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Strengthening local procurement in the Namibian Mining Industry

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STRENGTHENING LOCAL PROCUREMENT IN THE NAMIBIAN MINING INDUSTRY

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A research report submitted to the Faculty of Engineering and the Built Environment, University of the Witwatersrand, in partial fulfilment of the requirements for the degree of Master of Science in Engineering.

Johannesburg, 2020

DECLARATION

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



(Signature of Candidate)

19th day of October 2020

ABSTRACT

This research aims to strengthen local procurement, a facet of backward linkages in the Namibian mining industry. This work emanates from Nickerson, *et al.,* (2017) recent study on "The Relationship Between Local Procurement Strategies of Mining Companies & their Regulatory Environment: A comparison of South Africa and Namibia". Their research concluded that, Namibia is faced with significant challenges in their efforts to increase local procurement in mining. Therefore, this research is part of further studies required in order to find solutions to these challenges.

The research adopted a mixed methods explanatory sequential cross- sectional design. A sample consisting of six mines was selected and a study period of four years (2014 – 2017) was chosen for this research. Local procurement in the mining industry is solely influenced by the Namibian Mining Charter, a document implemented in 2014, which is not legally binding. The Mining Charter defines local procurement as the buying of goods and services from Namibian owned businesses of choice. The Charter also has a 40% local procurement expenditure requirement for mining companies in the country.

Stakeholders in the Namibian mining industry were found to have different definitions for local procurement, mainly due to lack of legally binding regulations to enforce a single definition. This has led to mining companies defining local procurement as buying of goods and services from Namibian registered businesses. A Namibian registered supplier encompasses a number of suppliers namely: local import agents, foreign exporter, locally based foreign manufacturer/service provider and local manufacturer/service provider. Some of these suppliers have limited value addition to the country. The adoption of this definition has therefore resulted in mining companies reporting inflated local procurement numbers for the period of study.

Local procurement by five of the six mines selected for the research was found to be well above the mining charter target over the four years. However, upon closer analysis, it was discovered that most of the purchases by these mines were made from foreign owned Namibian registered businesses and reported as local

procurement. This was the theme across all test samples and hence the inflated local procurement numbers. The procurement expenditure on Previously Disadvantaged Namibians' (PDNs) owned businesses averaged at 2.8% for the period of study. This average cannot be ranked as there are no targets set for procurement from PDNs; however there is need for further research to be done in order to determine a target to be met by all mining companies every year.

The researcher proposed a local procurement measuring and monitoring framework that will ensure that local procurement in mining is improved. The establishment of this framework will assist mining companies in developing effective supplier development programmes. Processes that needs to be undertaken in order to attain the desired framework outputs includes, accurately defining local procurement (based on varying combinations of three distinct aspects namely; participation, geographic location and value addition) and adopting a single definition for the industry. Other processes are design and development of local procurement regulations and policies, amending the Namibian Mining Charter and incorporating Social Impact Assessment (SIA) into core business strategies.

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And finally, I would like to express my heartfelt gratitude to my family, for always supporting and believing in me.

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LIST OF SYMBOLS

N$	Namibian Dollar
R	South African Rand
%	Percent
US$	United States Dollar

LIST OF ABBREVIATIONS

AMDC	African Minerals Development Centre
AMV	African Mining Vision
AU	African Union
BBBEE	Broad Based Black Economic Empowerment
BGR	Bundesanstalt für Geowissenschaften und Rohstoffe
CCSI	Columbia Center on Sustainable Investment
CSR	Corporate Social Responsibility
DRC	Democratic Republic of the Congo
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
HDI	Human Development Index
HDSAs	Historically disadvantaged South Africans
IBAs	Impact and Benefit Agreements
MCDA	Multi-criteria decision analysis
MPRDA	Mineral and Petroleum Resources Development Act of 2002
MTR	Mid – Term Review
NDPs	National Development Plans
NEPAD	New Partnership for Africa's Development
NIMT	Namibian Institute of Mining and Technology
PDNs	Previously disadvantaged Namibians
PSCs	Production-sharing contracts
R&D	Research and Development
SADC	Southern African Development Community

SIA	Social Impact Assessment
SLP	Social and Labour Plan
SWF	Sovereign Wealth Funds
UN	United Nations
UNDP	United Nations Development Programme
VAT	Value Added Tax
WTO	World Trade Organisation

1. INTRODUCTION

1.1. Chapter Overview

This chapter provides a brief background of the research, the problem statement, the overall aim and the goals to be met by the research. The significance of the research to relevant stakeholders is also discussed in this chapter. The chapter further discusses the regulatory framework that influences the industry's local procurement activities. Definitions to some of the terms that are widely used in the research are given and the Chapter concludes by giving the report overview.

1.2. Research Background

Namibia is richly endowed with mineral resources comprising of gold, copper, uranium, diamond, zinc, industrial metals, semi – precious metals and many others. The country has over 5% of the world's identified uranium reserves (Van Wyngaardt, 2017). Moreover, according to the World Nuclear Association (2019), Namibia has potential to provide 10% of the world's uranium output from existing mines.

Els (2013) pointed out that Namibia, was ranked number one as the country with the largest marine diamond deposits in the world, estimated to be more than 80 million carats. Diamonds accounted for about a quarter of all exports in 2016, generating US$ 1.2 billion in foreign exchange revenues, making it Namibia's major mineral export (Wakeford, 2017). In Africa, Namibia is the fourth largest exporter of non – fuel minerals (KPMG, 2015).

The Namibian mining industry is the largest contributor to the Gross Domestic Product (GDP) of the country. In 2017, the industry provided more than 50 percent of forex earnings and accounted for 11.5% of GDP (Chamber of Mines of Namibia, 2017; Central Intelligence Agency, 2018), see Appendix 7.1. According to McKinsey Global Institute (2013), countries that are primarily driven by mineral resources tend to underperform those without significant resources. This phenomenon popularly known as the "resource curse" persists across developing countries, especially in Africa.

Despite having considerable amounts of mineral resources, Namibia's level of economic and social development does not correspond with the level of mining that

has taken place in the country (Nickerson, *et al.,* 2017). The African Development Bank (2014) stated that Namibia's benefits from its mineral resources have not been shared fully throughout the country as a result of weak forward and backward linkages with other industries and the capital intensive nature of the industry.

Columbia Center on Sustainable Investment (CCSI) (2016) defined forward linkages as the further processing of extracted mineral resources. Meanwhile, backward linkages are when the establishment of a new business creates possibilities for local businesses to expand production through the supply of inputs to the new business (Leeuw & Mtegha, 2018). Local businesses in this context are those owned by previously disadvantaged groups, host communities and indigenous people (Anglo American, 2010; Ramirez, 2016).

Nickerson, *et al.,* (2017) posited that local procurement by mining companies in Sub – Saharan Africa has substantial social and economic development potential. This is because when mining companies buy local goods and services from local suppliers, skills and technology transfer is promoted, local jobs are created and local companies are integrated into the global value chain (World Bank, 2012). Capital expenditure by mining companies on local procurement alone can be more than the funds spent on salaries, taxes, royalties as well as community investment combined (Ovadia, 2014, 2015; Geipel, 2017; Nickerson, *et al.*, 2017).

According to Anglo American (2017), Minas-Rio iron ore mine had local procurement expenditure of US$ 800.3 million and the combined expenditure for wages, taxes, royalties and corporate social investment was US$ 359.7 million in 2016. This shows that Minas-Rio iron ore mine had spent more than twice as much money on local procurement than they spent on of wages, taxes, royalties and corporate social investment combined.

The Gahcho Kue mine in Canada had local procurement expenditure of US$ 266.5 million and the combined expenditure for wages, taxes, royalties and corporate social investment was US$ 145.4 million in 2016 (De Beers Group, 2016). Local procurement expenditure was 54.6% more than the expenditure on wages, taxes, royalties and corporate social investment combined. The two examples of Minas-Rio iron ore mine and that of Gahcho Kue mine demonstrates how much more

money mining companies spend on procurement than other areas when a country has a well-established local procurement environment. However, there could be national or regional biases, thus, the importance of research like this one to understand local procurement in different settings.

One of the ways to improve local procurement is by having sound and well thought out regulations in place (Tordo, *et al.,* 2013). Several researchers have found out that countries with local procurement regulations and incentives, procured more locally than those without (Esteves, *et al.,* 2010; Tordo, *et al.,* 2013; Nickerson, *et al.,* 2017). For example, East Asian countries, that is, Japan, Taiwan and South Korea, all used local procurement and other strategies to drive decades of sustained economic growth.

South Korea encouraged investing car manufacturers to buy local goods and services through regulations and economic incentives. As a result, South Korea is now the fifth largest car manufacturer in the world (Geipel, *et al.,* 2014). In this research, four methods for overcoming the challenges that minimises backward linkages in the Namibian mining industry are examined.

1.3. Problem Statement

The Namibian mining industry does not have a specific set of local procurement regulations (Esteves, *et al.,* 2010). The lack of regulations and the presence of weak public–private partnerships are two areas of weakness for the Namibian mining industry (Durant, *et al.,* 2017) and some of the factors that influence local procurement. Weakness in these areas deters the creation of sustainable local procurement strategies and puts Namibia at a competitive disadvantage (Esteves, *et al.,* 2010; Nickerson, *et al.,* 2017).

The Namibian Mining Charter, even though not legally binding, solely influences local procurement in the industry. Since the Mining Charter is not a legally binding document, a mining right or licence holder who does not comply with its requirements, is never in breach of any Act or regulation and therefore not held accountable for non – compliance.

The Namibian Mining Charter has 5 transformational pillars namely ownership, education and skills, affirmative action, procurement and enterprise development

and Communities & infrastructure (Chamber of Mines of Namibia, 2014b). The Charter requires a mining company to score a minimum of 12 points out a maximum of 20 in each of its five transformation pillars (Chamber of Mines of Namibia, 2014b). In the "Procurement and Enterprise development" pillar, mining companies are required to source 40% of their total procurement needs from local suppliers in order to score the minimum 12 points. As part of the Charter's requirements, mining companies are also required to submit annual reports showing their detailed procurement activities to the Chamber of Mines of Namibia (Chamber of Mines of Namibia, 2014b).

Despite the Mining Charter's requirements, Nickerson, *et al.* (2017) and Durant, *et al.* (2017) stated that it is very challenging to find publicly reported comparable local procurement spent amounts by mining companies. Mining companies' websites as well as the Chamber of Mines of Namibia's annual review reports, only show aggregated amounts. This makes it very difficult for all stakeholders, including suppliers, mining companies, industry association and governments, to accurately understand the current state of local procurement and also to identify existing opportunities. Therefore, this research aims to investigate the trends in local procurement, examine the factors that inhibit local procurement and suggest measures to improve local procurement in the Namibian mining industry.

1.4. Research Aim and Objectives

The research is aimed at unpacking factors affecting local procurement and developing a local procurement measuring and monitoring framework for the industry. This framework will help in better definition and consequently accurate reporting of local procurement.

The research also discusses supplier development programme which, can be used by mining companies to develop local suppliers' capabilities to meet company needs. The establishment of a healthy local procurement environment is a significant step towards transforming the industry from practising Corporate Social Responsibility (CSR) to a Shared Value (SV) approach between mining companies and the communities. Thus, the objectives of this research are to:

• Investigate the trends in local procurement in the Namibian mining industry.

• Analyse expenditures on local procurement against the requirements of the mining charter as well as proportions spend on PDNs.

• Determine the factors affecting local procurement.

• Identify measures to increase local procurement from literature and propose a guiding framework that can be used in the Namibian mining industry.

1.5. Significance of Research

The research identifies how Namibia can use its mineral endowments for socio – economic development through local procurement. It also seeks to quantify the level of local procurement in the Namibian mining industry during the period of 2014 to 2017. With this information, economists at the Ministry of Mines and Energy and Chamber of Mines of Namibia can identify whether Mining Charter targets have been met or not. They can also use this information to develop suitable strategies that will help increase local procurement in cases where Charter targets have not been met.

This research will also provide mining companies' procurement amounts from PDNs' owned businesses. This information is very significant as it identifies the level of PDNs participation in the mining companies supply chains so that improvements can be made where necessary. Other relevant stakeholders such as the mining companies can also use this research to identify areas of opportunity in their supply chains, for local suppliers to take advantage of.

1.6. Research Challenges

The author faced a few challenges when conducting this research. Firstly, mining companies in Namibia currently submit aggregated data on local procurement as part of their annual reporting. Therefore, the author received the aggregated data from the Chamber of Mines of Namibia with no breakdown of the specific segments where the local spending was concentrated. The Author tried without success to acquire more detailed information from the specific mines due to confidentiality purposes. Working with aggregated data made it difficult to determine a lot of important elements such as the different types of goods and services procured from local suppliers especially PDNs. This warrants a need for a better local procurement reporting system in the mining industry.

1.7. Definition of Terms

1.7.1. Social licence to operate

These are 'social investments' made by mining companies, in host communities in order to gain local support (Dodd & Greener, 2015; Ramirez, 2016). These investments are done through building of schools and hospitals and also funding initiatives targeted for local businesses development among others (Dodd & Greener, 2015).

1.7.2. Previously disadvantaged group

In Namibia this term, also known as the Previously Disadvantaged Namibians (PDNs) refers to those individuals who were discriminated against and did not have the right to vote during the Apartheid era (1966 – 1990) because of their race or origin (Booyens, 2006). During this period, mining was regulated by the Mines and Works Act of 1911 (CJPME Foundation, 2014). This Act was designed to prevent the emergence of a stable black working class and competition for better paid jobs between black and white mine workers (CJPME Foundation, 2014).

Restrictions of the Mines and Works Act of 1911 such as job mobility and crippling taxes, made it impossible for black Namibians to participate in the supply chains resulting in underdevelopment in rural communities (CJPME Foundation, 2014).

1.7.3. Historically disadvantaged South Africans (HDSAs)

These are South African citizens that endured unjust discrimination before the Constitution of the Republic of South Africa, 1993 (Act 200 of 1993) was adopted (Department of Mineral Resources, 2010). In mining, South African black citizens were excluded from skilled labour and better paying jobs by means of the Mines and Works Act of 1911 (CJPME Foundation, 2014). In addition, mining laws that restricted black's job mobility, low mine wages and punitive taxes, contributed to rural underdevelopment and poverty among South African black communities (CJPME Foundation, 2014).

1.8. The Legal Framework

The Ministry of Mines and Energy (MME) of Namibia is in control of keeping the legal framework harmonious with global best practices and is the sole custodian of all mineral resources in the country. According to KPMG (2015), all mining related activities in Namibia are regulated by the Minerals (Prospecting and Mining) Act of 1992. The Act contains all the guiding principles and the framework to pursue the development of the mining industry (Durant, *et al.*, 2017).

The Chamber of Mines of Namibia acts as a central coordinating body in the industry while buying of local goods and services in the industry is influenced by the Namibian Mining Charter which is a non-legally binding document (Nickerson, *et al.*, 2017; Esteves, *et al.*, 2010).

There is currently a new bill being drafted known as the New Equitable Economic Empowerment Framework and Bill (NEEEF Bill). The policies contained in the NEEEF Bill were formulated with the sole purpose of restructuring the private business sector in order to achieve balance in the economic ownership of high – yielding assets, at the same time creating job opportunities for the Namibian people (New Equitable Economic Empowerment Framework and Bill (NEEEF), 2015; Durant, *et al.*, 2017). A comprehensive discussion of the two policies is as follows.

1.8.1. The Namibian Mining Charter

The Mining Charter was created by the Chamber of Mines of Namibia in 2014 with the aim of facilitating worthwhile involvement of PDNs in the mining industry (Chamber of Mines of Namibia, 2014b). The mining Charter was initially implemented on a trial basis from 2014 and planned to end the trial by the end of 2016 (Chamber of Mines of Namibia, 2014b). However, the trial period never ended and it went on running through to 2017 (Ramirez, 2016; Durant, *et al.*, 2017; Nickerson, *et al.*, 2017).

According to Chamber of Mines of Namibia (2014b), mining companies are supposed to submit annual reports to the Chamber showing how the goals set by the Charter were met and if they were not met then an explanation should be provided in the report. However, submission of these annual reports was optional

for all mining companies during the trial period of the Charter (Chamber of Mines of Namibia, 2014b).

The design of the Charter is based on five transformational pillars, namely ownership, education and skills, affirmative action, procurement and enterprise development and Communities & infrastructure (Chamber of Mines of Namibia, 2014b). Ownership is aimed at ensuring participation of PDNs in the mining industry as owners and decision-makers. Education and skills is aimed at increasing the contribution by the mining companies towards the nation's knowledge and skill base. Affirmative Action's objective is to make sure that all levels of management in the mining industry consist of PDNs, for them to gain the skills and knowledge needed to effectively run the mining industry (Chamber of Mines of Namibia, 2014b; Nickerson, *et al.,* 2017).

Procurement and Enterprise Development, which is also the focus of this research is aimed at encouraging mining companies to buy either goods or services from local businesses. This will help integrate local businesses into the global value chain (Durant, *et al.,* 2017). Communities and Infrastructure's goal is to ensure that mining companies make significant contributions toward the uplifting and development of the communities in which they operate (Chamber of Mines of Namibia, 2014b).

Mining companies can score a maximum of 20 points from each of the five transformational pillars giving a total of 100 points. 12 points are awarded for meeting the minimum target of a pillar and an additional 8 points is awarded if a company goes beyond the minimum target (Chamber of Mines of Namibia, 2014b).

The Charter sets objectives to be reached by mining companies in each of its five transformational pillars (Nickerson, *et al.,* 2017). For procurement and enterprise development, the Charter required mining companies during mineral extraction and beneficiation, closure and post closure phases to have a discretionary expenditure of 25% in the period from 2014 to 2015.

From 2016 to 2020 a discretionary expenditure of 40% is required for the same phases of operation (Chamber of Mines of Namibia, 2014b; Nickerson, *et al.*,

2017). However, during the mine construction or crucial expansion, the discretionary spending can be cut by 50% (Chamber of Mines of Namibia, 2014b).

According to the Chamber of Mines of Namibia (2014b), discretionary expenditure is money spent by mining companies on goods and services that are available in the country from Namibian-owned businesses of choice. The discretionary expenditure by mining companies is supposed to be reflected in the annual reports submitted annually to the Chamber of Mines of Namibia (Chamber of Mines of Namibia, 2014b; Nickerson, *et al.,* 2017).

1.8.2. New Equitable Economic Empowerment Framework and Bill (NEEEF Bill)

Ramirez (2016) & Nickerson, *et al.* (2017) argued that the New Equitable Economic Empowerment Framework and Bill (NEEEF Bill) as an empowerment policy and a regulatory framework, was designed to work in the same way as the Broad Based Black Economic Empowerment (BBBEE) of South Africa. The bill is based on five development pillars namely ownership, management control and employment equity, human resources and skills development, entrepreneurship development, and community investment (NEEEF Bill, 2015).

The NEEEF Bill has a scorecard which mandate's companies to meet the bill's targets in every development pillar. For example, the drafted bill states that a mandatory 25% share of each and every mining company operating in Namibia must be sold to PDNs. The ownership clause in the NEEEF Bill is quoted as follows:

"*Any private sector enterprise that is established after the commencement of this Act may commence business only when such enterprise has secured 25 per cent ownership by a racially disadvantaged person or persons or such higher percentage as may be determined by Minister by notice in the Gazette (NEEEF, 2015, p 31)"*

Non – compliance with this Act will result in mining companies being disqualified from obtaining a mining licence or a government contract (NEEEF, 2015). The NEEEF Bill is still to be implemented as soon as all the issues with the current bill format have been sorted out (Nickerson, *et al.,* 2017). There is negative investor

sentiment towards NEEEF Bill and this raises worries that the proposed bill could be counterproductive to the growth of the mining industry once it comes into effect (KPMG, 2017; Davidson, 2017). Ramirez (2016) pointed out that since the NEEEF Bill was released into the public domain for scrutiny before being implemented, there have been concerns that the Bill might negatively affect future Foreign Direct Investment (FDI) in mining.

1.9. Report Overview

This report is divided into six Chapters. **Chapter one** provided a discussion on the background of the research, the problem statement as well as the research aim and objectives. The significance of the research as well as the legal framework in the Namibian mining industry were also discussed in this section. **Chapter two** is a review of literature on the resource curse, human development, African Mining Vision, linkages to the mining industry and the aspect of local procurement in mining. In addition, lessons learned from a number of countries that have successfully developed local procurement strategies are briefly discussed in the chapter. **Chapter three** discusses the research methodology, research design, data collection methods and data analysis.

Chapter four outlines and describes procurement by mining companies in Namibia, with an emphasis on local procurement and also discussing procurement from companies owned by PDNs. The Chapter also discusses local procurement opportunities available in the mining industry. Factors limiting the development of local procurement strategies are discussed. **Chapter five** provides a local procurement measuring and monitoring framework, that can be used to accurately quantify local procurement in the mining industry. **Chapter Six** deals with the conclusion and recommendations.

2. RESOURCE CURSE, HUMAN DEVELOPMENT AND LINKAGES IN THE MINING INDUSTRY

2.1. Chapter Overview

This Chapter provides a discussion on the resource curse often experienced in countries with natural resources, specifically mineral resources. The Chapter further discusses human development in mining. Human development mainly looks at how revenues from the exploitation of mineral resources can be used to improve the living standards of the people in host communities through its different channels namely the social sector, growth and diversification, social investment, employment, procurement and infrastructure.

There are different linkages through which a mining industry relates with other sectors of the economy. However, in this report five commonly known linkages namely, backward, forward, spatial, fiscal and knowledge are discussed. More emphasis is placed on backward linkages since this research is focused on local procurement which is a component of this linkage. Furthermore, Nickerson et al., (2017) concluded that local procurement in the Namibian mining industry was limited and needed to be improved, hence the relevance and choice of this research.

Linkages are essential in ensuring the realisation of substantial benefits for local people from the exploitation of mineral resources. This chapter also gave a discussion on how to create an enabling legal and regulatory environment for local procurement. The discussion focused on two key indexes namely Regulatory Quality Index and the Ease of Doing Business Index. Moreover, the Chapter gives a discussion of Norway, Canada and Ghana as examples of the countries that have been successful in developing local procurement in their mining sectors. This discussion is followed by the conclusion to the chapter.

2.2. Resource Curse

A country or a region is said to experience a resource curse when there is an inverse relationship between its economic development and its natural resource abundance (Sachs and Warner 1995, 1997 and 1999). For a large segment of Africa's population, natural resources (minerals, fuels and agriculture) constitute the main source of public revenue and national wealth (African Development Bank, 2007). However, developing countries with an abundance of natural resources tend to economically underperform and have lower human development than developing countries with less natural resources (Sachs and Warner, 2001; African Development Bank, 2007; Petar and Seba, 2016).

The resource curse does not necessarily mean that having an abundance of natural resources is always bad for economic growth, on the contrary, countries such as the United States of America (USA), Canada, Norway, Chile and Australia all had economic development based on natural resources (Benghida, 2017). Countries that suffer the resources curse are those that heavily rely on revenues received from the export of natural resources.

Resource dependency can result in poor economic performance due to a number of factors namely; metals market volatility, Dutch Disease, lack of skills and performance quality, fiscal insecurity and management of revenues (Benghida, 2017). Dutch disease occurs when the sudden profits realised from the export of natural resources causes currency appreciation in the host country, as a result products from other sectors become less price competitive (Mingcong, 2013; Erling, 2006). Figure 2.1 shows the relationship between economic growth and natural resources abundance for different countries between 1970 and 1989.

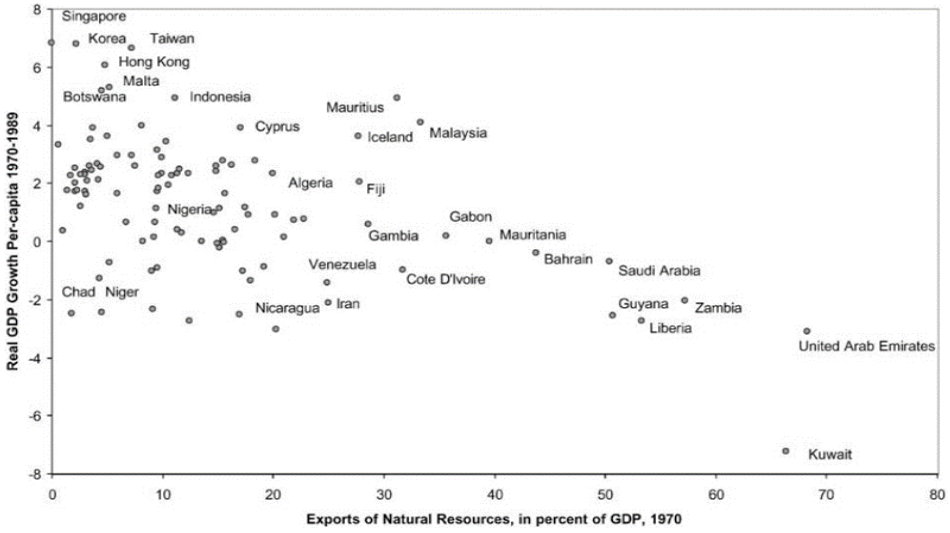


Figure 2.1: Economic growth vs natural resources abundance (Sachs & Warner, 2001)

From Figure 2.1 it can be observed that that during the period of 1970 – 1989 countries that were richly endowed with natural resources such as Liberia, Zambia, United Arab Emirates and Saudi Arabia grew at a slower rate that those without (Sachs and Warner, 1995, 2001). On the other hand, countries that began as natural resource poor such as Singapore, Taiwan, Hong Kong and South Korea, had more rapid economic growth (Sachs & Warner, 1995).

The resource curse still exists today and is supported by some recent studies in some developing countries. An example of a developing country that still experiences the resource curse is Democratic Republic of the Congo (DRC) which is the largest cobalt producer globally and the largest copper producer in Africa (Radley, 2017). Mining in DRC contributes 28% of government revenue (highest) and 22% of GDP (Radley, 2017). In 2015, DRC had a human development index (HDI) value of 0.435 (low human development category), ranking 176 out of 188 countries (Jahan, 2016) and having approximately 77% of the country's population living below the income poverty line (Jahan, 2016; Radley, 2017).

Among many other factors, the resource curse can also result from how governments manage their mineral resources and how they spend their mineral resource revenues among others (African Development Bank, 2007). For example, resource–rich countries from the Middle East, i.e. Qatar, Kuwait and United Arab Emirates(UAE), etc., in recent years have been able to spend the revenues from

mineral resources to transform their cities into mega cities and tourist attractions because of their policies, institutions and knowledge (African Development Bank, 2007). Public spending of revenues received by governments of these countries from their oil sector has been the primary tool used for economic performance. In the process these countries have created backward and forward linkages that generate extra income (Saif, 2009).

African countries on the other hand tend to suffer from the resource curse due to their lack of knowledge, poor linkages, corruption and poor quality policies formulation and implementation (African Development Bank, 2007). In cases where good quality policies are developed, governments lack credibility to commit to such policies. Diamond – rich countries such as DRC, Sierra Leone and Liberia for example get lower benefits from resource revenues due to rent – seeking behaviours by public officials. Government officials in these countries are mostly easily bribed by large corporations and enter into investments that harm long – term future development of their respective countries (Méon & Khalid, 2005; Demissie, 2014).

2.3. Human Development

Human development is defined by Dodd & Greener (2015) as the process of expanding the richness of life. Mineral resource exploitation in a host country should be carried out with its main purpose of improving the living standards of its citizens. Dodd & Greener (2015) reiterated that, there are different channels shown in Figure 2.2 through which revenues from mineral exploitation can be used to contribute to human development.

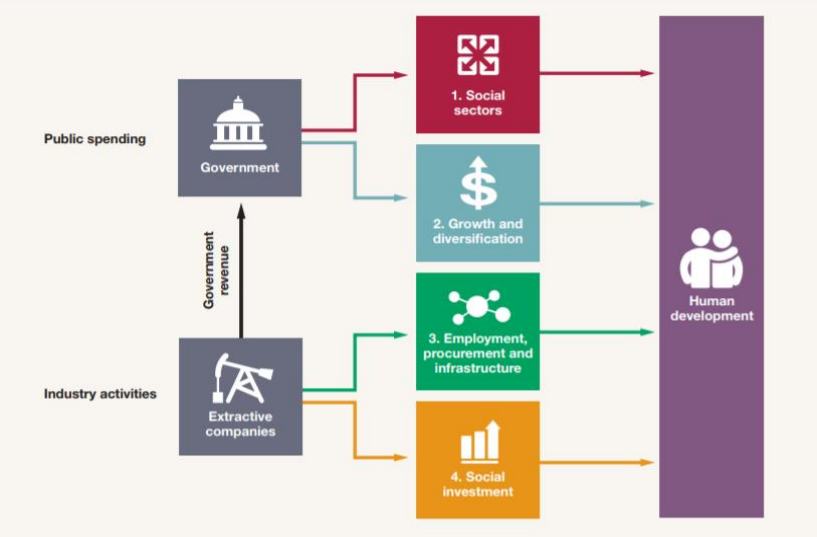


Figure 2.2: Revenues from mineral exploitation and channels to Human Development (Dodd & Greener, 2015)

The government of the host country receives revenues from mining companies in the form of taxes, profit shares and royalties. These revenues are spent on the social sector as it pertains to interventions that directly target human development in health, education and social protection (Dodd & Greener, 2015).

Public spending in Botswana, which is one of the countries considered to have defied the resource curse (Iimi, 2006; Koitsiwe & Adachi, 2015) uses a framework based around National Development Plans (NDPs) and the yearly budgeting process (African Development Bank, 2016). NDPs are the government's short term (five years) national goals. The government of Botswana spends the revenues through two sections of its annual budget, that is, development spending and recurrent spending. Development spending includes spending on big projects included in the NDPs such as schools, roads, capital equipment, investment of capital into state – owned enterprises, etc. Projects under development spending are often funded on a yearly basis over a number of years (African Development Bank, 2016).

The recurrent spending covers annual public sector wages, consumables, debts, maintenance costs, etc. The government budget and the NDPs are approved by the parliament and no minister is allowed to spend more funds than what was estimated in the budget (African Development Bank, 2016). Spending on projects that are not included in the NDPs is also not permitted. A mid – term review (MTR) is

undertaken when 50% of a project under development spending is completed. If necessary, project cost ceilings are varied during the review and approved development projects are either added or removed from the budget (African Development Bank, 2016).

Revenues received by the government are at times invested in wealth funds so that over time, interest is earned on the principal and hence more wealth is generated. Botswana has been successful in this area because they invested part of their mineral rents in Sovereign Wealth Funds (SWF) outside the country. Investing in financial assets outside the country is very significant because they are insulated from local pressure, like politics. Also offshore SWF are good for offsetting the Dutch disease (African Development Bank, 2016).

Spending of mining revenues by governments to strengthen other sectors of the economy also leads to human development and sustainable development of the economy (Dodd & Greener, 2015). The Hartwick rule (Hartwick, 1977) of sustainability states that minimum rents from exhaustible resources must be reinvested in reproducible capital such as machines, leading to a constant efficient consumption path (Asheim & Buchholz, 2000; Asheim, 2013; Martinet, 2004).

According to Martinet (2004), the Hartwick's rule is argued to lead to sustainability as it maintains the total stock of capital and the consumption constant along time. In Botswana for example, the policy that regulates spending of mineral rents follows the Hartwick rule. The public finance policy of the country clearly states that mineral rents should be used to finance investment in other assets (Martinet, 2004; African Development Bank, 2016).

Mineral resource exploitation can also lead to human development through employment, procurement and infrastructure. To effectively run a mining operation, mining companies need employees to run the day-to-day business, goods and services, which can be locally procured as well as good infrastructure (Dodd & Greener, 2015). Mining companies often make "social investments" in communities (often remote) where they are carrying out their mining operations by building schools, hospitals and investing in local businesses to gain local support. Although these types of investments are usually small, they however, make a

significant difference since these communities are usually vulnerable and poor (Dodd & Greener, 2015). Efforts by international organisations to expand the richness of life for the African people, has resulted in the formulation and adoption of the African Mining Vision (World Bank, 2012).

2.4. African Mining Vision (AMV) 2050

International organisations, including the African Development Bank, African Union (AU) and the New Partnership for Africa's Development (NEPAD) have been engaged in coordinating and publicly recommending mining policies with the comprehensive aim of using the natural resources exploitation in Africa as a stimulant for economic development.

AMV's main objective is to facilitate sustainable growth and socio-economic development through a transparent, equitable and optimal exploitation of mineral resources (United Nations Economic Commission for Africa, 2009; Busia, 2015). The principal component of this shared vision is the new resource-based industrialisation and development strategy for Africa, which is based on forward, backward and side stream linkages (United Nations Economic Commission for Africa, 2009; World Bank, 2012).

The African Mining Vision provides a comprehensive Framework for Action that gives an indication of actions to be taken at national, sub – regional and Africa-wide level to realise economic development (World Bank, 2012). Table 2.1 summarises actions to be taken related to backward linkages.

Table 2.1: AMV's Framework for Action: Goals and Actions related to backward linkages (United Nations Economic Commission for Africa, 2009)

Medium term goals (5 – 20 years)	Actions to be taken		
	Country level	**Regional Economic Community level**	**Africa-wide level**
Lateral migration/ Upstream value addition	Build national clusters for technology innovation and adaptation	Establish Knowledge Based Centre of excellence; scale up harmonisation of skills and standards to facilitate factor flow	Implement New Partnership For Africa's Development (NEPAD) program for the establishment of African Centres of Excellence
Improve the Value chain and maximise diversification of economies	Create a conducive environment for development of backward and forward linkages and value addition, especially semi-processing and cluster development, including intensification of technology sharing and investment of rent/capital generated through resources into other sectors	N/A	Initiate resource mobilization, especially financial resources

The visions strongly advocates for the establishment of strong collaborative instruments such as technology parks, chamber of mines, clusters and associations to realise backward linkages development and economic diversification (World Bank, 2012).

African Minerals Development Centre (AMDC), a facilitator of choice, was launched in 2013 to help eradicate critical sustainable development issues and other challenges that cause poverty in African countries which possess mineral resources driven economies (Busia, 2015; Davidson, 2017). AMDC underpins the implementation of the AMV by AU member States through country Mining Vision

(Busia, 2015). Namibia's Ministry of Mines and Energy, took a decision in 2017 to commence with the review of the nation's Minerals Policy document so that its objectives are aligned with the developmental objectives of AMV 2050 (Carter, 2017). It is significantly necessary that developing countries adopt the goals of the AMV 2050 in order for them to realise the much needed industrial development through local content development (World Bank, 2012).

2.5. Linkages to the Mining Industry

There are many countries whose economies are primarily driven by mineral resources extraction. While revenues received by governments through taxes and royalties contribute a large portion to a country's GDP, more benefits can be earned through the creation of linkages with other sectors of the economy along the mining value chain (CCSI, 2016), as shown in Figure 2.3.

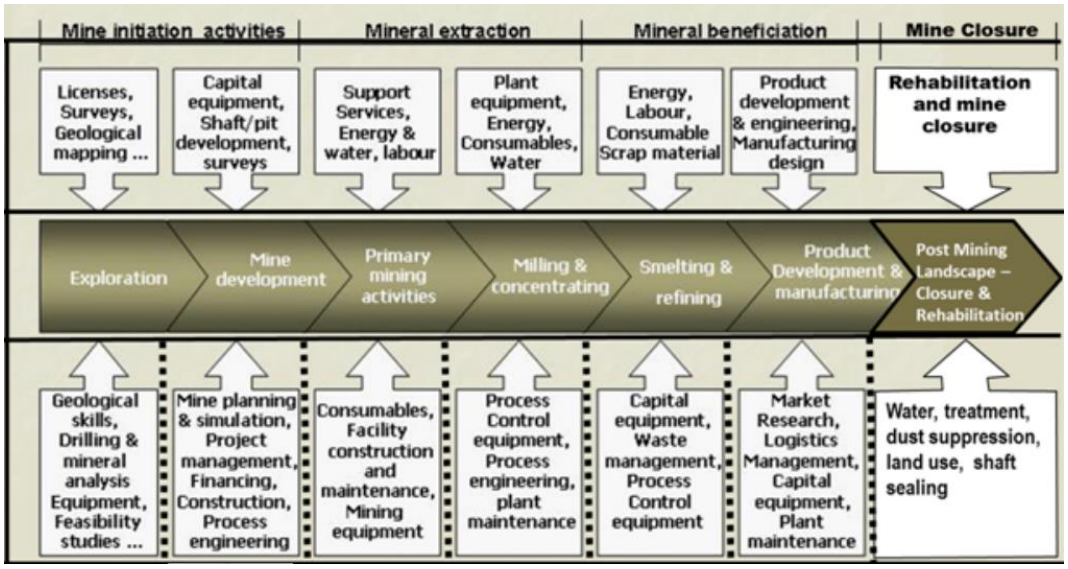


Figure 2.3: A General Mining Value Chain (Baartjes, 2011)

Figure 2.3 shows a mining value chain that consists of processes that are dependent on each other starting with exploration and ending with post mining landscape – closure and rehabilitation. Within these processes there are a number of activities that require successful completion in order to carry on to the next process. For example, in order to proceed from exploration to mine development, mine licences have to be obtained; surveys and geological mappings have to be carried out successfully.

It is imperative for local suppliers to take advantage of the opportunities that exist in carrying out these activities within each process through the different linkages created between the mining industry and other sectors (Jourdan, 2012; Glen Steyn and Associates, 2015). For instance, local consulting company could be hired to do surveys, drilling, design and bulk earthworks during the exploration stage of the mine project. Figure 2.4 shows five different linkages that can be created between the mining industry and other sectors of the economy.

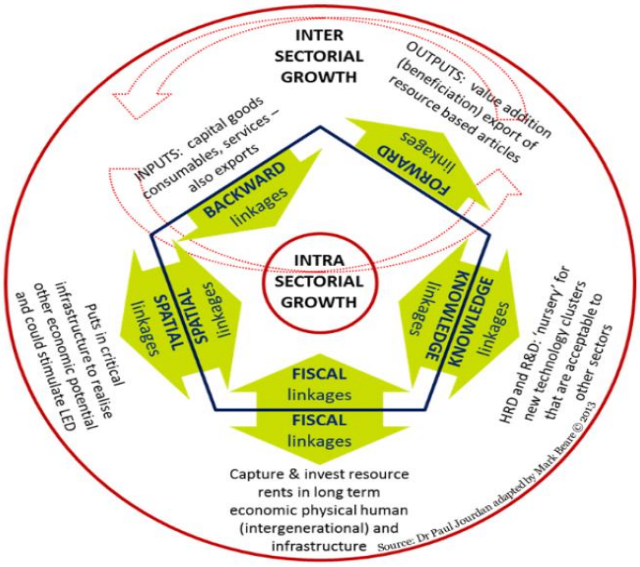


Figure 2.4: Linkages in a minerals extraction industry (Jourdan, 2012)

2.5.1. Forward linkages

Forward linkage, also known as downstream linkage refers to the further value addition of extracted commodities for the purpose of boosting the broader economy (CCSI, 2016). These commodities are processed and refined in order to locally produce finished goods instead of exporting them in their raw state (Roe, *et al.*, 2016; Centre for Energy, Petroleum and Mineral Law and Policy, 2019). In the South African context, an example of a downstream industry is the Rand Refinery located in Johannesburg. The Rand refinery is a gold refinery plant that receives gold for value addition from all parts of Africa (Centre for Energy, Petroleum and Mineral Law and Policy, 2019).

In most cases establishing forward linkages requires government intervention; this can be through government negotiations with the mining companies when awarding mining licences or by imposing taxes or tariffs on exports (Roe, *et al.*, 2016).

Successfully establishment of forward linkages can lead to increased government revenues from mining as more of the country's wealth is retained. In addition, forward linkages can helps achieve national development goals such as promoting employment, technology transfer, industrialisation and economic diversification (Roe, *et al.,* 2016). In this space, countries such as South Africa have drafted a beneficiation strategy to improve on shared value in mining.

2.5.2. Spatial linkages

Spatial linkages relate to the realised economic potential from shared infrastructure the mining industry requires when it comes to its operations (Ramdoo, 2015). Mineral resources are mostly found in remote areas and for a mining company to carry out its operation successfully, the mining companies usually need to invest in developing the roads, getting electricity and water to the mine sites and also building Information and Communications Technology (ICT) infrastructures.

Once these infrastructures are in place, they can be shared to enable other business opportunities that were previously not economically viable to be exploited (CCSI, 2016). Mining industries globally have done fairly well in establishing schools, clinics and subsequently creating necessity of other jobs outside mining (CCSI, 2016).

2.5.3. Fiscal linkages

Fiscal linkages refer to when captured resource rents are strategically used for public spending by the government to boost the wider economy. These revenues are captured through taxes, royalties and profit shares from production-sharing contracts (PSCs). These funds are used on recurrent cost (public sector wages, maintenance costs, etc.), invested for future use in wealth funds and also invested in funds that smoothen commodity price fluctuations (Roe, *et al*., 2016). The Middle Eastern countries have used this linkage the most to develop their mega cities (Saif, 2009).

2.5.4. Knowledge linkages

Knowledge linkages refers the knowledge and technology transfer from the extractives value chain which, can be turned into productive human and capital assets over time (CCSI, 2016; Centre for Energy, Petroleum and Mineral Law and

Policy, 2019). It is vital that individuals involved in the mining sector learn multiple skills in order to fully realise the benefits from mineral extraction (Roe, *et al.,* 2016). However establishing knowledge linkages have been found to be difficult (CCSI, 2016). Research previously done on this subject has observed that foreign companies often fail to train and recruit local labour, sidestep local participation, lack of support towards local businesses and in some cases refuse to transfer technology and skills (Jourdan, 2012; CCSI, 2016). This stands as a barrier to utilise developmental outcomes from large projects.

One example of these barriers comes from Chinese investments in Africa. The number of Chinese companies in Africa has been growing over the past few years and they are characterised by 'vertical integrated' investments. This characterisation happens when; all different components of the investment, starting from funding to design, to implementation, commissioning and operation are all quoted only to Chinese companies.

Mostly, all inputs required for the project comes from overseas, leaving little or no room for local procurement, very low level employment and weak or no local supplier development programmes (Roe, *et al.,* 2016). Shelton & Kabemba (2012) postulated that, private investors have downplayed this observation saying that it is difficult to find reliable sources and partners in Africa and if the government have to make it a must for them to employ local workers it will simply put the business at a risk (compromising project quality and completion).

A recent industrial development study in Tanzania comprehensively expressed the need to make knowledge linkages stronger. Furthermore, the study also showed the important role that technology plays in the acceleration of economic and development growth (Roe, *et al.,* 2016). Many governments in Africa are however slow when it comes to promoting these linkages.

In countries such as Brazil and Malaysia, companies are required to dedicate a percentage of their gross revenue on local based Research and development (R&D) and innovation. This should be done in conjunction with local higher learning institutions (Roe, *et al.,* 2016). The design of this approach is aimed at establishing home – grown R&D base and build local capacity in preparation to receive new

technology (Roe, *et al.,* 2016). There are tax-incentives for companies to award bursaries, but most companies only award bursaries for undergraduate studies. There is a need to focus on postgraduate and research, but this is out of the scope of this research.

2.5.5. Backward linkages

Backward linkages are related mining companies buying local goods and services and employing local people (Roe, *et al.,* 2016). The economic chain therefore entails procuring from backward linkages in order to supply forward linkages (Leeuw, 2012).

According to Hirschman (1958) forward linkages could never occur in pure form, as they are always accompanied by backwards linkages. Studies by Ramdoo (2015) and CCSI (2016) discovered that there is lack of local sourcing in African resource – based economies. To overcome this challenge, governments in recent years have established local procurement regulations to ensure that more local goods and services are used by mining companies to create more value in the economy (Ramdoo, 2015).

Compliance and explicit reporting remains a challenge and there is a need to understand and investigate means of improving shared value through local procurement in the mining industry (Roe, *et al.,* 2016). One way to ensure that there is compliance and explicit reporting is to implement a local procurement measuring and monitoring framework.

The framework should systematically categorise suppliers based on their level of local value addition geographic location and local citizens' participation. It should also clearly state the percentage spending required per category of suppliers. The framework should also guide mining companies to submit detailed reports of their procurement activities annually.

2.6. Local Procurement in a Mining Industry

2.6.1. Defining local procurement

Local procurement has no standardised definition and that poses a challenge in developing effective local procurement frameworks. Different countries and organisations all over the world have different interpretations for "local"

procurement or "local" suppliers (World Bank, 2012). As an example, World Bank (2012) bases their definition of "domestic preference qualification" on the share of local ownership of the business. Meanwhile, the African Development bank (AfDB) bases their definition of "local firms" on three elements. These elements are: shareholding level of indigenous people, proportion of indigenous people on the board and firm registration location (World Bank, 2012).

Despite the different approaches to defining "local" procurement by the nations and organisations, a common theme was observed. The preferred definition for "local" procurement by each country and organisation was based on varying combinations of three distinct aspects namely; participation, geographic location and value addition (Kaiser Economic Development Partners, 2015), see Table 2.2.

Table 2.2: Definition of "local" by different countries *(Kaiser Economic Development Partners, 2015)*

	Country	Geographical Location	Participation	Local content/Value Addition
1.	Australia	Regional, national, state-level	Ownership	Value addition
2.	Mongolia	National	Ownership	Local content of goods and services
3.	Kazakhstan	National	Employment, Ownership (resident)	Local content of goods and services
4.	Brazil	National		Local content of goods
5.	Ghana	National, "local-local"	Ownership	
6.	Nigeria		Ownership	Local content, local value addition or creation
7.	Trinidad and Tobago		Ownership	Local content of goods, services, financing Local value addition
8.	Mozambique	National	Ownership	
9.	Sierra Leone	National	Ownership, management	
10.	South Africa		Ownership, employment	
11.	Angola		Ownership	
12.	Timor-Leste			Local content of goods and services
13.	Chile	National (implied)	Ownership (implied)	
14.	Madagascar		Ownership (implied)	

Geographic location is a requirement that activities of a business take place within the vicinity of the mine at a wider region or national level. Geographical location requirements are adopted from existing laws and regulations in the country. Moreover as it can be observed from Table 2.2 that most country categorise geographical location as local with the aim of having the benefits of mineral resources shared equally in their respective countries (Kaiser Economic Development Partners, 2015). Participation is a requirement on the level of participation by local citizens across employment, management and ownership in

the company. Finally, value addition is a requirement that goods must be manufactured locally and services are conveyed locally (Kaiser Economic Development Partners, 2013; 2015).

These critical components are each related to important areas of benefit to local economies such as: real participation by local citizens, job creation through local manufacturing and prominence on the most suitable geographical focus. It is a misapprehension to only look at locally – registered companies when defining local procurement as the potential benefits to local economies mentioned earlier will not be captured (Kaiser Economic Development Partners, 2013; 2015). Failure to precisely define local procurement to its specifications also leads to difficulties in implementing policies and evaluating compliance. Therefore, in order to allow a consistent strategy for maximising developmental impacts and to ensure equal treatment of mines and suppliers, all stakeholders need to adopt a common approach that considers all three components in a simple and practical way (Kaiser Economic Development Partners, 2013).

2.6.2. Measuring and monitoring local procurement

The method used to measure and monitor local procurement is based on the principle of categorising suppliers in relation to value addition activities and local citizen participation. This principle makes it possible and easier to quantify the multiplier effect resulting from procurement activities by mining companies (World Bank, 2012; Kaiser Economic Development Partners, 2013).

According to World Bank (2012), suppliers are categorised into six different groups namely, foreign exporter; foreign exporter (with some level of local citizen participation); local importer; locally based foreign service provider/ manufacturer; locally based foreign service provider/ manufacturer (with some level of citizen participation) and finally local manufacturer/ service provider.

By knowing the different suppliers available to procure from, stakeholders can assess the extent of their local value addition as well as the level of local citizen's participation in these businesses. This helps to determine the impact of the supplier on local economic development. The supplier categorisation approach was first developed by Kaiser Economic Development Partners in consultation with

governments, suppliers, local citizens, regional organisations and mining companies in West Africa (World Bank, 2012).

To enable monitoring of local procurement, indicators that bespeak current and targeted local procurement expend by categorised suppliers have to be developed. These indicators form the bedrock for monitoring processes by all relevant stakeholders. The development of the aforementioned indicators requires on-going tracking of a number of components as well as the incorporation of these components in the mining companies' local procurement plan. These components are summarised as follows (World Bank, 2012; Kaiser Economic Development Partners, 2015):

- Current expend (differentiate between operational and capital expenditure) by mining companies per supplier category
- Amount of contracts issued by mining companies per supplier category
- Future target spending on suppliers in each category and the quantity of contracts to be given out in the following terms:
    - Short term (2 years)
    - Medium term (2 – 5 years)
    - Long term (5 to 10 years)

2.6.3. Local procurement benefits

Historically, mining companies in developing countries procured goods and services from outside the host countries. This practice has a negative impact on the development of the host countries as they usually have nothing to show for at the end of mineral exploitation (Mining Shared Value, 2017).

As of late, stakeholders in mining industries across the globe are becoming more aware of the social and economic benefits that can be realised through procurement of goods and services from local businesses (Mining Shared Value, 2015, 2017). This awareness and the implementation of AMV 2050 which is a strong advocate of local procurement have resulted in an increased focus on local procurement.

Local procurement can influence the creation of local supplier businesses which encourages economic activities, attract further investments into the communities and enhance human development (Esteves, *et al*., 2011). According to SEAF (2007) and Mining Shared Value (2015), local procurement:

- enables skills and technology transfer;
- creates jobs in local economies;
- lowers procurement costs;
- formalises local economies;
- strengthens social licence to operate; and
- Increases integration into global value chains.

According to the World Bank (2012), local procurement provides a range of opportunities for local suppliers in various input categories within a mining value chain (see Figure 2.5). These categories include consumables and replacement parts, infrastructure and bulk services, capital goods and construction material, services and non – core goods.

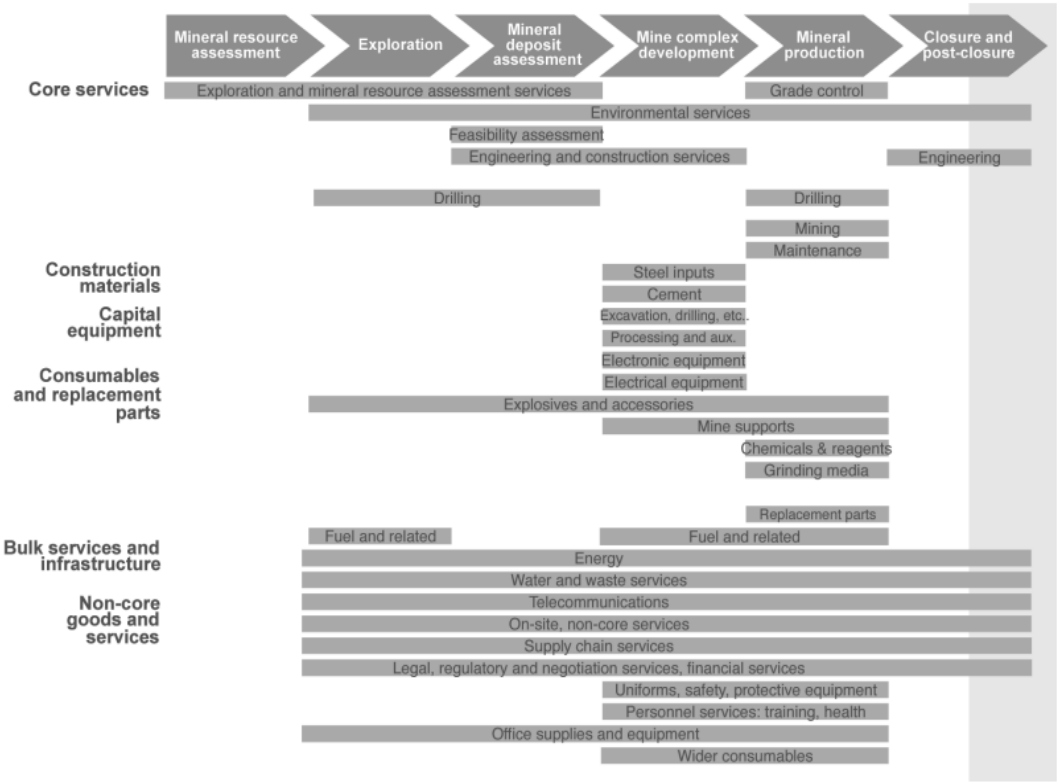


Figure 2.5: Procurement categories along the mining value chain (World Bank, 2012)

Table 2.3 presents prevalent inputs for the categories shown in Figure 2.5. These inputs are mainly goods and services required along the mining value chain.

Table 2.3: Procurement categories and suitable inputs (World Bank, 2012)

Category	Inputs
Consumables and replacement parts	Explosives and accessories, chemicals, anchor bolts, valves and fittings, liners, tires, hydraulic systems, pneumatic systems, conveyor rolls, bearings, etc.
Bulk services and infrastructure	Electricity, telecommunications, waste management, transport infrastructure, water, etc.
Capital goods and construction materials	Machinery for the mine site, processing plant, and tailings areas, like for instance: excavators, bulldozers, trucks, drills, crushers, grinders, concentrators, separators, ventilation equipment, conveyors, irrigation systems, cement, steel, etc.
Services	Legal, regulatory, financial, and negotiation services .Purchasing, logistics, information systems, training, counselling, health and safety services. Also services that are core to the operations, such as: drilling, crushing, mining, sample analysis, laboratory testing, geoscientific surveying, and mapping, etc.
Non-core goods	Uniforms, lamps, protective equipment, air-quality monitoring services, furniture, medicine, office supplies, etc.

Farooki, *et al.* (2016) argued that, mining companies in Southern Africa have adopted a procurement chain which serves as a framework for all procurement activities. The study by Farooki *et al* (2016) made this observation when they evaluated the domestic procurement challenges of four countries in Southern Africa namely South Africa, Mozambique, Zambia and Madagascar (Farooki, *et al.*, 2016).

2.6.4. The mining procurement chain in Southern Africa

Figure 2.6 shows a typical Southern African mining company's procurement from five main conduits. The five conduits are, SMEs; Original Equipment Manufacturers (OEMs); Engineering, Procurement and construction Management firms (EPCMs); corporate buying and in – house (Lydall, 2009).

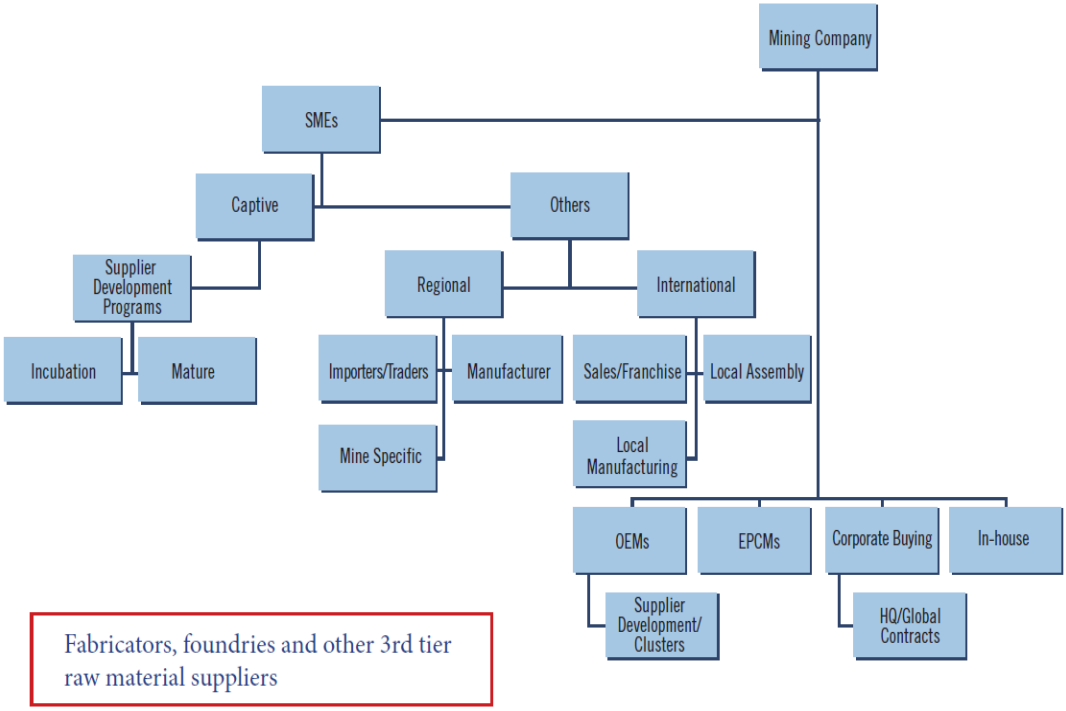


Figure 2.6: Mining Procurement Chain in Southern Africa (Farooki, et al., 2016)

SMEs procurement is divided into two groups; 'captive' and 'others'. Lydall (2009) stated that, Captive represents SMEs that receive support from mining companies in a form of training, mentorship and capital investment, in other words, these SMEs are part of the supplier development programme offered by a specific mining company (Farooki, *et al*., 2016). It is very difficult to make it into the supplier development programmes of these mining companies but once a supplier gets

included, they are provided with full support and this enables suppliers to cater for the standards and needs of the global mining company (Fessehaie, 2015). Captive SMEs are further disaggregated into incubation and mature and subsequently these are SMEs that are in the early phases of the supplier development program and those that are ready to operate independently of the supplier development programmes respectively (Farooki, *et al*., 2016; Fessehaie, 2015).

SMEs under 'other' can adequately meet the standards and needs of the mining companies without being included in their supplier development programme. These SMEs can be within the host country or international. Under OEMs, mining companies usually have supplier development programmes, but slightly on a smaller scale relative to Captive SMEs (Lydall, 2009). OEMs in most cases require specialised, top quality raw materials to produce their products.

Most OEMs in Southern Africa have no manufacturing capacity in the host countries, they are merely assembly unit. As assembly units it means that larger value added raw materials are imported from 'mother' companies overseas. Only a smaller portion of the items is sourced locally.

Unlike South Africa that has a combination of OEMs with manufacturing capacity e.g. Trident South Africa and those with limited manufacturing capacity e.g. Bell equipment, countries like Namibia and Angola lack OEMs only have assembly units. Centralised procurement systems are adopted by some mining companies operating in multiple countries with different laws that allow them to negotiate globally for companywide purchases imported (Farooki, *et al*., 2016).

Finally, some mining companies have in – house mechanics that conduct repairs and services of machinery and engineering equipment. There is potential for outsourcing such services to SMEs; that is why they are included on the mining procurement chain. Manufacturers and factories that provide raw materials that supplier, who feed into the mining procurement chain use, have the potential to affect the entire procurement chain (Lydall, 2009; Farooki, *et al*., 2016).

2.6.5. Local supplier development programmes

Supplier development is when a buying organisation makes a direct effort to increase the capability and performance of a supplier for the benefit of the buying

organisation. The benefits for the buying organisation range from improved supplier performance, reduced procurement costs, resolved quality issues and development of new routes to suppliers to name a few (Moagi, 2015).

The specific goals for a supplier development programme vary from country to country and among companies. For example, some programmes focus on critical technical skills, others on management skills and some assist suppliers with the bidding process (Simanye, 2014). Chile has some of the best supplier development programs in their mining industry. The country through its Economic Development Agency (EDA), created an institutionalized national suppliers' development program in 1998 (International Institute for Sustainable Development (IISD), 2018).

The program was aimed at improving competitiveness of SMEs and encouraging participation of SMEs in mining companies supply chains. The program provided professional advice, technical assistance, support to improve management, training and technological transfer to SMEs. All mining companies that participated in this program acted as "sponsors" in assisting SMEs in delivering quality goods and services (IISD, 2018). SMEs benefitted from this program and this was evident in increased sales, employment of more workers and increased capacity to export products and services (Stucchi, 2012).

Australia also has significant supplier development programs. The country developed a dynamic "minerals innovation complex" with the support of various incentives. The complex is based on close collaboration between mining related research, innovation organisation and mining companies.

The Australian government also established Industry Growth Centres in order to offer support to mining companies operating in difficult areas and also improve the capacity of local suppliers. The overall aims of these incentives were as follow; facilitating access to global supply chains, improving management and workforce skills and improving collaboration between research and industry (IISD, 2018).

In South Africa, Anglo American Platinum conducted a supplier development pilot study at their Modikwa platinum mine. Three suppliers who were seen as "role models" to the community were chosen for this study (Anglo American, 2015a).

The selection was based on hands – on entrepreneurs who had existing businesses or potential to start new ones. The suppliers were provided with financial support and were also helped to get ready for mining opportunities through an intense nine month programme. After that, the three supplier entered an 18 months structured mentorship programme in order to grow their businesses.

Through the programme the suppliers had monthly mentoring meeting with the executive team and supplier performance measurement processes were created. As a result, the mine spent approximately N$ 26 million on local suppliers and created 253 new jobs (Anglo American, 2015a).

Despite the different focus areas of the programmes, the end objectives of all programmes are geared towards local supplier and local economic development (Simanye, 2014). Local supplier development focuses on developing local SMEs to make sure that they have the capability to actively participate in the company's supply chain. Inherently, this objective is not sustainable and is confined to the existence of a supply chain (Frohlicher & Pothering, 2013).

Local economic development on the contrary, has a more sustainable focus as it builds non – supply – based SMEs. In the process the non – supply – based SMEs are equipped with the capacity to provide services beyond the mining operation (Frohlicher & Pothering, 2013; Simanye, 2014).

To support the all – inclusive growth of local firms, some supplier programmes' centre of attention is on capacity development of institutional bodies such as local industry entities and government divisions (Simanye, 2014). Effective supplier development programmes are centred on collaborations with other industry players and build capacity of local SMEs by addressing sophisticated business elements.

One such example is the supplier development programme formed through a partnership between Anglo Ferrous Brazil, the local community, government, local trade unions and other sectors operating in the same region (Esteves, *et al*., 2011). The following elements were addressed by this programme:

New enterprise creation

This was done through campaigns aimed at calling back local residents that are trained and living or working elsewhere to come work in their home regions;

entrepreneurial awareness; using bursaries/subsidies to attract young people to the region and encouraging the creation of new raw material and machines suppliers (Esteves, *et al.*, 2011).

Creation of long – term value and growth for SMEs

Long – term value and growth in local suppliers was created by developing programmes in support of higher education for workers e.g. scholarships; bulk purchasing incentives; doing market research focused on local demand; developing programmes that enable employees to be taught courses focused on production, sales and administration; encouraging and supporting part – taking in trade events and financial disclosure (Esteves, *et al.*, 2011).

Helping unprofitable enterprises

Esteves, *et al.*, (2011) is of the opinion that, Anglo Ferrous Brazil through its supplier development programme assisted in reviving struggling enterprises. This was done by identifying the problem causing the business to be unprofitable in order to assess its profitability and potential brand status change areas. The programme also made the struggling supplier aware of the potential market segment in which they can move into.

Management training

This involves training on management of production, inventory, services, contracts, sales and marketing, personnel, public relations; mining law (Simanye, 2014b). Management training also includes initiative to raise managers' knowledge and education levels; courses on business and finance management; entrepreneurial awareness; courses on technical training and joint development of a strategic company vision (Esteves, *et al.*, 2011).

Supplier development programme outcomes

The results and impacts of this supplier development programme were notable. 45 Small Medium and Micro Enterprises (SMME's) suppliers were targeted by the programme between 2012 and 2014. Approximately 66 free online courses were offered to the local SMEs by Anglo Ferrous Brazil (Anglo American, 2015a). The SMMEs targeted by the programme all combined saved about US$ 64 million in

interest over the course of two years. The Minas – Rio iron mine also spent around US$ 73.5 million on local SMEs from 2013 – 2014. Overall, the community saw a 6.62% increase in local GDP from 2012 to 2014 all due to the supplier development programme (Anglo American, 2015a).

2.6.6. Factors impelling local procurement strategies

Mining companies develop their local procurement strategies with respect to different factors. According to Nickerson, *et al.,* (2017), some of these factors include moral responsibility, patriotism and professionalism, see Figure 2.7. Some companies that develop local procurement strategies see it as the "right thing to do" or being morally obliged to do so. When local procurement is viewed as an indicator of professional performance in a company, managers and employees tend to promote it more. Patriotic feelings can also be a catalyst to local procurement promotion by mine managers and employees (Nickerson, *et al*., 2017).

In addition to the core factors, personnel within mining companies are influenced by other incentives to source locally. These incentives are reactive economic, proactive economic, reactive social and proactive social see Figure 2.7.

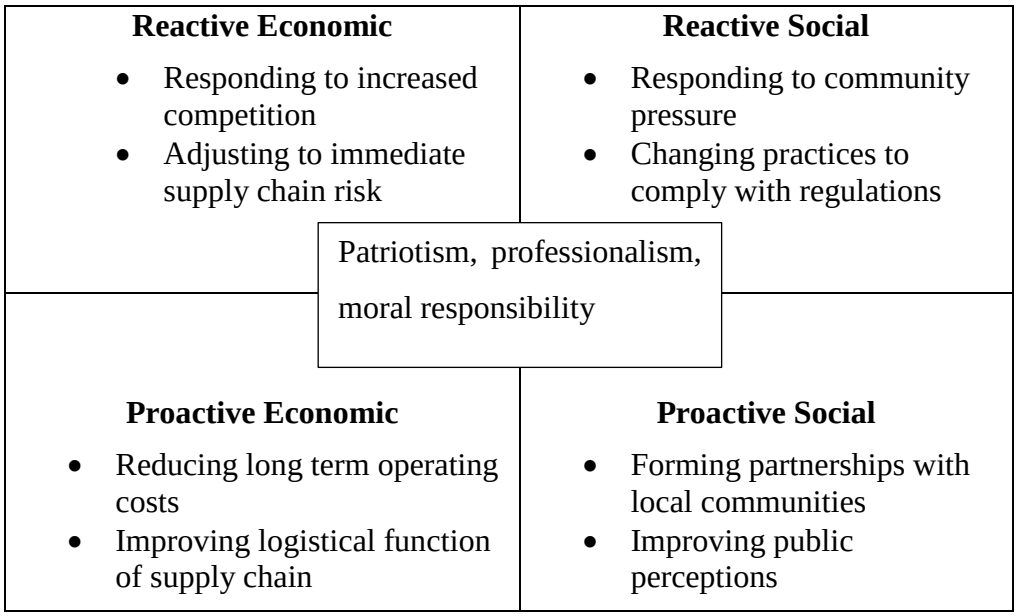


Figure 2.7: Drivers of local procurement in mining (Nickerson, et al., 2017)

Reactive economic incentives are based on the creation of local procurement strategies by mining companies due to economic threats posed to its operation (Engineers Against Poverty, 2013). An example is when a mining company decides to have contracts with multiple suppliers for the same product or service. This is

done in case the main supplier is unable to supply products or services on time, then the mining company can source from a different supplier and business continues uninterrupted. Therefore as a result of mining companies trying to dissipate risk more contracts are given out to local supplier (Nickerson, *et al*., 2017).

Reactive social incentives are based on external pressure from governments and communities surrounding the mining operations. Governments can pass legislation and regulations that requires mining companies to buy local products and services. Non-compliance can lead to loss of mining licences and operations being shut down.

As a result companies have no other choice but to comply with regulations by establishing local procurement strategies (Ramirez, 2016). If people in local communities are unhappy with the conduct of the mining company, it may result in industrial action. Industrial actions cost mining companies a lot of money and can also result in violence. Therefore, mining companies increase local procurement to obtain social licence to operate (Nickerson, *et al.,* 2017).

Proactive economic incentives consist of strategies aimed at lowering long-term operating costs. These strategies can also help improve supply-chain efficiency. Mining companies benefit from helping to develop local suppliers because when a mining company procures from a local supplier, import costs and the risk associated with volatility in exchange rates are eliminated (Engineers Against Poverty, 2013).

Proactive social incentives involve a company setting long – term goals on stakeholder engagement at pre – feasibility study (Ramirez, 2016; Nickerson, *et al*., 2017). By developing a positive social licence to operate, which enhances mining company's reputation, future social problems are minimised.

2.6.7. Local procurement interventions and shortcomings

In some developing countries supplier linkage programmes have been established through partnerships between governments, development agencies and support institutions. These linkage programmes, provide local businesses access to skills development programmes and financing (Nelson, 2007; Esteves, *et al*., 2011). Esteves, *et al.,* (2011) argued that mining companies are engaging in local procurement interventions. These include breaking large contracts into smaller ones

in order to give opportunities to small local businesses, training and mentoring, creating long term contractual arrangements with local businesses, giving more preference to local businesses in their bidding processes and price matching. In addition, mining companies only focus on doing business with external suppliers if they get into joint ventures or sub – contract local suppliers.

Anglo American (2015a) commented that, to reach their goal of creating fulfilled and thriving communities, it is imperative to include SMMEs in their value chain. In South Africa, Anglo American Platinum has formed a Black Economic Empowerment (BEE) and local procurement unit within their supply chain.

Through this unit, local SMMEs are given the opportunity to participate in Anglo American's procurement activities and to become sustainable beyond mining. A supplier development programme is also offered under this unit, to help develop SMMEs into global competitors (Mokomane, 2018). These interventions play a major role in elevating the level of human development in the host country.

Setting up local procurement targets can lead to perverse behaviour, corruption amongst them (Nickerson, *et al.*, 2017). A good example for this is when a local business is registered in the name of an individual targeted by the local procurement policy, but the most benefits and decision–making are for and by those not targeted by the policy (Esteves, *et al.*, 2011; Durant, *et al*., 2017; Nickerson, *et al*., 2017).

Researchers also pointed out that communities surrounding mining operations often suffer loss of human capital because most experienced professionals prefer working in high paying jobs in mines than anywhere else and as a result the service sector in these local communities shrinks (Esteves, *et al*., 2011).

Communities at times can feel that there are some who are favoured by mining companies for business opportunities which can negatively affect social cohesion (Esteves, *et al*., 2011). Local SME's that get the opportunity to be part of the mining companies' value chain tend to be at risk when these companies are their main client (Ramirez, 2016). That is because; SME's are left vulnerable to the business cycles of the mining companies which are highly dependent on commodity prices (Ramirez, 2016; Nickerson, *et al.*, 2017).

2.6.8. Factors inhibiting local procurement strategies

Several studies have discovered that resource – rich developing countries are usually faced with barriers that inhibit the development and implementation of local procurement strategies. These impediments include precedent and corporate risk aversion, limited local knowledge and expertise, location of decision making, centralised global procurement, access to funding, previous experiences with local suppliers, poor appetite for risk by mine managers and definition of "local procurement" by stakeholders.

Hanlin (2011) argued that international mining contractors are usually contracted by mining companies at the construction phase of the mine life. This is usually because these contractors have proven track records as mining companies cannot afford project failure at the initial stage of the mine life. These main contractors are then kept and contracted by the mining companies in the operation phase of the mine life because it is less risky to maintain the existing state of affairs than bringing in a new contractor. As a result, when looking at a mining operation at its operational phase it appears as though an international contractor was hired to cater for the welfare needs (such as accommodation and catering) of the workforce but, it is usually because they have catered for these needs from the construction phase of the mine life. However, such needs are suitable for provision by local suppliers. It is therefore very challenging for local suppliers to obtain contracts in the initial operational years of the mine (World Bank, 2012).

Several studies conducted by Hanlin (2011), World Bank (2012) and Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) (2018) have discovered that creating local procurement strategies can be challenging when mining companies lack or have limited knowledge on the capacity and expertise of local suppliers and also when then supplier lack understanding of what mining companies need. In cases where the corporate offices that makes decisions about buying local goods and services are situated outside the host country, there is often a good chance that local procurement potential will be untapped (Hanlin, 2011).

Lack of access to adequate funding by local SME's in resource rich countries also prevent the creation of local procurement strategies (Simanye, 2014; GIZ, 2018). Lack of funding results in lack of capacity by the local SME's. Hanlin (2011) and

World Bank (2012) noted that some mining contracts such as supplying of fuels, lubricants and chemicals are tendered at global corporate offices because they are often of high value and the profitability of the mine presumes their effective procurement. Subsequently, local suppliers are excluded from the bidding process of these contracts since only supplier with capacity to supply on a global scale can tender these particular contracts.

Previous experience can also serve as a barrier for local procurement promotion in a mining industry. When procurement personnel conduct business with local suppliers and receive goods or services that do not meet their expectations, procurement officers tend to divert their focus away from local suppliers to reputable suppliers (Hanlin, 2011). This could be due to operational language issues, dissimilar cultural definitions of service standards and a range of other factors that can slow down production (World Bank, 2012).

Simanye (2014) and Hanlin (2011) argued that some mine managers tend to be risk averse and thereby avoiding change in suppliers, a move that would give local suppliers an opportunity. This is because in most instances the procurement officers' performance is measured by their potential to deliver within the given budget and time. Therefore, changing from reputable suppliers to unknown local suppliers is often seen as a risky move by procurement officers and could affect their performance level if the suppliers are unable to deliver on time.

When stakeholders adopt different definitions for "local procurement" in a host country, it becomes challenging to accurately measure its level. This was emphasised by a Chilean based mining company (Teck Resources Limited) when one of its mines, had 12% of their total procurement expenditure on locally based suppliers in 2009 (Teck Resources Limited, 2009). Teck Resources Limited (2009), made a point that their local procurement value might seem low compared to other mining companies operating in the same country but that is because they define local procurement as "regional procurement". All other mining companies defined local as "province – wide or state – wide". They also noted that there is always going to be inconsistencies in measuring local procurement across operations as long as different mining companies and other stakeholders within the host country have different definitions to the term "local" (World Bank, 2012).

Despite these barriers, some countries such as Norway and Canada have been able to successfully develop local procurement systems in their respective mining sectors. For the purposes of this research, a case study was carried out on Norway to determine the cause of their sustainable local procurement practices.

2.6.9. Social Impact Assessments (SIA)

Mining or any other large scale economic project brings with it a lot of benefits but also unintended detrimental effects on people and natural resources. These harmful effects range from loss of human livelihood, destruction of natural resources and disruption of social and communal harmony (Centre for Good Governance, 2006). In order to have a balanced project development planning, mine managers need to take into account the social, environmental and biodiversity impacts of the project.

Social Impact Assessment (SIA), Environmental Impact Assessment (EIA) and biodiversity impact assessment are therefore some of the tools used to assist with planning and decision making processes. These tools assist with identifying the potential positive and negative impacts of proposed projects, likely trade – offs and synergies in order to ease or facilitate decision making (Esteves, 2008). Since this research is on the effects of mining projects on the human environment (social impacts), SIA will be a tool of interest throughout the study.

SIA is a project – planning tool used by companies to assess and estimate, beforehand, intended and unintended social consequences, both negative and positive associated with specific project development (Esteves & Vanclay, 2009). SIA's main objective is to trigger a more sustainable, fair and impartial biophysical and human environment. A number of large mining companies have incorporated SIA into their core business strategies in order to promote local procurement.

O'Faircheallaigh (1999) has however suggested that SIA's full potential in its application in the mining sector has not been reached over recent years. This is because SIA did not champion the incorporation of sustainability and social development into key business strategies as well as the development of partnerships with communities and governments (Esteves, 2008).

Most mining companies have attempted and succeeded in rectifying this situation with different interventions. For example, Anglo American has a Socio-Economic

Assessment Toolbox (SEAT) which focuses on ameliorating the implementation and contribution of undertakings such as: human capital development, post – closure planning, increasing local procurement and setting up partnerships with communities and governments (Esteves & Vanclay, 2009).

Local procurement specialists at Quellaveco copper used SEAT to inform local procurement decisions and to gain a deeper understanding of how to use local procurement to strengthen economic and social impact as well as boosting local supply chains (Anglo American, 2015b). A local procurement strategy for the mine was developed by using the tools in SEAT to guide the process (Anglo American, 2015b). In addition, SEAT provided a support structure to construct positive and transparent dialogues with stakeholders (Samuel, 2012).

2.7. Enabling legal and regulatory environment for local procurement

In order to promote enterprise and start – ups development, it is vital to have well – designed and well – implemented regulations. Regulations include those that uphold safety and labour standards. Regulations in an economy helps boost competitiveness and facilitate formalisation (International Labour Organization, 2017). Key economic indicators that will be focused on in this report are the "Regulatory Quality Index" and the "Ease of Doing Business Index".

The Regulatory Quality Index measures the capacity of a government to provide well formulated policies and regulations with the aim of promoting the private sector. The index has a scale from -2.5 to 2.5 with higher values indicating better governance (International Labour Organization, 2017). Ease of Doing Business Index ranks countries around the globe from 1 to 190, based on how conducive the countries' regulatory environment is to business operations (Trading Economics, 2019). The country ranked in first place has the most conducive environment to conduct business (International Labour Organization, 2017).

In order to strengthen local procurement new enterprises needs to be developed and existing ones needs to be upgraded. It is therefore important for a country to have an enabling legal and regulatory environment for them to be able to boost local procurement.

2.8. Successful Local Procurement Practices

Some international countries have been successful in establishing local procurement frameworks in their respective countries. This includes Norway, Canada and Ghana to name a few. Their achievements and factors that influenced their success are as follow:

2.8.1. Norway

Norway has successfully established local procurement systems in their mining sector (Heum, 2008). Their achievements and factors that influenced their success as well as the lessons learned from their experiences are discussed as follow:

In 2016 Norway was ranked 1 out of 188 countries on the Human Development Index (HDI) by the United Nations Development Programme (UNDP). Their HDI value for 2015 was 0.949 putting Norway in the "very high human development" category (Jahan, 2016). The World Bank gave Norway a Gini coefficient value of 0.258 in 2013, for the country with the least income inequality in the world (World Bank, 2013).

The nation's oil and gas sector on average receives about 50-60% of capital inputs and 80% of the operations and preservation inputs from local suppliers annually. The country also exports about 46% of its sales by local SMEs to other countries (World Bank, 2012; Heum, 2008). Despite the fact that Norway was already industrialised when oil and gas was discovered in the late 1960s in the region, there are other factors that influenced the success of Norway's local procurement development. These factors are, crucial guideline and shared view; distinct assignment of responsibilities and local procurement policy framework.

Crucial guideline and shared view

Norway had a guideline for capability and knowledge development which stipulated that the country stays dedicated to the underlying task. The task was to involve and boost the local knowledge base through preparatory measures that empowers a dynamic industrial and technological development. This development moderately broadened local capabilities and competences to competitive levels of the global markets. This baseline is essential for local procurement development success, not just in Norway, but any other resource – rich country (Heum, 2008).

Norway also shared a broad view that all oil and gas resources in the country belong to the whole society. This view has helped specify industrial development goals that serve the society as a whole (Pirog, 2007).

Distinct assignment of responsibilities

After studying international experiences on local procurement development, the Norwegian government recommended a new administrative system. The aim of the new system was to separate the different functional responsibilities namely; technical control and resource management, policy – making and commercial participation (Heum, 2008; Pirog, 2007). The formation of a new system together with the creation of three different organisations for the different functional responsibilities was approved by parliament in 1972 (Pirog, 2007).

These three organisations were namely the Norwegian Petroleum Directorate responsible for advisory and regulatory functions as well as technical control, the ministry of Petroleum and Energy was responsible for awarding licences, setting policies and ensuring that future development plans by mining companies met the Norwegian standards. The last organisation approved by the parliament was the Statoil, which was a 100% state owned company. Statoil's main goal is to implement state policies and also looks out for the commercial interests (Heum, 2008).

The separation of different functional responsibilities, made clear the different roles each organisation plays within the government and between government and companies. It has also allowed for the transparency in politics and has created an environment where business operates separate from politics. Norway has a strong tradition of not tolerating corruption among business people and public workers, this is another guarantee that ensured business was kept separate from politics, which has attributed to Norway's success in local procurement development (Pirog, 2007).

Local procurement policy framework

Norwegian policies strongly advocated for the development of domestic capacity in order to ensure that local firms can operate as full – scale oil companies (Heum, 2008). This was partly done by permitting foreign companies to set up operations

in Norway, while the Norwegian government through policy motivates hiring of local people. As more foreign companies entered Norway, the government started to implement policies that enable local suppliers into their supply chains. This way protectionism measures were working in favour of local firms and the local firms had a fair opportunity to participate (Heum, 2008).

Norway possessed policies that required oil companies to inform the Ministry about the firms listed on its bidders list before awarding tenders. Moreover, the Ministry has the power to add local firms that were not initially on the bidders list. However, the Ministry could not keep foreign firms off the list (Leskinen, *et al.*, 2012). The oil companies had another obligation of informing the Ministry about the firm that they were interested in on awarding the job before signing the contract. If the Ministry was not satisfied with the supplier, it had the power to change the oil company's decision (Heum, 2008; Silva *and Onguglo*, 2014).

In an effort to help Norwegian oil companies to learn business from experienced personnel and organisations, the Norwegian government gave itself a task of encouraging foreign oil companies to technically assist the Norwegian local firms. This was encouraged through legally binding agreements showing commitment by foreign companies to carry out such tasks (Silva *and Onguglo* 2014).

To address the need for local suppliers, the Norwegian government sponsored a supplier development programme. In addition, it also invested more than US$ 60 million in R&D, as well as creating solid links between local academic centres and private companies during the early 1980s. This encouraged joint – ventures between local firms and foreign oil companies to allow for technology transfer through learning and as well as building industrial capacity (Pirog, 2007; Heum, 2008).

Oil companies were also encouraged to carry out R&D projects with Norwegian research institutions and universities from mid to late 1980s. This initiative significantly stretched and deepened the Norwegian knowledge base (Leskinen, *et al.*, 2012). It was stretched in the sense that the whole Norwegian education system was involved extending beyond business. Moreover, this exercise deepened because scientific research was included and the focus was not only project

developments. R&D played a significant role in assisting Norwegian oil firms to make adjustments to new challenges (Heum, 2008).

All tenders by foreign and local oil companies in Norway were deliberately structured to fit the Norwegian business when it was technically and economically justifiable. In addition, from 1980 to 1990, Norway worked on restructuring the contracts, language and labour relations in the local oil business into a more local structure without disrupting business. Local firms benefited from these more than foreign firms (Silva *and Onguglo,* 2014).

As result, Norwegian oil companies, got into the habit of making their plans and solutions for future field development projects known by the domestic industry. Local firms benefitted the most from this since they had more time to prepare for the jobs opportunities that would come unlike the foreign firms who had no clue about the future developments until it was too late (Heum, 2008). In essence, the arrangement of a dynamic industrial and technological development that involves proficient actors within the local knowledge base and leading global proficiencies was the key to Norway's industrial success.

2.8.2. Canada

Canada's Mining Policy's pivotal focus is ensuring that local Indigenous communities participate in any mining venture. The focus resulted from the constitutional precondition that the Crown consult with the Aboriginal communities over development that would impact traditional land (Korinek & Ramdoo, 2017).

Indigenous people's views and needs are therefore more prioritised and are the most distinguished local procurement requirements in Canada. The most common specific local content agreements signed between mining companies and the indigenous communities are the Impact and Benefit Agreements (IBAs). One example to this is the Raglan Agreement which was signed in 1995. Canada has widely used this IBA, as a benchmark in the mining industry over the years. The agreement was signed by a mining company and two communities closest to the mine. The agreement was aimed at facilitating the fair and impartial participation of the local Indigenous population and also to ensure that they obtain direct and

indirect social and economic benefits throughout the life of the mine (Korinek & Ramdoo, 2017).

The Raglan agreement had two components which are employment requirements and supporting local enterprise. With regard to employment, the mining company made a commitment to support training indigenous people from communities closest to the mine so that more jobs at the mine can be occupied by the locals. Even though there were no numerical targets on the number of locals to employ or how much to be spent on training indigenous people, the agreement contained specific strategies to be implemented by the mining company (The Raglan Agreement, 1995).

The strategies included the establishment of an initial recruitment programme, on – and off – site training of indigenous communities, formulation and implementation of information initiatives to advertise job opportunities, dedication to offer permanent employment to trainees after they have successfully completed the training programme and requiring contractors and sub – contractors to prioritise on hiring indigenous people from local communities and also trainees who have successfully completed the mining company's training programme (Korinek & Ramdoo, 2017; The Raglan Agreement, 1995).

With regard to supporting local enterprises, the strategies that were implemented included the establishment of a data base that keeps a list of potential local suppliers and maintained by one of the two communities, setting up a monitoring mechanism that was aimed at submitting reports containing the level of engagement between mining company, contractors sub – contractors and the local community on a regular basis. In addition, specific areas that goods and services can be supplied for by local suppliers including road maintenance, fuel storage, environmental research, catering, etc. were identified and direct negotiating were entered into with the qualified supplier from the local community. Suppliers from the local communities were invited to bid for tenders and awarding tenders was based on quality of work, cost competitiveness, timeliness and continuity of supply (Korinek & Ramdoo, 2017; The Raglan Agreement, 1995).

2.8.3. Ghana

Ghana has some of the most advanced initiatives around mining local procurement in Africa. The country implemented the Ghana Minerals and Mining Act in 2006. The Act stated that mining companies should give procurement preference for Ghanaian made goods. In addition the Act also has requirements for local citizen participation in employment (Kaiser Economic Development Partners, 2015).

Ghana through its Minerals Commission started focusing more on local procurement by drafting some proposed regulations for local procurement in 2008. The regulations included specific targets to be met by mining companies. Emphasis was placed on promoting preference for high Ghanaian participation and local manufacturing (Kaiser Economic Development Partners, 2013).

In 2011, a Memorandum of Understanding (MOU) was signed between the Chamber of Mines, the Minerals Commission and the International Finance Corporation (IFC). The aim of the MOU was to stimulate collaboration around mining supplier assessment and development with the focus around SME development (Kaiser Economic Development Partners, 2015). Individual supplier diagnostics to identify support needs as well as overall supplier capacity assessment were conducted in early 2012.

Regulations developed in 2012 and implemented in 2013 required mines to submit individual local procurement plans. This included the development of a local supplier list of goods manufactured in Ghana (Kaiser Economic Development Partners, 2015).

Lessons to be learned from the three countries

All three countries owe their success to the involvement of high magnitude by their governments through incentives and policy decisions to actively develop the local industry. These countries also promoted collaborations between industry stakeholders in order to ensure that those local businesses were empowered. They also had initiatives that favour capacity development of local suppliers. And finally they were dedication to boost local knowledge base in order to broaden local competencies.

2.9. Conclusions

This chapter provided a review of the literature on the resource curse experienced in resource – rich developing countries. It was established from literature that, the level of economic development in a developing country, with a natural resource driven economy, is inversely proportional to the amount of natural resources found in the country. This is because, resource dependency can result in poor economic performance due to a number of factor namely; metals market volatility, Dutch disease, lack of skills and performance quality, fiscal insecurity and management of revenues.

Later in the chapter, the researcher discussed different channels through which windfalls from mineral resource extraction can be used to improve the living standards of people residing in close proximity to the mining operations. The chapter also shed some light on the African Mining Vision 2050. The Vision's main goal is to facilitate sustainable growth and socio-economic development through a transparent, equitable and optimal exploitation of mineral resources.

The researcher reviewed different linkages that a mining industry can develop with other sectors of the economy in order to optimise gains from mineral extraction. The author interrogated the interdependent relationship between backward and forward linkages. It was established that the economic chain entails procuring from backward linkages in order to supply forward linkages. Local procurement in a mining industry was discussed. The definition for local procurement that is preferred among countries globally and organisation, was based on varying combinations of three distinct aspects namely; participation, geographic location and value addition.

African resource – rich developing countries can learn a lesson from the few international countries such as Norway, Canada and Ghana that have succeeded in local procurement development. Their success has mainly been a result of involvement of high magnitude by their governments through incentives and policy decisions to actively develop the local industry, promotion of collaborations between industry stakeholders in order to ensure that that local businesses were

empowered, initiatives that favours capacity development of local suppliers and dedication to boost local knowledge base in order to broaden local competencies.

3. RESEARCH METHODOLOGY

3.1. Chapter Overview

This chapter provides an overview of the methods used to meet the research objectives. It starts with a discussion of the research design followed by a review of the sampling and data collection approach. Furthermore, it goes on to discuss the techniques used for data analysis and finally it ends with a conclusion.

3.2. Research Methodology

3.2.1. Research design

The approach used in this research was the mixed methods explanatory sequential cross- sectional design as shown in Figure 3.1. This is a method for collecting, analysing and integrating both qualitative and quantitative data within a single study (Creswell, 2002).

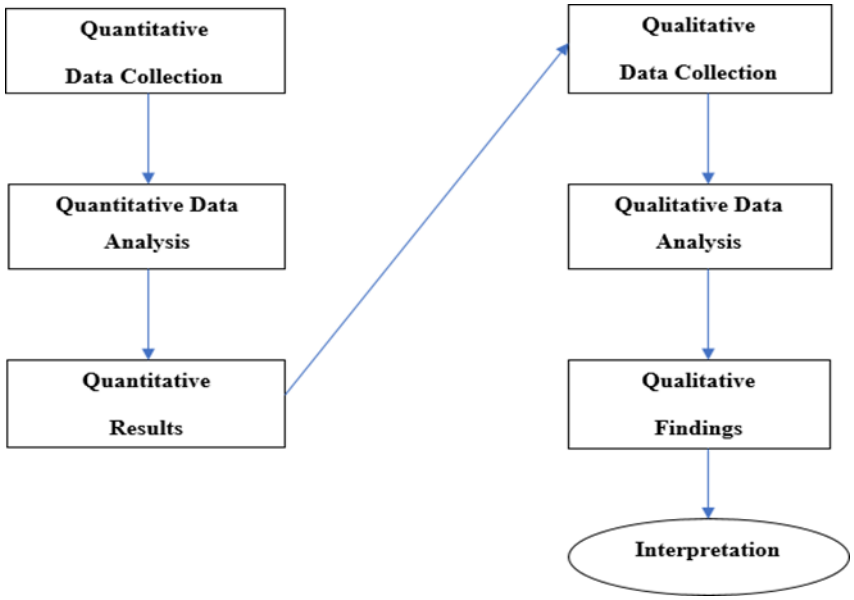


Figure 3.1: Explanatory Sequential design (Subedi, 2016)

The collaborative efficiency of using both qualitative and quantitative methods was the rationale for merging both methods. The purpose of this research was to establish local procurement trends and understand the mining regulations and incentives that influenced the trends over the years. Therefore, it would have been to a disadvantage to use qualitative and disregard quantitative method in view of the fact that when combined, they complement each other and produce a more comprehensive analysis (Tashakkori & Teddlie, 1998).

The researcher employed the qualitative component to provide elaborative emphasis on the existing policies and non – regulatory interventions and incentives in the mining industry regarding local procurement. The qualitative method is described as a distinct method that makes use of data interpretation to produce accurate inferences about experiences, events and processes (Sandelowski, 2010). Meanwhile, the quantitative component, as defined by Creswell (2002) is a research method that provides comprehensive phenomena by means of numerical data used to generate results.

Therefore, the mixed methods approach was suitable for this research as it sought to identify numerical trends on local procurement, in order to further elaborate these trends. This speaks to the employment of the explanatory sequential design in order for the quantitative results to be explained by qualitative data as shown in Figure 3.1. Furthermore, this research happened over a short period of time and the information was collected once. Therefore, this supports the claim of the research being a cross-sectional design.

3.2.2. Sampling and data collection

Surface mines make up approximately 84% of the mines in Namibia (Chamber of Mines of Namibia, 2017). It is on this basis, that four surface mines namely; QKR Namibia (Navachab Gold mine), Vedanta Zinc International (Skorpion Zinc mine), Paladin Energy (Langer Heinrich Uranium mine) and Rio Tinto (Rossing Uranium mine) were selected for the research. These mines were selected because they were the only four open pit mines with sufficient data on procurement recorded by the Chamber of Mines of Namibia for the study period.

In addition, one underground mine namely, Rosh Pinah Zinc Corporation (Rosh Pinah mine) and one marine mining company namely Debmarine Namibia were also selected for this research. The underground mine was selected because it is the only underground mine currently in operation in the country and any results found will create a local procurement framework for any future underground mine developments in Namibia. The same applies for the marine mining company.

This research looked at trends for four years (2014 – 2017), thus, these mines were used because they have all been in operation for the number of years required for

the research. The research period was chosen because the Namibian Mining Charter which influences local procurement in the mining industry was only implemented in 2014 and therefore, any data available on local procurement in the mining industry starts from 2014.

Data collection involved collecting secondary data from annual review reports showing how the mining companies have progressed over the years to meet the Namibian Mining Charter targets on local procurement. Annual review reports were downloaded from the Chamber of Mines of Namibia website. These reports showed mining companies' community relations including, corporate social responsibility projects undertaken. They also showed mining companies' procurement from Previously Disadvantaged Namibian suppliers.

In order to enrich the information from the downloaded annual review reports, the researcher sent an email see Appendix 7.6 – 7.7, to the economist at the Chamber of Mines of Namibia (Windhoek), requesting for the annual reports for the selected mines. The collected reports for the selected sample were for the past four years (2014 – 2017) on companies' reporting on local procurement in details. The reports also contained total procurement spent by mining companies over the course of four years (i.e. 2014 – 2017).

3.2.3. Data Analysis

This research study made use of comparative thematic analysis method in a deductive qualitative component. According to Braun and Clarke (2006), thematic analysis is a method for identifying, analysing, and reporting patterns or themes within data. This is important as the researcher aimed to identify and describe why local procurement in Namibia tends to be lower than that of some countries in the Southern African Development Community (SADC) (Nickerson, *et al.*, 2017). Microsoft Excel was used to plot graphs using quantitative data collected on companies reporting on local procurement for the period of research. The overall local procurement trend in the mining industry was analysed for the period of study. The existing policies and regulations that influence local procurement in the industry were also examined in order to determine the amendments if any to be made, in order to make them more effective.

3.3. Conclusions

The Chapter provided a comprehensive overview of the approach used to solve the research objectives. The approach adopted for the research was mixed methods explanatory sequential cross- sectional design. This approach used both quantitative and qualitative methods within the same study to identify numerical trends on local procurement and provide explanations for the trends.

The research sample consisted of four surface mines, one underground mine and one offshore mine. These mines were selected because they were the only mines with sufficient data on procurement for the study period. The study period was from 2014 – 2017 and it was particularly chosen because the Mining Charter was only implemented in 2014. Data collection involved collecting secondary data from annual reports by the Chamber of Mines of Namibia. Additional data was obtained via email from the representative of the Chamber of Mines in Namibia. A comparative thematic analysis method in a deductive qualitative component was used to analyse the data.

4. LOCAL PROCUREMENT IN THE NAMIBIAN MINING INDUSTRY

4.1. Chapter Overview

As discussed in the literature review chapter, the definition for local procurement may hinder its implementation and monitoring. Therefore, this chapter discusses how stakeholders in the Namibian mining industry define local procurement. Different stakeholders were observed to have different definitions for local procurement and hence a need for a single definition to be adopted across the entire mining industry. Moreover, the local procurement trend for the entire mining industry over the period of study is discussed. The local procurement expenditure from PDNs owned businesses' trend was also examined.

Reasons for the lack of PDNs participation in the mining companies' value chain were unpacked. Potential local procurement opportunities for each mining method were discussed. The chapter also provided a discussion on the legal and regulatory environment in Namibia for the period of study.

The chapter further went on to analyse local procurement trends by individual mining companies selected for this research in comparison to the mining charter targets. The sample consisted of four open pit mines, one underground mine as well as one marine mining operation. Reasons for lack of consistency in measuring local procurement were elaborated on and this was followed by the conclusion to the chapter.

4.2. Definition of Local Procurement by Stakeholders in Namibia

It is imperative that a common definition of local procurement is adopted across relevant stakeholders to ensure accuracy in measurement and fair treatment of all mines. As examined earlier in the literature, the best definition for local procurement should be based on varying combinations of three distinct aspects namely; local participation, geographic location and local value addition (Kaiser Economic Development Partners, 2015).

It was established that mining companies in Namibia defined local procurement as the purchase of goods and services from Namibian – registered suppliers (Chamber of Mines of Namibia, 2016; 2017; Rio Tinto, 2014). This can be a foreign or local

supplier as long as their business is registered in Namibia. According to Nickerson *et al.*, (2017), one of the main reasons why mining companies adopted this definition is due to the limited local capacity in the country to meet their demands.

Adopting this definition by mining companies however, makes it difficult to determine the extent of local value addition by these suppliers as well as the level of local citizen's participation in employment, management and ownership of the supplier firms. The Ministry of Mines and Energy and the Chamber of Mines of Namibia on the other hand, defined local procurement through the Namibian Mining Charter as money spent by mining companies on goods and services that are available in the country from Namibian-owned businesses of choice. This is commonly referred to as discretionary expenditure (Chamber of Mines of Namibia, 2014b).

Clearly, stakeholders in the industry have different definitions for local procurement. This, as stated earlier is largely due to the limited local capacity to meet the procurement needs of mining companies coupled with limited supplier development support in order to build said capacity. Lack of local procurement regulations that would have ensured that a common definition is adopted across stakeholders is also one of the major causes (Nickerson, *et al.*, 2017). Finally, the industry lacks a local procurement measuring and monitoring framework. The lack of these important elements can lead to stakeholders adopting different definitions as it suits them and ultimately leads to limited local sourcing.

4.3. Local Procurement (discretionary) in Namibia

The information shown in Figure 4.1, was provided to the Chamber of Mines of Namibia by different mining companies operating in the country. This information shows the level of local procurement in the entire mining industry for the period of 2014 to 2017. Figure 4.1 - Figure 4.2 were plotted using raw data in appendices 7.2 and 7.3.

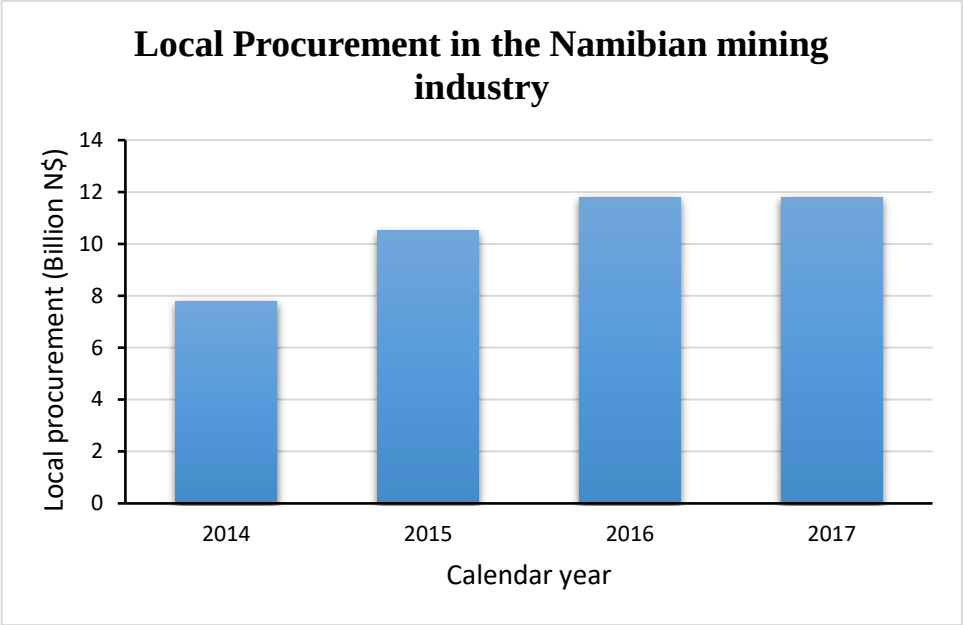


Figure 4.1: Local procurement in the Namibian mining industry (Chamber of Mines of Namibia, 2014a; 2015; 2016; 2017)

Local procurement in the Namibian mining industry increased every year from 2014 to 2016, followed by a slight decline in 2017. Each annual spending was given in Namibian dollars (N$). The average conversion rate for US$ to N$ between 2014 and 2017 was 1:13.69 (OFX, 2019). The notable increase in expenditure from N$ 7.8 billion in 2014, to N$ 10.5 billion in 2015 was mainly due to two surface mines namely; Tschudi copper and Otjikoto mine ramping up into full production in 2015. This increased the demand for goods and services from local suppliers. According to the Chamber of Mines of Namibia (2016), Namibia's copper production was trebled by Tschudi copper mine in 2016. In addition, Otjikoto mine posted a record production of 166 286 ounces (4 714 kilograms) of gold during the same year (Chamber of Mines of Namibia, 2016). As these mines expanded their operations and increased production, their procurement needs also increased, resulting in an overall local procurement amount of N$ 10.5 billion in 2015 to increase to N$ 11.8 billion in 2016.

Despite the increase in the overall local procurement over the period of study, procurement from businesses owned by PDNs did not show the same trend (see Figure 4.2)

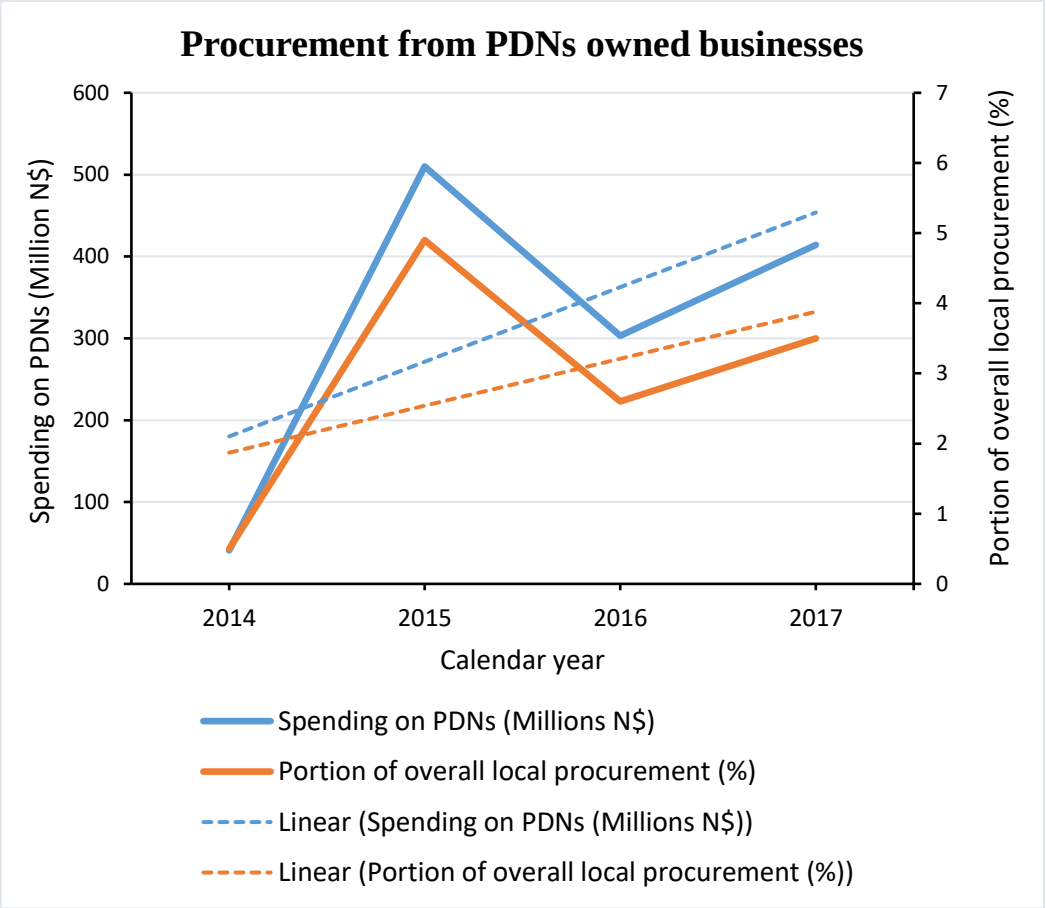


Figure 4.2: Procurement from PDNs owned businesses (Davidson, 2018)

It can be observed from Figure 4.2 that the trend line for the PDNs' portion of overall local procurement have gradually risen over the period of study. It is worth noting that spending on PDNs owned businesses is included in the local procurement shown in Figure 4.1. For the period under observation, local procurement from PDNs owned businesses averaged at 2.8%. This means that PDNs had an average market share of 2.8% in local procurement from 2014 – 2017.

The average market share cannot be said whether it is low or high since there are currently no set targets for PDNs market share in local procurement. The lack of set targets to be met considering that PDNs make up more than 70% of the country's population is concerning. However, it is not the entire 70% that is participating in business and in particular in mining related business. Therefore, there is a need for further research to establish the proportion of PDNs involved in business that can participate in local procurement so that targets can be determined.

4.4. Local procurement opportunities

An analysis of local procurement opportunities for the research samples' active mining phases was conducted. In addition local procurement opportunities at mine closure and post closure were also identified. The researcher classified the opportunities into two categories that is **category A** (surface and underground mining opportunities combined) and **category B** (marine mining opportunities).

4.4.1. Category A

Figure 4.3 shows different procurement categories suitable for servicing by local suppliers along a mining value chain. Inputs into each procurement category were selected based on two criteria. The first criterion required the capability of inputs to be supplied to other sectors of the economy to avoid overreliance on one mining company or the mining industry in particular. This is to ensure that suppliers are not vulnerable to the business cycles of the mining companies that are highly dependent on commodity prices. The second criterion was the current capacity for supplying these goods and services in the country.

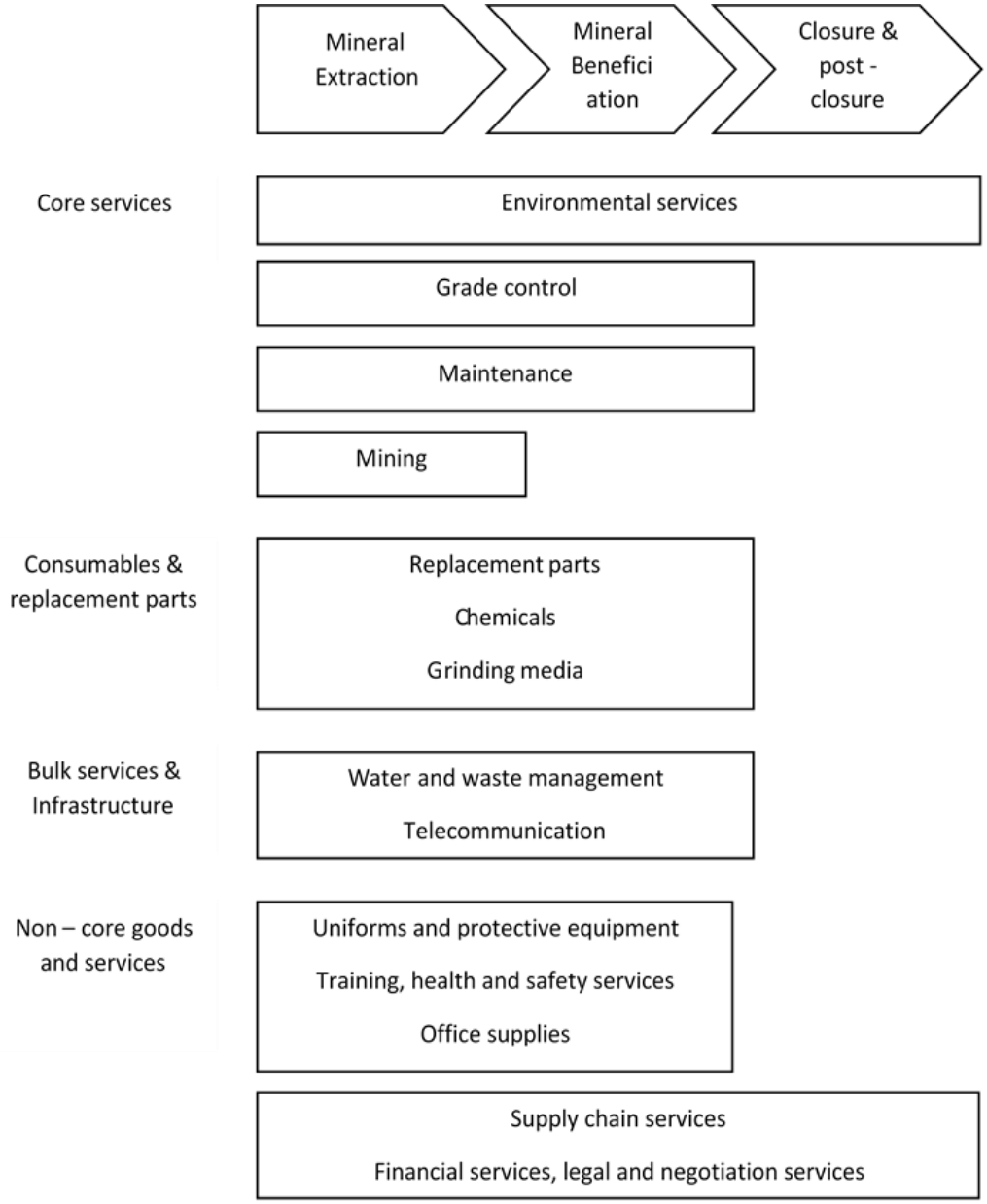


Figure 4.3: Local procurement opportunities for surface and underground mining (adapted from World Bank, 2012)

Core services inputs suitable for supply by local suppliers includes drilling, sample analysis, laboratory testing, mapping, geoscientific surveying and air quality monitoring services. Consumables & replacement parts during mineral production includes tires, anchor bolts, roof bolts lubricants, chemicals, valves and fittings, conveyor rollers, bearings, liners and hydraulic systems.

Bulk services & infrastructure includes telecommunications, water and waste management at mineral production and mine – closure and post closure phase of

the value chain. And finally, non – core goods and services are made up of furniture, lamps, uniforms, personal protective equipment during mineral development and financial services, training, logistics, legal and negotiation services, health & safety services at both mineral production and mine closure. Current reporting by mining companies does not enable in – depth analysis of which of these goods/services are fully local.

4.4.2. Category B

Figure 4.4 shows different procurement categories suitable for servicing by local suppliers along a mining value chain. Due to the highly specialised skilled nature of marine mining and the limited capacity in Namibia, most services cannot be provided by local firms. In fact some of Debmarine Namibia's vessels are sailed to South Africa where maintenance is carried out for equipment on board.

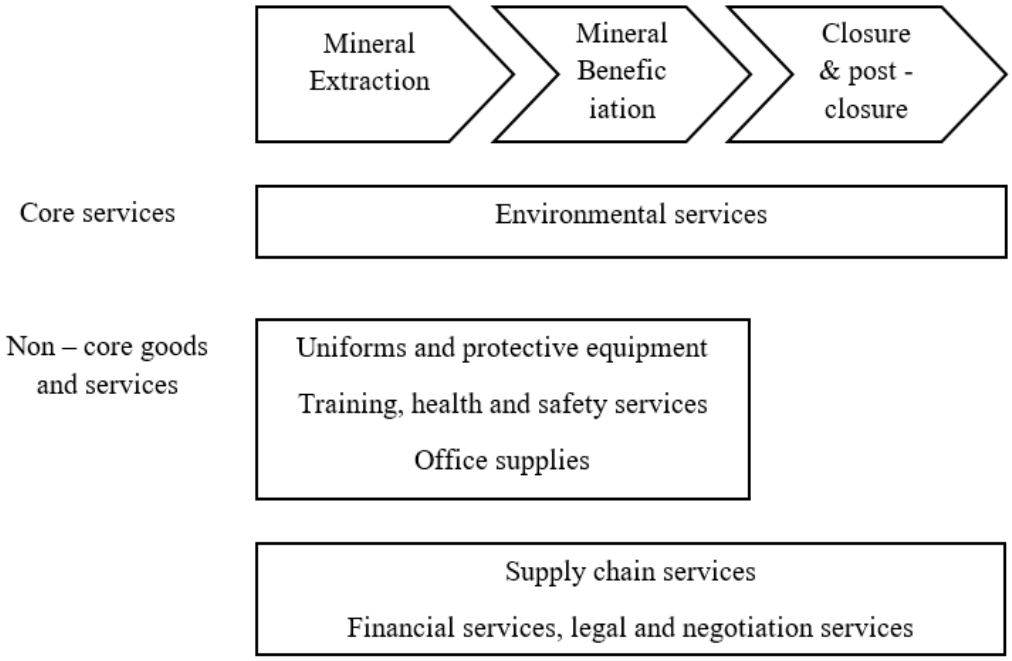


Figure 4.4: Local procurement opportunities for marine mining method (Adapted from World Bank, 2012)

With the help of policy and regulations, local firms with capacity have opportunities available in environmental services such as Environmental Impact Assessments (EIA) at mine production and closure. Office supplies such as pens, desks, chairs, books, etc., uniforms and protective equipment, on board health and safety services can also be provided by local suppliers during mineral development. Namibia also

currently has well qualified locally owned institutions that can provide financial, legal and negotiation services to Debmarine Namibia. It is therefore essential for the Namibian government to consider incentives such as, tax incentives, scholarships, supplier development programmes, to develop future capacity in marine mining to service mining vessels locally.

4.5. Enabling legal and regulatory environment in Namibia

4.5.1. Regulatory Quality Index

Namibia's regulatory quality index has deteriorated every year for the period of study dropping from -0.01 in 2014 to -0.19 in 2017, as shown in Figure 4.5.

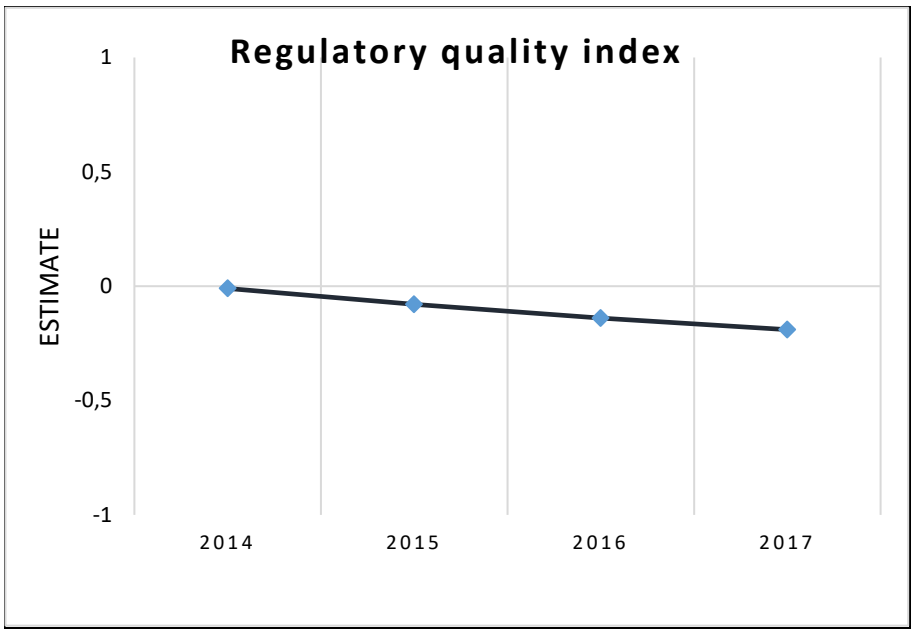


Figure 4.5: Namibia's Regulatory Quality Index 2014 - 2017 (International Labour Organization, 2017; The Global Economy, 2019)

-0.19 is the lowest value the country has ever experienced since independence in 1990 (International Labour Organization, 2017). This also implies that the Namibian government has been getting weaker over the period of study at providing well formulated policies and regulations which promote the private sector.

In the context of local procurement, the Namibian government has been unable to make the Mining Charter a legally binding document for the period of study, resulting in compliance to the document being done on a voluntary basis. Namibia's shortcomings in providing a well-designed legal framework for

investment are echoed in the low ease of doing business rankings shown in Figure 4.6. The country dropped in ranking from 101 out of 190 in 2014 to 108 out of 190 in 2016 before moving up to 106/190 in 2017.

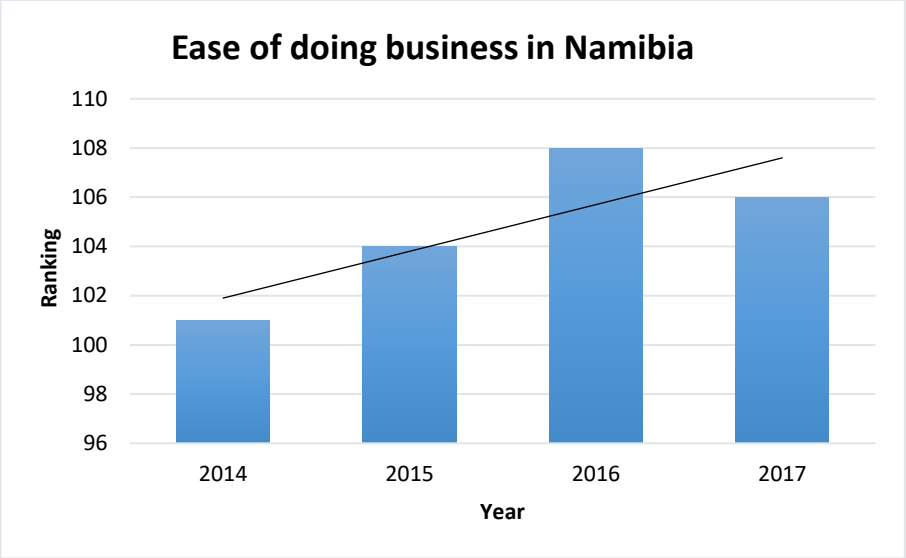


Figure 4.6: Ease of doing business in Namibia, 2014 - 2017 (The Global Economy, 2018)

4.6. Local Procurement by individual mines vs Mining Charter Targets

All mining companies in the Namibian mining industry reported goods and services procured from Namibian registered businesses as local procurement. This is in contrast to the Mining Charter requirements which, prefers local procurement to come from Namibian – owned businesses. However, the Chamber of Mines of Namibia, who generates mining annual review reports for the country have also chosen to report local procurement in their annual reviews as reported by the mining companies. The definition adopted by mining companies can lead to a misinterpretation of local procurement. This is because a Namibian registered company can incorporate many categories some of which add limited local value to the host country.

The categories of Namibian registered companies can include; local import agents, foreign exporter, locally based foreign manufacturer/ service provider and local manufacturer/ service provider among others. Some of these companies example, foreign exporter, have a low level of local value addition as well as local

participation in ownership, management and employment. In some cases the funds received by these companies is barely spent in Namibia.

Reporting local procurement from Namibian registered companies can lead to misalignment of local procurement to the Mining Charter definition. However, since this kind of reporting was the only kind available at the time this research was conducted, the author compared this reported local procurement to the Mining Charter targets for six individual mines.

Five of the six mines scored above Charter target every year from 2014 – 2017. It was observed that the scores above targets were mainly a result of misalignment of local procurement definition, which also made it appear as though very few inputs (goods and services) were imported into the industry over the same period. However even foreign exporters and local importers were categorised as companies benefitting from local procurement as long as their businesses were registered in Namibia.

The Namibian Mining Charter required mining companies to spend 25% of their total procurement expenditure on Namibian – owned businesses from 2014 - 2015. From 2016 – 2020 the share was increased and mining companies were required to spend 40% on local procurement. Figure 4.7 to Figure 4.17 were plotted using raw data in Appendix 7.4. These figures show local procurement expenditure by the six mining mines against the Mining Charter targets.

4.6.1. Rossing Uranium mine

Rossing Uranium's local procurement, inclusive of procurement from businesses owned by PDNs has met Mining Charter targets ever since the Charter was established in 2014, see Figure 4.7.

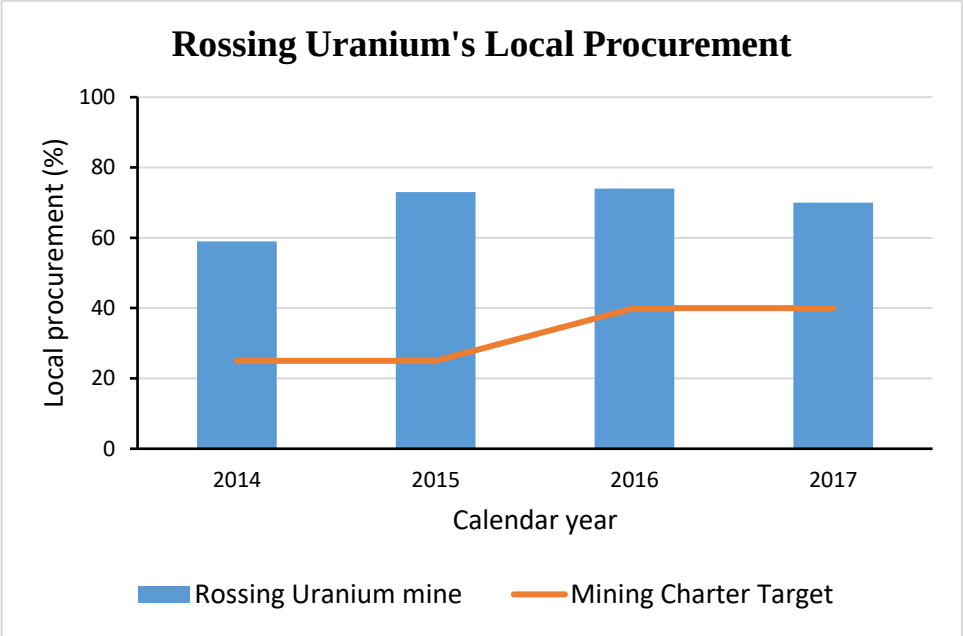


Figure 4.7: Rossing Uranium mine's local procurement as a percentage of total procurement expenditure (Davidson, 2018)

By looking at Figure 4.7, it appears as though Namibia is a country capable of supplying most of the manufacturing and services demands for Rossing Uranium, average local procurement at 69% over the 4 year period. However, this is not the case and the author will provide a discussion on how the current reporting system in the country gives a misrepresentation of local procurement according to the mining charter simply by adopting different definitions for local procurement.

There was a 15% increase in local procurement from 2014 to 2015. This was mainly due to the long term contract that Rossing Uranium signed with Dundee Precious Metals (Pty) Ltd to purchase sulphuric acid from them (Rössing Uranium Limited, 2015). Dundee Precious Metals (Pty) Ltd is a subsidiary of Dundee Precious Metals Inc. (DPM), listed on the Toronto Stock Exchange (Rossing, 2013). However, since Dundee Precious Metals (Pty) Ltd is a Namibian registered company, this purchase is considered local (Rössing Uranium Limited, 2015). This expense does not meet the definition of local procurement according to the Mining Charter, since the company is not Namibian owned.

Concentrated sulphuric acid is a by-product that comes from treating complex copper concentrates. Dundee Precious Metals (Pty) Ltd smelts copper sulphide ores that are imported from Bulgaria (Dundee Precious Metal, 2019). This means that

the raw materials from which the sulphuric acid is produced are imported, therefore, buying sulphuric acid from Dundee is not entirely local procurement and the expense requires further breakdown. Other inputs needed to produce sulphuric acid such as Vanadium catalyst plates and High Fuel Oil (HFO) are all imported (Dundee Precious Metal, 2019). In conclusion, Rossing Uranium purchases sulphuric acid from a company that is not Namibian owned that also imports its raw materials and yet categorises the purchase as local procurement.

The example discussed earlier demonstrated what has been happening in the Namibian mining industry when it comes to reporting on local procurement. Unless legally binding regulations and a local procurement measuring and monitoring framework are put in place, local procurement will continue to be inflated while real local sourcing will be limited.

Rossing Uranium's procurement from PDNs owned businesses

Rossing Uranium's spending on the main group of people (PDNs) targeted by the Mining Charter, had an average of 5.2% over the period of study. Figure 4.8 shows the procurement expenditure from businesses owned by PDNs. As stated earlier, this expenditure cannot be said whether it is low or high because there are currently no targets set in the industry.

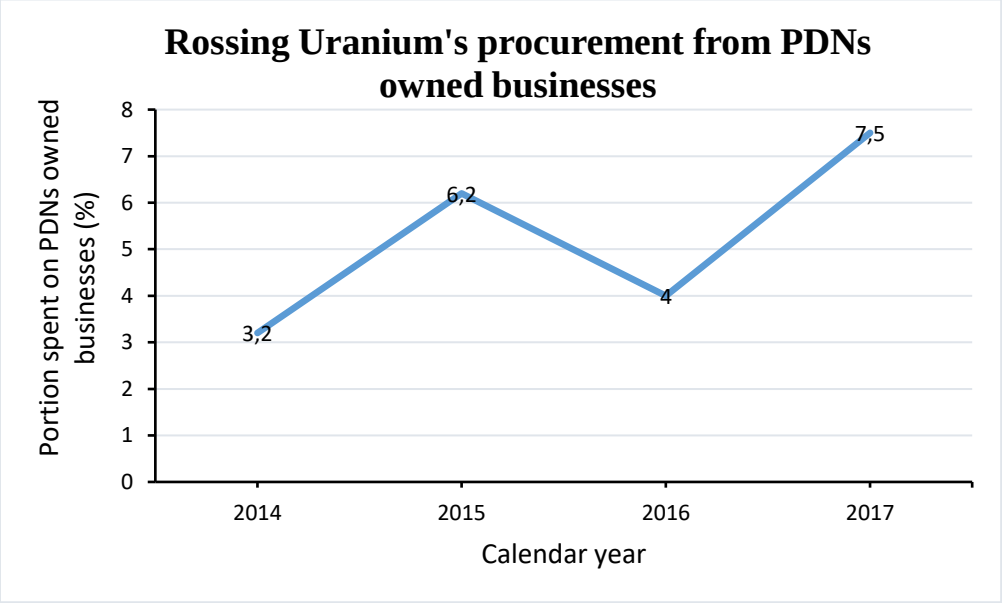


Figure 4.8: PDNs spending as a percentage of local procurement by Rossing Uranium mine (Davidson, 2018)

There is however a lack of incentives and policies by the government to encourage expenditure on PDNs owned businesses. Mining companies can therefore decide by themselves when and how much to spend on PDNs owned businesses. Rossing Uranium had noteworthy supplier development programme over the period of study.

Rio Tinto recognises that profound socioeconomic benefits can be attained through the buying of goods and services from local people and that is why it works with indigenous and local communities to ensure that they have the opportunities to participate in their supply chain along the value chain. Rio Tinto came up with the "Rio Tinto Procurement principles" that ensures that buying of goods and services is understood by all relevant stakeholders and conducted with transparency (Rio Tinto, 2014; Durant, *et al.*, 2017).

In 2014, Rio Tinto directly and through its Rossing foundation, invested more than N$21 million in neighbouring communities targeted at local economic diversification and strengthening local SMEs (Durant, *et al.*, 2017). The company provided 15 SMEs with enterprise development support. This was in the form of guidance on taxation, compliance and bookkeeping. New SMEs were assisted by the Rossing foundation to develop business plans (Rio Tinto, 2014).

4.6.2. Navachab Gold mine

Navachab gold mine is an open pit mine situated near the town of Karibib, Namibia. The mine started production in 1989, producing gold bullion which is refined at the Rand Refinery in South Africa (Chamber of Mines of Namibia, 2017). Figure 4.9 shows local procurement by QKR Namibia's Navachab gold mine from 2014 to 2017.

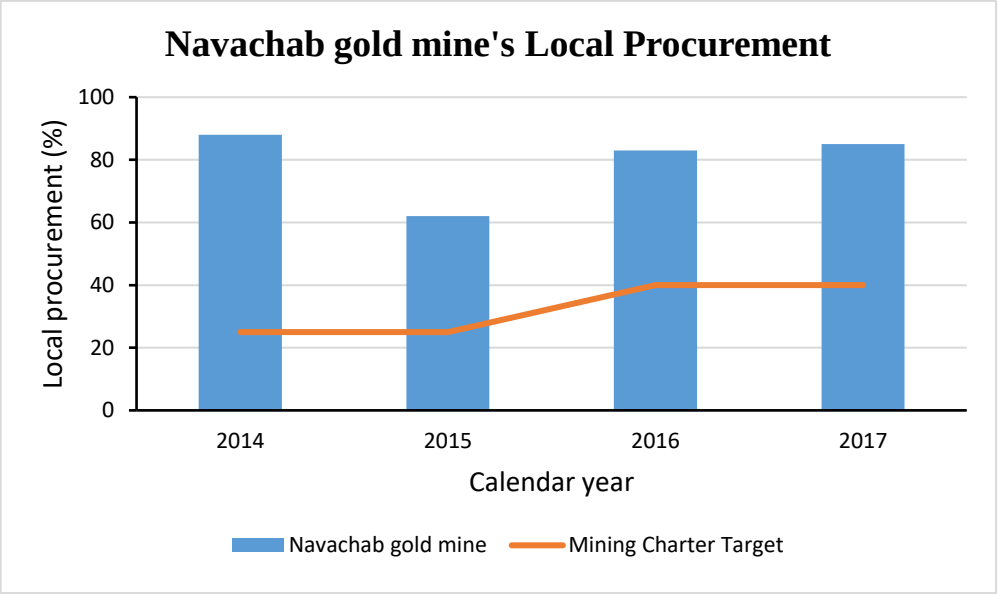


Figure 4.9: Navachab gold mine's local procurement as a percentage of total procurement expenditure (Davidson, 2018)

Navachab gold mine outperformed the goals set by the Mining Charter from 2014 – 2017. This is mainly because Navachab awarded contracts to Namibian registered businesses that were not necessarily Namibian owned. This expenditure is categorised as local procurement in Namibia (Chamber of Mines of Namibia, 2015). In cases where contracts were awarded to Namibian owned businesses, the raw materials were imported from outside the country (Chamber of Mines of Namibia, 2017), which can limit the level of local value addition.

Navachab gold mine's highest local procurement expenditure came in 2014 when the mine was sold by AngloGold Ashanti to QKR Namibia Minerals holding and Epangelo Mining. Epangelo mining which is a state owned mining company got a stake of 7.5% in the company (Duvenhage, 2014). In the same year, the mine had increased production from the previous year outperforming production expectations by 5% (Chamber of Mines of Namibia, 2014a). In 2015, local procurement fell by 26% from the previous year, due to reduced production at the mine. The production was 11.3% below targets mainly due to unsteady operational problems as well as tie – in and commissioning of new projects (Chamber of Mines of Namibia, 2015).

In 2016, local procurement increased to 83% of total procurement expenditure. The mine had 3 major plant expansions as well as an upgrade of the pit dewatering system (Chamber of Mines of Namibia, 2016). These 2 contracts were awarded to

an Original Equipment Manufacturers (OEM) and the second contract to an Engineering, Procurement and Construction Management (EPCM). Both these companies are locally registered but not locally owned (Chamber of Mines of Namibia, 2016). Due to limited local capacity most of the raw materials to these projects were imported. The expenditure was however categorised as local procurement. These developments increased expenditure on goods and services for the year. There was a slight increase in local procurement in 2017 partly due to the company contracting Gecko mining, a Namibian owned mining services provider, for development phase services for one of their pits (Chamber of Mines of Namibia, 2017).

Navachab gold mine's procurement from PDNs owned businesses

The procurement from PDNs suppliers, did not follow the overall local procurement trend for the study period. In fact, procurement from PDNs owned businesses declined from 2014 to 2016 before increasing slightly in 2017 and was below 3.5% for the study period, see Figure 4.10. Navachab Gold mine did not have a supplier development programme for the period of study. This possibly contributed to the low participation in the supply by PDNs.

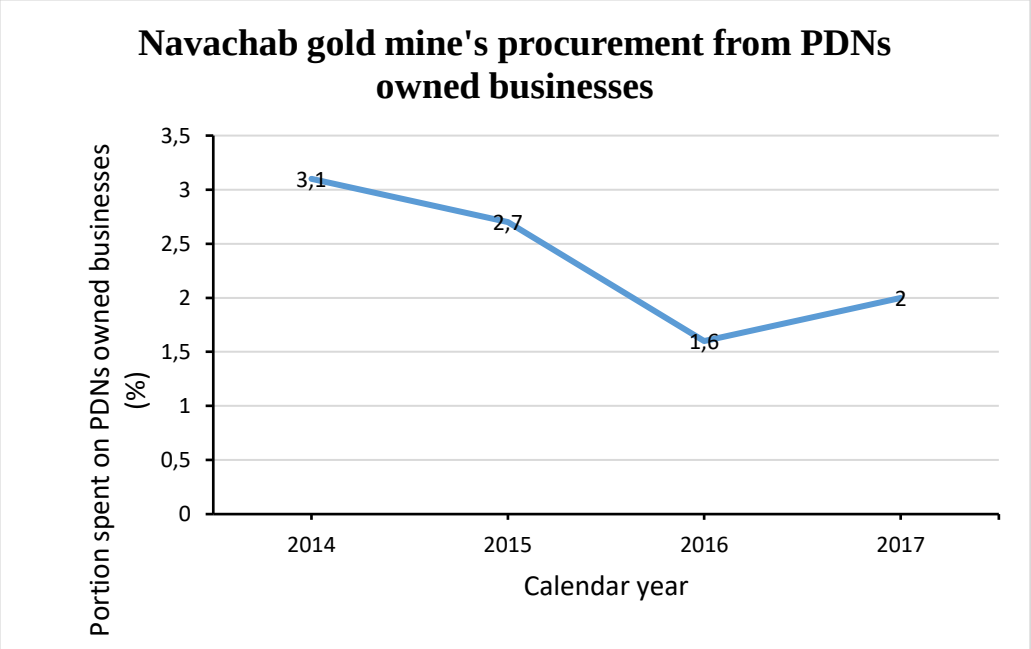


Figure 4.10: PDNs spending as a percentage of local procurement by Navachab Gold mine (Davidson, 2018)

4.6.3. Skorpion Zinc mine

Skorpion Zinc is an integrated zinc operation situated in the //Kharas region, Namibia. The operation comprising of an open pit mine and refinery is located 25km north of the town of Rosh Pinah (Vedanta Zinc International, 2018a). The operation is the largest of its kind in Africa (Vedanta Zinc International, 2018b) and as a result, the mine has a variety of potential opportunities for local suppliers. Figure 4.11 shows local procurement by Vedanta Zinc International's Skorpion Zinc mine from 2014 to 2017.

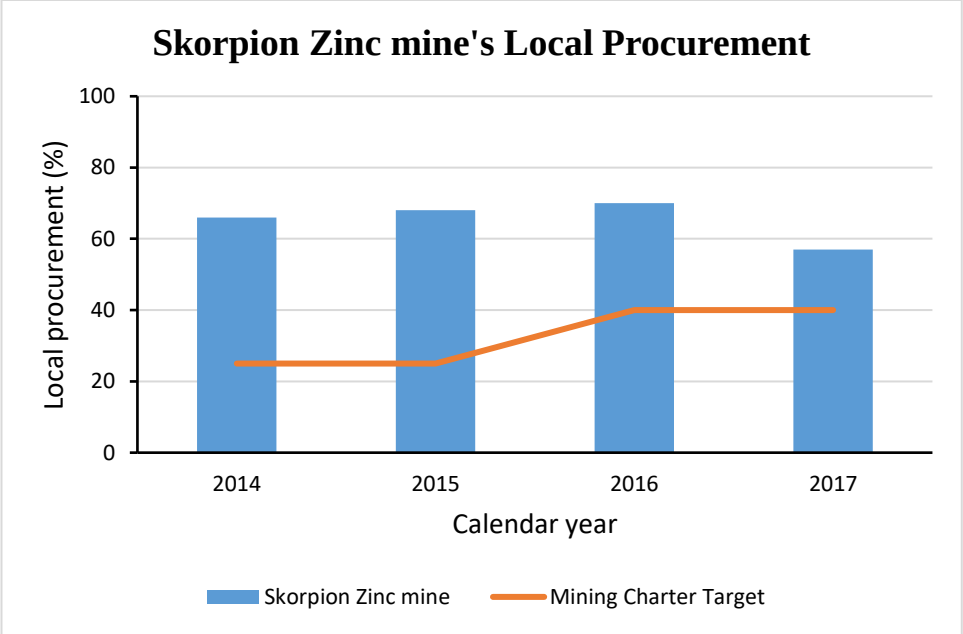


Figure 4.11: Skorpion Zinc mine's local procurement as a percentage of total procurement expenditure (Davidson, 2018)

The company's local procurement, inclusive of procurement from businesses owned by PDNs has met the targets of the Mining Charter since its inception in 2014. Local procurement at the mine increased slightly from 66% in 2014 to 68% in 2015 due to rising cost of mining consumable, equipment repairs and water (Chamber of Mines of Namibia, 2015). In addition to rising costs, the mine hired local service providers in 2016 to provide technological solution for retreating water from the pit in 2016 (Chamber of Mines of Namibia, 2016).

In 2017, production as well as local procurement fell at the mine due to the transition that the mine went through. The main pit at the mine got depleted in 2017 resulting in the mine reaching a state of closure, hence a decline in production due

to the retrenchment of workers. However, the company started with expansion of a different pit (pit 112) which extended the life of the mine by at least another 3 more years (Vedanta Zinc International, 2017).

Skorpion Zinc mine's procurement from PDNs owned businesses

Procurement from businesses owned by PDNs has been below 2.5% for the period of study. From 2014 to 2015, overall local procurement increased but procurement from PDNs owned businesses declined. This could be due to lack of regulation around local procurement, and spending on PDNs owned businesses is done at mining companies' own convenience hence the inconsistent expenditure shown in Figure 4.12.

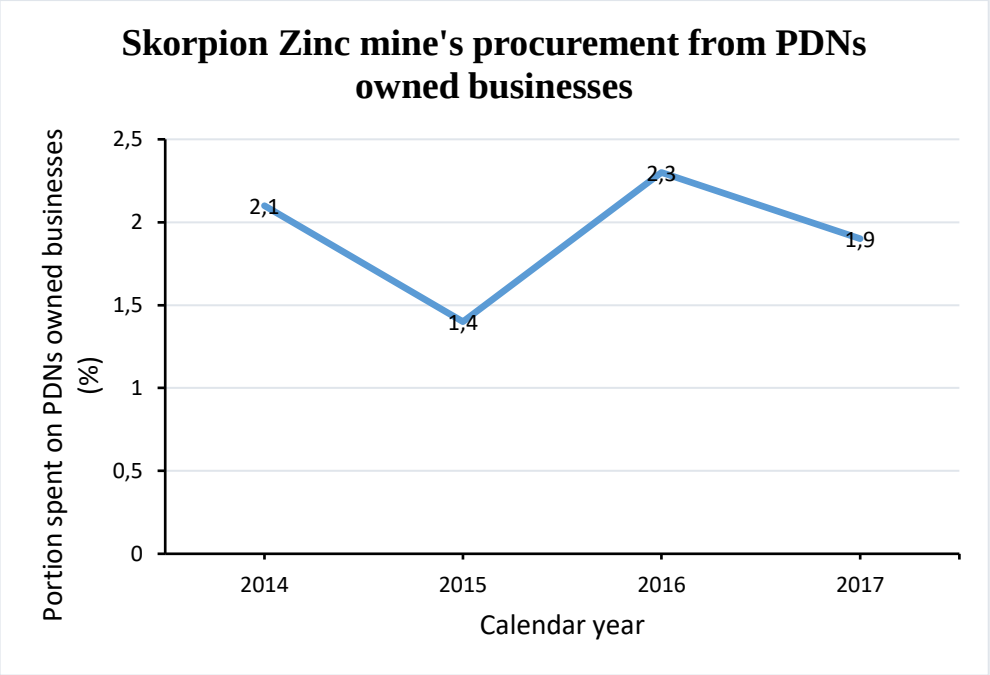


Figure 4.12: PDNs spending as a percentage of local procurement by Skorpion Zinc mine (Davidson, 2018)

The mine did not have a supplier development programme to build local capacity for the period of study. Lack of capacity building implies that local suppliers especially PDNs, will remain challenged resulting in stagnant growth and inability to meet the standards of the mining companies.

4.6.4. Langer Heinrich Uranium mine

Langer Heinrich Uranium mine is an open – pit mine located 80km east of Walvis Bay in Namibia. The mine is situated in the Namib Desert (Mining Technology, 2018). Figure 4.13 shows local procurement by Paladin Energy's Langer Heinrich Uranium mine against the Charter target from 2014 to 2017.

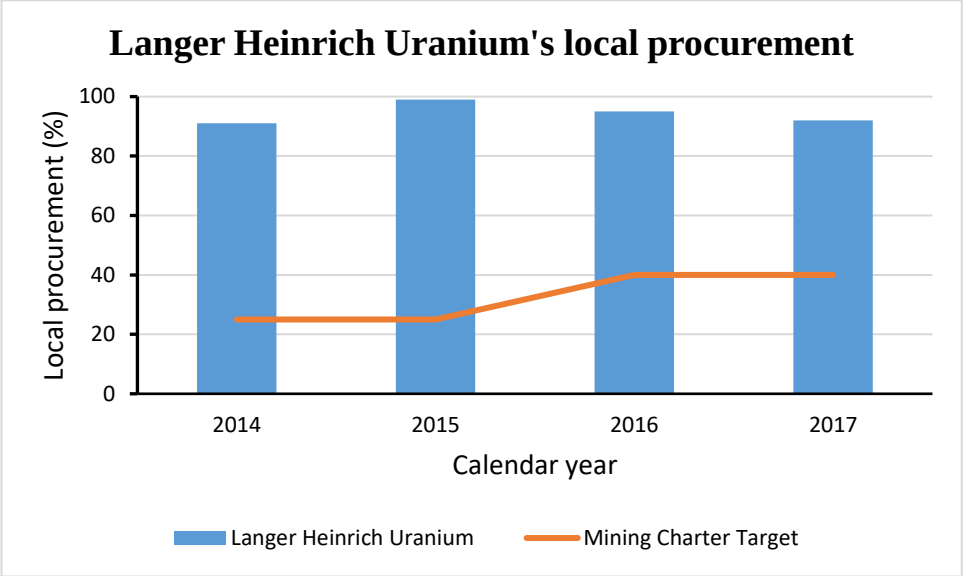


Figure 4.13: Langer Heinrich Uranium mine's local procurement as a percentage of total procurement expenditure (Davidson, 2018)

As mentioned before, mining companies in Namibia report procurement from Namibian registered businesses as local procurement. It can be observed from Figure 4.13 that Langer Heinrich seems to have had the highest local procurement average (94.5%) over the period of study. The mine had such high local procurement percentages because it had contracted Karibib Mining and Construction Company to carry out mining operations (Mining Technology, 2018) for the period of study.

Karibib Mining and Construction Company is a Namibian registered but not a Namibian owned company (Chamber of Mines of Namibia, 2015). Most of the company's inputs such as trucks, drilling equipment, spare tires, lubricants and spare parts among others were imported from outside Namibia. Therefore, on paper Langer Heinrich gave the contracts to a Namibian registered company but most of the money was still being spent outside the country.

In addition, Langer Heinrich also contracted Bulk Mining Explosives (BME) (Pty) Ltd Namibia to supply the mine with raw materials for explosives manufacturing and the supply of mobile manufacturing units or explosives blend trucks (Chamber of Mines of Namibia, 2017) for the period of study. The company also carried out blasting operations at the mine. BME Namibia is a Namibian registered company with its parent company Omnia Group in South Africa. All the raw materials supplied to the mine were imported from South Africa. Finally, Langer Heinrich had a Namibian owned company namely Gecko Mining contracted to carry out exploration at the mine for the period of study (Chamber of Mines of Namibia, 2015; 2016; 2017).

The case of Langer Heinrich Uranium demonstrates how reporting local procurement as procurement from Namibian registered suppliers can be a misrepresentation because contracts were given out to companies registered in the country but most of the spending was not done in the country.

Langer Heinrich Uranium procurement from PDNs owned businesses

The company also had public records on expenditure from PDNs suppliers that accounted for all the years the Mining Charter was implemented. Procurement expenditure on businesses owned by PDNs for the same period is shown in Figure 4.14.

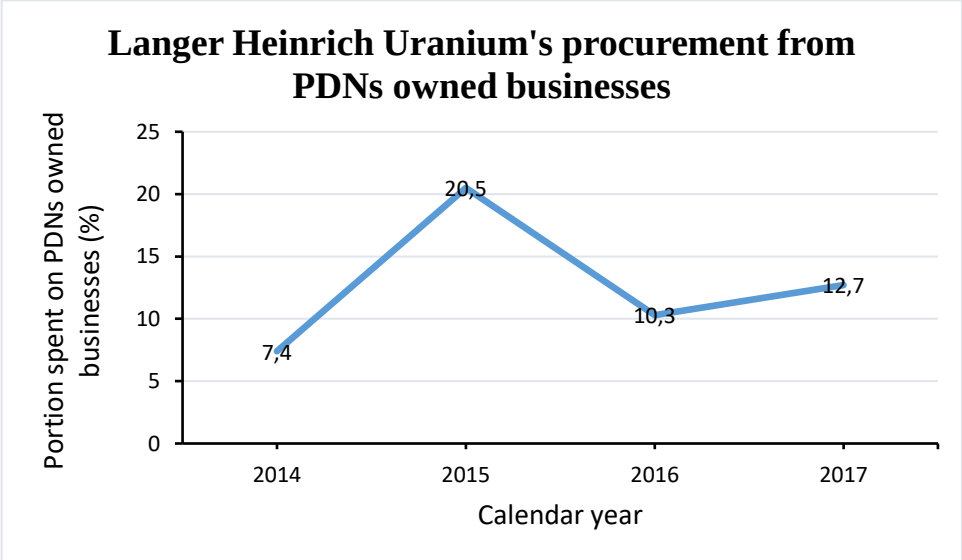


Figure 4.14: PDNs spending as a percentage of local procurement by Langer Heinrich Uranium mine (Davidson, 2018)

Of the total local procurement expenditure in 2014, 7.4% was spent on supplier firms owned by PDNs. That percentage increased to 20.5% in 2015 as the company increased production in 2015 (Chamber of Mines of Namibia, 2015) before dropping to 10.3% in 2016. The drop in 2016 was mainly due to cost cutting initiatives implemented at the mine (Chamber of Mines of Namibia, 2016).

In 2017, the percentage improved slightly from the 2016 value to 12.7%, when the company hired a local contractor in preparation for the care and maintenance phase of the mine (Chamber of Mines of Namibia, 2017). Langer Heinrich Uranium mine did not have a supplier development programme for the period of study and that may also have caused low PDNs participation.

4.6.5. Rosh Pinah Zinc mine

Rosh Pinah Zinc is an underground zinc – lead mine, the only underground mine currently in operation in Namibia. The mine is located in the //Kharas region in the mining town of Rosh Pinah. Figure 4.15, shows local procurement by Rosh Pinah Zinc Corporation's underground mine against Charter target from 2014 to 2017.

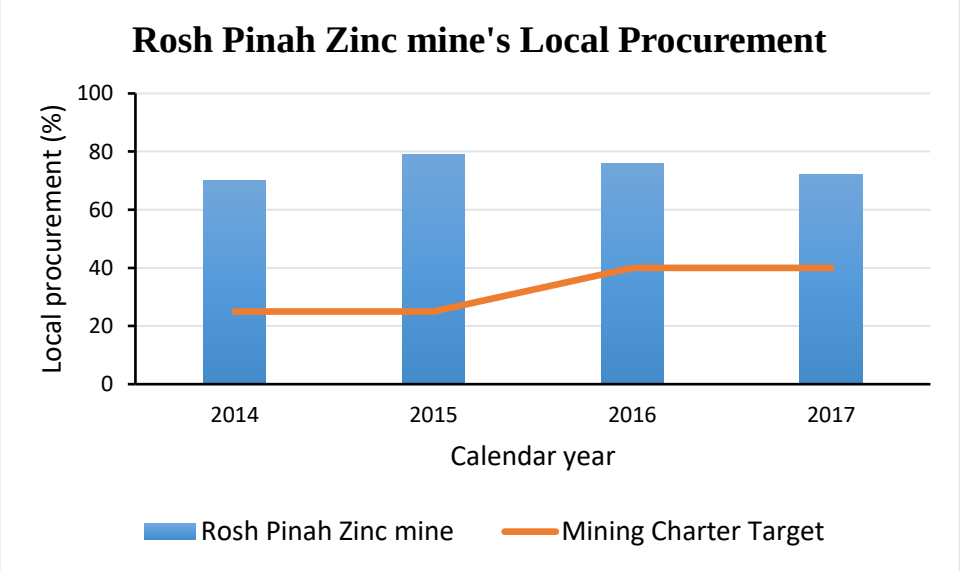


Figure 4.15: Rosh Pinah Zinc Corporation's local procurement as a percentage of total procurement expenditure (Davidson, 2018)

The company's local procurement, inclusive of procurement from businesses owned by PDNs has met the targets of the Mining Charter ever since its establishment in 2014. Local procurement declined as a result of a two – month strike at the mine in 2016 (Chamber of Mines of Namibia, 2016). In 2017, the mine

had more production challenges due to lower feed grade (Trevali Mining Corporation, 2018). As a result, local procurement fell a further 4% in 2017 (Chamber of Mines of Namibia, 2017).

Rosh Pinah Zinc mine's procurement from PDNs owned businesses

Expenditure on PDNs owned businesses was averagely higher at Rosh Pinah Zinc mine for the period of study averaging at 20.8%, see Figure 4.16.

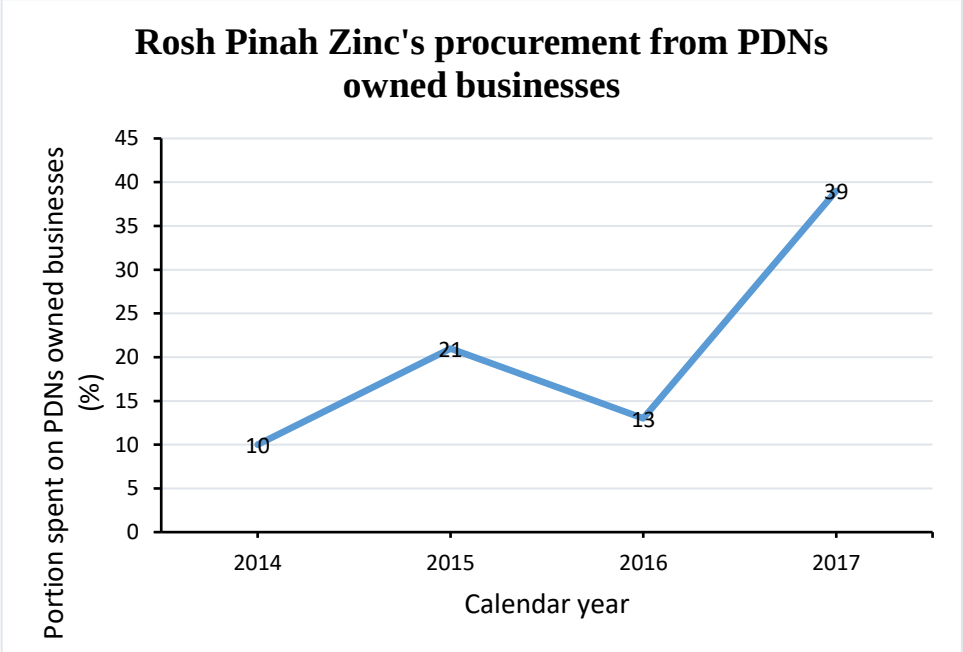


Figure 4.16: PDNs spending as a percentage of local procurement by Rosh Pinah Zinc Corporation (Davidson, 2018)

In 2015 PDNs owned business expenditure increased with increasing production at the mine. However there was a drop in 2016 due to the industrial action that went on for a prolonged period. The PDNs owned business expenditure increased in 2017, when the mine contracted a locally registered contractor with a 30% share of PDNs in management, employment and ownership to carry out mining (mineral extraction) at the mine (Chamber of Mines of Namibia, 2017).

Awarding a contract to a locally registered contractor with PDNs representation in ownership, employment and management to carry out tasks at the mine proved to be an effective ways to increase local procurement as procurement was observed to be the highest at 39%. Other mines in Namibia can learn a lesson from Rosh Pinah

Zinc. Rosh Pinah Zinc mine did not have supplier development programme for the period of study.

4.6.6. Debmarine Namibia

Debmarine Namibia deploys two mining technologies on-board its five diamond mining vessels namely the crawler and the airlift-drill mining technology to mine diamonds off the ocean floor (Debmarine Namibia, 2018). Debmarine Namibia focuses a lot on skills development initiatives. These include technical skills, communication and leadership programmes. The company also trains its employees in areas such as deck ratings, control and instrumentation and sea bed tool pilots just to name a few (Chamber of Mines of Namibia, 2016). Figure 4.17 shows local procurement by Debmarine from 2014 to 2017.

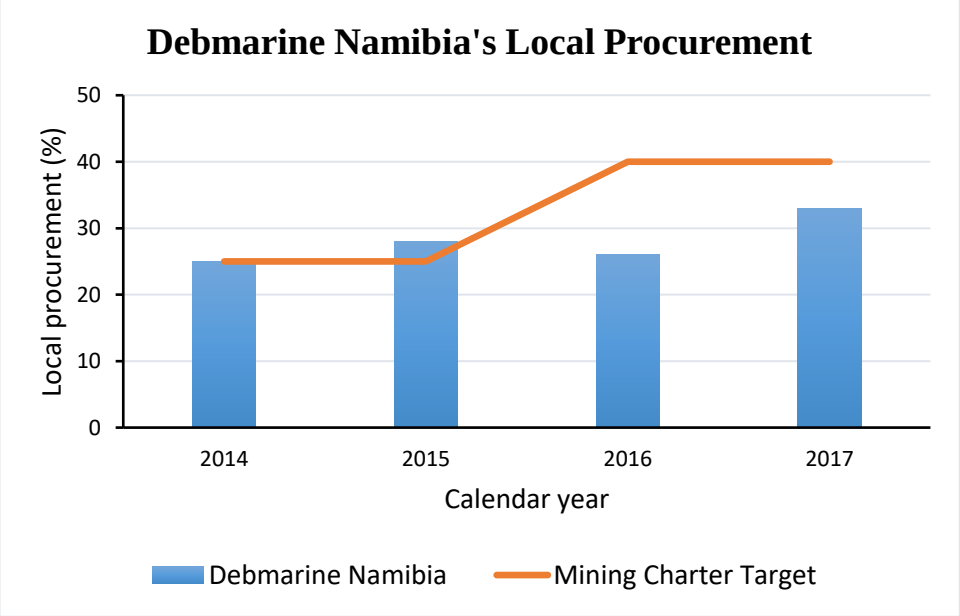


Figure 4.17: Debmarine Namibia's local procurement as a percentage of total procurement expenditure (Davidson, 2018)

Debmarine Namibia failed to reach the Mining Charter's target in 2016 and 2017. This was largely due to the purchase of a 7971 tonnes exploration vessel in 2016 from Norway. The vessel is the largest, most advanced diamond sampling and exploration vessel in the world and it cost around R 2.3 billion (Chamber of Mines of Namibia, 2016). This expenditure drastically increased the external procurement cost by the company at the same time when the Charter's target was also increased.

The company also has 5 additional vessels in its fleet which are normally serviced in Cape Town, South Africa due to lack of expertise locally (Kaira, 2013). A supplier development programme for the period of study was non-existent at Debmarine Namibia. Debmarine's operation is off the coast of Namibia; hence its remoteness poses a challenge for local suppliers to have any real involvement in the supply chain. In addition, Debmarine services require highly specialised skills and expertise (Debmarine Namibia, 2018), which are in limited capacity in the local market (Brandt, 2014).

4.7. Causes of limited local participation in mining companies' supply chains

The Namibian Mining Charter, which is the only policy document available in the country that influences local procurement even though not legally binding does not clearly specify the type of local suppliers that mining companies should buy goods and services from. The Charter only states that 40% of total procurement expenditure should be spent on "Namibian – owned companies". This is quite broad hence, it has resulted in mining companies buying goods and services from suppliers as long as they are registered in Namibia.

In other words, stakeholders use Namibian owned and Namibian registered companies synonymously. A small number of the goods are actually manufactured in Namibia. The main reason for this could be lack of adequate local capacity however local capacity in the mining industry has not been documented in the public domain and therefore there is a need for research to document local capacity. Most of the "local suppliers" are agents and distributors of physical inputs, meaning that the local value added in this part of the value chain is limited or thin.

Since mining operations are mostly in remote areas, host communities made up of indigenous and previously disadvantaged groups in most cases do not have the capacity to supply the goods and services to mining companies in order to create sustainable socio-economic development within their areas. Hence, host communities are left out of the supply chains and lose out on potential local procurement benefits.

Another reason for lack of participation by PDNs in the mining supply chains is because of lack of regulation to support their involvement. Other countries such as Canada and South Africa have legally binding local procurement frameworks that they use to encourage involvement of their local people and to hold mining companies accountable for non – compliance. South Africa's Mining Charter was prescribed by the Mineral and Petroleum Resources Development Act of 2002 (MPRDA) and it uses the Mining Charter Score- card and Social and Labour plan for enforcement (Nickerson, *et al*., 2017). Meanwhile, Canada has what is termed the Impact and Benefit Agreements (IBAs), which aims at increasing the participation of aboriginals in local procurement within the mining sector (Korinek & Ramdoo, 2017). This way they make sure that, HDSAs and aboriginal Canadians are involved in the mining companies supply chains. In the case of Namibia, compliance in the Mining Charter is voluntary and there is no enforcement by the government.

In addition to the lack of policy in support of PDNs involvement in local procurement in the Namibian mining industry, there is also lack of supplier development programmes by mining companies. Local SMEs especially those owned by PDNs are usually small and face a lot of challenges ranging from, lack of skills and experience in running business, lack of finances, and lack of expertise among many others (Indongo, *et al*., 2014). In most cases these local SMEs need to be assisted in order to grow and be competitive. Supplier development programmes are very significant because they ensure that local SMEs get the support they need in terms of financing, skills development, technology transfer as well as mentoring to be able to supply products that are of the standard required by the mining companies and also be globally competitive in the most efficient way possible.

Mining companies submit reports on their local procurement activities to the Chamber of Mines of Namibia on a voluntary basis with aggregate data. For example, suppliers awarded contracts by mining companies are mostly not included in the reports hence end up not being known by the Chamber of Mines or civil society. This scenario also applies to the type goods and services acquired from specific suppliers.

The Namibian mining industry has a strong local OEM base, such suppliers are mostly local subsidiaries that are verified distributors of OEM equipment and machinery, or are directly owned by international OEM companies. The locally based OEM companies also provide after sales support, technical maintenance and engineering services which generate returns locally. For example, Barlow Equipment, the official distributor for Caterpillar equipment has six branches across the country located in the main mining areas and is a common supplier among mining companies (Barloworld Equipment, 2018).

Not only are they providing the necessary mining equipment, their operations in Namibia appear to be sustained by the important support, technical and maintenance services provided to mines. Furthermore, some OEM distributors have established workshops on mining sites to provide full-time support for the service and maintenance of equipment supplied by them.

The strong presence of OEMs in the country presents a challenge for local suppliers looking to enter the supply chain. This is mostly because OEMs are providers of mining equipment, component and wear parts as well as important engineering, maintenance, repair and general after sales services. This situation has caused OEMs to evolve to provide turnkey solutions to the industry and have captured a significant portion of the mining supply chain.

According to Davidson (2017), local suppliers in Namibia struggle to understand basic tender requirements and submit the necessary documentation on time. This challenge is specifically related to contextual constraints as it suggests that educational institutions are not adequately equipping suppliers with necessary skills to effectively conduct business.

4.8. Conclusions

The Chapter unpacked local procurement in the Namibian mining industry. The researcher observed that stakeholders have different definitions for local procurement. All mining companies defined local procurement as the buying of goods and services from Namibian – registered businesses. Meanwhile the Ministry of Mines and Energy and the Chamber of Mines of Namibia through the Namibian mining Charter, defined the term as the buying of goods and services from

Namibian owned businesses. The two definitions are used synonymously however, they are fundamentally different. This has resulted in mining companies quantifying purchases from Namibian registered businesses as local procurement even though some are merely foreign exporters with limited local value addition.

Local procurement by all mining companies, despite having a different definition from the Mining Charter's definition, was found to have risen since the implementation of the Mining Charter in 2014. The rise in local procurement was observed to have corresponded with increased production. Local procurement from PDNs owned businesses in the entire mining industry averaged at 2.8% for the period of study. This means PDNs only had a market share of 2.8% for the period study and even though there is currently no targets set to be met, this average warrants for further research to be conducted so that a target can be set. The researcher figured that the lack of a local procurement measuring and monitoring framework is the cause of stakeholders adopting different approaches to define local procurement.

The researcher discovered a lack of supplier development programmes in the industry. Only Rossing Uranium had a supplier development programme for the period of study. The lack of supplier development programmes contributes to the limited participation of local SMEs in the supply chains because, most SMEs usually need the support offered by these programmes in order to adequately participate.

5. STRATEGIES FOR IMPROVING LOCAL PROCUREMENT IN NAMIBIA

5.1. Chapter Overview

Chapter five provides a comprehensive discussion on the development of a local procurement measuring and monitoring framework in the Namibian mining industry. The chapter also discusses the processes that needs to be conducted in order to produce the outputs of the framework.

The first process discussed is how to accurately define local procurement in the mining industry. Furthermore, the consultative process that needs to be undertaken to determine supplier category thresholds will be discussed. The chapter also provides a discussion on how the Namibian government can develop effective local procurement policies and regulations and also the amendments recommended for the current Mining Charter.

This chapter provides a discussion how Social Impact Assessment (SIA) can be used by mining companies to enhance local procurement opportunities in the industry. The chapter also gives steps on how mining companies in Namibia can design supplier development programmes. Finally framework implementation principles were discussed followed by the conclusion to the chapter.

5.2. Development of a Local Procurement Measuring and Monitoring Framework.

An input – process – output (IPO) framework that will enable accurate measuring and monitoring of local procurement in the Namibian mining industry was developed, see Figure 5.1. This framework will assist in improving local procurement in the industry. Input is information from the external environment that is fed into the system. Process is what causes the change or transformation by performing an operation in the system. Output is what comes out of the system after processing the input (Subiyakto & Ahlan, 2014).

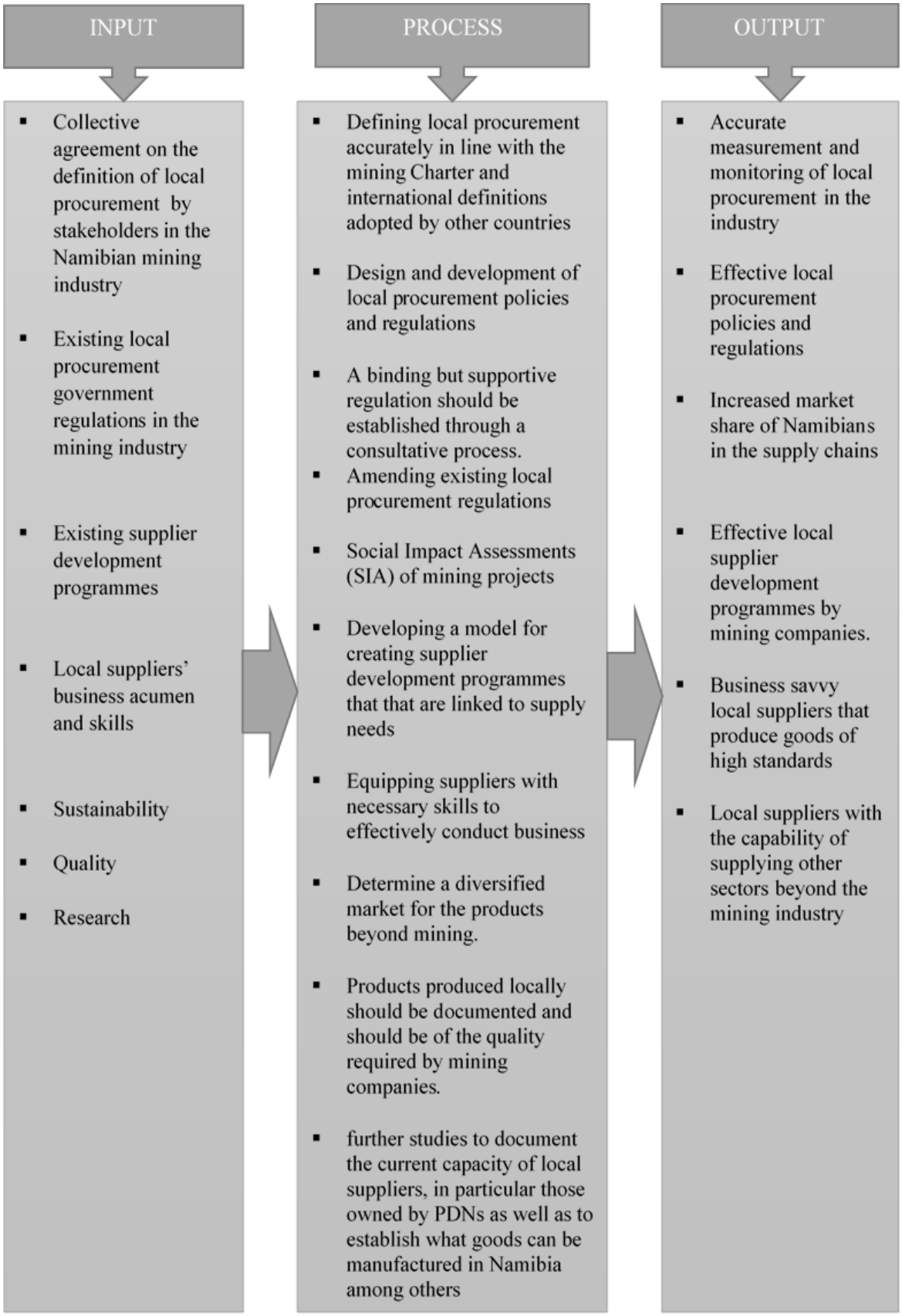


Figure 5.1: Local procurement measuring and monitoring framework

This framework is based on the classic systems theory, which has a casual structure, in that the outputs are a function of group processes which are in turn influenced by various input variables (Psychology, 2019). The different processes that will lead to the desired outputs are discussed in the following sub-sections. Testing validity of this framework is beyond the scope of this research and requires further research.

5.2.1. Accurately defining local procurement and adopting a single definition in the industry

Mining companies in Namibia currently report procurement from Namibian registered contractor/supplier businesses as local procurement, as shown in Figure 5.2. This kind of reporting makes it difficult to evaluate the extent of value addition by the "local" suppliers utilised by the mining companies as well as and the level of local citizens participations in these companies.

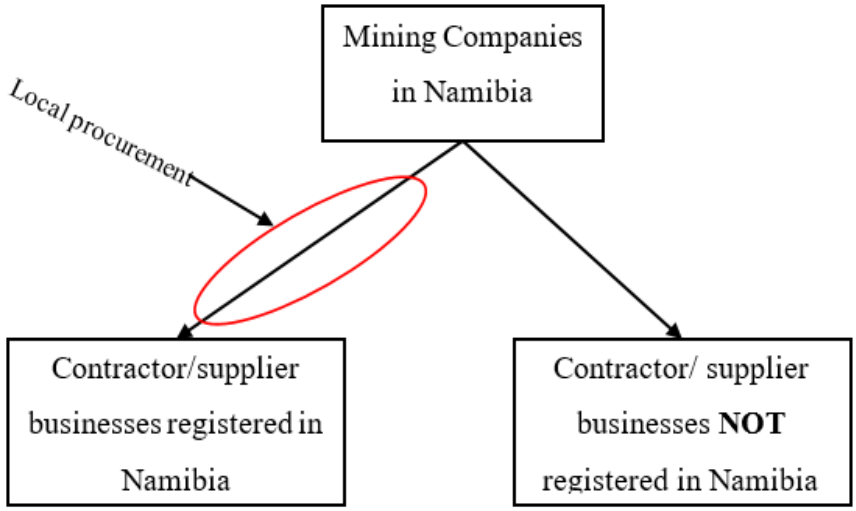


Figure 5.2: Definition of local suppliers by mining companies in Namibia

From Figure 5.2, it can be observed that mining companies' definition of local suppliers is based on the first level of suppliers (shown in red). This is a misconception of local procurement since a Namibian registered supplier constitutes many different businesses. In addition a Namibian registered supplier consists of businesses with different levels of value addition and local citizen participation in employment, management and ownership (Kaiser Economic Development Partners, 2015).

In order to properly define a local supplier, contractor/supplier businesses registered in Namibia needs to be further broken down as shown in Figure 5.3. Additionally, for the Namibian people to fully reap benefits from local procurement, contractors/suppliers should be defined accordingly such that their levels of value addition, local citizen participation and geographic location are known when reporting on local procurement.

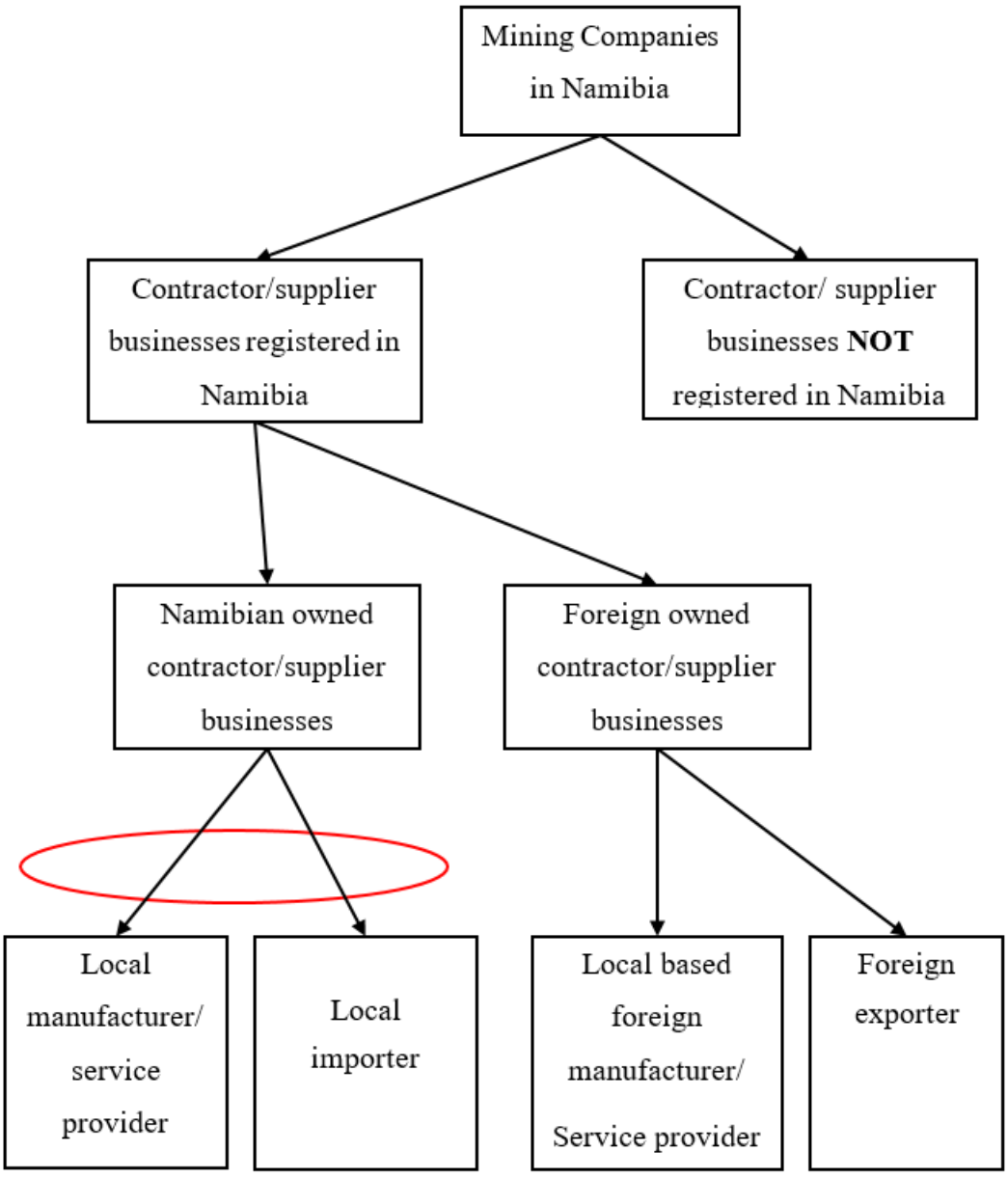


Figure 5.3: Breakdown of suppliers available for mining companies under contractor/supplier businesses registered in Namibia

In Figure 5.3 the different suppliers available under Namibian registered businesses are shown. The two main groups under contractor/ supplier businesses registered in

Namibia are: Namibian owned contractor/supplier businesses and foreign owned contractor/supplier businesses. A local supplier in the Namibian mining industry should therefore be defined at the third level (shown in red) under Namibian owned contractor/supplier businesses. They can either be a local manufacturer/ service provider or a local importer.

A local manufacturer/ service provider is a locally owned company which provides its services from a local head office and also manufactures its goods locally. In addition, this supplier has majority of locals in management and employment (Kaiser Economic Development Partners, 2013). Epangelo mining is a good example of a local manufacturer/service provider in Namibia. A local importer is a Namibian owned company that does not manufacture its goods locally nor does it provide services from a local station (World Bank, 2012). An example of a local importer in Namibia is Xtreme Safety Wear which imports Personal Protective Equipment (PPE) manufactured in China (Kaira, 2016).

Under Foreign owned contractor/supplier businesses there are two types of businesses namely: Local based foreign manufacturer/service provider and foreign exporter. A local based foreign manufacturer/ service provider is a foreign owned international firm that manufactures goods locally and/or provides services from a local station e.g. Dundee Precious metals' sulphuric acid plant (Rossing, 2013).

A foreign exporter is an internationally owned company with international employees and management. This supplier has minimum to no local citizen participation in ownership, management and employment (World Bank, 2012; Kaiser Economic Development Partners, 2015). The supplier does not provide services from a local station and their goods are not locally manufactured. Example of a foreign exporter is De Beers Marine South Africa which is based in Cape Town and provides specialist technical engineering maintenance services for Debmarine Namibia diamond mining vessels (Cronje, 2015).

It is important to point out that the aim of clearly defining a Namibian supplier/contractor is not to immediately replace the foreign entities because they are still needed in the short-medium term. The aim is to create a market share

balance between foreign and local entities based on local capacity and to increase the market share as the local capacity increases.

5.2.2. Determining supplier category thresholds

After the different suppliers have been defined accordingly, a consultative process between the governments, the public, mining companies and all other relevant stakeholders in the mining industry should follow. This process is necessary because it helps determine the thresholds for categorising suppliers into each of the four categories namely local manufacturer/service provider, local importer, local based foreign manufacturer/service provider and foreign exporter.

The thresholds will be determined based on the level of local citizen participation in employment, management and ownership in the supplier firms. Another factor that will help determine the threshold is the level of local value addition by the supplier firms. This process will help answer the following questions:

1. For a supplier to meet the requirements of having robust local participation, what should the level of local ownership, management and employment in the company be?
2. For a supplier to qualify as a locally manufacturing company, what should the level of local value addition be?

When the different thresholds for the supplier categories are defined and applied, any given supplier can easily be placed in their most suitable category

5.2.3. Design and development of local procurement policies and regulations

It was observed that the most important element that the Namibian mining industry needs with regard to local procurement is regulations. The industry lacks specific local procurement regulations which lead to certain groups of people such as PDNs to be left out of the supply chains of the mining companies. One way to avoid indigenous communities being left out is to incorporate supplier development programmes as a requirement by the mining companies when developing local procurement regulations. Through this process, local communities can be assisted to build capacity and to take advantage of local procurement opportunities presented by mining companies.

When setting up regulations for the mining industry, the policy - makers need to consider certain critical aspects. These are, historically disadvantaged groups; trade agreements; expectations of the community and government regulatory framework (Ramirez, 2016). Disadvantaged communities are mostly targeted by countries looking to benefit through local procurement when designing their local procurement regulations (Department of Mineral Resources, 2010). For example, South Africa has a racially selective programme namely BBBEE, on which the policy and regulatory frameworks in the country are based. The programme aims to empower HDSAs and enhance the economy. Namibia has the same policies in the proposed NEEEF Bill but however, the bill is still being developed through consultations with relevant stakeholders and is yet to be implemented. In addition, the NEEEF Bill cannot be mentioned without discussing the negative impacts that the bill is projected to have on future FDI in mining.

Policy – makers in Namibia need to be well aware of World Trade Organisations' (WTO) rules when coming up with mining policies and regulations. WTO is the world leading international organisation responsible for setting trade rules between countries. One of the WTO's main targets is to abolish protectionism. Hence, in order to ensure an open competition among international firms or firms of national origin, the WTO has set agreements that contain rules that its members must comply with (Ramirez, 2016). The three most important WTO agreements that the policy – makers must take into consideration when formulating local procurement policies are shown in Figure 5.4.

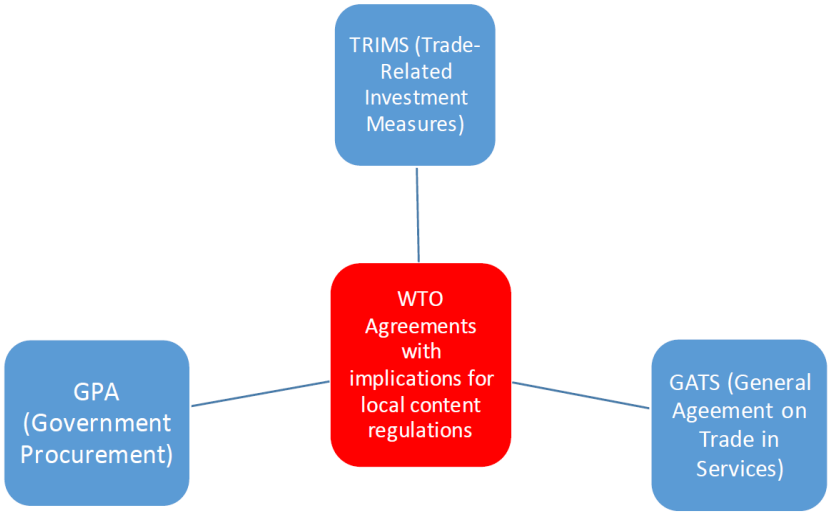


Figure 5.4: WTO Agreements with regard to local procurement (Warner, 2011)

Under normal circumstances, giving preference to local companies over international companies would be viewed as protectionism. Namibia experiences this view with the proposed NEEEF Bill which may result in risk of losing future FDI. The WTO has therefore created the "Special and Differential Treatment Provisions" that allows industrial development in developing countries through local procurement (World Trade Organisation (WTO), 2013). In addition to the special rights given to developing nations when implementing the WTO agreements through the Special and Differential Treatment Provisions, the provisions also gives developed nations the capability to favour one another more than other WTO members (WTO, 2013).

Through these provisions, Namibia also qualifies to receive help from the WTO to develop capacity of local suppliers. Figure 5.5 shows special and differential treatment provisions for developing countries.

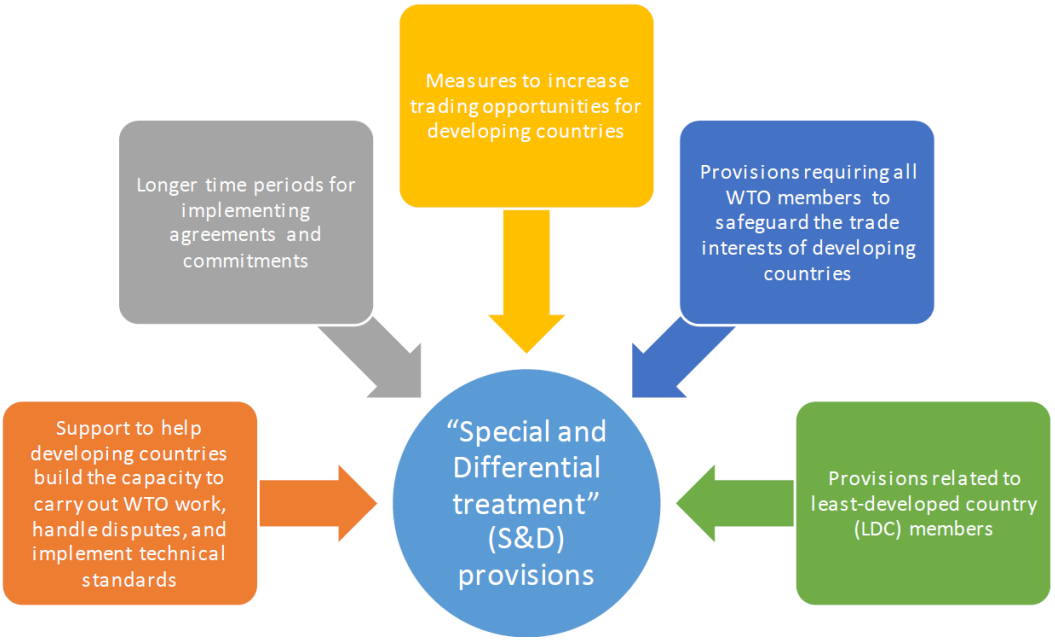


Figure 5.5: Special and Differential Treatment Provisions for developing countries (WTO, 2013)

As Figure 5.5 indicates, the WTO consists of clauses that policy – makers in developing countries should be familiar with when formulating policies and regulations in order to take full advantage of the opportunities provided without breaching WTO normative. However, international treaties between individual countries when developing protectionism measures should not be breached. Since Namibia is a developing country, policy makers need to take advantage of these provisions to develop policies and regulations that favour local supplier firms especially those owned by PDNs in order to realise local economic development through local procurement.

In other words, Namibia can develop protectionism measures in the mining industry and not be in breach of the WTO agreements or risk lowering investors' confidence because of the Special and Differential Treatment Provisions. For example, Namibian policy makers can develop regulations that require a specific percentage spending on PDNs owned businesses with non-compliance consequences as a way to promote local procurement.

5.2.4. Amendments to the Namibian Mining Charter

The current Mining Charter needs to be legally binding so that companies that do not comply with its requirements can be held accountable for non-compliance.

Moreover, the Charter can be made legally binding by adding clauses for its pillars e.g. Procurement and Enterprise Development clauses in the Minerals (Prospecting and Mining) Act 33 of 1992. This has been done with the South African Mining Charter by adding its pillars' clauses to the MPRDA. A regulation that is not legally binding tempts companies to comply on a voluntary basis.

5.2.5. Using Social Impact Assessments (SIA) to design and implement local procurement strategies

SIA is recommended for any economic project that has an impact on the people. Namibia is no exception to this and mining companies the country need to conduct SIA in order to enhance participation of indigenous communities in the mining companies' supply chains. This is because SIA addresses social issues and identifies opportunities available for local people at the beginning of the project. SIA process follows four phases namely; scoping the issues and opportunities, predicting likely impacts and contribution, developing mitigation strategies and monitoring and adaptive management.

Phase 1: Scoping the issues and opportunities

This first phase in the SIA process involves the understanding of potential issues and opportunities. This is done in order to assess the impacts of indigenous community involvement in a project's supply chain. The best time to implement phase one of SIA is as early as possible, preferably at the beginning of a project in order to take full advantage of all the opportunities that the project presents. Shell Nigeria is one of the companies that start off with local procurement planning at the conceptual planning phase of the project in response to intensified community expectation for local benefits. Local procurement planning at this stage should be done for the whole life of the project (Esteves, *et al.,* 2011).

Since most mines in Namibia are already at the production phase, phase 1 of SIA can still be carried out when the mines do their yearly planning. The planning can commence with a gap analysis to determine the skills, expertise and services available in the indigenous communities in relation to the capability and capacity requirements of the project. In cases where indigenous communities fail to match project capacity and capability requirements which is mostly the case in the Namibian mining industry, the mine can develop initiatives to train indigenous

people and develop local enterprises to be able to supply goods and services at the standard required by the mining company.

Phase 2: Predicting the likely impacts and contributions

After scoping the issues and opportunities, phase 2 involves the selection of impact variables for further analysis, establishment of a base and evaluating the importance of impacts probable to result from each local procurement plan considered. When selecting variables, outputs, outcomes and impacts should be distinguished. Outputs can be viewed as the measurable results of the mining company's local procurement undertakings. For example, the number of local enterprises supported (Esteves, *et al.*, 2010). Outcomes can be considered as distinct changes in the local suppliers, their workers, families and communities that result from SME ventures. These changes can be in the form of the level of business activities in community, increased skills in the area, degree of economic diversification and level of state investment in infrastructure and services in the area. Impacts of a local procurement plan constitute the dissimilarity between outcomes experienced by the indigenous community and the outcomes that would have materialised in the absence of the plan (Esteves, *et al.*, 2011; Selsky & Parker, 2005).

The receiving social system that workers, families and communities experience has an impact on the local procurement strategy. There are a number of indicators of impact experienced and deciding which is suitable depends on the purpose for which they are used. Table 5.1 shows some impact variables at different social system levels.

Table 5.1: Local procurement impact variables (Esteves, *et al.*, 2010)

Social System	**Indicator of impacts experienced**
Enterprise owner – level	Profitability of the business
	Entry to new markets
Worker – level	Skills and expertise gained from received training
	Individual net worth of worker
Household – level	Purchasing power

	Substantial investment in family's health and education as a result of gained confidence in job stability
Community level	Access to job opportunities
	Women involvement through enterprise ownership and employment
Regional – level	Local tax revenues increase
	Local area economic activity stimulation

Note that the impact measures provided in Table 5.1 demonstrate a tip of the iceberg of what is available and used. Esteves, *et al.* (2011) noted that, these impact measures can provide accountability and transparency to stakeholders and serve as a platform for mining companies to carry on engaging with relevant stakeholders on affairs of value to them. It is therefore, advisable that data collection processes and indicators used be acceptable by both mine managers and stakeholders (Esteves & Vanclay, 2009).

Phase 3: Developing mitigation/development strategies

During the third phase of the SIA process, the project managers select from a number of options to make opportunities reachable to local enterprises, boost their capability to make sure that they are able to meet contract requirements and enhance their competitiveness in the process (Esteves, *et al.*, 2011). Esteves and Vanclay (2009) established that the third step of SIA involves the formulation of plans to diminish estimated negative impacts. Additionally, this phase places great value upon the alignment of a company's social investment commitments with social development aims of the community. Phase three addresses sustainability issues such as, local capacity and accessibility of opportunities through the promotion of partnerships as a medium for corporate social investment.

Mining companies in Namibia need to form more partnerships with the government and industry organisations such as Epangelo mining and Chamber of Mines of Namibia in order to effectively address sustainability issues. This is because partnerships bring together different skills and resources from the diverse organisations involved (Esteves, *et al.*, 2011). Sustainability issues in the Namibian

mining industry can be addressed through partnerships between tertiary institutions and mining companies to provide training and technology transfer to local SMEs, government can provide start – up capital for often struggling PDNs owned SMEs and organisations such as Chamber of Mines of Namibia can develop platforms for creating awareness of business opportunities available for local SMEs.

The companies need to consider organisational features of strategies being implemented when addressing issues. It is widely accepted that traditional sector solutions usually fail to address some challenges that they face and in order to improve the effectiveness of their solutions, those sectors faced with challenges need to learn from other organisations in other sectors (Esteves & Vanclay, 2009). According to Selsky and Parker (2005), the boundaries between sectors are softened by the developing relationships between businesses, governments and other industry players

Evidence suggests that, the basis of a successful partnership is common or shared activities that most importantly, deliver against the separate targets of each partner specifically those targets that have been justified within the partnership. This claim challenges the common myth that shared long – term vision was responsible for shaping successful partnerships (Esteves & Vanclay, 2009). Esteves (2008) supported the usefulness of multi-criteria decision analysis (MCDA) techniques in integrating partner targets into assessing potential areas for investment focus. This is to ensure that benefits are enjoyed by both the community and businesses. The MCDA analysis produces shortlist of priorities as results. This shortlist mostly requires additional analysis with inputs from community, government and experts. When the analysis is complete, the next process defines community projects. This process is iterative and participatory in nature. In order to ensure on-going monitoring and assessment of community projects, performance measures are developed (Selsky & Parker, 2005).

Phase 4: Monitoring and adaptive management

Monitoring is the final step in the SIA process. Stakeholder engagement and buy-in is significant to the assessment design as well as the reporting process. Mutual agreements between stakeholders involved in the project on data collection and distribution methods, present an opportunity for shared learning and motivate

ownership of results. This leads to a deepened dedication to implement the results (Vargas, 2010).

Paying attention to business value to the company derived from putting money into local supplier development programmes and local procurement is significant in the assessment process. Companies should not have a philanthropic view when putting money into supplier development programmes but rather approach it as a business investment. It is crucial for measures of business value to be included in the monitoring process since local procurement provides mutual benefits to mining companies and their communities. Impact indicators used should be associated to the business drivers for buying goods and services from local communities (Esteves & Vanclay, 2009).

Examples of business output indicators includes: value of goods and services purchased locally, number of local suppliers, number of local workers employed by local SMEs and local procurement as a percentage of total procurement expenditure. Business outcome indicators includes: reduced cost of mine closure, reduced risk of industrial action and reduced cost linked to delays in delivery (Esteves, *et al.*, 2011).

SIA is therefore an effective tool that promotes partnerships and enables indigenous people to actively participate in the social and economic development of their communities. The interdisciplinary, participative and multi-sectoral nature of SIA provides project developer with an understanding of the connection between procurement exercise and the community environment.

5.2.6. Developing a model for creating supplier development programmes

The creation of supplier development programmes by mining companies in Namibia is very crucial to ensure PDNs participation in the mining companies' supply chains. Supplier development programmes can also be instrumental in cultivating and developing local suppliers e.g. assisting them to understand basic tender requirements and submit the necessary documentation on time.

Of all the mining companies selected for this research only one had a supplier development programme. The supplier development programme by Rio Tinto's Rossing Uranium mine, offered local SMEs support in the form of guidance on taxation, compliance and bookkeeping. New SMEs were assisted by the Rossing foundation to develop business plans (Rio Tinto, 2014; Rossing Uranium Limited, 2016).

The researcher found the aforementioned supplier development programme did not link to the Rossing's supply needs since it failed to mention critical business elements that make an effective supplier development programme. These business elements include technical and management skills development. The programme also didn't mention collaboration with other industry organisations. The researcher provided a framework for creating effective supplier development programmes that will give local SMEs particularly those owned by PDNs the capacity and ability to participate in mining supply chains and indirectly diversify their customer base, (see below Figure 5.6). This framework is the foundation for developing a supplier development programme in any big company.



Figure 5.6: Supplier development framework (Simanye, 2014a)

The framework shown in Figure 5.6 consists of four stages namely design, preparation, implementation and finally, evaluation. The four stages of the framework are discussed as follows:

Design

The first step to consider for the supplier development programme to be implemented successfully is, establishing management commitment. In other words, making sure that the senior management of the company is committed to the goals of the supplier development programme. This is done by ensuring that the company's vision and the supplier development programme's goals are aligned (Mehta, 2009).

The second step is identifying and selecting partners. Suitable partners in Namibia can be government, Epangelo mining, Chamber of Mines of Namibia and tertiary institutions. To successfully implement a supplier development programme it is necessary to have support from different partners, each with a different role. Assigning roles to partners should be based on their expertise, experience and skills. For Namibia, the government can assist with providing funds to assist new SMEs, tertiary institutions can assist to run courses to educate SMEs on how to successfully run a business. Companies that have successfully implemented supplier development programmes were found to have more than one partner regardless of their country of location (Mehta & Jaspers, 2008; Simanye, 2014a).

It is also very important to design a programme structure at an early stage. The structure includes the financing strategy. The programme methodology and processes should also be designed at this stage. It is worth noting that the programme methodology encompasses how suppliers will be selected, rated and evaluated. In addition, the strategies to be used to develop suppliers as well as evaluated SMEs and programme should be designed at this stage.

Preparation

The second stage of the supplier development framework involves the establishment of a steering committee. The steering committee usually made up of senior managers of the partner organisations, supervises all activities of the programme. The steering committee also meets quarterly to monitor the progress of the programme. Another role of the steering committee is to assess the program and propose changes to improve the program. During the second phase of the framework, staff is recruited and trained and infrastructure requirements are implemented (Mehta & Jaspers, 2008). Infrastructure requirements involve setting up office building or centre from where supplier development undertakings will be coordinated. It also includes setting up all electronic procurement systems required.

Engaging with stakeholders and managing their expectations should also be done during stage 2 of the framework. Conducting a demand analysis is also very important when preparing for a supplier development programme. It helps the company to identify the procurement categories to focus on by evaluating them

along a range of criteria. These include but not limited to growth, risk, size of demand, projected decrease in demand and complexity (Simanye, 2014a).

SME mapping which involves the creation of an exhaustive SME database in the region should be conducted during the preparation stage of the framework. This database should show supplier available to companies in the area of focus and it can be achieved through the use of existing SME data from a central co – ordination body such as Chamber of Mines or through on-the-ground surveys directed by supplier development programme employees. Meticulous conditions should be maintained when entering suppliers into the SME database to avoid the problem of having too many suppliers. Having a lot of suppliers registered on the database makes shortlisting of suppliers for tendering processes and supplier development extremely complex. The best way to avoid this problem is to rate the suppliers as discussed in the next phase of the supplier development framework (Mehta, 2009; Simanye, 2014a).

Implementation

The implementation stage of the framework is based on the identification of the appropriate suppliers for the programme. The ultimate goal for this process is to identify suppliers with the most prospective running businesses, which are most worth for local procurement. This selection is usually conducted by the procurement division of the company implementing the programme in association with partner organisation. Local SMEs that already supply the company with goods and services but have inadequate technical and business capacity are selected and developed first through the supplier development programme. This will help the local SME reach the buying organisation's prescribed standards and also become more competitive (Simanye, 2014a).

Different methods are used by companies when selecting SMEs for the programme. The two most used methods are general practice selection criteria and rigorous grading and mapping system. General practice selection criteria are less meticulous and set standards that should be met by the supplier to be considered eligible to take part in the programme (Mehta & Jaspers, 2008).

Rigorous grading and mapping system is a meticulous and strategic approach to supplier selection. This method requires a lot of upfront effort. After suppliers have been selected, they are rated on the basis of their level of competence. The suppliers to be developed first are those with the best ratings and operating in the least complex business segment (Simanye, 2014a).

Most local SMEs lack experience and struggle to fill out detailed tenders for large organisations. It is even worse when an electronic tendering system is used. Simanye (2014) debated that, it is important to develop training modules to support local SMEs during the tendering process. Local SMEs can then be trained in association with the buying organisation's procurement staff on tendering. The next and most important step in stage 3 of the framework is training of the selected suppliers based on the needs identified. Training involves the development of individual improvement plan for each supplier being developed. The specific plan should have details of the categories that need to be improved, the goals that need to be met and their respective deadlines (Holly & Sokol, 2007).

Implementing the training programme has a variety of approaches, for example: public training (seminars and workshops), formal training (classroom training for groups), mentoring and coaching (one – on – one sessions), peer-to-peer training (SMEs learning from each other) and learning through experience (Holly & Sokol, 2007). Highly qualified personnel in the area of local procurement and mining should be selected as trainers and mentors for the programme. These experts can come from universities, mines, professional associations and technical centres as long as they are passionate about teaching and coaching, patient and experienced in the field of speciality (Mehta & Jaspers, 2008).

Evaluation

The final step in the framework is the evaluation of the impacts of the programme. This is done by assessing Key Performance Indicators (KPIs) in the companies' supply chains and in developed suppliers. Some of these KPIs are as follows: product quality, service quality against service level agreements, relationship management and housekeeping. It is important to notice areas where the programme failed and most significantly learn from these failures and integrate the learned lessons into the programme to avoid the same problem from happening

again. The final step in the framework is planning for the future. The steering committee of the supplier development programme should find ways to make the programme operationally and financially self – sustained in the future instead of relying on funding from development institutions (Mehta, 2009; Simanye, 2014a).

5.3. Framework implementation principles

There are a number of principles that all stakeholders need to consider when implementing this framework. These include regular review of the framework, development of regulations to support the framework, reinforcement of the framework, development of targets to be met and formation of collaborations.

The framework should also be regularly updated to incorporate improved processes and new information. Thus, the government should develop regulations advocating the framework for measurement, targeting and monitoring local procurement. Furthermore, the government should task an independent committee with the role of reinforcing the implementation of the framework. The central coordinating body should assist with the development of a common supplier list. This list should include information needed to measure local procurement that is, the supplier's level of local participation and value addition and it should also be able to categorise suppliers accordingly (Kaiser Economic Development Partners, 2013).

The government should also develop targets in collaboration with the mining companies on how much should be spent per category of suppliers. The spending targets should be in relation to available capacity in the country. The mining companies should on an annual basis report to the government on how they executed their local procurement goals. Meanwhile, the government should inform the mining companies when the targets need to be increased (Kaiser Economic Development Partners, 2015). Collaboration between the government, civil society and the mining companies is needed in order to build capacity, for implementation and monitoring of the framework (World Bank, 2012).

5.4. Conclusions

An Input – Process – Output (IPO) framework for accurately measuring and monitoring local procurement in the Namibian mining industry was developed. System processes that need to be conducted in order for the outputs to be produced

were discussed. Two types of supplier were defined as local suppliers in the Namibian context. The first one is a locally owned company which provides its services from a local head office and also manufactures its goods locally. In addition, this supplier has majority of locals in management and employment. The second supplier is a Namibian owned company that does not manufacture its goods locally nor does it provide services from a local station.

Warranted by the lack of local procurement policy and regulations, the researcher provided guidelines for developing effective policies and regulations. Moreover, the researcher also provided necessary amendments to the Mining Charter and chief among them is making the charter a legally binding document.

The Chapter provided a discussion on how SIA can be used by the mining companies to boost local procurement. SIA is a project – planning tool that companies make use of in order to assess the social consequences, associated with specific project development. When incorporated into key business strategies, SIA can be an effective tool that promotes partnerships and enables indigenous people to actively participate in the social and economic development of their communities.

The Chapter also provided the necessary principles for framework implementation. The implementation of this framework in the Namibian mining industry will improve socio – economic benefits from local procurement and enables all stakeholders to accurately measure and monitor local procurement activities at all times.

6. CONCLUSION AND RECOMMENDATIONS

6.1. Conclusion

Local procurement has no standardised definition and that poses a challenge in measuring it. It was also established that, the definition given to local procurement by stakeholders is significant for accurately measuring and monitoring local procurement activities. The author therefore reviewed literature on local procurement to find the definition that best captures full benefits towards local economies from local procurement.

It was uncovered that the definition for local procurement that is preferred by resource rich countries and mining organisations globally is based on varying combinations of three distinct aspects namely; participation, geographic location and value addition. This definition is preferred because it enables suppliers to be categorised accordingly based on their level of value addition as well as local citizen participation in ownership, management and employment. When suppliers are categorised it is easier to tell local from foreign suppliers and their different levels of value addition and local citizen participation.

The author learned that, stakeholders in the Namibian mining industry have different definitions for local procurement. Mining companies defined local procurement as the purchase of goods and services from Namibian – registered suppliers. Meanwhile, the Ministry of Mines and Energy and the Chamber of Mines of Namibia defined local procurement through the Namibian Mining Charter as money spent by mining companies on goods and services that are available in the country from Namibian-owned businesses of choice. This has led to mining companies procuring goods and services from Namibian registered businesses and categorising it as local procurement.

The overall local procurement in the mining industry was found to have risen every year since the Mining Charter was implemented in 2014. This was mainly due to mines namely, Tschudi copper and Otjikoto mine expanding their operations and increasing production, which resulted in increased demand for goods and services. Five of the six mine selected for this research had local procurement performance above the Mining Charter target over the period of study. Debmarine Namibia was

the only company that failed to reach the Mining Charter target in 2016 and 2017. These local procurement numbers even though impressive are highly inflated due to the misconception of local procurement. Most companies made their purchases from foreign companies and categorised the purchases as local since the businesses are locally registered.

Spending on PDNs owned businesses had an average of 2.8% for the period of study. However it could not be said if this value is high or low since there is no target set for procurement from PDNs owned businesses. Further research needs to be done so that there can be a target for expenditure from PDNs owned businesses. Some factors that might have affected PDNs involvement in supply chains were discussed.

The notable one is the lack of local procurement regulation in the mining industry. The industry is only influenced by the Namibian Mining Charter which is not legally binding hence; compliance to it is done on a voluntary basis. In addition, the Charter does not clearly specify the type of local suppliers from which the mining companies are supposed to buy goods and services. It only states that 40% of total procurement expenditure should be spent on Namibian – owned companies.

Lack of regulations to support PDNs participation in mining supply chains was another issue. Other countries such as South Africa and Canada have legally binding regulations that advocate the involvement of their local people in the supply chains. Namibia does not have such laws currently however; the newly proposed NEEEF Bill seems to look out for the interest of the PDNs. The Bill is currently being reviewed and will be passed as soon as it is made favourable to all stakeholders. Another reason for lack of PDNs participation in the supply chains was the limited number of supplier development programmes in the industry, to support struggling PDNs owned SMEs grow. It is important for mining companies to have supplier development programmes in order to give small and struggling SMEs the capability to produce goods that meet the standards of the international mining companies.

Efficient supplier development programmes are centred on collaborations with relevant stakeholders and build local SMEs' capacity by addressing sophisticated

business elements. In the Namibian mining industry, only Rio Tinto was found to have a supplier development programme, which not only lacks collaboration with other industry organisations and relevant stakeholders but also fails to address key components necessary to develop a supplier that is able to meet the standards of the mining company. This led the researcher to make recommendations on how to increase the level of PDNs participation in the mining supply chains.

6.2. Recommendations

The researcher proposed the following recommendations in order to enhance local procurement in Namibia and ensure that everyone including PDNs gets to participate in the mining supply chains.

The Namibian mining industry needs to adopt the local procurement measuring and monitoring framework proposed by the author. The framework has the following processes that need to be carried out to ensure its success. Local procurement should be defined accurately and this definition should be adopted by all stakeholders across the industry. Suppliers in the industry should be categorised based on their level of value addition and local citizen participation.

The Namibian government needs to develop policies and regulations supporting local procurement and especially the participation of PDNs. These regulations should ensure that a common definition for local procurement is adopted by all stakeholders. The regulations should also encourage full transparency of procurement activities by mining companies. Policies and regulations developed by policy makers should be within the WTO normative, legally binding and have consequences for non – compliance.

Amendments need to be made to the current Mining Charter and also ensure that the document is legally binding. In order to make the Mining Charter a legally binding document, all the five pillar namely ownership, education and skills, affirmative action, procurement and enterprise development and Communities & infrastructure clauses should be added to the Minerals (Prospecting and Mining) Act 33 of 1992.

Mining companies in Namibia need to incorporate SIA into their core business strategies in order to promote local procurement. This will enable the incorporation of social development and sustainability into key business strategies.

The Namibian government should work together with mining companies and other industry organisations in order to pool resources together and come up with supplier development programmes that can adequately assist local SMEs that need assistance in order to grow and meet mining companies' standards. All programmes should aim to develop local SMEs such that they are able to produce products at a standard required by the mining companies and also become globally competitive over time.

The author believes a study needs to be carried out to develop supplier development programmes that have adequate partnerships with relevant industry stakeholders for mining companies in the Namibian mining industry. In addition a supply and demand analysis needs to be conducted to determine where there is over capacity and where there is under capacity. This will enable stakeholders to take appropriate measures to meet capacity demands.

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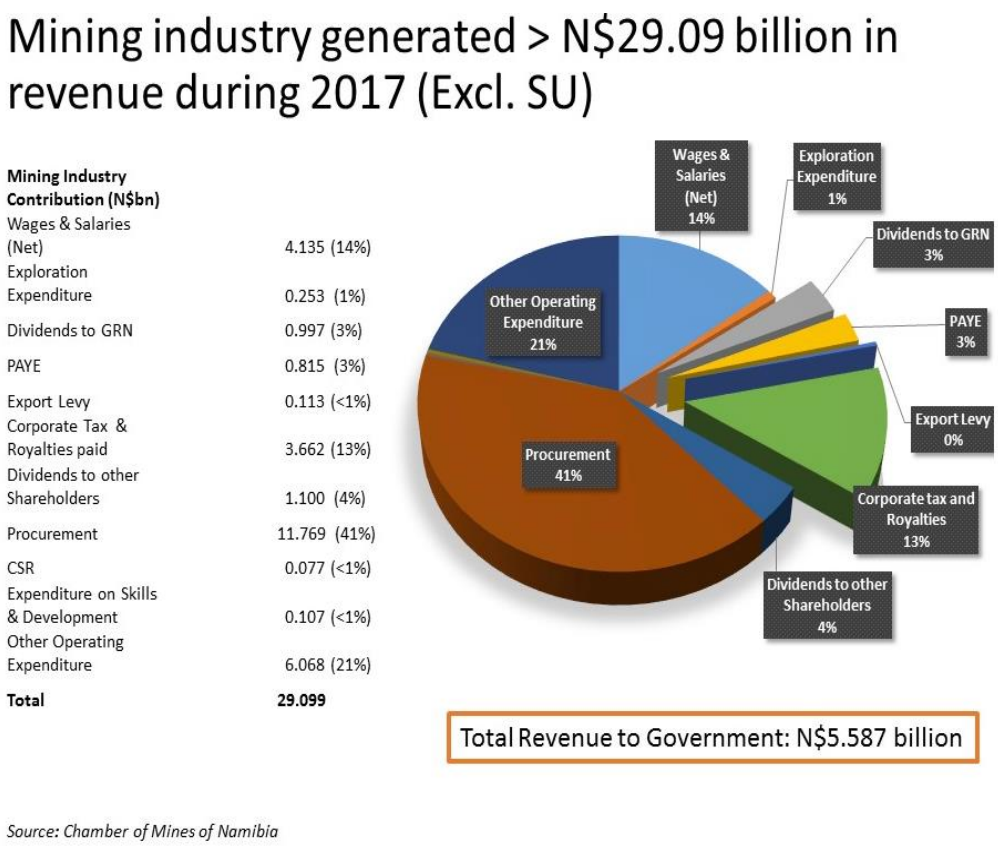
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7. APPENDICES

Appendix 7.1: Namibia's mining revenues in 2017, source: (Chamber of Mines of Namibia, 2017)



Appendix 7.2: Overall local procurement in the Namibian mining industry, source: (Chamber of Mines of Namibia, 2014a; 2015; 2016; 2017)

Year	Local procurement (Billion N$)
2014	7.8
2015	10.5
2016	11.8
2017	11.8

Appendix 7.3: Overall spending on PDNs owned businesses in the Namibian mining industry, source: (Davidson 2018, 13 June)

Year	Spending on PDNs (Million N$)
2014	49
2015	510
2016	303
2017	414

Appendix 7.4: Procurement Expenditure by mining companies in Namibia, source: (Davidson 2018, 13 June)

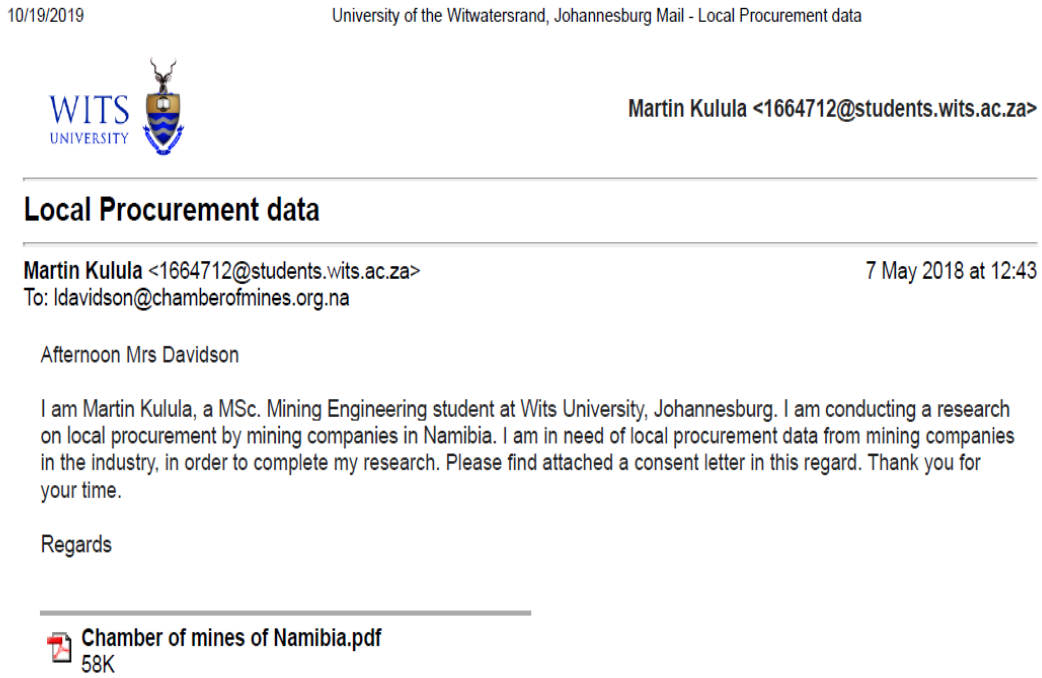
Mining Company	2014		2015		2016		2017	
	Namibian Spent ‘000	External ‘000	Namibian Spent ‘000	External ‘000	Namibian Spent ‘000	External ‘000	Namibian Spent ‘000	External ‘000
QKR Namibia	R684 002	R91 988	R515 414	R316 563	R771 564	R159 774	R607 003	R111 292
Vedanta Zinc International	R1 029 000	R530 091	R910 000	R428 236	R953 000	R409 000	R1 270 000	R970 000
Rio Tinto	R736 960	R511 041	R1 293 028	R486 532	R1 672 000	R575 000	R1 400 000	R605 000
Paladin Energy	R547 600	R54 159	R1 315 400 000	R1 022	R1 541 000	R76 000	R677 400	R58 600
Rosh Pinah Zinc Corporation	R369 304	R155 841	R282 285	R74 427	R346 000	R110 000	R408 000	R162 000
Debmarine Namibia	R962 000	R2 738 000	R1 307 000	R3 532 433	R1421 000	R4 044 384	R1 567 000	R3 181 000

Appendix 7.5: Procurement Scorecard from the South African Mining Charter source: (Department of Mineral Resources, 2017)

PROCUREMENT SCORECARD

Element Description	Measure	Compliance Target %	Weighting %
Goods Procurement: A minimum of 70% of the total mining goods procurement spend must be spent on South African manufactured goods must be sourced from a BEE compliant manufacturing companies. Calculation of goods and services spend does not include spend on buildings, roads, utilities (electricity and water) and land rates.	Percentage of the total mining goods procurement spend on South African manufactured goods from 50% + 1 vote Black owned and controlled companies.	21%	5%
	Percentage of the total goods procurement spend on South African manufactured goods from companies with a minimum of 50%+1 vote Black women owned and controlled and/or 50% +1 vote youth ownership;	5%	1%
	Percentage of the total goods procurement spend on South African manufactured goods from companies that are at least at level 4 BEE +26% ownership	44%	9%
Services Procurement: A minimum of 80% of the total spend on services must be sourced from South African based companies. The abovementioned 80% of the total services procurement spend shall be apportioned in the following manner.[1]	Percentage of total spend on services from South African based services companies.	65%	5%
	Percentage of total spend on services from companies with a minimum of 50%+1 vote Black women owned and controlled companies.	10%	2%
	Percentage of total spend on services from companies with a minimum of 50%+1 vote youth owned and controlled companies.	5%	2%
Percentage of samples analyses using South African based facilities: Utilise South African based facilities for the analysis of mineral samples across the mining value chain except in cases where samples are analysed for the purpose of verification of the accuracy of local laboratories.	Percentage of samples analysed using South African based facilities	100%	3%
Contribution by Foreign Suppliers Mining companies to submit supplier development plans.	Percentage of annual turnover generated from local mining companies contributed towards the Mining Transformation and Development Agency	1%	3%
Total			**30%**

Appendix 7.6: Email sent to the Chamber of Mines of Namibia requesting for local procurement data



10/19/2019 University of the Witwatersrand, Johannesburg Mail - Local Procurement data

WITS UNIVERSITY

Martin Kulula <1664712@students.wits.ac.za>

Local Procurement data

Martin Kulula <1664712@students.wits.ac.za> 7 May 2018 at 12:43
To: ldavidson@chamberofmines.org.na

Afternoon Mrs Davidson

I am Martin Kulula, a MSc. Mining Engineering student at Wits University, Johannesburg. I am conducting a research on local procurement by mining companies in Namibia. I am in need of local procurement data from mining companies in the industry, in order to complete my research. Please find attached a consent letter in this regard. Thank you for your time.

Regards

Chamber of mines of Namibia.pdf
58K

Appendix 7.7: Letter sent to the Chamber of Mines of Namibia requesting for local procurement data

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG | **SCHOOL OF MINING ENGINEERING**

Title of research project:	Strengthening local procurement in the Namibian Mining Industry
Student details:	Martin I. Kulula (Student Number: 1664712)
Supervisor:	Ms. Paskalia N. Neingo

07/05/2018

ATT: Mrs Lauren Davidson

RE: REQUEST FOR ACCESS TO LOCAL PROCUREMENT REPORTS BY MINING COMPANIES IN NAMIBIA

Dear Mrs Davidson

I am a full-time student, registered for Masters of Science in Engineering (Mining) in the School of Mining Engineering at the University of the Witwatersrand in Johannesburg. I am conducting research on local procurement in the Namibian Mining Industry under a research project titled: 'Strengthening local procurement in the Namibian Mining Industry'. The research is aimed at providing the foundation for creating sustainable socio-economic development through local procurement.

The data I need is contained in the annual reports submitted by individual mining companies to the Chamber of Mines of Namibia as required by the Namibian Mining Charter. The Charter states that if the public wants to access these reports, they should enquire with the Chamber of mines of Namibia. Therefore, I kindly request access to annual reports on local procurement for 4 mining companies in the Namibian Mining Industry during the period of 2007 to 2017. These mining companies are QKR Namibia (Navachab Gold mine), Vedanta Zinc International (Skorpion Zinc mine), Rio Tinto (Rossing Uranium mine) and Rosh Pinah Zinc Corporation (Rosh Pinah mine). This information will help me achieve the objectives of my research and partially fulfil the requirements of the degree. While this research is for academic purposes, it will provide a better understanding of the roles required from different stakeholders in order to strengthen local procurement. The research will also assess the impact of commodity price on local procurement and establish intervention measures. I have selected these mines because of their strong strategic plan as evident in their ability to have been in operation continuously for a period exceeding the research period (2007 – 2017).

Private Bag 3, WITS, 2050, South Africa | T +27 (0) 11 717 7403 | F +27 (0) 11 339 8295 | www.wits.ac.za

The raw data will only be accessible to me and my supervisor. The analysis will be based on trends and Mining Charter scores, thus, data can be normalised to protect exact figures. Once the research is completed, it will be published on the Wits Institutional Repository.

The findings of this research may also be published in journals and/or presented in academic conferences both, locally and internationally. I am happy to share the final report and any publication/presentation that would be produced from the research upon request.

Thank you in advance for considering my request and I look forward to your response.

Should you require any further information, please contact:

1. Martin I. Kulula
   Email: martinkulula@gmail.com
   Cell: +27 65 807 0284

2. Ms. Paskalia Neingo
   Email: Paskalia.Neingo@wits.ac.za
   Tel.: +27 11 717 7445
   Cell: +27 79 388 2557



Martin Itoolwa Kulula
MSc Student
School of Mining Engineering – University of the Witwatersrand