



destea

department of
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tourism and environmental affairs
FREE STATE PROVINCE

Research Report:
**The state of Mineral Beneficiation in the Free State
Province**

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Table of Contents

Acknowledgements	ii
Executive Summary	iii
1. Introduction	1
2. Problem Statement	3
3. Methodology and limitation of the study	6
4. Mineral beneficiation: potential catalyst for economic growth in the Free State	6
5. Statutory and Ethical Consideration	13
6. Research findings: A summary of stakeholders views on beneficiation in the Free State	13
7. Conclusion and recommendations	18
8. Reference	19

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Executive Summary

The mining industry still adds significant value to the South African economy despite its noticeable decrease over the past 20 years, having devastating effects on the mining towns in the Free State province. The South African government has taken greater steps towards supporting mining companies by putting policies into place to promote mineral beneficiation. The available literature indicate that that not all provincial governments and mining companies have benefitted from the potential economic opportunities mineral beneficiation present. The research methodology employed was of a qualitative approached and a questionnaire was distributed to all the mining companies in the Free State as well as Non-governmental organisations. This research found that only North West, Limpopo, Kwa-Zulu Natal and the Gauteng provinces have been proactive in beneficiating raw natural materials while the Free State province is seemed to be left behind. This research report provides recommendations on the basis of feedback from the participants and lessons to be learned from across the Free State borders.

1. Introduction

The South African mining industry has played a vital role in the economic development of the country. South Africa's mineral resources are valued at approximately \$2.5 trillion (approximately R 30.0761 trillion) (XE Currency Converter, 2018), (Tom, 2015: 1). However, the contribution of the mining industry to South Africa's economy has decreased substantially over the past 20 years; despite it playing an important role in the South African economy. Hence, the National Development Plan (NDP) emphasizes the important role mineral and metals cluster play towards enhancing economic development in South Africa. This is because approximately 60% of South Africa's export revenue comes from mining, minerals and secondary beneficiation products (National Development Plan 2030, 2012: 146).

The mining industry is the third largest sector and contributed approximately 7,8% of the South African Gross Domestic Product (GDP) in 2015. However, the proportion of directing mining activities in the country's GDP has dropped drastically from 21% in 1970 to a mere 6% in 2010 (NDP, 2012: 146). The mining industry employed a total number of 90 146 people at the end of June 2015 and the platinum group metal ore division employed the largest number (198 952 equivalent to 40,5%). This was followed by the mining of gold and uranium ore which employed a total number of 104 369 (equivalent to 21,3%) and mining of coal and lignite which employed a total of 97 952 (equivalent to 20,0%) (Mining Industry, 2015: 8).

Table 1: Employment comparison as at June 2012 and June 2015 in the mining industry

Type of mining	2012		2015	
	Number	% contribution	Number	% contribution
Coal and lignite	91 605	17,0	97 952	20,0
Gold and uranium ore	144 084	26,8	104 369	21,2
Iron ore	26 975	5,0	24 524	5,0
Chrome ore	20 540	3,8	16 571	3,4
Manganese	6 812	1,3	7 279	1,5
Platinum group metal ore	206 764	38,5	198 951	40,5
Dimension stone (granite, marble, slate and sandstone)	1 741	0,3	1 801	0,4

Limestone and limeworks	3 384	0,6	2 616	0,5
Other stone quarrying (including stone crushing, clay and sandpits)	15 131	2,8	10 619	2,2
Mining of diamonds (including alluvial diamonds)	11 943	2,2	15 386	3,1
Other chemical and fertiliser mineral mining	2 023	0,4	1 749	0,4
Extraction and evaporation of salt	741	0,1	483	0,1
Other mining and services activities incidental to mining	5 489	1,0	7 206	1,5
Other minerals and materials n.e.c	912	0,2	640	0,1
Total	538 144	100,0	490 146	100,0

*Adapted from Mining industry Report (2015: 8).

Table 1 clearly indicate that employment in the mining industry declined from 539 144 in 2012 to 490 146 in 2015 resulting in 47 998 jobs losses. From 2012 to 2015 the mining industry total value added decreased from 9,1% to 7,8%. The province with the highest mining contribution towards a province's value added was North West at 33,5%, followed by Limpopo (27,0%) and Mpumalanga (22,6%), while the Eastern Cape and Western Cape both recorded the lowest contribution at 0,2% (Mining Report, 2015: 10-11).

In order to revitalise the mining sector, the South African government has developed a minerals beneficiation strategy as a key area for potential growth. It therefore comes as no surprise that the Free State Growth and Development Strategy (FSGDS) has also identified mining as one of the key sectors that should be supported in order to catalyse economic growth and job creation. However, as it would be shown under the section dealing with the problem statement, the major problem has been lack of value addition to mineral products. There has been a simultaneous growth in awareness of the potential for increasing the value of exports of mineral commodities by means of beneficiation process (Robinson & Von Below, 1990: 91). Accordingly, this study seeks to determine the nature, extent and opportunities of mineral beneficiation in the

Free State. In this regard, lessons will be drawn from both domestic and international best practice.

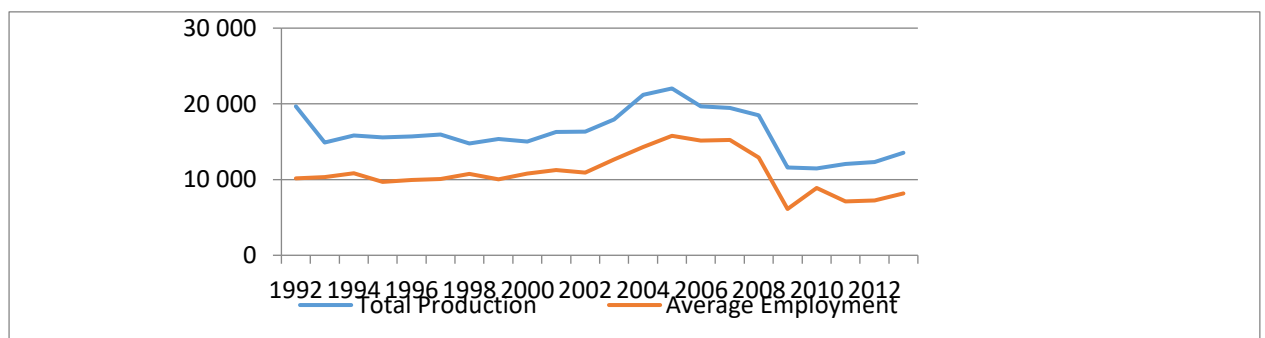
2. Problem Statement

South Africa has fallen short of taking full advantage of benefitting from the commodities boom over the past ten years. It has not taken full advantage of its mineral resources in order to create job opportunities and generate foreign exchange and tax revenue (National Development Plan 2030, 2012: 124-126). In 2016 a total number of 784 000 people were employed in the Free State which accounts for 5% of the total employment in South Africa (15.7 million). During the period of 2006-2016 employment in the Free State increased on average at 0.45% annually (HIS Markit Regional eXplorer, 2017: 36). The mining production increased by 6,5% year-on-year in November 2017 with its largest positive contributors being PGMs (12,3%), iron ore (20,7%) and coal (8,5%). Gold production however, decreased by 8,3% and contributing -1,3 percentage points was the most noticeable negative contributor. Mineral sales increased by 14,3% year-on-year in October 2017 with the main positive contributors being coal (14,0%), manganese ore (84,6%) and iron ore (18,4%). Although, the recent indicators are positive, in recent years there has been a decline in the contribution of the mining industry towards the South African economy. This decline has particularly affected the Free State Province mining sector which had an average annual growth rate of -1.03% for the period 2006 to 2016 (HIS Markit Regional eXplorer, 2017: 22). This is due to the fact that there are towns in the province whose economies have been built around mining activities. For instance, while mining employment was at 154 343 in 1980 in the Free State Goldfields (Matjhabeng) region, it reached a very low level of 34 633 in 2001; representing a massive decline of 77.6% (Marais, 2010: 20). The economic development in Matjhabeng in the Lejweleputswa region has experienced poor economic growth. When compared to other regions in the Free State, Lejweleputswa District Municipality had the highest unemployment rate of 38.5% in 2016, an increase from 30% in 2006 (HIS Markit Regional eXplorer, 2017: 41). The average growth rate for Matjhabeng Local municipality is -0,04% during the period of 2006 to 2016. A total of 99 650 people are employed in contrast to the 58 524 people that are unemployed of which 49,7% are unemployed youth and 105 159

are not economically active (Statistics SA, 2011). The manufacturing, agriculture and construction industries' employment also declined by 41%, 21.5% and 68.8% respectively in the same period (Marais, 2010: 20). This decline in other sectors reflects the extent to which they were dependent on the mining industry. The continued decline in economic opportunities in the mining towns, which is reflected by a decline in gold mining contribution to the Free State Provincial economy from 37% in 1980 to 10% in 2006, has resulted in a *ghost towns phenomenon* and this is a matter of serious concern to the Free State government (Marais, 2010: 17). The gloomy picture painted above largely represents the gold mining industry. The main problem is that the prominence of the gold mining industry in the province was not leveraged to diversify the economy away from dependence on the mining industry. The diamond-mining-dependent town of Koffiefontein (established in 1982) in the Letsemeng Local Municipality which has an annual growth rate of -1,08%, 11 788 are economically active (employed or unemployed but seeking work) and of these 22,3% are unemployed (Statistics SA, 2011).

This is because there has been a general decline in diamond mining output and employment in the country in the past two decades as illustrated in figure 1 below. For instance, while total diamond production was at about 10.2 million carats (Mct) in 1992, it stood at 8.2 Mct in 2013; representing a decline of about 20%. In 1992, an average of 19 654 workers was employed in the diamond mining industry. However, by 2013 this number had been reduced to only 13 547 workers; representing a decline of 31% in employment in the mining industry.

Figure 1: Diamond Production and Average Employment (1992-2013)



Source: Constructed from Department of Mineral Resources 2014 statistical tables (Increase in 2007 was due to improved data collection and methodology).

The economy of Koffiefontein has been built around diamond mining activities. The decline or scaling down of mining activities continues to have negative effects on this town's economy. There has been high levels of out-migration, largely due to the lack of job opportunities which will result in the population of the town decreasing. This has the potential of a vicious cycle of problems; namely drop in municipal revenue, decrease in residential property values, aging infrastructure, and erosion of buying power, failure of businesses and service sector industries and an increase in r job losses in the mine-dependant sectors (Marais, 2010: 32).

There have been numerous interventions in the past to turn the economic situation around in the Matjhabeng region. These include the Free State Goldfields Development Centre's sector strategy focusing on agro-processing, training and support centre, gold jewellery hub, mining tourism and international cargo airport; establishment of the Matjhabeng Marketing and Investment Company; and the Lejweleputswa Development Agency. These interventions did not succeed due to various factors, including lack of support from provincial and national authorities and the fact that these interventions were introduced too late when the gold mining industry was already declining at an alarming rate (Marais, 2010: 42-44).

Given these facts in the above discussion, the question becomes; *whether there is nothing more that could be done to leverage mining activities in the mining towns in particular and the province in general? Is it too late to strengthen and revive efforts to create upstream, downstream and side-stream linkages?* This study attempts to respond to these questions with specific focus on downstream mineral beneficiation in the Free State. Therefore, the study aims to answer the following questions:

- *What is the state of mineral beneficiation in the Free State?*
- *Does mineral beneficiation really present an opportunity to address the socio-economic problems in South Africa, and more especially in the Free State province?*
- *What lessons can be learned from other mining companies outside the Free State borders?*

3. Methodology and limitation of the study

The research unit employed qualitative method for this study in order to keep aligned with the major approaches being utilised in the social and human sciences (Creswell, 2003: 17).. The research instruments for this study only consist of a questionnaire and literature review. Qualitative studies are frequently associated with smaller, purposive (non-random) samples compared to quantitative research that rely on large and random samples (Bazeley, 2002: 5). For the purpose of conducting this study, non-probability sampling is applied and the subjects selected are key role players in the mining industry. A questionnaire has been designed that consist of both qualitative (open-ended) and quantitative (close-ended) questions so the data will be collected simultaneously. The Mineral Beneficiation questionnaire was distributed to mining companies and other relevant stakeholders.

4. Mineral beneficiation: potential catalyst for economic growth in the Free State

Whilst the African continent is rich in mineral resources, it has been predominantly a primary commodity exporter. Downstream beneficiation only started to emerge in countries like South Africa, Botswana and Mozambique in the 20th century (Montja, 2014: 1). Therefore, beneficiation is not a new phenomenon in South Africa, the adding of value or transforming of primary materials to more finished products has been undertaken since the 1960s. Although on a world context of the countries that are major producers of ores and metals, South Africa is nevertheless still a relatively small producer of processed mineral products, particularly the more sophisticated processed products. Robinson and Below (1990: 91-98), question whether domestic production of ores and metals actually provides South Africa with an overwhelming competitive advantage. South Africa has the profile of a modern economy with well-developed financial, commercial and industrial sectors, yet mining remains an important base of the economy. Mining companies assert that administrative prices set by state entities and the uncertainties of supply have a heavy impact on their

pricing. As a result while they cannot influence prices in the global markets, they can do so in the domestic market, due to their monopoly power.

Turok (2014:4-5) clearly illustrates the unfair and alarming pricing policies by giant companies such as ArcelorMittal South Africa (AMSA) and SASOL. The former was established in 1910 and later became the parastatal Iscor in 1928. AMSA has plants situated in Vanderbijlpark, Vereeniging, Saldanha, Pretoria and Newcastle. Despite the South African government's criticism towards AMSA's policy pricing (previously targeting international domestic price parity [IDPP] and recently shifted towards import parity pricing [IPP]), not much has been done to rectify this policy approach (Turok, 2014: 4). *Import parity pricing* (IPP) is a pricing policy determined by suppliers of products for their sales to domestic consumers, in accordance to the cost of a unit of an imported product. Simply put, price is benchmarked to that of the international price, converted into rand, transportation cost included, tariff and all other expenses the customer would tolerate if the good was imported (Parr, 2005: 2). The latter, SASOL was established in 1950 as a parastatal coal-to liquid fuel enterprise. SASOL's unfair policy pricing went untouched for a long time but was recently slapped with a R534 million fine by the Competition Tribunal and ordered to charge lower prices to promote local production in order to compete with imported final plastic products, manufactured locally instead of imported from abroad. SASOL was fined because it sell polypropylene at an IPP instead of an IDPP. The practice of IPP appears to have become the norm, even Wuhan a South African-owned company operating from China imports polypropylene to China, adds value, produce plastic buckets and then export it back to South Africa to be sold locally at an IDPP (Turok, 2014: 3-5).

Despite the ongoing debate to enhance mineral beneficiation, stakeholders have cautioned that the beneficiation development strategy should not be generalized but rather be taken on a case specific basis. Accordingly, some observers have warned that the downstream processing is not necessarily an appropriate development path to be taken unless policies are adapted to take advantage of the opportunities presented by beneficiation (Hausmann, Klinger & Lawrence, n.d: 1-2). There is insufficient international evidence available that prove that mineral beneficiation

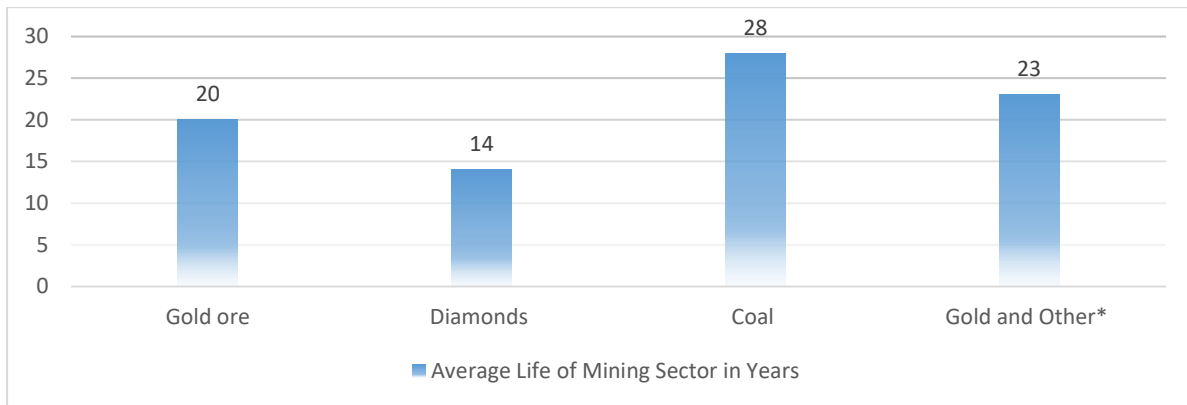
automatically provides a country with competitive advantage in beneficiation activities (Tom, 2015: 34). History, indicates that the majority of exported raw materials are exported to previous colonial masters where they are fabricated and re-imported back into South Africa. This is where the opportunity to create jobs in the processing side are then exported outside South Africa. Baxter (2005: 26) alludes that the debate of beneficiation should shift. Primarily the focus is more on why mining companies have a lack of beneficiation activities which should be redirected; the debate should rather be separated into two parts. Data indicates that beneficiation is practiced by countries that do not mine the raw materials at all or mine small quantities. Countries such as China, India, Dubai, United States and Turkey are classic examples of countries that are focused on the manufacturing sector (Baxter, 2005: 27), (Montja, 2014). Mining capital-equipment exports to Africa has grown significantly by 400%, hence Africa has become one of the biggest market for manufactured exports. This is an important fact to note when discussing mineral beneficiation expansion in South Africa. South Africa should not operate in isolation according to the former African Union Chairperson, Nkosazana Dlamini-Zuma. Dlamini-Zuma emphasised the need for infrastructure highways that would link African countries for R&D and training centres and Inga Dam hydropower project in the Democratic Republic of Congo (DRC). Former President Thabo Mbeki's research also notes the importance of dealing with illicit financial flows by mining companies, high cost and the undervaluation of minerals exported from Africa, non-payment of taxes and how these amounts exceed foreign aid. There is a clear need for African governments to provide decisive policy on how to manage mining and rail to ensure that foreign mining companies do not abandon national interests (Turok, 2014: 11).

The focus has indeed shifted; previously the main concern related to where raw materials were extracted, now the focus is where it can be fabricated because these products can now be obtained from anywhere in the world – hence competitive advantage is not the focus anymore. The Industrial Development Corporation (IDC) has taken an optimistic position and states that South Africa has successfully achieved in the first three stages of upstream beneficiation for most metals and industrial minerals such as PGMs, chrome, coal and iron ore. Undeniably, South Africa is ranked one of the richest countries in terms of mineral resources hence this study seeks to

determine if the Free State province can take advantage of beneficiation. The Mineral and Petroleum Resources Development Act of 2002, Act 26 of 2002 ensures that mineral beneficiation is promoted in South Africa and has set conditions or limitations. For example, any person who intends on beneficiating a locally mined South African mineral outside its borders may only do so after a written notice and in consultation with the Minister. The South African government's commitment is further demonstrated through the South African Mining Charter of 2004; which clearly instructs that mining companies will have the opportunity to offset the value of the level of beneficiation achieved by the company against its Historically Disadvantaged South Africans (HDSA) ownership obligations (Department of Mineral Resources, n.d: online). The Diamond Amendment Bill and the Precious Metals Amendment Bill are two pieces of legislation by the South African government which permit a more conducive environment for mineral beneficiation at the manufacturing level due to its complexity (Baxter, 2005:28). Both these Bills take on an "iron and fist approach", in other words, forcing local producers of raw mineral resources to play a direct role in the downstream beneficiation. Furthermore, the two Bills makes provision that the South African government would play a more interventionist role to ensure greater access to raw materials for local companies and to provide access to additional sectors for foreign investments and direct participation. Therefore, these two Bills makes provision for a conducive environment to promote mineral beneficiation in South Africa (Minerals and Energy Portfolio Committee, 2005). Another key initiatives by the South African government was the Industrial Policy Action Plan (IPAP) which promotes diversification and value addition in order for South Africa to compete effectively in export markets and against imports (Department of Trade and Industry, 2013: 10) Despite these efforts by the South African government, the mining sector is declining, particularly the gold industry. However mining activities still play an important role in the economy of the Free State province. For example, it should be noted that the mine life in the Matjhabeng region has been extended by deep mining which is characterised by capital intensity and accidents. Future investments will depend on the price of gold and the willingness of investors to commit to new investment in line with government policy. Besides gold and diamond mining, there is coal, sandstone, limestone and uranium mining in the province (Department of Mineral Resources Presentation, 2015). In terms of mining licences the Department of Mineral Resources has assured that there is still a future for mining in the province despite the

decline in gold mining. Figure 2 below, indicate the licences average periods for various minerals as a proxy for the average life of the mines and key minerals in the province.

Figure 2: Average mine life in years: gold, coal and gold & other minerals



Source: Adapted from Department of Mineral Resources Presentation to Desteas; 29 July 2015 (*Calculated from licenses that include a mixture gold, uranium, silver, copper and silver).

It is therefore important for Desteas to have a comprehensive understanding of the upstream,¹ downstream² and side-stream³ linkages that exist for each of the industries identified. Linked to this is a need to understand the extent to which these linkages find expression in the Free State economy and the support needed to strengthen linkages.

When comparing South Africa to the rest of the world it becomes evident that the mining industry has an “immature status” of beneficiation (Robinson & Von Below, 1990: 92). Hence it is important for South Africa to learn from other countries especially from two of the BRICS partnership, namely China and India. China’s Policy on Mineral Resources focused on the importance of developing and rational utilisation of mineral resources. The Chinese government promote the exploration and exploitation of the resources in the market demand, especially those important to western regions

¹ Linkages with mining capital goods, consumables and services industries

² Linkages into mineral beneficiation and manufacturing

³ Linkages into infrastructure (power, logistics, communications, water and skills and technology development)

(Montja, 2014: 7). The mining industry requires that the development of beneficiated products should be produced according to the industry needs irrespective of domestic availability of the raw materials in a particular country (Robinson & Von Below, 1990: 93). Most importantly, China's policy ensures that import foreign capital and technology that are utilised to exploit its mineral resources ensure that local enterprises and mineral products enter the foreign mineral international market (Montja, 2014: 7). India has made some significant strides with their National Mineral Policy which was revised to permit private domestic and foreign investors to explore and exploit the following minerals; iron ore, copper manganese, lead, chrome etc. The Department of Mines liberalised the mining sector to encourage Foreign Direct Investment (FDI). For example, 100 percent of FDI is permitted in exploration and mining of gold, silver and minerals except for diamonds and precious stones, metallurgy and processing (Mehta, 2002: 4).

At domestic level, the Industrial Development Corporation (IDC) has been instrumental in mineral base diversification in Merafe. The IDC took equity stake in South African Chrome and Alloys (SA Chrome) previously known as South Witwatersrand Exploration Company in 1999, in order to obtain chromite resources and provided funding for beneficiation trials and feasibility study. The aftermath of the successful feasibility study resulted in the IDC approving R150 million in equity and a R100 million debt facility in February 2001. The funds led to the establishment of a ferrochrome smelting facility in Boshhoek, near Rustenburg, North West province. South African Chrome company success led to the establishment of a Joint Venture (JV) with Xstrata plc, a London – and Zurich listed international resource company in July 2004 and became the largest ferrochrome producer in the world. They operate 8 chrome mines and 20 smelters and their combined capacity of approximately 1.9 million tons of ferrochrome annually (Tunyiswa, 2014: 24).

Another success story the Free State province can learn from is the JSE-listed company Hulamin Ltd. Hulamin manufactures produce technically-demanding, high quality high margin aluminium semi-fabricated products. These products include heat treated plate, closure sheet, bright treadplate, thin gauge foil, finish painted products

and clad products for automotive gear exchangers and is 65% exported to international and local markets. The rolled products plant is situated in Pietermaritzburg, in Kwa-Zulu Natal province and is the leading producer of extruded aluminium products in Africa (Tunyiswa, 2014: 25). In the Limpopo province, a consortium of Chinese investors led by Hong Kong Mining Exchange have committed to invest more than R40 billion into an industrial park. The industrial park will be developed and managed in the Musina-Makhado Special Economic Zone (SEZ) with the primary focus on the beneficiation of minerals and agricultural endowments. The Limpopo provincial government and the Chinese investors has identified minerals such as chrome, manganese, coking coal and lime that will be extracted and beneficiated. The project will be implemented over a five year timeline and an estimated 21 000 jobs will be created in the region (Engineering news, 2016: internet).

A further R30 million was invested in South Africa's first pilot plant in manganese beneficiation plant which was launched by the University of Limpopo (UL) in 2017 in Mbombela, Mpumalanga. This was a strategic initiative by the Department of Science and Technology (DST) to launch the Lithium Ion Battery (LIB) which is utilised in mobile phones, laptops, watches, digital cameras and some medical devices such as pacemakers. This strategic initiative by DST was the correct move towards becoming more competitive on the global stage because South Africa has 80% of the world's high grade manganese ore reserves (Polokwane Observer, 2016: Internet). The Gauteng provincial government in collaboration with De Beers and Anglo American Zimele, launched the Diamond Enterprise Development Project for South Africa. The Diamond Enterprise Development Project is set to enable growth and create employment in the diamond beneficiation industry. The OR Tambo jewellery precinct is an infrastructure currently under development for mineral beneficiation and diamond training (Fin24, 2016: internet). The space that has been availed for infrastructure development is 30 295 m² to for facilities for precious metal and gold beneficiation and high secure customs-controlled area (CCA), space for beneficiation process and business services (Gauteng Industrial Development Zone, 2017: internet).

5. Statutory and Ethical Consideration

This research complies with all statutory and ethical obligations as required by the Desteas Research Policy (Desteas, 2017). A subject information sheet explaining the purpose of this study and a consent form accompanied each questionnaire which was mandatory to sign before participating in this study.

6. Research findings: A summary of stakeholders views on beneficiation in the Free State

Table 2 provide a summary of the Free State mining companies that participated in the Mineral Beneficiation Questionnaire. It outlines the date of establishment the number of people currently employed, their method of excavation and commodity.

Table 2: Profiles of mining companies in the Free State

Mining company (code)	Establishment of mining company	Number of people employed	Excavation method	Commodity
MQB1	2003	928	Open pit	Diamond
MQB2	1950	30 990	Underground	Gold
MQB3	2013	60 000	Conventional deep level mining	Gold and Platinum
MQB4	2007	590	Sub-level caving	Diamond
MQB5	1950	30 000	Conventional and Trackless	Gold

Section B of the Mineral Beneficiation Questionnaire provided the participants with ten open-ended statements. These statements focused on the importance of mineral beneficiation, export processes, potential opportunities and question of capacity of mining companies in the Free State to take advantage of Mineral beneficiation. See the statements in table 3 below.

Table 3: Statements on Mineral Beneficiation

STATEMENTS: MINERAL BENEFICIATION	
B1	Free State has enough raw materials (gold, diamonds, uranium, coal, etc.) for mining to continue to be a priority sector in the Free State.
B2	The export of raw material hinders the beneficiation process.
B3	Free State mining will play a vital role in the future of the Free States economy.
B4	Beneficiation has the potential to strengthen South Africa's export market.
B5	Beneficiation should be undertaken by mining companies.
B6	Beneficiation should be undertaken by the manufacturing industry.
B7	South African and/or Free State mining companies have the capacity to operate beneficiation processes.
B8	It is cheaper to do manufacturing in the Free State compared to other provinces.
B9	South African labour laws support business optimization.
B10	Free State mining companies have access to international markets for beneficiated products

The participants had five response options to Section A of the questionnaire. Kindly see table 4 on the proceeding page.

Table 4: Response Indicators for statements on Mineral Beneficiation

RESPONSE INDICATORS				
1	2	3	4	5
Strongly Agree	Agree	Neutral	Strongly disagree	Disagree

A majority of 62.5 % of the participants agreed and 37.50% strongly agreed that the Free State has sufficient raw materials for mining to be a priority sector. When asked whether the export of raw material hinders the beneficiation process; 12.50% strongly agreed, 50% agreed, 25% were neutral on the matter and 12.50% disagreed. A majority of 87.5% of the participants are in agreement that the mining industry will continue to play a vital role in the future of the Free State economy while 12.5% were neutral on the matter. The feedback indicate that 99.75% of the participants agree with the statement that mineral beneficiation has the potential to strengthen South Africa's export market while 0.25% did not provide any feedback. Half of the participants agreed that mineral beneficiation should be administered by mining companies in contrast to the 25% were neutral on the matter, 25% disagree with the notion. A minority of 37.50% agree that South African mining companies have the capacity to operate beneficiation processes while 12.50% were neutral, 25% disagree and 12.50% strongly disagree.

The feedback from participants indicate that 25% agree that it is more cost effective to undertake manufacturing in the Free State compared to other provinces, while 25% were neutral on this matter, 12.50% disagreed and a majority of 37.50% of the participants strongly disagreed with this statement. When participants were asked whether the South African labour laws support business optimization, 0% agreed with this statement, 37.25% were neutral, 12.50% disagreed and 37.50% strongly disagreed. Although the participants' response to South African labour laws can be interpreted as being pessimistic, a majority of 49.50% are optimistic that Free State mining companies will be able to access international markets, while 12.50% were neutral on the matter and 37.50% strongly disagreed. The responses by the participants should not be viewed in isolation. The responses to the open-ended questions in Section B of the questionnaire will provide more depth to the opinions expressed by participants in Section A of the questionnaire.

Section B of the Mineral Beneficiation Questionnaire seek to determine the state of downstream mineral beneficiation in the Free State province. Majority of participants indicated that downstream mineral beneficiation is non-existent in the Free State province. Some alluded that government intervention is required to establish beneficiation facilities in the province. See some of the comments by mining companies;

“It is none existent [sic] but government may implement strategy to attract or support beneficiation to establish the business in the province” – MBQ1

“VIRTUALLY NON-EXISTANT” – MBQ3

“Too many illegal activities will and do hinder the possibility of downstream mineral beneficiation in the FS in particular” –MBQ5

The questionnaire asked whether mineral beneficiation could address socio-economic problems such as poverty, unemployment and inequality in the Free State. A majority of 75% of the participants indicated that mineral beneficiation has the potential to address the socio-economic problems in the Free State. This is in contrast to the remaining 25% of the participants that raised the concerns of illegal mining activities that could undermine this effort. Another participants are of the opinion that support should rather be directed towards supporting entrepreneurs in the Free State to

address these socio-economic problems. The Mineral Beneficiation Questionnaire asked participants whether the Free State government should make mineral beneficiation a priority for economic development. The feedback received was two folded; while 50% agreed with this notion, the other 50% participants disagreed and are of the opinion that government should not make mineral beneficiation an economic priority. Concerns were raised that the raw minerals found in the Free State such as gold, coal and diamonds have insufficient scope for downstream beneficiation and should therefore not be a priority but rather one of the pillars for industrialisation. However, the overall feedback suggest that there is consensus amongst participants that mineral beneficiation has the potential to create job opportunities and skills development, which could provide the Free State with a competitive advantage. See some of the comments below:

“No, the priority focus should be on the production of ore” – MBQ4

“Entrepreneurship, agriculture etc. should enjoy priority” – MBQ6

“YES. The agriculture sector is declining, mining become the next available intervention mechanism” – MBQ7

The questionnaire seek to determine the impact of downstream mineral beneficiation on the Free State mining companies in terms of productivity and profitability. A majority of the participating mining companies indicated that beneficiation of mineral resources is not a strength of Free State mining companies. The beneficiation process should rather be done by manufacturing companies. The follow up question in the questionnaire pertained to whether mining companies fully support the value added beneficiation programme. It is evident that majority of the mining companies are in agreement that mineral beneficiation is not the core of strength of the mining companies. See some of the comments below;

“Mining companies support beneficiation considering its benefit to socio-economic development. In the diamond industry, large producers such as De Beers sell minimum of 40% of total gross sales to local manufacturers” – MBQ1

“NO, BECAUSE IT IS NOT A CORE STRENGTH OF MINING COMPANIES. IT IS A MANUFACTURING COMPANIES COMPETENCY” – MBQ3

“In terms of making use of local suppliers of resources and services, yes. But the FS is limited with the required skills and cannot compete with the expertise of experienced companies” – BMQ5

“There is currently no scientific proof of that as yet as this could impact on the profit margins. However increase Productivity which could ensure sustainability” – MBQ7

The questionnaire asked participants to identify the key drivers for sustainable beneficiation programmes. The following common themes derived from their feedback in no particular order;

- Government creating an enabling environment
- Development of critical skills for beneficiation
- Access to raw materials
- Facilitate economic diversification
- Create opportunities for new enterprise

The participants were asked what are the main reasons for exporting raw materials instead of high value finished products, the following reasons were provided;

- Lack of skills on beneficiation in the Free State.
- Lack of tools (equipment) to beneficiate raw materials.
- South Africa is not ready or prepared for industrialization.
- Labour productivity and cost.

There is a correlation between the primary data collected and feedback from the questionnaire. Literature suggest that the level of value added mineral beneficiation in South Africa is generally low. These challenges relate to the availability of energy to power, infrastructure constraints, labour cost, quality of school education and skills, limited access to raw material for beneficiation (Tom, 2015: 37). The Mineral Beneficiation Questionnaire asked participating mining companies whether the Free State mines will have access to international markets for beneficiated products. There was an overwhelming positive response to this question. A majority of 87.5% of the participants believe that Free State mines will be able to gain access to the international markets. The remaining 12.5% of participants disagreed and did not

provide reason for their response. The questionnaire asked the participants to list the top five challenges that constrain the beneficiation programme, the following were listed;

- Illegal mining activities
- Corruption/ nepotism
- Safety index
- Lack of established market and branding
- Lack of infrastructure and government support.

7. Conclusion and recommendations

This research attempted to comprehensively answer the research questions and ultimately determine the state of mineral beneficiation in the Free State province. In order to achieve this, this research provided background on the mining industry in South Africa with special focus on the Free State. This research report briefly discussed the impact of the decline in the mining industry and how it resulted in “ghost towns” in the Free State. The literature suggest that mineral beneficiation or downstream production indeed has the potential to raise the unit value of South African exports (NDP 2030, 2012: 124-126). It should be noted however, that previous research on mineral beneficiation in South Africa mainly focus on policies and its contribution to achieve national and provincial economic and social development (Tom, 2015: 43-44). There are lessons to be learned from mining companies beyond the Free State borders. Foreign and domestic investments has resulted in beneficiation investment in North West, Limpopo, Kwa-Zulu Natal and the Gauteng province. It is recommended that the Free State provincial government organise a study group tour to the mining companies that have succeeded in creating infrastructure for beneficiation in their respective provinces. Furthermore, the Free State provincial government is encouraged to engage all the mining companies, NGOs’ and other stakeholders on this matter and perhaps seek investment to conduct a feasibility study.

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