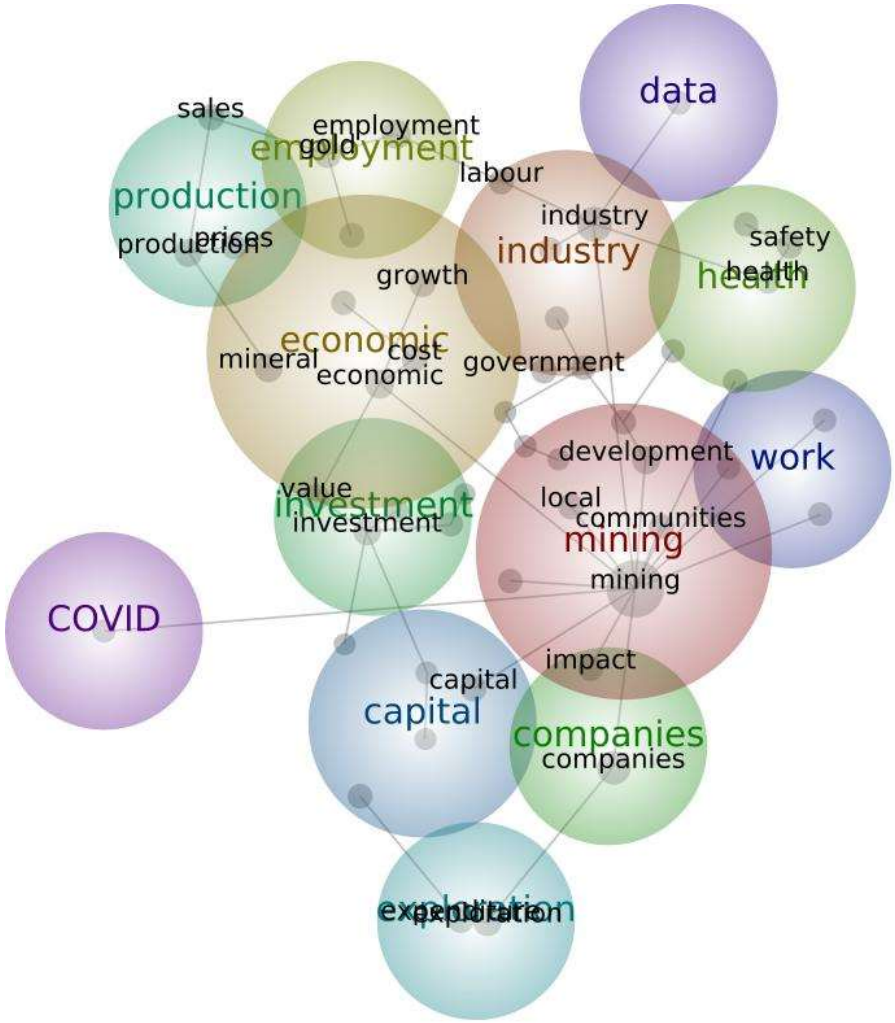

Figure 4.2: Concept map generated by Leximancer, resulting in 13 major themes from the local context sources.

Table 4.2: Main themes and sub-themes generated by the conceptual analysis of locally-focused source literature.

Rank	Main themes	Sub-themes
1	**Mining**	Local communities
		Development
		Mining
		Impact
2	**Economic**	Mineral
		Economic
		Cost
		Government
		Growth
3	**Industry**	Industry
		Labour
4	**Capital**	Capital
5	**Exploration**	Exploration
6	**Companies**	Companies
7	**Investment**	Value
		Investment
8	**Covid**	
9	**Work**	
10	**Health**	Safety
		Health
11	**Production**	Sales
		Production
12	**Employment**	Employment
		Gold
13	**Data**	

As expected, the most prevalent and important theme is *mining* in red with a sizeable sphere. It was a dominant theme within the source literature.

Another theme with a large sphere that was generated by the Leximancer software is *economic*. The *economic* theme is shaded orange which is a further indication of its importance within the source literature and it overlapped four other themes, namely *production*, *employment*, *investment* and *industry*. The *economic* theme includes related sub-themes such as *cost* and *growth*.

The *industry* theme is further connected via the network lines to related sub-themes that include *health* and *safety*, *labour* and *employment* and *development*; this is an indication of a strong underlying sense of social responsibility. The sub-theme of *development* interconnected to a range of sub-themes, thus confirming the expectation that mining plays a major role in ensuring the continuation of the development of communities around areas where mines are situated.

The *investment* theme is linked to *economic* and *capital* themes. This was expected but the blue shade indicates that these themes had minimal importance in the source literature. The related sub-themes, including *value*, are synonymous with investment. It was expected that the *investment* theme would overlap with the *industry* and *mining* themes in Figure 4.2.

The *production* theme is placed a distance away from the *mining* theme and is shaded in green. It includes related sub-themes such as *prices*, *cost* and *sales*. The *production* theme overlaps the *employment* theme. The relationship between the two within the source literature can be explained by the fact that the mining industry plays an important role in employing a vast number of people.

The *exploration* theme is linked to the *mining* theme via *capital* and *companies* themes. This was an unexpected outcome as one would have thought that there would be a strong relationship between mining and mineral exploration. There were also no related themes, except for *capital* and *companies*, shared among the other expected themes such as *investment*, *economic growth* and *development*.

No themes were generated for *policy*, *regulation*, *tax* or *incentives* in the local source literature as was the case for the global source literature. These themes are often perceived as some form of barrier to exploration investment in South Africa.

Uncertainty surrounding policy and regulation and the lack of tax incentives have been predominant in recent dialogue about the current state of the South African exploration sub-industry. The *tax* sub-theme was only counted 256 times with a weighting of 8 percent, which did not warrant a sphere on the themes map and was related to the *exploration* theme only 35 times and to the *investment* and *incentives* themes only 16 times. *Policy* and *regulation* themes were only counted 201 times and only related to *exploration*, *investment* and *growth* themes 27 times within the source literature.

The Covid19 pandemic and the national lockdown also featured as a theme which was surprising as the amount of literature that assesses the impact of the pandemic on the industry is not readily available and only in small amounts. Although the sphere is far removed and shaded blue to indicate minimal importance, the medium- to long-term impact of the pandemic on the exploration sub-industry in South Africa should not be underestimated. The full impact of the pandemic on the sub-industry in the coming years warrants further research.

4.4 Analysis

From the analysis of the literature used in the analysis of the global perspective, themes identified as being the mechanisms that drive investment in the sub-industry clearly show relationships and interconnectedness to one another. The relevance of themes such as *policy*, *cost*, *tax incentive*, *commodity prices*,

value and *capital* are clearly illustrated in the theme map generated by the software.

The theme map generated from source literature on the local perspective, however, indicates a strong focus on social and economic development. The mechanisms that have been identified as factors that are important for creating an attractive investment environment were found to be of lesser relevance and importance in the local source literature. Factors, such as access to capital, tax incentives, commodity prices, cost of mining, value and capital, do not feature predominantly.

The results indicate that local source literature is focused on themes that differ from those of global literature. Themes such as *tax incentives, policy and regulatory mechanisms, certainty, resource development, value creation and capital* that are expected to generate growth in the sub-industry are not discussed frequently.

The global literature clearly indicates that the underlying mechanisms that drive the sub-industry – tax, value, policy and costs – are well understood and are discussed frequently. It is concerning that these themes that will improve the exploration sub-industry encourage investment and ensure the long-term sustainability of the mining industry are not discussed frequently in the local literature.

The themes that were expected to be the main themes from a South African perspective – *tax incentive*, *access to capital*, *policy* and *regulations* – did not feature prominently. This begs the question of whether these themes that require attention are given sufficient thought in South Africa. The themes, which have placed countries such as Canada and Australia in a position where the

exploration sub-industry is healthy and growing, should be discussed frequently and in-depth locally.

4.5 Chapter Summary

The Leximancer analysis of global and local literature gave insight into what main themes and sub-themes were frequently discussed. Local source literature is focused less on the factors identified in the global source literature that create growth in the industry. Programmes that encourage investment in those countries that have been successful in regenerating the sub-industry are not prevalent in the dialogue discussed locally. The content of the local source literature is not focused on the mechanisms required to stimulate growth in the industry.

With the local source literature not focused on mechanisms to stimulate growth, what are the perceptions of major role-players and stakeholders on the future growth of the sub-industry and the sustainability of the mining industry?

5 PERCEPTIONS OF SOUTH AFRICAN ROLE-PLAYERS AND STAKEHOLDERS

5.1 Chapter Overview

Often the perceptions of major stakeholders in a sub-industry are indicative of the environment within which the sub-industry operates (Dunbar, 2007). A survey was conducted to analyse the perceptions of stakeholders within the mineral exploration sub-industry in South Africa with regards to the regulatory and practical barriers to investment in the sub-industry. The survey results identified areas that mostly affect investment in the sub-industry and the overall sustainability thereof. It also identified areas where the future intervention of stakeholders, especially the government, can be most effective.

5.2 Background to the Survey

The Fraser Institute conducts an annual survey that assesses the perception of how various external and internal factors influence the exploration sub-industry globally. These factors include how mineral endowment, regulatory and policy frameworks and tax incentive programmes determine exploration investment in different countries. The Fraser Institute's survey is sent to executives in various mining jurisdictions globally and is used to formulate a perception index that aims to illustrate the ability of a specific country to attract exploration investment (Stedman et al., 2019).

A similar approach, guided by the conceptual analysis of the literature presented in Chapter 4, was used to formulate survey questions. The survey aimed to establish the current perceptions, whether positive or negative, based on the feedback from selected respondents.

The targeted participants included executives of contracting companies, project leaders, representatives of junior mining companies, senior managers of equipment suppliers, industry experts, government representatives, office bearers in organised labour and academics. While only 17 responses were received, nonetheless the survey lent insight into the current perceptions of stakeholders with regards to the investment attractiveness of mineral exploration and subsequent mine project development in South Africa.

In line with the Fraser Institute report (Stedman et al., 2019), the survey results are indicative of the leading and lagging factors that influence exploration investment in South Africa. It should be noted that the survey was designed for and solely focused on South Africa.

5.3 Survey Overview

A total of 17 responses were received. Sixteen of these respondents completed the survey and one respondent skipped four of the questions. Figure 5.1 illustrates the makeup of the respondents. There were no organised labour or government representative responses to this survey. The largest group of the respondents were project geologists (29.41 percent), mining company senior managers/executives (17.65 percent) and officials from contracting companies (23.53 percent). It is worth noting that there was one response from a junior miner.

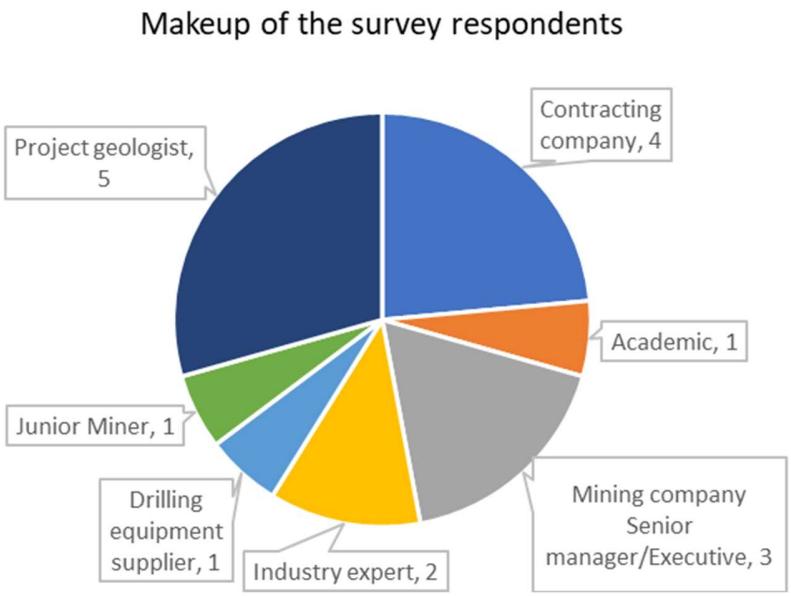

Figure 5.1: Makeup of the survey respondents.

Figure 5.2 indicates that 71 percent of the respondents have more than 10 years' experience in the mineral industry, with 29 percent having less than five years' experience. The years of experience is relevant as it indicates the depth of knowledge in the industry.

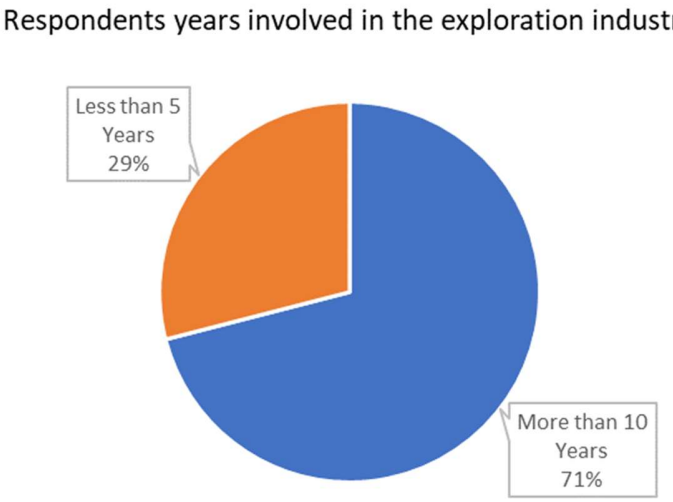

Figure 5.2: Respondents' years involved in the exploration industry.

Figure 5.3 indicates that 65 percent of respondents had local affiliation and 35 percent had global affiliation. This is relevant to the study as the perceptions of globally affiliated respondents could differ from those of respondents with local affiliation.

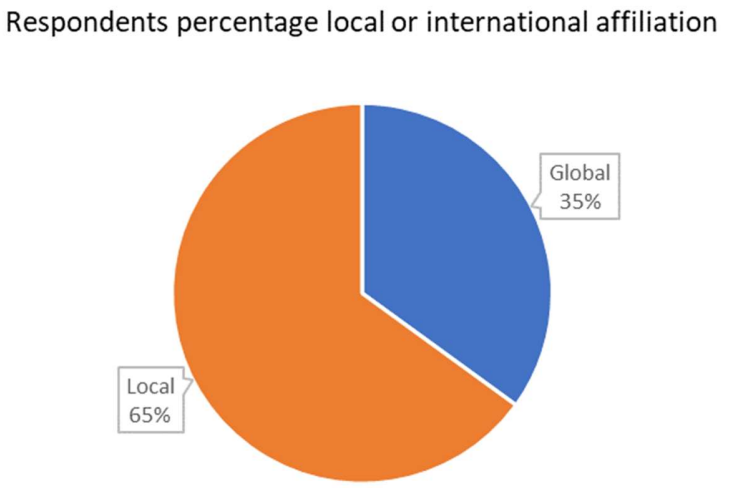

Figure 5.3: Respondents' percentage of local or international affiliation.

5.4 Detailed Survey Results

The survey was divided into sections, with the first section consisting of five closed-ended questions, which lent insight into the background of the respondents. The next section was comprised of Questions 6 to 22, as can be seen in Appendix A, and the last section was comprised of Question 23, an open-ended question. The discussion below will delve into details concerning the second (closed-ended questions) section and the third (open-ended questions) section, respectively.

Closed-ended questions of the survey

The survey questions formulated can be summarised into the following factors that influence mineral exploration investment in South Africa:

- Policy and regulations
- Socio-economic and community development requirements
- Tax legislations
- Available infrastructure
- Corruption
- Ease of trade
- Organised labour and associated costs
- Technological advances
- Environmental laws and regulations
- Availability of skills
- Political stability
- Mineral endowment
- Revised Mining Charter
- Section 12J tax legislation
- Current cost position of mines
- Current strategic intent
- Access to capital

5.4.1 Policy and regulations

The survey data indicates that the perceptions of the respondents surrounding policy and regulation in South Africa are skewed towards the negative perception side (Figure 5.4). The data collected indicated that 35.28 percent of the respondents feel that policy and regulation have a major influence with another 35.28 percent indicating that they would not invest in South Africa due to this reason. This is a concerning finding. The revised Mining Charter is aimed

at addressing some of these issues, but it is not evident that the changes have impacted the perceptions of stakeholders and role-players positively.

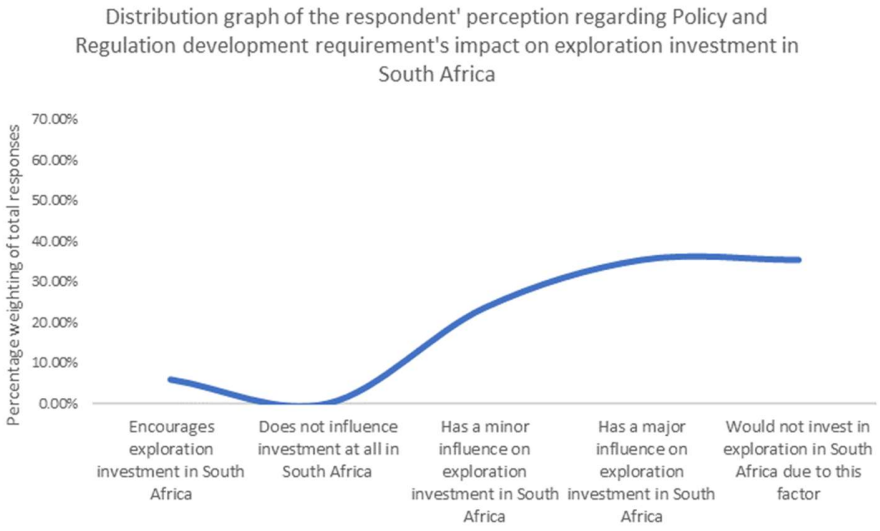

Figure 5.4: Distribution graph of respondents' perceptions regarding the impact of policy and regulation on exploration investment in South Africa.

5.4.2 Socio-economic and community development requirements

Socio-economic and community development requirements are often perceived as barriers to entry and not easily achievable. Host community expenditure, local labour employment requirements, meaningful economic participation and enterprise development programme targets are often difficult to achieve as prospecting is a specialised sub-industry. The operations require specific skills and specialised equipment is often not available at the local level.

Figure 5.5 indicates a negatively skewed perception of the socio-economic and community development requirements conditions. Approximately 52.0 percent of respondents indicated that the requirements have a major effect on exploration investment in South Africa.

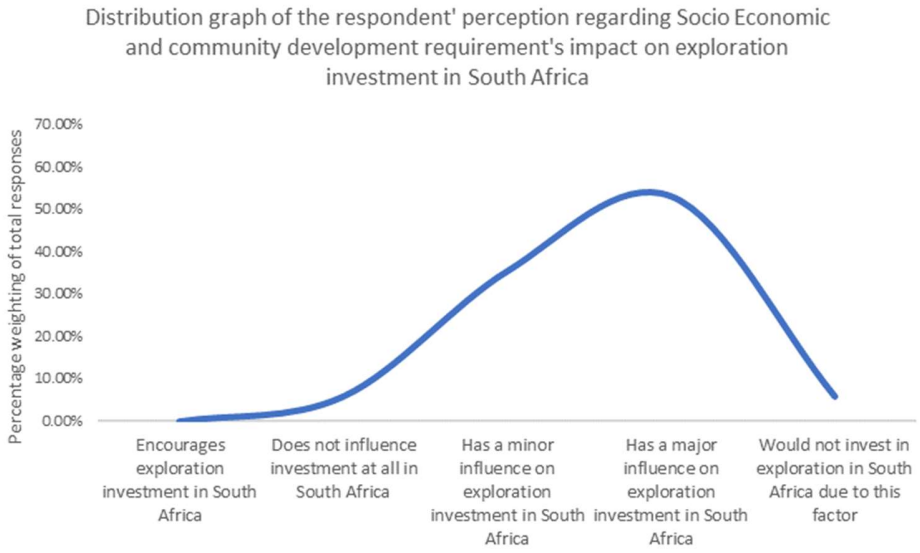

Figure 5.5: Distribution graph of the respondents' perceptions regarding the impact of socio-economic and community development requirements on exploration investment in South Africa.

5.4.3 Tax legislation

The survey data indicate that tax restrictions and lack of incentives are perceived to have a significant influence on exploration investment in South Africa. The response by the respondents on the perception of tax legislation and the influence thereof is significant with 37.5 percent of the respondents indicating that it has a major effect on exploration investment. Figure 5.6 indicates a negatively skewed perception.

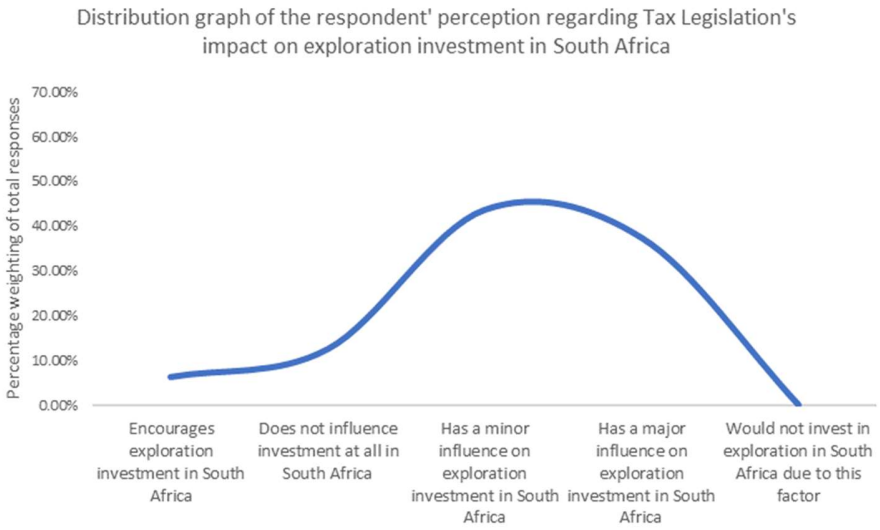

Figure 5.6: Distribution graph of the respondents' perceptions regarding the impact of tax legislation on exploration investment in South Africa.

5.4.4 Availability of infrastructure

The survey data indicated that the availability of infrastructure does not have a major influence on exploration investment in South Africa. Figure 5.7 indicates that the response by the respondents to their perception of the influence of the availability of infrastructure is neutral.

The survey reveals that 52.94 percent of the respondents indicated that this factor has a minor influence on exploration investment in South Africa. This can largely be attributed to the fact that exploration drilling is usually carried out in secluded areas with little more than the stand-alone machinery required and the ability to transport parts and consumables is not a deterrent. The survey shows that 17.65 percent of respondents indicated that the availability of infrastructure in South Africa motivates investment in the sub-industry.

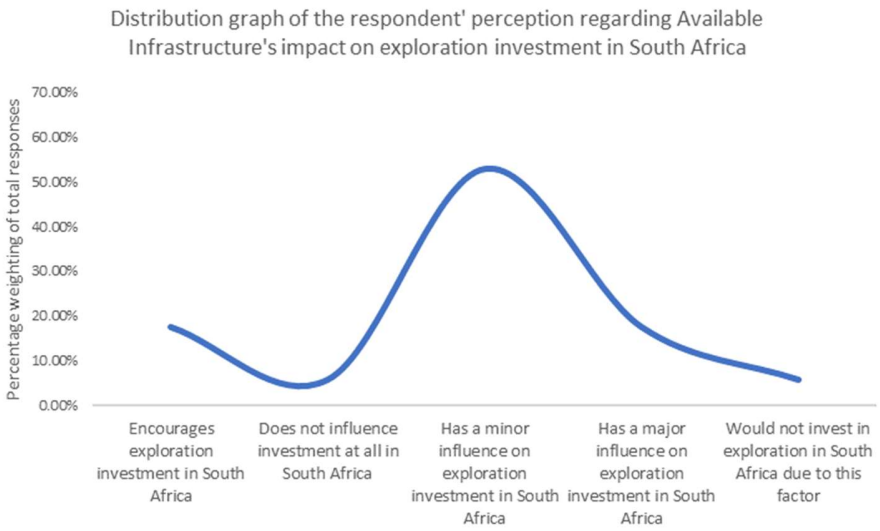

Figure 5.7: Distribution graph of the respondents' perceptions regarding the impact of the availability of infrastructure on exploration investment in South Africa.

5.4.5 Corruption

From the survey data, the perception of the impact of corruption in South Africa on exploration investment is negative. Figure 5.8 indicates a negatively skewed distribution. No responses were recorded for the answers on corruption not influencing investment nor encouraging investment in South Africa. The survey shows that 58.82 percent of the respondents indicated that corruption has a major influence on investment in the sub-industry while 5.88 percent indicated that they would not invest in South Africa due to this reason.

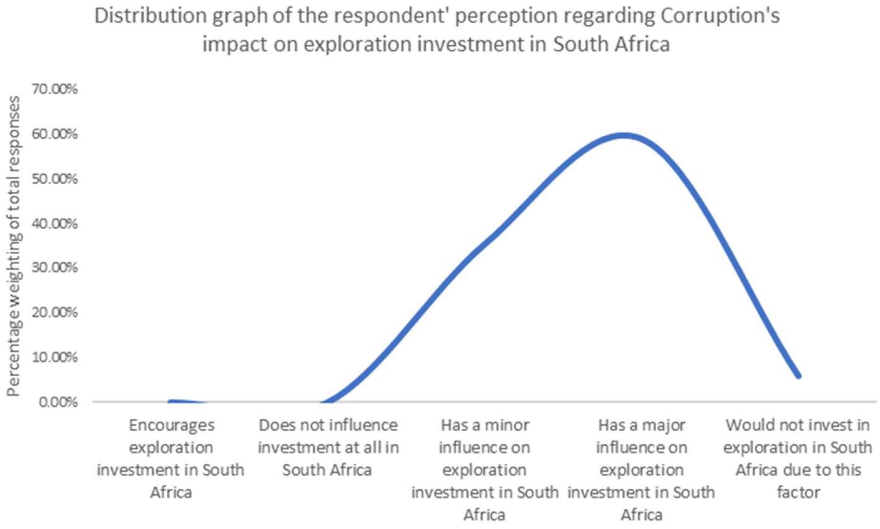

Figure 5.8: Distribution graph of the respondents' perceptions regarding the impact of corruption on exploration investment in South Africa.

5.4.6 Ease of trade

The survey data indicate that the perception of the ease with which one can trade in South Africa on exploration investment is negatively skewed, as illustrated in Figure 5.9.

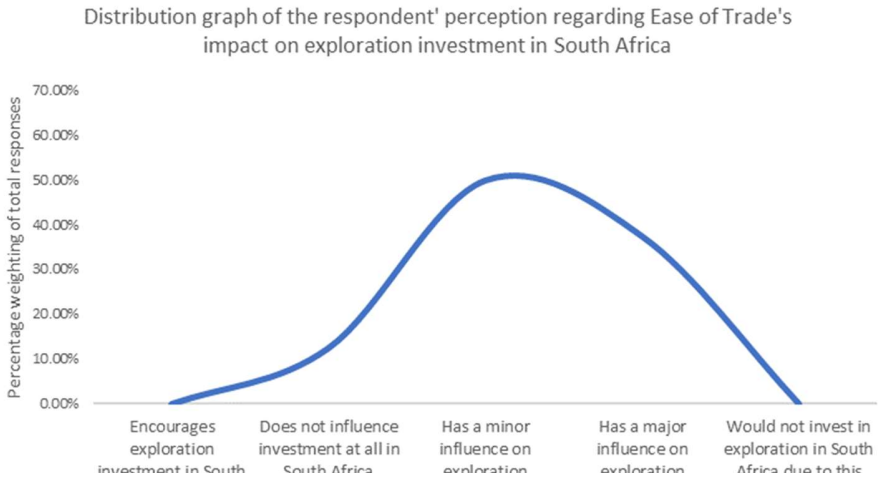

Figure 5.9: Distribution graph of the respondents' perceptions regarding the impact of ease of trade on exploration investment in South Africa.

The survey shows that 50.0 percent of the respondents indicated that ease of trade has a minor influence on exploration investment while 37.5 percent of respondents indicated that it has a major influence on investment in exploration drilling.

5.4.7 Organised labour and associated costs

As can be seen in Figure 5.10, the influence of organised labour and its associated costs are perceived to have a significant influence on investment in the sub-industry. Work stoppages, exuberant wages and employment demands have further placed already struggling mining companies under severe pressure. It is clear from the data gathered through the survey that organised labour in South Africa plays a major role in prospecting and would likely be the case for the mining industry as a whole.

The survey shows that 58.82 percent of the respondents indicated that it has a major influence on exploration investment. This could be attributed to the fact that exploration budgets are usually the first budget allocations to be cut when mines are under financial stress. It also reveals that 5.88 percent of the respondents indicated that they would not invest in South Africa due to this reason.

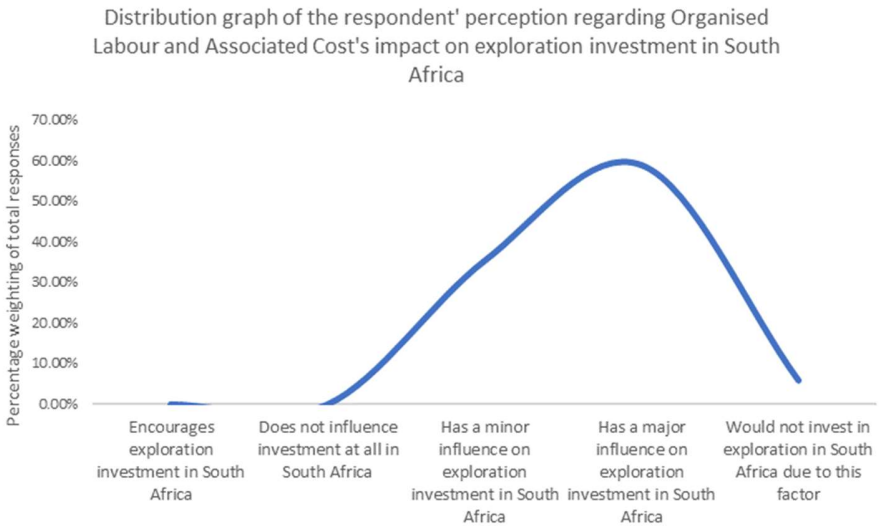

Figure 5.10: Distribution graph of the respondents' perceptions of the impact of organised labour and associated costs on exploration investment in South Africa.

5.4.8 Technological advances

Respondents' perceptions of the influence of technological advancements and the availability of technology are more neutral, as illustrated in Figure 5.11. South Africa has a long history of mining; the many large equipment manufacturers based in the country have likely contributed to the fact that stakeholders and role-players do not perceive technological advancement and the ease of access to technology as having a negative impact on exploration investment.

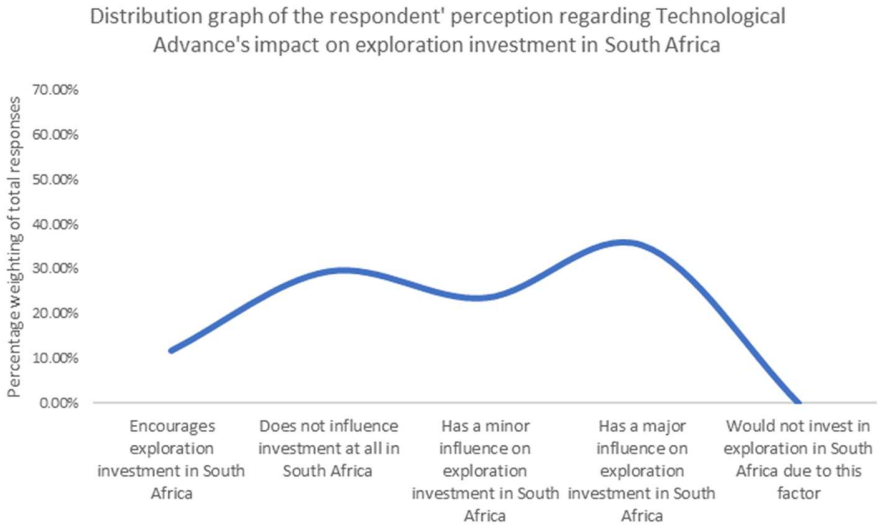

Figure 5.11: Distribution graph of the respondents' perceptions of the impact of technological advances on the exploration investment in South Africa.

5.4.9 Environmental laws and regulations

The perceptions of the respondents on the influence of environmental laws and regulations are more neutral, as illustrated in Figure 5.12. The environmental impact of the footprint of exploration drilling projects is usually quite small and therefore these laws and regulations do not impact investment significantly. Prospecting for potential resources in environmentally sensitive areas would have a minor influence on exploration investment. Of the respondents, 47.06 percent indicated a minor influence.

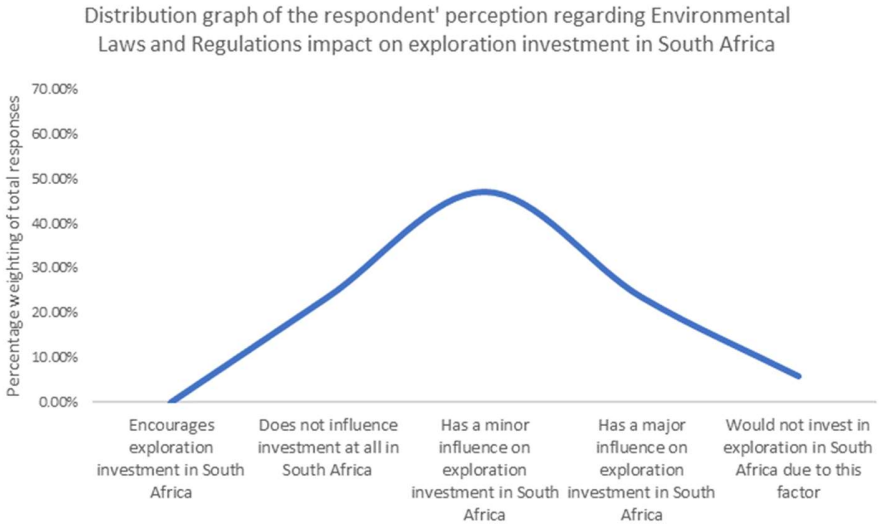

Figure 5.12: Distribution graph of the respondents' perceptions of the impact of environmental laws and regulations on exploration investment in South Africa.

5.4.10 Availability of skills

The perception of the respondents on the impact of the availability of skills, as illustrated in Figure 5.13, is positively skewed. South Africa has a long-standing history of specialised mining and the survey data gathered indicated that the role-players and stakeholders are positive that the skills required in the sub-industry are available. The survey shows that 11.76 percent of the respondents indicated that the availability of skills has a major effect on exploration investment, but it is unclear as to the reason.

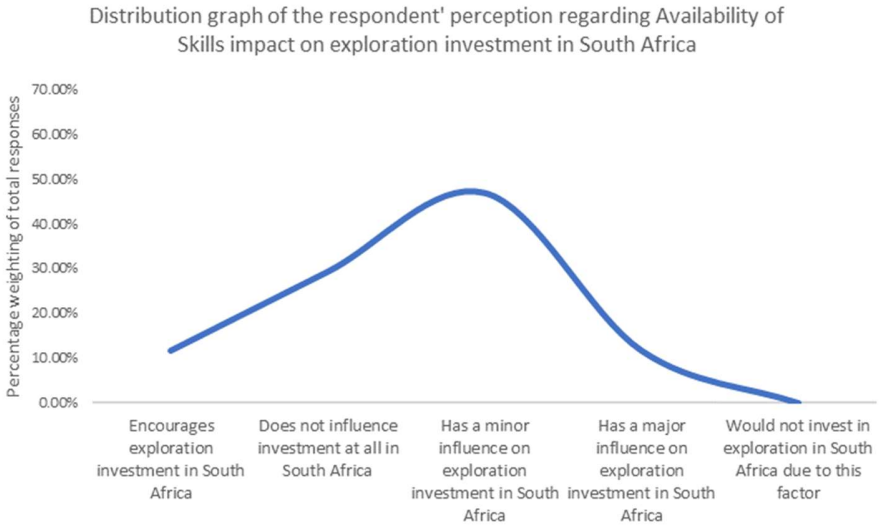

Figure 5.13: Distribution graph of the respondents' perceptions on the impact of the availability of skills on exploration investment in South Africa.

5.4.11 Political stability

As with the results obtained on the influence of corruption, the respondents indicated that political stability has a significant influence on exploration investment in South Africa. Figure 5.14 indicates that the distribution of the responses received is negatively skewed to the left. No responses were recorded for the answers on political stability influencing investment or encouraging investment in South Africa.

The survey shows that 58.82 percent of the respondents indicated that political stability has a major influence on investment in the sub-industry while 29.41 percent indicated that it has a minor influence on investment. It also shows that 11.76 percent of respondents indicated that they would not invest in South Africa due to this factor. This is a concerning result.

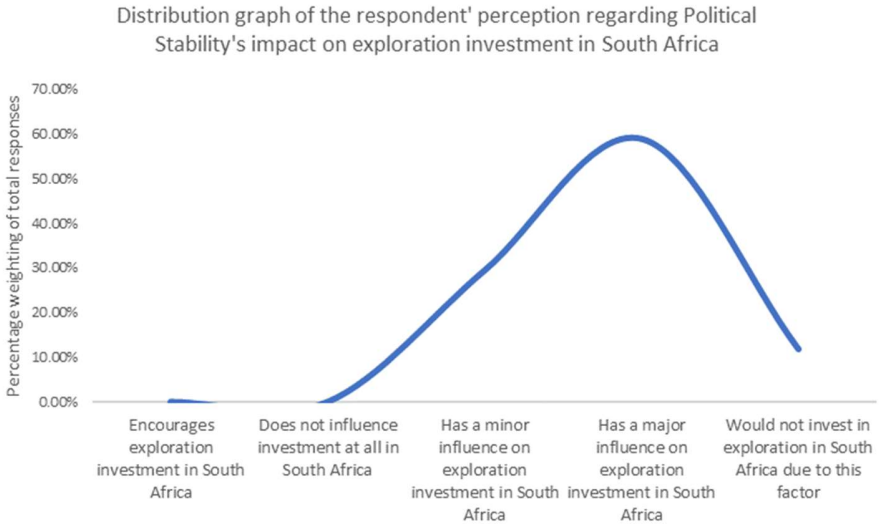

Figure 5.14: Distribution graphs of the respondents' perceptions on the impact of political stability on exploration investment in South Africa.

5.4.12 Mineral endowment

As illustrated in Figure 5.15, the closed-ended question on the influence of mineral endowment on exploration investment in South Africa delivered expected results with 56.0 percent of respondents stating that it has a major influence on exploration investment in the country.

The survey shows that 25.0 percent of the respondents indicated that the mineral endowment of the country encourages exploration investment. It also shows that 12.5 percent indicated that it has a minor influence on exploration investment and 6.25 percent indicated that it has no impact.

This is an interesting finding as it shows that mineral endowment alone will not necessarily attract investment. Although South Africa is well endowed with mineral resources and the respondents identify this as a factor of major influence, South African exploration expenditure is declining.

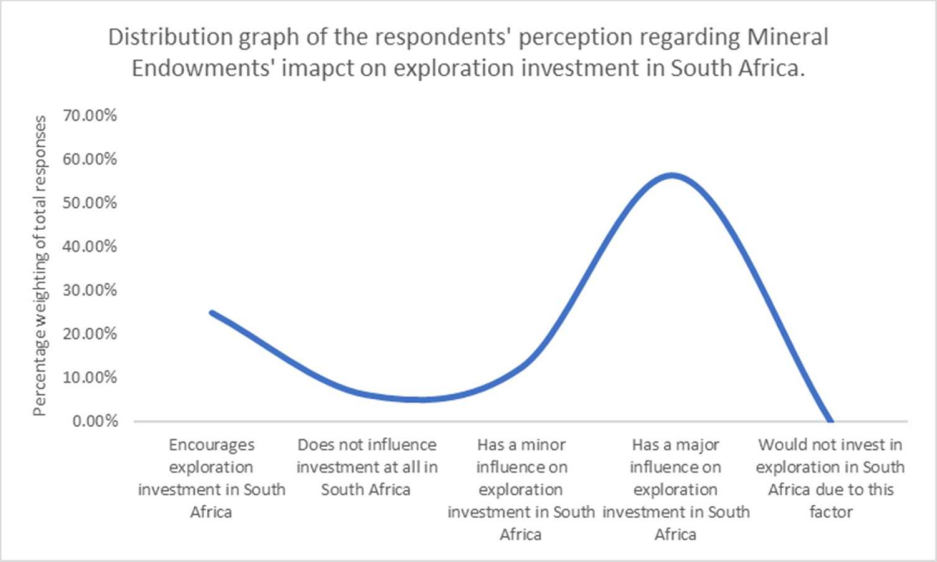

Figure 5.15: Distribution graph of the respondents' perceptions of the impact of mineral endowment of the country on exploration investment in South Africa.

5.4.13 Revised Mining Charter

The respondents indicated that the influence of the 2018 revised Mining Charter is skewed towards a negative perception, as illustrated in Figure 5.16. The respondents do not believe that the outcomes envisioned through the revision of the Mining Charter would have a positive effect in revitalising the sub-industry.

Of the respondents, 43.75 percent indicated that it has a major influence on exploration investment in South Africa. Another 6.25 percent of the respondents indicated that they would not invest in South Africa due to this reason. This is a concerning finding as the revised Mining Charter aims to address issues that have been barriers to the growth and sustainability of the industry.

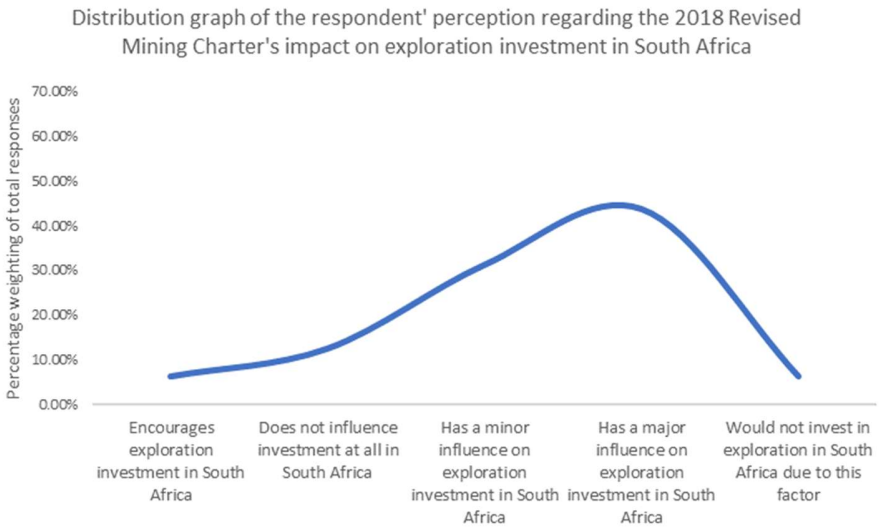

Figure 5.16: Distribution graph of the respondents' perceptions on the impact of the 2018 revised Mining Charter on exploration investment in South Africa.

5.4.14 Section 12J tax legislation

The influence of Section 12J of the Income Tax Act of 1962 on mineral exploration investment was included in the survey not only to establish the perception of the stakeholders but also to gauge the awareness of the respondents of this tax incentive scheme in South Africa. Of the 17 respondents, only 14 answered this question indicating that not all the respondents know about the incentive scheme.

The distribution graph is skewed to the right for those responses received, as illustrated in Figure 5.17, and is indicative of a more positive perception of the influence of the incentive scheme on exploration investment in South Africa. Of the respondents, 42.86 percent indicated that this factor has a minor influence on exploration investment, while 35.71 percent indicated that it does not influence investment at all.

In this context, the skew towards the right is indicative of the tax incentive scheme not being utilised for its intended purpose. This is an interesting finding as the Minister of Finance announced on 24 February 2021 during his annual budget speech that the Section 12J tax legislation would be expiring on 30 June 2021; no replacement has been proposed.

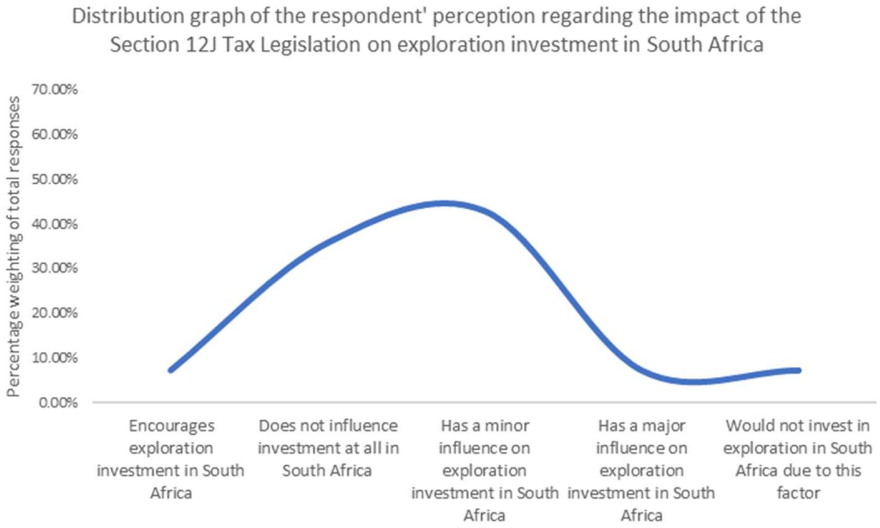

Figure 5.17: Distribution graph of the respondents' perceptions of the impact of the Section 12J tax legislation on exploration investment in South Africa.

5.4.15 Current cost position of mines

The current cost position of existing mines influences the strategic intent of mining companies. As illustrated in Figure 5.18, the influence of the current cost position of mines is perceived as negative and is skewed towards the left. The cost position is perceived by 43.75 percent of the respondents as having a minor influence on exploration investment and by another 43.75 percent as having a major influence on exploration investment.

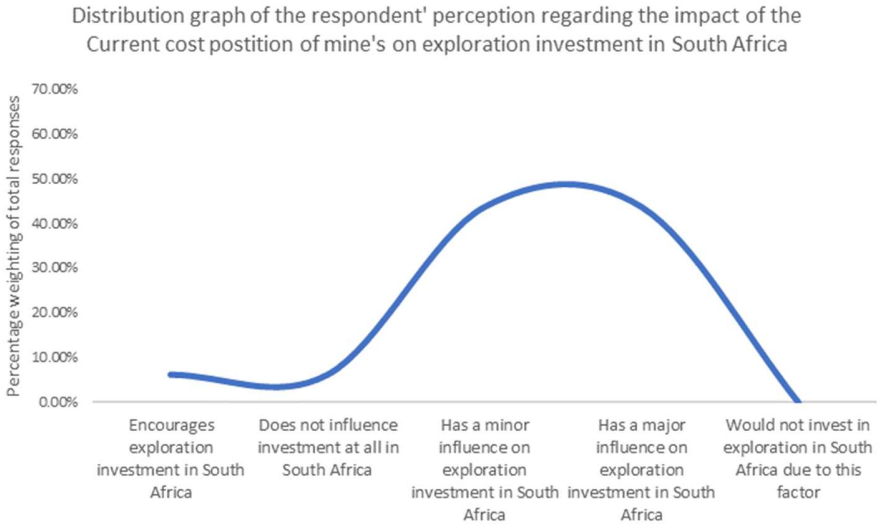

Figure 5.18: Distribution graph of the respondents' perceptions of the impact of the current cost position of mines on exploration investment in South Africa.

5.4.16 Current strategic intent

The current strategic intent of mining companies is skewed towards the left and respondents indicate that the influence is significant. As illustrated in Figure 5.19, the data gathered from the respondents indicated a negative perception. Of the respondents, 58.82 percent perceive the current strategic intent of mining companies to have a major influence on exploration investment.

Notably, the current cost position's influence on exploration investment is more normally distributed than the influence of the strategic intent. This could indicate that the cost position is not the only factor or the main factor influencing the strategy of large mining companies.

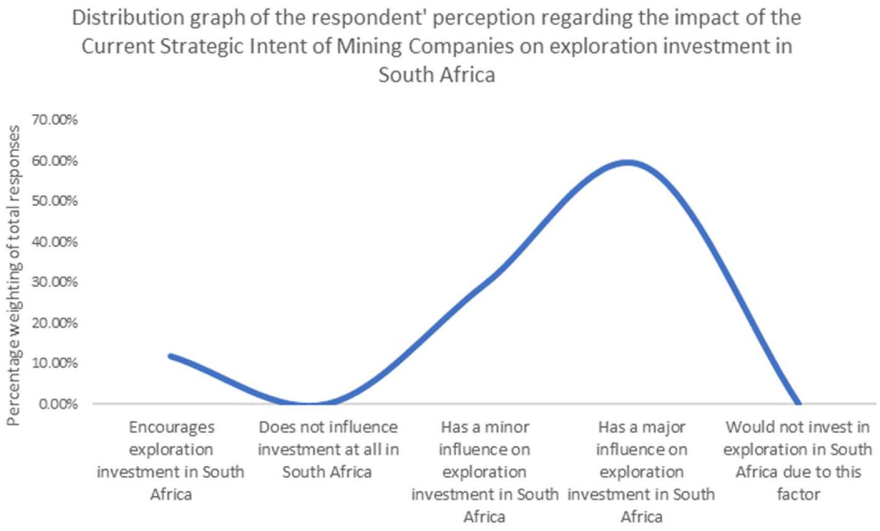

Figure 5.19: Distribution graph of the respondents' perceptions of the impact of the current strategic intent of mining companies on exploration investment in South Africa.

5.4.17 Access to capital

Access to capital is significantly skewed towards the left, as illustrated in Figure 5.20. From the data collected from the respondents' responses, 68.75 percent indicated that access to capital has a major influence on exploration investment in South Africa. There were no responses on access to capital encouraging investment or having only a minor influence thereon. The responses collected clearly indicate that access to capital is a major barrier to entry into the sub-industry. This is concerning because without new entrants the market growth of the mining industry at the required level will not be possible.

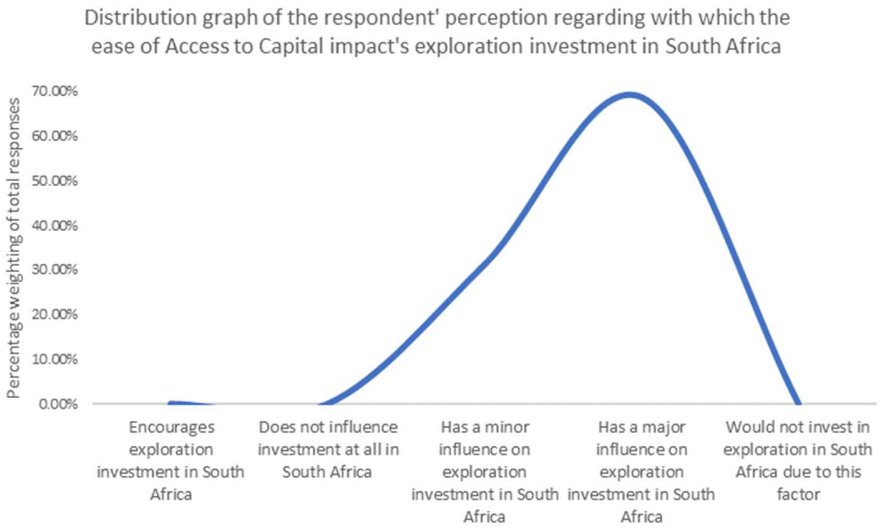

Figure 5.20: Distribution graph of the respondents' perceptions of the impact of the access to capital on exploration investment in South Africa.

Open-ended question of the survey

Question 23 of the questionnaire (see Appendix B) asked the respondents to indicate if they are concerned about the sustainability of the mining industry as a whole and 16 of the 17 respondents responded to the question. The written responses to this question support the negative distributions of the closed-ended questions. Of the 16 written responses, only one of the respondents indicated a positive sentiment regarding the sub-industry. The other 15 written responses were all negative.

From the written responses, the main themes perceived as barriers to growth in the industry are summarised as follows:

- Policy and regulatory uncertainty and lack of transparency
- Organised labour
- Socio-economic obligations
- Corruption
- Access to capital

- Declining investment

5.5 Analysis

The respondents' responses to the closed-ended survey were pooled to enable the analysis of the data as a whole and to derive a perception distribution. The aim was to illustrate if the perceptions of role-players and stakeholders are skewed towards a positive or negative perception or are neutral. The data of the total responses are illustrated in Table 5.1.

Table 5.1: Responses to the survey summarised for each factor used in the formulation of the survey.

	Positive Perception	←		→	Negative Perception
	Encourages exploration investment in South Africa	Does not influence investment at all in South Africa	Has a minor influence on exploration investment in South Africa	Has a major influence on exploration investment in South Africa	Would not invest in exploration in South Africa due to this factor
Policy and regulatory	1	0	4	6	6
Socio economic and community development requirements	0	1	6	9	1
Tax restrictions	1	2	7	6	0
Available infrastructure	3	1	9	3	1
Corruption	0	0	6	10	1
Trade barriers and tax restrictions	0	2	8	6	0
Organised labour and associated costs	0	0	6	10	1
Technological advances	2	5	4	6	0
Environmental laws and regulations	0	4	8	4	1
Availability of skilled labour	2	5	8	2	0
Political stability	0	0	5	10	2
Mineral endowment	4	1	2	9	0
2018 revised mining charter	1	2	5	7	1
12 J tax incentive	1	5	6	1	1
Cost of mining	1	1	7	7	0
Current strategic intent of mining companies	2	0	5	10	0
Access to capital	0	0	5	11	0
Count of Responses	18	29	101	117	15
Percentage of Total responses	6.43%	10.36%	36.07%	41.79%	5.36%

The number of responses to each of the formulated answers in the closed-ended questions was then plotted on a line distribution graph (Figure 5.21).

The response to Question 17, which asks the respondents to indicate what the impact of mineral endowment has on exploration investment in South Africa, was removed. The answer to this question would skew the data used to illustrate the perception of the respondents. The data used for the distribution graph is illustrated in Table 5.2 with the weighting of total responses adjusted. The distribution in Figure 5.21 is heavily skewed towards the left with a mean to the left of the median.

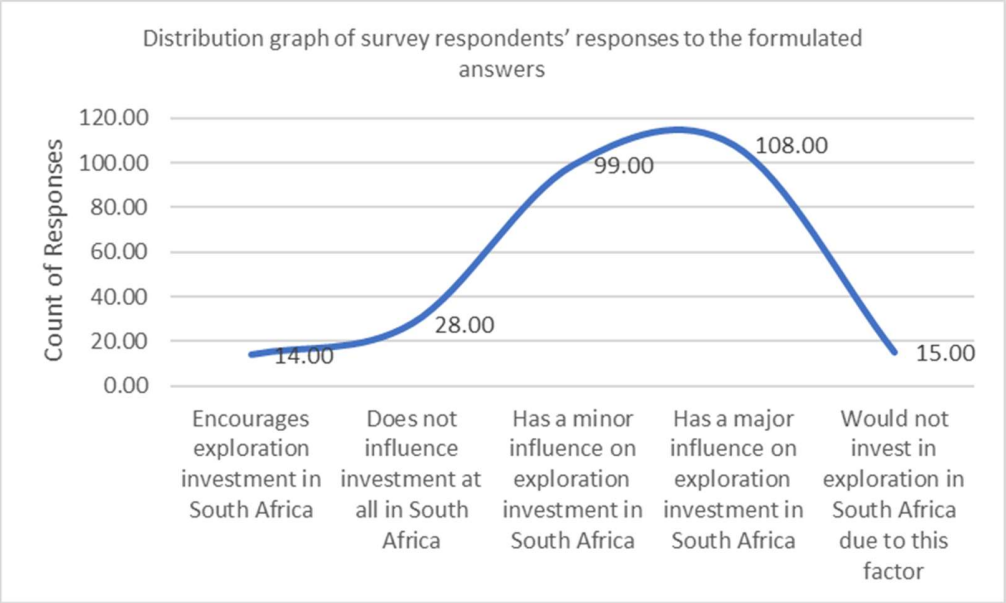

Figure 5.21: Distribution graph of survey respondents' responses to the formulated answers, excluding Question 17.

Table 5.2: Responses to the survey summarised for 16 of the 17 factors used in the formulation of the survey.

	Positive Perception	←		→	Negative Perception
	Encourages exploration investment in South Africa	Does not influence investment at all in South Africa	Has a minor influence on exploration investment in South Africa	Has a major influence on exploration investment in South Africa	Would not invest in exploration in South Africa due to this factor
Policy and regulations	1.00	0.00	4.00	6.00	6.00
Socio economic and community development requirements	0.00	1.00	6.00	9.00	1.00
Tax legilations	1.00	2.00	7.00	6.00	0.00
Available infrastructure	3.00	1.00	9.00	3.00	1.00
Corruption	0.00	0.00	6.00	10.00	1.00
Ease of trade	0.00	2.00	8.00	6.00	0.00
Organised labour and associated costs	0.00	0.00	6.00	10.00	1.00
Technological advances	2.00	5.00	4.00	6.00	0.00
Environmental laws and regulations	0.00	4.00	8.00	4.00	1.00
Availability of skills	2.00	5.00	8.00	2.00	0.00
Political stability	0.00	0.00	5.00	10.00	2.00
Revised mining charter	1.00	2.00	5.00	7.00	1.00
12 tax legislation	1.00	5.00	6.00	1.00	1.00
Cost position of current mines	1.00	1.00	7.00	7.00	0.00
Current strategic intent	2.00	0.00	5.00	10.00	0.00
Access to capital	0.00	0.00	5.00	11.00	0.00
Count of responses	14.00	28.00	99.00	108.00	15.00
Percentage of total responses	5%	11%	38%	41%	6%

The overall perception of the respondents as illustrated in Figure 5.21 is negatively skewed indicating that the overall perception of the health and future of the sub-industry is negative. The written responses to the open-ended question of the survey support the negatively skewed perception obtained from the closed-ended survey questions.

5.6 Chapter Summary

The data collected from this survey indicate a negative perception by major stakeholders and role-players within the sub-industry. The main factors around which the survey was formulated were informed by the literature review both

from a local and global perspective. It is clear from the responses in the survey that the issues that are prevalent in the current dialogue on the sustainability of the sub-industry are pressing and have a major effect on exploration investment and expenditure.

According to the written responses from the respondents, policy and regulatory uncertainty, lack of tax incentives that promote investment, corruption, the impact of organised labour and access to capital are the main barriers to the development and sustainability of the sub-industry. The current strategic direction of large mining companies is influenced by these factors and thus the respondents perceive these factors as having a major impact on the sustainability of the industry.

In conclusion, there is a general negatively skewed perception of the sustainability of the sub-industry and the growth of the mining industry in South Africa. This conclusion will be elucidated in the next chapter.

6 SUMMARY AND CONCLUSION

6.1 Conclusion

An increasing trend in exploration expenditure has been observed globally over the past decade. This increasing trend has not been observed in South Africa and South Africa's exploration sub-industry has been on the decline posing a sustainability risk for the larger mining industry. The lack of new mining project development in a country that relies significantly on the contribution of the mining industry to GDP is cause for concern.

Various factors influence the investment climate in South Africa and the current systems and programmes, or rather the lack thereof, have not created an environment that encourages investment. Policy and regulatory uncertainty, socio-economic obligation, tax restrictions and lack of incentives, corruption, organised labour, cost of mining and lack of access to capital are the factors that have the largest impact on the growth of the sub-industry.

The current cost position of mines in South Africa and commodity price volatility due to a weak currency have a major impact on funds available to the sub-industry. This is further exacerbated by social and community-related obligations. Increasing work stoppages, exuberant wages and employment demands are further eroding the potential profitability of mining operations and thus exploration expenditure and new project development. With the substantial mineral endowment of South Africa, it is concerning that exploration expenditure is at the lowest levels observed in decades.

Global giants of the industry, such as Canada and Australia, as well as the growing trend in other large African countries, are driven by financial and regulatory mechanisms that make prospecting an attractive investment vehicle.

The South African Mining Charter was revised in 2018 and the amendments are aimed at creating an environment that would drive investment in the sub-industry. Some of the changes made were urgently required and were motivated by the risk posed to the sustainability of the mining industry if they were not addressed. Some of the major changes include the fact that prospecting falls outside the scope of Broad-Based Economic Empowerment obligations.

Mining Charter requirements will now only become effective once a mining right is obtained. This means that investors can now prospect and sell off the rights to investors for development at a profit. Other changes that would make the South African sub-industry more competitive globally include new integrated licensing programmes and a detailed geological database.

There is also more focus on the potential impact that junior miners and new entrants to the market could have on the growth of the sub-industry. Various programmes that would address the difficulties that these parties experience to obtain the capital required to prospect and develop new resources are being implemented and developed. Newly proposed flow-through share schemes such as those in Australia and Canada, incentivised tax programmes and governmental support will be aimed at supporting new entrants into the market by ensuring easier access to capital.

The conceptual analysis of literature from both global and local perspectives was undertaken with the use of data mining software. The analysis aimed to establish the main themes and sub-themes that are being discussed in both perspectives and to compare these to one another. The global perspective literature is more focused on addressing factors known to encourage growth and investment than compared to the local perspective literature. The main themes identified as being the drivers behind the growth in the sub-industry are

more often addressed and their interconnectedness is clearly illustrated and defined.

The South African focus remains that of social and economic development but a clear method to achieve this is often not discussed. Globally, the relationships between tax incentives, economic development, capital, policy and regulation are prominent. The results indicate that those countries realising significant growth in the sub-industry understand what mechanisms are required to ensure the sustainability of the sub-industry.

Locally, the recent developments aimed at bolstering the industry are not discussed enough and their relationship is not clearly defined. To be able to identify and understand the areas of improvement needed to create an attractive investment environment would aid in guiding the strategic direction of government and the private sector.

Through the analysis of responses to a closed-ended survey by major stakeholders and role-players in the sub-industry, their perceptions of the future of the sub-industry can be determined. It also lends insight into the impact that barriers to investment have on the future development of the sub-industry. The results show that the perception of these role-players of the future of the industry is bleak. The responses indicate that even with renewed focus and policy and regulatory amendments, the investment climate is not conducive for the growth of the sub-industry and therefore the sustainability of the mining industry is at risk.

The current perceptions of stakeholders and role-players on the outlook of the sub-industry and the content of the locally-focused literature are related. The main themes and sub-themes identified in the conceptual analysis resonate in the closed-ended responses from the respondents and have an impact on

exploration investment in South Africa. Based on these perceptions, it can be said that the South African mining industry needs urgent reform and economic stimulus.

6.2 Recommendations

A clearly defined programme to stimulate growth needs to be formulated. The government needs to work closely with the private sector to determine if the currently proposed mechanisms will be sufficient to ensure the growth of the industry. Reform cannot be formulated in isolation by the government. Without the support of the private sector, the programmes will not be successful.

The exploration sub-industry is vital in ensuring the sustainability of the mining industry. The sub-industry should look to the countries where exploration is healthy and thriving to determine on which mechanisms these countries rely and then develop and focus on similar programmes in South Africa. The development of policy and regulations that encourage investment must be ensured and implemented. The government should also work closely with the private sector and organised labour to build a relationship that supports the initiative to grow the mining industry.

South Africa's economic outlook is negative. Unemployment is rife and foreign investment is scarce. The full effect of the global COVID19 pandemic on the economy of South Africa is still unknown. The mining industry offers a glimmer of hope and could greatly contribute to the revitalisation of the economy. This can only be ensured if the reform required to stimulate significant and urgent growth is undertaken.

Further research needs to be undertaken to determine if the newly implemented mechanism to motivate investment is being used. Mining will be

fundamental in the country's efforts to recover. Exploration is the foundation of the envisaged change in the industry and should realise the efforts of both the government and the private sector to be able to lead the mining industry into a new era of development and growth.

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Appendix A

Closed-ended question of the survey questionnaire to industry role-players and stakeholders and their responses

South Africa's Mining Exploration Sector - Present and Future Outlook

Q1. How long have you been involved in the exploration industry?

Answer Choices	Response	Responses
Less than five years	29.41%	5
Between five and ten years	0.00%	0
More than ten years	70.59%	12
	Answered	17
	Skipped	0

Q2. How are you involved in the industry?

Answer Choices	Response	Responses
Contracting company	23.53%	4
Project Geologist	29.41%	5
Junior Miner	5.88%	1
Drilling equipment supplier	5.88%	1
Industry expert	11.76%	2
Mining company senior manager/executive	17.65%	3
Government representative	0.00%	0
Organised labour representative	0.00%	0
Academic	5.88%	1
	Answered	17
	Skipped	0

Q3. Do you have a global or local company/affiliation?

Answer Choices	Response	Responses
Global	35.29%	6
Local	64.71%	11
	Answered	17
	Skipped	0

Q4. To your knowledge has the budget allocation for exploration drilling increased or decreased over the past five years?

Answer Choices	Response	Responses
Increased	11.76%	2
Decreased	88.24%	15
	Answered	17
	Skipped	0

Q5. Do you think that the declining productivity and current cost position of existing mines in South Africa further impact the long-term investment in exploration? Please provide a short answe

Answer Choices	Response	Responses
Yes	94.12%	16
No	5.88%	1
Short comment in support of answer		0
	Answered	17
	Skipped	0

Q6. In your professional opinion, what impact does the uncertainty surrounding and the enforcement of policy and regulation have on mineral exploration investment in South Africa?

Answer Choices	Response	Responses
Encourages exploration investment in South Africa	5.88%	1
Does not influence investment at all in South Africa	0.00%	0
Has a minor influence on exploration investment in South Africa	23.53%	4
Has a major influence on exploration investment in South Africa	35.29%	6
Would not invest in exploration in South Africa due to this factor	35.29%	6
Other (please specify)		0
	Answered	17
	Skipped	0

Q7. What impact does required socioeconomic agreements or community development conditions have on mineral exploration investment in South Africa?

Answer Choices	Response	Responses
Encourages exploration investment in South Africa	0.00%	0
Does not influence investment at all in South Africa	5.88%	1
Has a minor influence on exploration investment in South Africa	35.29%	6
Has a major influence on exploration investment in South Africa	52.94%	9
Would not invest in exploration in South Africa due to this factor	5.88%	1
Other (please specify)		0
	Answered	17
	Skipped	0

Q8. What impact does taxation legislation and available tax incentives have on mineral exploration investment in South Africa?

Answer Choices	Response	Responses
Encourages exploration investment in South Africa	6.25%	1
Does not influence investment at all in South Africa	12.50%	2
Has a minor influence on exploration investment in South Africa	43.75%	7
Has a major influence on exploration investment in South Africa	37.50%	6
Would not invest in exploration in South Africa due to this factor	0.00%	0
Other (please specify)		0
	Answered	16
	Skipped	1

Q9. What impact does available infrastructure have on mineral exploration investment in South Africa?

Answer Choices	Response	Responses
Encourages exploration investment in South Africa	17.65%	3
Does not influence investment at all in South Africa	5.88%	1
Has a minor influence on exploration investment in South Africa	52.94%	9
Has a major influence on exploration investment in South Africa	17.65%	3
Would not invest in exploration in South Africa due to this factor	5.88%	1
Other (please specify)		0
	Answered	17
	Skipped	0

Q10. What impact does corruption, be it at the local or national level, have on mineral exploration investment in South Africa?

Answer Choices	Response	Responses
Encourages exploration investment in South Africa	0.00%	0
Does not influence investment at all in South Africa	0.00%	0
Has a minor influence on exploration investment in South Africa	35.29%	6
Has a major influence on exploration investment in South Africa	58.82%	10
Would not invest in exploration in South Africa due to this factor	5.88%	1
Other (please specify)		0
	Answered	17
	Skipped	0

Q11. What impact do trade barriers and subsequent taxation restrictions on profits have on mineral exploration investment in South Africa?

Answer Choices	Response	Responses
Encourages exploration investment in South Africa	0.00%	0
Does not influence investment at all in South Africa	12.50%	2
Has a minor influence on exploration investment in South Africa	50.00%	8
Has a major influence on exploration investment in South Africa	37.50%	6
Would not invest in exploration in South Africa due to this factor	0.00%	0
Other (please specify)		0
	Answered	16
	Skipped	1

Q12. What impact do organised labour and the risk associated with labour costs and disruptions have on mineral exploration investment in South Africa?

Answer Choices	Response	Responses
Encourages exploration investment in South Africa	0.00%	0
Does not influence investment at all in South Africa	0.00%	0
Has a minor influence on exploration investment in South Africa	35.29%	6
Has a major influence on exploration investment in South Africa	58.82%	10
Would not invest in exploration in South Africa due to this factor	5.88%	1
Other (please specify)		0
	Answered	17
	Skipped	0

Q13. What impact do technological advances operationally have on mineral exploration investment in South Africa?

Answer Choices	Response	Responses
Encourages exploration investment in South Africa	11.76%	2
Does not influence investment at all in South Africa	29.41%	5
Has a minor influence on exploration investment in South Africa	23.53%	4
Has a major influence on exploration investment in South Africa	35.29%	6
Would not invest in exploration in South Africa due to this factor	0.00%	0
Other (please specify)		0
	Answered	17
	Skipped	0

Q14. What impact does environmental laws and regulations have on mineral exploration investment in South Africa?

Answer Choices	Response	Responses
Encourages exploration investment in South Africa	0.00%	0
Does not influence investment at all in South Africa	23.53%	4
Has a minor influence on exploration investment in South Africa	47.06%	8
Has a major influence on exploration investment in South Africa	23.53%	4
Would not invest in exploration in South Africa due to this factor	5.88%	1
Other (please specify)		0
	Answered	17
	Skipped	0

Q15. What impact does available skills in the labour force have on mineral exploration investment in South Africa?

Answer Choices	Response	Responses
Encourages exploration investment in South Africa	11.76%	2
Does not influence investment at all in South Africa	29.41%	5
Has a minor influence on exploration investment in South Africa	47.06%	8
Has a major influence on exploration investment in South Africa	11.76%	2
Would not invest in exploration in South Africa due to this factor	0.00%	0
Other (please specify)		0
	Answered	17
	Skipped	0

Q16. What impact does political stability have on mineral exploration investment in South Africa?

Answer Choices	Response	Responses
Encourages exploration investment in South Africa	0.00%	0
Does not influence investment at all in South Africa	0.00%	0
Has a minor influence on exploration investment in South Africa	29.41%	5
Has a major influence on exploration investment in South Africa	58.82%	10
Would not invest in exploration in South Africa due to this factor	11.76%	2
Other (please specify)		0
	Answered	17
	Skipped	0

Q17. What influence does the mineral endowment of the country have on mineral exploration investment in South Africa?

Answer Choices	Response	Responses
Encourages exploration investment in South Africa	25.00%	4
Does not influence investment at all in South Africa	6.25%	1
Has a minor influence on exploration investment in South Africa	12.50%	2
Has a major influence on exploration investment in South Africa	56.25%	9
Would not invest in exploration in South Africa due to this factor	0.00%	0
Other (please specify)		0
	Answered	16
	Skipped	1

Q18. How does the newly published Mining Charter of 2018 affect investment in the exploration sector in South Africa?

Answer Choices	Response	Responses
Encourages exploration investment in South Africa	6.25%	1
Does not influence investment at all in South Africa	12.50%	2
Has a minor influence on exploration investment in South Africa	31.25%	5
Has a major influence on exploration investment in South Africa	43.75%	7
Would not invest in exploration in South Africa due to this factor	6.25%	1
Other (please specify)		0
	Answered	16
	Skipped	1

Q19. How does the 12J Tax legislation affect investment in the exploration sector in South Africa?

Answer Choices	Response	Responses
Encourages exploration investment in South Africa	5.88%	1
Does not influence investment at all in South Africa	29.41%	5
Has a minor influence on exploration investment in South Africa	35.29%	6
Has a major influence on exploration investment in South Africa	5.88%	1
Would not invest in exploration in South Africa due to this factor	5.88%	1
I don't know what the 12J tax legislation entails	17.65%	3
I don't know what the 12J tax legislation is		0
	Answered	17
	Skipped	0

Q20. How does the current cost of mining in South Africa influence investment in exploration?

Answer Choices	Response	Responses
Encourages exploration investment in South Africa	6.25%	1
Does not influence investment at all in South Africa	6.25%	1
Has a minor influence on exploration investment in South Africa	43.75%	7
Has a major influence on exploration investment in South Africa	43.75%	7
Would not invest in exploration in South Africa due to this factor	0.00%	0
I don't know what the 12J tax legislation is		0
	Answered	16
	Skipped	1

Q21. What impact does the current strategic intent of large mining companies have on exploration investment?

Answer Choices	Response	Responses
Encourages exploration investment in South Africa	11.76%	2
Does not influence investment at all in South Africa	0.00%	0
Has a minor influence on exploration investment in South Africa	29.41%	5
Has a major influence on exploration investment in South Africa	58.82%	10
Would not invest in exploration in South Africa due to this factor	0.00%	0
I don't know what the 12J tax legislation is		0
	Answered	17
	Skipped	0

Q22. What impact does access to capital in South Africa have on exploration investment?

Answer Choices	Response	Responses
Encourages exploration investment in South Africa	0.00%	0
Does not influence investment at all in South Africa	0.00%	0
Has a minor influence on exploration investment in South Africa	31.25%	5
Has a major influence on exploration investment in South Africa	68.75%	11
Would not invest in exploration in South Africa due to this factor	0.00%	0
I don't know what the 12J tax legislation is		0
	Answered	16
	Skipped	1

Appendix B

Open-ended question of the survey questionnaire to industry role-players and stakeholders and their responses

Q23. Are you concerned about the sustainability of the mining sector in South Africa as a whole and why? Please provide a short answer that supports your view.

Answered 16

Skipped 1

Response 1

There is no clear path forward in the industry with regards to policy and regulatory certainty. Mining companies are not willing to invest in the country as their returns cannot be guaranteed.

Response 2

The budget allocations towards greenfield exploration in the country has declined considerably in the years I have been involved in the mining industry. Without a considerable drive towards developing new resources the sustainability of the mining sector is in danger.

Response 3

I would not invest in the mining sector as long as organised labour and government dictate the way that companies have to do business. If you

spend the money you need to be assured that you will see returns on your investment.

Response 4

The industry in South Africa has so much potential. Companies and government should work together to find the best way forward on how to build the industry and return to the glory days when mining was at the core of our economy.

Response 5

In all my years in the mining industry I have never been more concerned about the sustainability of the industry. We are light years behind the leading countries in the world when it comes to growth in the industry.

Response 6

If governments focus is on the development of the people and not the business itself mining will not grow.

Response 7

If we cannot keep mining companies from divesting in South Africa there is no hope for growth.

Response 8

Government has realised that major changes is required is we are to realise growth in the industry. There is a lot of talk but no real plan. Enough talk. More action.

Response 9

There have been talks about ways to stimulate the industry in recent years and some progress has been made. The progress although has been slow and we will need to shift the focus towards developing new mines if we are to ensure the sustainability of the industry.

Response 10

Unions control how we spend our money. Government dictates where it goes. There is no money.

Response 11

There are multiple projects in the pipeline and the future looks bright. I sure the industry will recover. We all need to join hands and find the solutions for the issues at hand.

Response 12

Without clear leadership from the South African government the sustainability of the sector cannot be guaranteed. Mining companies are looking to other countries where they know they can make money.

Responses 13

No one wants to invest in a country with so much corruption. You must bribe everyone to do business.

Response 14

There is a lot of red tape when it comes to mining in South Africa. Remove some of the red tape and make it easier to do business and the industry will recover.

Response 15

South Africa has so much to offer and is rich in minerals. The industry is well positioned to realise growth in the future.

Response 16

It is too difficult to obtain the funds to explore in South Africa. No one wants to invest. No new mines without exploring.