DEVELOPMENT OF MINERAL BENEFICIATION AND VALUE ADDITION FRAMEWORK FOR SUSTAINABLE SOCIO-ECONOMIC DEVELOPMENT OF ZIMBABWE

By

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DECLARATION

I, **John Laisani**, Student Number **11605708** hereby declare that the thesis is my own work in design and execution. Where the work of others has been used, it has been duly acknowledged. It is being submitted for a Doctor of Philosophy in the Department of Earth Sciences, Faculty of Science, Engineering and Agriculture, University of Venda. The work presented in the thesis has not been submitted before in any form for any degree or examination in this or other University.

Signed 

Student: John Laisani

This 2ND day of September 2024.

DEDICATION

I dedicate this thesis to my children.

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This thesis could not have been complete without the support of several people.

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ABSTRACT

Less than a decade is remaining for African Vision 2030 which began in 2009 to lapse, yet some of its targeted developmental milestones such as mineral beneficiation and value addition are yet to be achieved. Most of the African countries richly endowed with mineral resources that are committed to incorporating beneficiation and value addition in various value chains are still lagging significantly. Zimbabwe is one country through its Zimbabwe Accelerated Sustainable Socio-Economic Transformation (ZIMASSET) economic blueprint which elaborated the multiple benefits of the beneficiation strategy to unlock value from its vast mineral resources but never developed a framework for its implementation.

This study aimed to fill that gap by developing a mineral beneficiation and value-addition framework to achieve sustainable socio-economic development in Zimbabwe. The objectives of this study were to examine the existing policies on mineral beneficiation and their effects on sustainable socio-economic development; evaluate the cross-cutting constraints and associated interventions to encourage mineral beneficiation in Zimbabwe; examine the perceptions of stakeholders regarding the need for mineral beneficiation and value addition in Zimbabwe and ultimately developing a framework for mineral beneficiation and value addition for the sustainable socio-economic development of Zimbabwe.

A mixed methods approach was used to achieve the objectives and the study design was convergent parallel design. A stratified random sampling technique was used to select 291 participants for the quantitative survey. Data was collected using a survey questionnaire and descriptive statistics were computed using SPSS version 25. An unstructured interview guide was used to collect qualitative data and themes were used to analyse the data through thematic approach. Results of the study indicate that the existing policies on beneficiation are hindering the realisation of the beneficiation and value addition of minerals. Zimbabwe's policy volatility, policy inconsistency, bureaucracy, and corruption heavily affected the implementation of the beneficiation policy.

The cross-cutting constraints include energy constraints, lack of skills, lack of institutional capacity, lack of coordination, monitoring, and evaluation of policies, lack of appropriate legislative instruments, and the neglect of the socio-economic aspect of beneficiation. Stakeholders indicated a strong affiliation to the beneficiation strategy but there is scepticism around the current economic and political situation which is blurring the realisation of this policy. Using the above results, the framework for mineral beneficiation and value addition was developed. This framework is a critical pillar for enhancing economic value chains through beneficiation and value addition because it outlines important aspects, role players and the

resulting benefits for achieving sustainable socio-economic development in Zimbabwe. The development of the framework for mineral beneficiation and value addition in Zimbabwe implies a strategic roadmap that can guide policymakers, promote collaboration, address challenges, and pave the way for sustainable socioeconomic development through the efficient utilization of the country's mineral resources.

Keywords: Development of Framework, Mineral Beneficiation, Sustainable Socio-Economic Development, Economic Value Chains.

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ACRONYMS AND ABBRIVIATIONS

ACHPR-	African Charter for Human and People's Rights
AFDB-	African Development Bank
AMTS-	Advanced Manufacturing Technology Strategy
AMV-	African Mining Vision 2030
ASM-	Artisanal Small-Scale Mining
AU-	African Union
BEE-	Black Economic Empowerment
CNRG-	Centre for Natural Resources Governance
COMZ-	Chamber of Mines of Zimbabwe
FDI-	Foreign Direct Investment
GDP-	Gross Domestic Product
HHI-	Human Happiness Index
ICT-	Information, Communication and Technology
IDC-	Industrial Development Cooperation
MMA-	Mining and Minerals Act
MMCZ-	Minerals Marketing Cooperation of Zimbabwe
MMMDZ-	Ministry of Mines and Mining Development of Zimbabwe
PGMs-	Platinum Group Mines
PPP-	Public Private Partnerships
RRI-	Rapid Results Initiative
SADC-	Southern African Development Community
OPC-	Office of the President and Cabinet
UNECA-	United Nations Economic Commission for Africa

UNIDO-	United Nations Industrial Development Organisation
ZEPARU-	Zimbabwe Economic Policy Analysis and Research Unit
ZESA-	Zimbabwe Electricity Supply Authority
ZIMASSET-	Zimbabwe Accelerated Sustainable Socio-Economic Transformation
ZIMSTATS-	Zimbabwe Statistics

CHAPTER 1

INTRODUCTION

1.1 Background to the Study

Beneficiation and value addition of mineral resources is regarded as a critical pillar for advancing socioeconomic development across many mineral-rich economies worldwide. In China, beneficiation and value addition of mineral resources helped create employment and develop internal markets within the mining value chain Wang *et al*., (2020). A study carried out in Australia indicates that beneficiation and value addition of mineral resources tripled its contribution towards the national output from 5% to 14% between 2010 and 2018 (Batida and Ericsson, 2014). According to Dube (2016) beneficiation involves the transformation of a combination of minerals or a mineral into a higher-value product.

Value addition refers to enhancing a product's value through manufacturing, smelting or crushing of mineral resources (Gudyanga, 2020). Beneficiated minerals are sold in their final products and not in their raw or primary state to fetch more value in the market. Beneficiation and value addition of mineral resources is vital in transforming industrial structures and the economy Huni (2018). Therefore, it is argued that adopting beneficiation and value addition of mineral resources elongates the mining value chain while creating growth opportunities, increasing revenue, and fostering socioeconomic development in a country.

Most African countries are abundantly endowed with vast deposits of heavy and light mineral resources. Mamina *et al*., (2020) reiterate that regional organizations such as the Southern African Development Community (SADC) and the African Union (AU) are advocating for beneficiation and value addition-oriented policies to foster a fundamental change in mineral-rich African countries. For example, the African Mining Vision compels African Union member states to pursue mineral resource beneficiation and value addition to promote industrial growth and improve the competitiveness of African mineral products in the global markets (Dzinomwa *et al*, 2018). Beneficiation and value addition are vital in maximizing the gains from African mineral resources because it unlocks potential industrial development opportunities (Gudyanga, 2020; Muromo *et al*., 2020). Maponga and Musa (2021) underpin industrial growth for Africa by enhancing the mineral value chain through beneficiation and value addition and further suggest a regional framework for achieving the African Mining Vision 2030.

Before the proclamation of the African Mining Vision 2030 in 2009, countries such as Ghana, South Africa, Botswana, Kenya, Zimbabwe, and Nigeria had already indicated their intention to beneficiate and add value to their mineral resources (Economic Commission for Africa and African Union, 2011). Although countries like Botswana and Ghana championed a successful campaign for beneficiation and value addition of diamond and gold, respectively there is need to understand the approaches they utilized Fessehaie and Rustomjee (2018). The World Bank (2019) outlines the various constraints, such as the lack of beneficiation frameworks, lack of skilled labour, lack of innovation and technology, and several other legal impediments ahead of the beneficiation and value addition which need to be dealt with.

Mineral beneficiation and value addition have become central to Zimbabwe's discourse on mineral resource governance (Mambondiani and Manyuchi, 2021; Manyeruke *et al*., 2020). The country has vast mineral resources, but the full potential of these resources still needs to be tapped due to a lack of beneficiation and value addition. The Zimbabwean government has acknowledged the significance of beneficiation and value addition as a crucial pillar for the growth of the mining industry and the country's overall economy. Yet, a resource-based development strategy, according to a report by Africa Mining Vision, is a problematic development path that calls for a powerful state with vested power to actively control and coordinate economic transformation by fortifying the resource sector Gwatidzo and Mbohwa (2019).

Low mineral prices have been a significant obstacle for Zimbabwe's mining industry, which has also faced other difficulties like ongoing cash crisis, electricity, and capital flight (Samanga, 2019; Tapera, 2016). The mining sector in Zimbabwe has remained weak and troubled, with many mining companies needing help to break even. This could be attributed to the continued constraints caused by a shortage in electricity supply, poor foreign currency flows, and high labour costs. The industry saw negative growth in 2021 for the second consecutive year, dropping from -3.4% in 2020 to -2.5%, while total mineral revenue fell from US$1.9 billion in 2018 to US$1.86 billion in 2021, according to the Chamber of Mines of Zimbabwe Report from 2022. The mining sector's poor performance caused the Zimbabwean economy's growth to decrease, from 3.8% in 2014 to 1.1% in 2019 (Chamber of Mines, 2022).

Zimbabwe’s Accelerated Sustainable Socioeconomic Transformation policy (ZIM ASSET) earmarked value addition of mineral resources and beneficiation as a critical pillar for economic growth and development. According to Dzinomwa *et al*., (2018), Zimbabwe's mineral beneficiation strategy aims to give the mining industry a strategic direction for creating mineral value chains and extending beneficiation activities to the country's final stages of the value chain. The policy

also aligns with other, more comprehensive national initiatives, such as the Advanced Manufacturing Technology policy (AMTS), the energy security program, and the industrialization initiative. According to Mberi *et al*., (2021), the goal of the beneficiation approach is to release side-stream and downstream values. Additionally, it provides the first study of downstream beneficiation's prospects and difficulties and recommends tools that should be taken into account and applied in order to maximise value addition. However, Manyeruke *et al*., (2020) highlight several cross-cutting constraints to mineral beneficiation in Zimbabwe, including limited access to finance, inadequate infrastructure, and limited research and development capacity. These constraints affect the ability of mining companies to adopt new technologies and techniques that could enhance their beneficiation capacity.

Previous studies conducted in Zimbabwe on mineral beneficiation and value addition focused on the need for a comprehensive database of the country's mineral resources (World Bank, 2019). Meanwhile, Kundai (2017) argues that no consolidated database provides detailed information on the extent, quality, and accessibility of these resources. As a result, it is challenging to evaluate the economic potential of these minerals and determine the best value-addition initiatives to adopt. However, Zimbabwe has the potential to harness the economic value of its mineral resources through beneficiation and value addition. Mamina *et al*., (2020) argues that amid the prevailing setbacks, the medium to long-term prospects of the industry remains bright as new measures such as beneficiation and value addition are beginning to feed positively into the minerals value chain.

The lack of a clear framework for mineral beneficiation is a significant policy issue in Zimbabwe. Manhando and Mbara (2020) argues that Zimbabwe needs a comprehensive mineral beneficiation policy that provides a clear roadmap for promoting value addition in the mining sector. The policy should address local content development, technology transfer, and skills development to enhance the country's beneficiation capacity. In addition, the policy should promote linkages between the mining sector and other sectors of the economy, such as manufacturing, to create a value chain that benefits the economy as a whole.

Despite these policies and regulations, implementing beneficiation and value addition in the mining sector could be more satisfactory. Several factors contribute to this situation. One of the main factors is the lack of adequate infrastructure to support beneficiation and value-addition activities. For example, the country's electricity supply is unreliable, making it difficult for mining companies to engage in energy-intensive beneficiation processes (Gudyanga, 2020; Marinda *et*

al., 2020). The transportation infrastructure is also inadequate, making it difficult for mining companies to transport their products to markets and beneficiation plants or centres.

In another study, Mahonye and Mandishara (2015) examined the impact of inconsistent policy implementation on the mineral beneficiation sector in Zimbabwe. The study found that policies and regulations promoting mineral beneficiation are not consistently implemented, leading to a lack of clarity and certainty amongst investors. Mavhunga (2018) reiterates that the government should improve policy implementation to promote investor confidence in the sector. Furthermore, most studies have not considered the socioeconomic impacts of value-addition initiatives on the local communities. Value-addition initiatives have the potential to create jobs, promote local entrepreneurship, and enhance the livelihoods of the communities surrounding the mineral resources (Mamina *et al*., 2020). However, there is a need for studies that assess the socioeconomic effects of value-addition initiatives and identify ways to maximize their benefits to the local communities.

It is argued that while previous studies on mineral beneficiation and value addition in Zimbabwe have made significant contributions to the understanding of the country's mineral resources and their potential economic value, some knowledge gaps need to be addressed. For example, one of the significant knowledge gaps is the lack of a comprehensive database on the country's mineral resources. While some studies have identified mineral deposits in Zimbabwe, no consolidated database provides detailed information on the extent, quality, and accessibility of these resources (Matinde *et al*., 2014; Huni, 2018; Mavhunga, 2018). As a result, it is challenging to evaluate the economic potential of these minerals and determine the best value-addition initiatives to adopt. Another critical knowledge gap is the limited exploration of innovative value-addition techniques. Most studies have focused on conventional value-addition methods, such as smelting and refining, which are energy-intensive and have environmental impacts.

The study investigates the idea of beneficiation and examines how applying this process can broaden the country's financial capacity and ultimately support sustainable socioeconomic growth through conducting in-depth key informant interviews with practitioners, mineral processing experts and various stakeholders within the mining sector. Manyuchi and Mbowa (2019) contend that the Zimbabwean government has a strong argument for advancing the beneficiation and value addition of mineral resources. They contend that this strategy might encourage equitable and broad growth, advance economic diversification, and propel industrialisation throughout the continent. Beneficiation essentially aims to improve mineral resource downstream processing, which will increase trade performance and hasten the change of the economy.

The government, mining corporations, investors, and local populations in Zimbabwe will all benefit from the study's conclusions. The results will guide the creation of rules and policies that will encourage value addition and beneficiation in the mining industry. The results will also shed light on the barriers to value addition and beneficiation as well as the actions needed to remove them.

1.2 Statement of the Problem

Despite Zimbabwe's vast mineral wealth, the nation remains one of the poorest globally, reflecting a critical disparity between resource endowment and socio-economic development. For instance, Zimbabwe’s mineral resources include significant deposits of platinum group metals, diamonds, and gold, yet the country in 2022 ranked 180th out of 189 countries in terms of GDP per capita (World Bank, 2023). This stark contrast underscores the inefficacy of current policies in translating mineral wealth into economic prosperity.

Since 2002, Zimbabwe has experienced a dramatic decline in foreign direct investment (FDI) in the mining sector. For example, FDI in mining decreased from USD500 million in 2012 to just USD100 million in 2021 (UNCTAD, 2023). This sharp decline is attributed to policy uncertainty and inconsistent regulatory frameworks, which have created an unpredictable business environment. The Chamber of Mines of Zimbabwe (2022) reports that policy inconsistency has resulted in a significant decrease in mining productivity, with only 30% of the country's mining companies operating at full capacity. Moreover, Zimbabwe’s per capita income in the mining sector has stagnated at approximately USD800, compared to USD4,500 in other resource-rich countries like Botswana (World Bank, 2023). This low per capita income reflects the inefficacy of policies in fostering a robust industrial economy.

The lack of a coherent beneficiation and value addition framework exacerbates these issues. For instance, the country's beneficiation rates are among the lowest in the region, with less than 10% of minerals being processed locally compared to 60% in countries like South Africa (World Bank, 2023). Additionally, the policy barriers, including restrictive export regulations and inadequate support for local processing infrastructure, have hindered efforts to harness mineral resources for sustainable socio-economic development.

This study aims to address these gaps by redefining and reconceptualising mineral beneficiation and value addition. By analyzing the current landscape and integrating these statistical insights, the research seeks to develop a comprehensive framework that will assist policymakers in crafting effective strategies to unlock the full potential of Zimbabwe’s mineral resources for sustainable socioeconomic advancement.

1.3 Aim and Objectives of the Study

The main objective of the study was to develop a mineral beneficiation and value addition framework for sustainable socio-economic development of Zimbabwe. The specific objectives of the study were:

- To examine the existing policies on beneficiation and their effects on socio-economic development.
- To evaluate the cross-cutting constraints and associated interventions to encourage beneficiation in Zimbabwe.
- To examine the perceptions of stakeholders regarding the need for mineral beneficiation and value addition in Zimbabwe.
- To develop competitive mineral beneficiation framework for the mineral sector in Zimbabwe

1.4 Hypothesis

The following hypotheses will be tested in this study:

- Formulating appropriate mineral beneficiation policy directives and regulatory framework can enhance mineral beneficiation and value addition in Zimbabwe.
- Creating beneficiation key enablers can enhance ore beneficiation and value addition potential in Zimbabwe.
- Mineral beneficiation is critical for socio-economic transformation of Zimbabwe.
- There is a potential for mineral beneficiation in Zimbabwe given a conducive framework in a sound economic and political environment.

1.5 Significance of the Study

This study is significant in many ways. The study unveils mineral resources beneficiation and value addition as a critical pillar for attaining sustainable socioeconomic development in Zimbabwe. It is argued that the beneficiation of mineral resources is essential for spurring employment creation, women empowerment, and youth development. The industrial linkages created through mineral resource beneficiation present an opportunity for the country to strengthen the market value of its products on the international market. A strong and competitive

market position helps to increase revenue and alleviate foreign currency shortages in the country. Moreover, beneficiating mineral resources will also improve the country's trade balance.

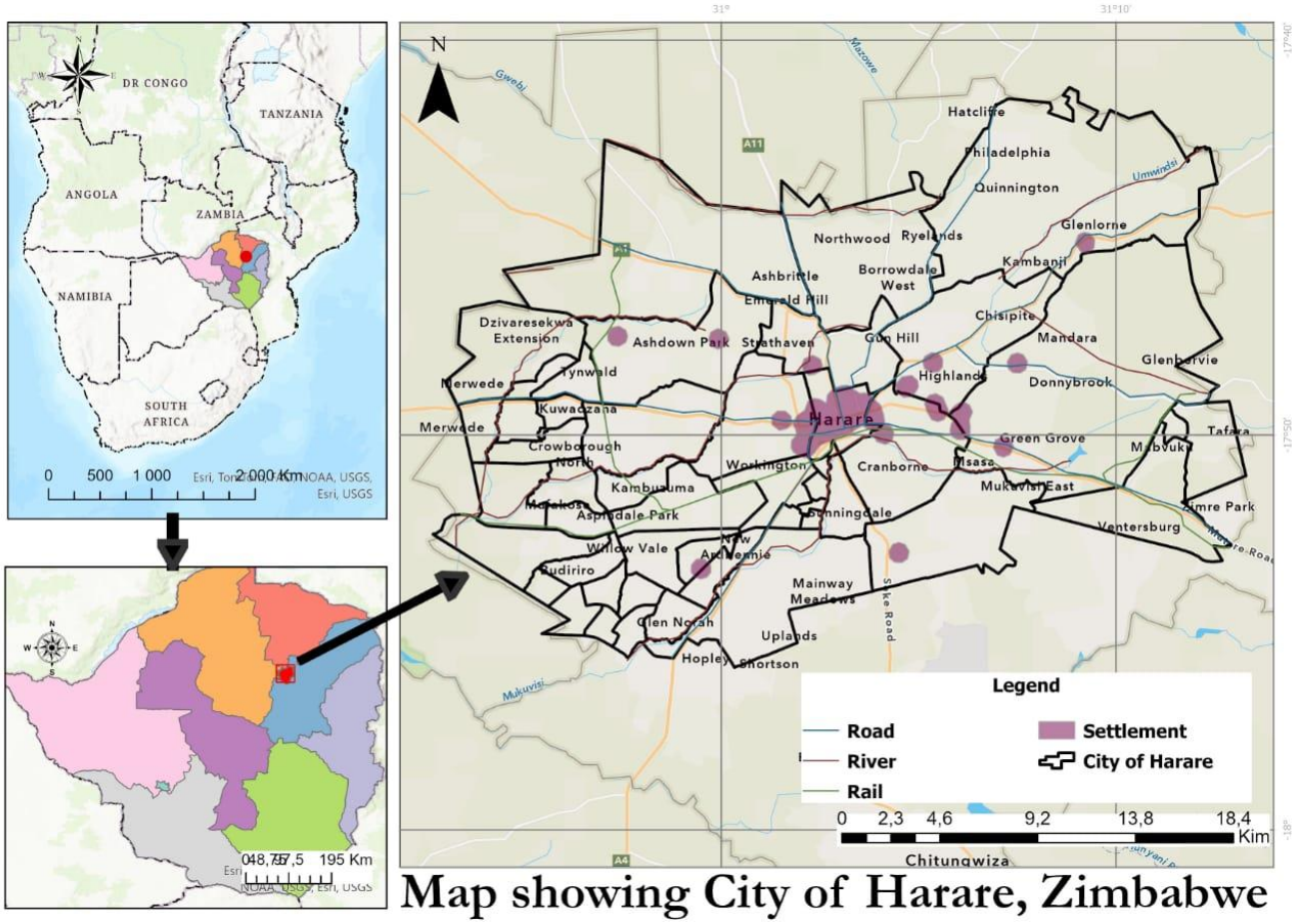
The study is also significant as it helps identify opportunities for skills development as the country is moving towards a knowledge-based economy. Another dimension that makes this study significant is persistent poverty and underdevelopment in both urban and rural areas. The study implores the government to pursue beneficiation and value addition of mineral resources as a way to empower communities. Making community voices count in the beneficiation of mineral resources improves the living standards of the local communities.

The study also aids in shaping a policy and regulatory framework for mineral beneficiation and value addition that aligns with Zimbabwe's socio-economic development objectives. Other nations can use the framework developed in this study as a basis for creating policies that encourage efficient resource use, inclusive development, and effective collaboration among government, industry, and communities. By assessing the viability of mineral beneficiation and value addition for achieving sustainable socio-economic growth in Zimbabwe, the study adds to the existing knowledge base. It offers valuable insights into the potential advantages, risks, and challenges related to the development of this sector, an area that has not been extensively explored

1.6 Description of the Study Area

The study was conducted in Harare, the capital city of Zimbabwe. Zimbabwe occupies the northern plateau in Southern Africa. In the south, the country shares borders with South Africa, Mozambique and Malawi on the eastern side as shown in Figure 1.1. On the western side, the country shares borders with Botswana and Zambia in the north.

The country is landlocked and is well known for harbouring gold belts, which are scattered in most parts of the country. Coal and diamond deposits are found in the Eastern highlands and iron ore is mainly found along the Great dyke. Other mineral resources available include platinum, zinc, nickel and chrome. The Ministry of Mines and Mining Development is responsible for developing policies regarding beneficiation and value addition. The national offices of the Ministry of Mines and Mining Development are located in Harare, the capital city of Zimbabwe.



Map showing City of Harare, Zimbabwe

Figure 1.1 Map of the study area

Source: GIS section University of Venda, 2020

1.7 Assumptions of Study

Assumptions that guided the study were that mineral beneficiation and value addition is a specialised field of study hence the study was restricted to mining professionals in the mining or mineral sector and related stakeholders, government, academics and technocrats within the mining and mineral sector.

1.8 Delimitations of the Study

The study was restricted to professionals, executives, senior management and government employees in the mining and mineral sector and other stakeholders and mining professionals involved in mineral beneficiation and value addition. The rationale for such a criterion for delimitation was that mineral beneficiation and value addition is a highly technical field and hence the mining professionals and related stakeholders in the mining and mineral processing sector

are the ones that have such capacity to contribute to the beneficiation strategy and framework to be developed in this study. The study also focused on the government Ministry of Mines and Mining Development and agencies responsible for mining policies and development issues.

1.9 Organisation of the Thesis

This thesis is organised into six chapters.

Chapter One is the introductory chapter which lays out the background of the study, the statement of the problem, research objectives and aim of the study, the research questions and significance of the study. Also contained in this chapter are the description of the study area, delimitation of the study, assumptions of the study and limitations of the study.

Chapter Two provides an overview of the review of literature. A systematic method of reviewing literature was utilised. The most prominent aspects reviewed include the outlook of the beneficiation and value addition in Zimbabwe and other selected countries across the world. The theoretical framework that underpins the study is also presented in this chapter. The last section of the review provides the summary of knowledge gaps that were identified which warrant the carrying out of the research.

Chapter Three presents the methodology utilised in the study. It shows that a mixed methods approach which allows for the use of quantitative and qualitative approaches. It also details the research designs, population and sampling procedures, data collection methods and data analysis techniques. The chapter highlights the ethical considerations which were followed during the research process.

Chapter Four provides the presentation of research findings. Quantitative data is presented using graphs and tables whereas qualitative data is presented using verbatim. The chapter also provides some discussion of the research findings.

Chapter Five provides a synthesis of the framework in line with the findings of the study. It further provides a discussion on the components and elements of the framework and the validation process.

Chapter Six contains the conclusion and recommendations of the study. The recommendations are targeted at various stakeholder groups such as the government of Zimbabwe, Ministry of Mines and Mines and Mining Development, the mining sector, academia, policy makers, local communities and the civil society.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter gives a general overview of the history of the mining industry in Zimbabwe, the policy thrust of its beneficiation program, the endowment of mineral resources, the feasibility of beneficiation, the potential advantages and risks of value addition and mineral beneficiation in the nation, the importance of mineral exports to the country's economy, competitiveness, historical and socioeconomic perspectives to the present, and a theoretical and analytical framework.

2.2 History of the Mining Industry in Zimbabwe

The history of mining in Zimbabwe dates back more than a century to the pre-colonial era, claims Chitando (2018). Cecil John Rhodes' colonization of Zimbabwe was prompted, among other things, by the nation's abundant mineral wealth. Additionally, missionaries, hunters, and prospectors confirmed the folklore about Zimbabwe's abundant gold deposits, according to Mawowa (2018).

Throughout the colonial era, gold was the most extracted resource by European colonial migrants. Some of Zimbabwe's largest old mines, such as Sabi Gold Mines since 1890, Jena Mine since 1898, and Blanket Mine, are situated southwest of Gwanda. These mines were among the earliest ones to be established (Oshionebo, 2020). Boosting the Zimbabwean economy through mining was one of the key priorities during the 2000s. According to Nu Times Innovations (2015), one notable characteristic of the 2000s was the growth of the artisanal and small-scale mining (ASM) industry. The ASM sector contributed over half of the gold production in 2018 amounting to 380 tonnes of gold (Portfolio Committee on Mines and Energy, 2020).

The discovery of diamonds in Zimbabwe sparked an illicit trade in minerals in Marange, in Manicaland Province and other parts of the country. After illegal miners stole and smuggled the priceless minerals, the government only succeeded in seizing control of the mining operations in 2008 (Mandizha, 2017). Zimbabwe's economy has experienced a dramatic drop compared to the first few years following independence, making life difficult for regular people. According to Mugano *et al*. (2013), the country's bad macroeconomic policies and political unrest have caused it to become cut off from the rest of the world as a less desirable location for investment in the SADC region.

Nevertheless, Zimbabwe's minerals offer a potential for an economic turnaround, according to Mahonye and Mandishara (2015), who also asserted the view that the country is ready for prosperity with the adoption of sound economic policies and good governance. The Mines and Minerals Act Chapter 21:05, according to Sanderson (2021), is the main statute that controls the mineral industry in Zimbabwe. Since it was first published in 1961, this law has undergone numerous revisions (Centre for Natural Resources Governance, 2013).

2.3 Mineral Resource Endowment

With more than 40 economically valuable minerals available for extraction, Zimbabwe has a large and extremely diverse mineral resource base. The nation is endowed with a range of mineral resources, most of which may be found in the geological formations and bodies as shown in Table 2.1. The distribution of mineral resources is shown in Figure 2.1.

Table 2.1 Mineral Resources of Zimbabwe

Source: Ministry of Mines and Mineral Resources of Zimbabwe (2018)

Geological Formation	**Minerals Resources Available**
Alluvial and Placer Deposits	Gold and Diamond
The Magondi Super group	Copper and Silver
Greenstone belts	Copper, Cobalt, Nickel, Gold, Silver, lron ore
Karoo Basins	Bituminous Coal, CBM
Pegmatites	Lithium minerals, columbite
The Great Dyke	PGMs, Chrome, Copper, Nickel
The Carbonatite Igneous Complexes	Phosphate (Dorowa, Shamva)

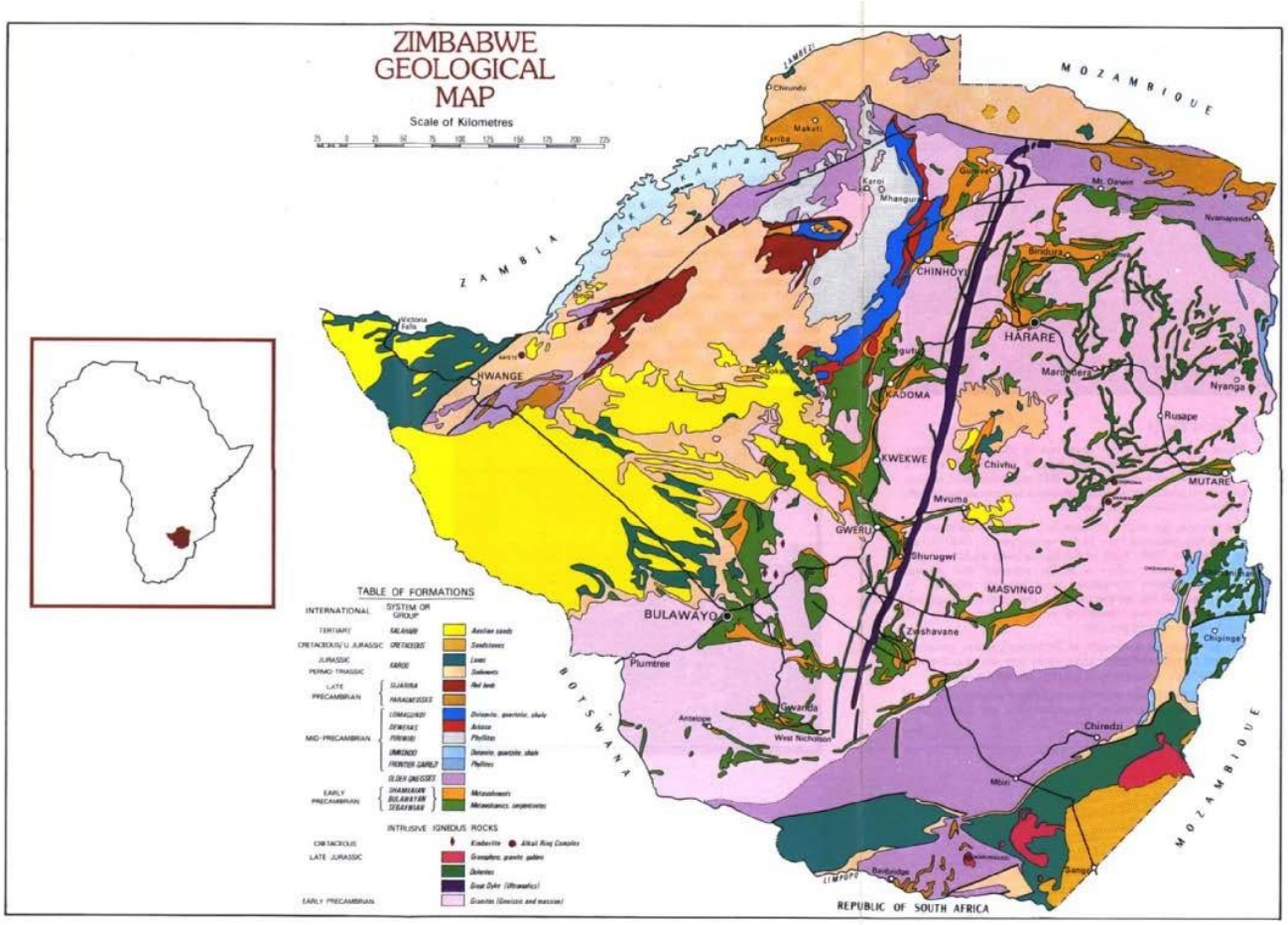


Figure 2.1 Geological map of Zimbabwe

Out of the 40 economic mineral resources, the mining industry concentrates mostly on six (6) essential mineral categories: coal, diamond, nickel, chromium, platinum group metals (PGMs), gold, and coal. These six categories accounted for 95% of the total value of minerals produced in 2021. Recently, lithium has been added to the collection of minerals. When compared to all other minerals, gold is the most profitable, accounting for up to 45% of mineral proceeds (COMZ, 2022). Figure 2.2 provides a summary of each mineral's value contribution.

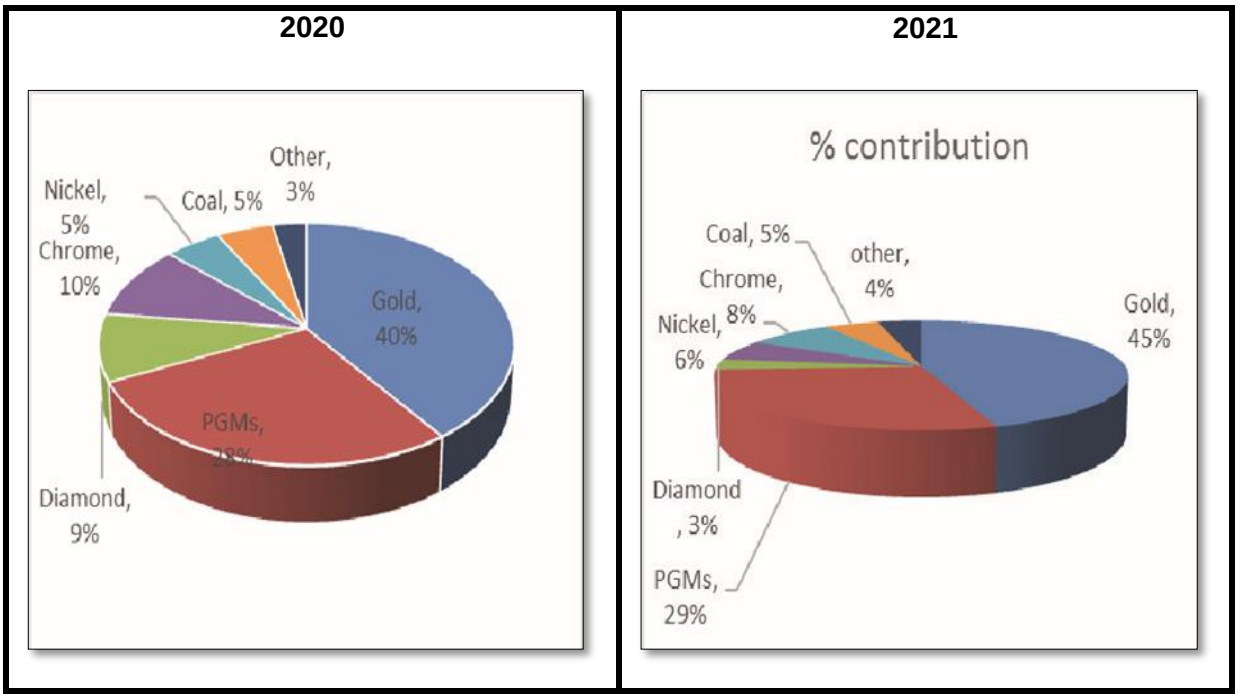


Figure 2.2 Distribution of value by mineral (2020-2021) **Source: COMZ (2022)**

2.4 Mineral Beneficiation

Mineral beneficiation is the process of converting a mineral or mixture of minerals into a higher-value product that can be exported or used locally (Dube, 2017). The phrase is synonymous with value-addition. There are two main components to it, thus downstream value addition and upstream value addition. According to Marinda (2018), downstream value addition refers to both labour- and capital-intensive processes like smelting and refining as well as large-scale metal fabrication projects like manufacturing machinery and equipment. The Department of Mineral Resources of South Africa defines side stream as inputs including capital goods, consumables, and services, as well as infrastructure such as power, logistics, research and development, and human resource development (De Bruyne *et al.,2023)*

Mineral-rich nations have backed beneficiation strategy throughout the past few decades, but the World Bank and other international organizations have resisted it. It is justified for the major minerals produced in Southern Africa to be beneficiated there rather than sold as raw materials because of their considerable economic contribution to the global economy. According to

UNCTAD (2018), these minerals are distributed as follows: 20% cobalt, 53% vanadium, 40% chromite, 36% gold, 49% platinum and 50% diamonds.

Gumbo (2020) presented a thorough analysis of the industrial revolution of the world. His theory is based on the notion that actual transformation does not result from the processing of raw materials but rather from specializing in tasks that are similar in terms of technology and factor intensity or already have a competitive advantage. The idea of comparative advantage is an economic theory that explains how disparities in resource endowments or technical advancement can result in trade benefits for people, organizations, or entire countries (Mambondiani and Manyuchi, 2021). Grynberg and Sekelela (2015) depicts the concept of Beneficiation in Figure 2.3.

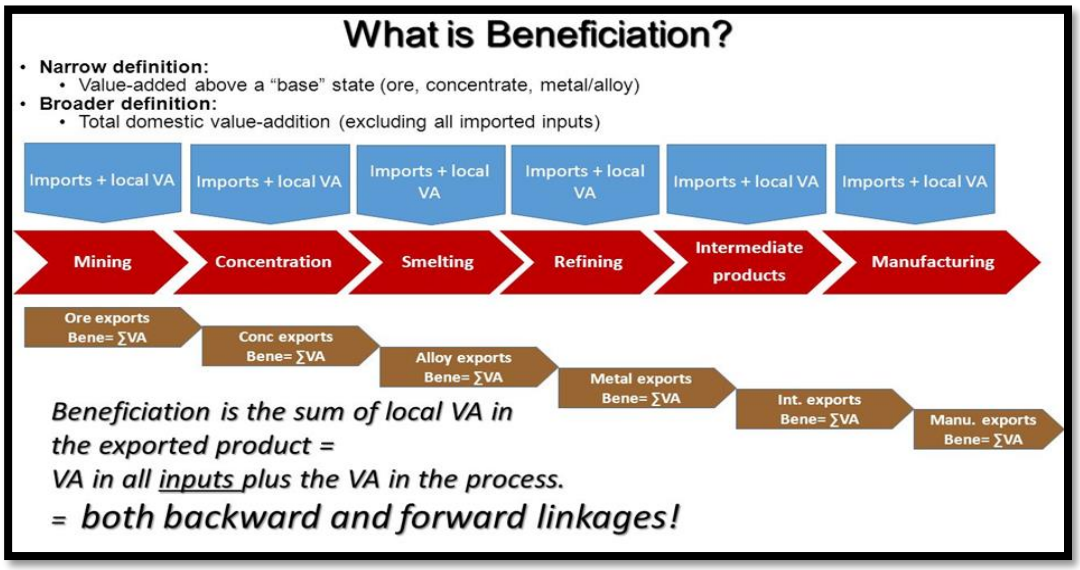


Figure 2.3 Shows the flow of beneficiation in the minerals value chain *Source:* Grynberg and Sekelela (2015)

2.5 Zimbabwean Beneficiation Policy Thrust

Zimbabwe's mineral beneficiation policy has been marred with multiple policy inconsistences over the years posing difficulties in the ease of doing business. The policies mentioned below have an impact on beneficiation and value addition in Zimbabwe, indicating the necessity for public policy studies on these topics. Zimbabwe is well known for its abundant mineral resources since the colonial era (1890–1980), including copper, asbestos, platinum, chrome, iron, gold, coal, asbestos and many others. Despite gaining independence, colonial government policies and laws, particularly the Mines and Minerals Act Chapter 21:05 of 1965, continued to govern mining

(Gwatidzo and Mbohwa, 2019). Legislative changes were largely cosmetic, therefore they had little impact on the current macro-environment. The Mines and Minerals Act has been under revision for the past 15 years by the Zimbabwean government. The government is taking this action to stay current with commercial demands and international best practices.

According to ZIA (2019), Zimbabwe's economic strategy should be in line with the National Development Plans to ensure that Zimbabwe keeps up with industrial demands and international best practices that support mineral beneficiation. Plans that support skill development should be the national priority, and partnerships with the pertinent sector education and training authorities should be formed to match the pipeline of beneficiaries' skills with the National Skills Development Strategy and the Sector Skills Plans.

Sadly, no action has been made in this regard by the Ministry of Higher Education, Science, and Technology. The Minerals Amendment Bill was draughted by the Ministry of Mines and Mining Development in response to sustained agitation from civil society organisations and research groups. The Mines and Minerals Act of 1961, they claimed, is no longer relevant. For instance, artisanal mining was uncommon when the Mines and Minerals Act (Ch 21:05) was created because of Zimbabwe's low unemployment rate and the lack of prominence of some minerals in the country's geology, such as the Platinum Group of Minerals (PGM) (Gwatidzo and Mbohwa, 2019).

However, unfavourable macro and microeconomic realities such as a high liquidity crisis, a lack of foreign direct investment, and high government debt, have a significant impact on Zimbabwe's ability to benefit. A boom in the discovery of new mineral reserves and an exponential rise in artisanal mining have been observed in Zimbabwe (Baissac *et al*., 2015). Fassehaie and Rastomjee (2018) argue that the mining industry has remained isolated from other economic sectors, like processing and manufacturing, due to the absence of linkages formed through beneficiation and value addition of mineral resources. As a result, Zimbabwe's mining sector is a major source of unreported illicit financial flows and capital flight.

Zimbabwe is presently experiencing an economic crisis, which may indicate that the mining industry is not producing enough economic value for the nation, or that the relevant authorities are not collecting and allocating enough revenue to promote sustainable socioeconomic development (Mutandwa and Genc, 2018). Even though mining activity has increased significantly over the last 14 years, this problem still exists. The primary issue is the antiquated Mines and Minerals Act of 1961, which has led to a number of serious flaws. The expectation, on

the other hand, was that a new law, or at least an update to the current one, would modernise Zimbabwe's mining industry and bring it into compliance with the most recent regional and international mining standards and best practices (Tadesse *et al*., 2019).

The draft mining amendment bill gives the Minister and Permanent Secretary in the Ministry of Mines and Mining Development tremendous power, contrary to what the public might believe. This is done to undermine other state regulatory agencies and ministries. If the Bill becomes law, it will even supersede the Environmental Management Agency's ability to control how mining affects the environment. Instead of forming an independent board with the power to hold the Minister and Permanent Secretary accountable, the Bill suggests forming a Mining Affairs Board made up of Ministry of Mines employees and chaired by the Permanent Secretary (Baissac *et al*., 2015).

Despite years of advocacy for mining industry reform, the Ministry of Mines developed this outdated legislation. The lack of proper consultation is evident, as the Ministry did not seek input from industry participants during the drafting of the Bill. As a result, the proposed modifications do away with related government ministries and departments' checks and balances, including the Environmental Management Agency, while fostering secrecy and questionable appointments within the Ministry.

The bill's contents are solely those of the senior ministry officials. After carefully examining this Bill, it becomes clear that it does not meet even the bare minimum requirements for effective corporate governance, hence the proposed legislation must be rejected by parliament. In order to ensure that the mineral industry leads domestic resource mobilization and Zimbabwe's economic recovery, a multi-stakeholder inclusive approach is required (Sanderson *et al*., 2021). Some new provisions have been added to the Mines and Mineral Amendment Bill to guarantee the sustainability of Zimbabwe's mineral wealth. The Bill conforms its contents to, among other things, the country's supreme constitution and other constitutional requirements calling for the restructure of the Ministry of Mines and Mining Development. The Bill includes a broad range of recommendations aimed at matching the country's socio-economic development requirements with the mines and minerals legislation. A legislative framework that fosters an atmosphere that encourages investment by both domestic and international business people is necessary for the mining industry.

The Zimbabwe Mining Development Corporation (ZMDC) was founded as the government's investment arm in the mining industry by the Zimbabwe Mining Development Corporation Act

(Chapter 21:08). ZMDC's job is to develop the mining industry and start new firms. Similar to this, the Mineral Marketing Corporation of Zimbabwe Act (Chapter 21:04) resulted in the establishment of the government-owned Mineral Marketing Corporation of Zimbabwe (MMCZ), which is in charge of marketing minerals. Officially, MMCZ is acknowledged as the only representative for the promotion and trade of all minerals within Zimbabwe.

The Economic Structural Adjustment Program (ESAP) (1991–1996), which encompassed trade liberalisation, monetary and fiscal policy reforms, and investment rules, brought to deregulation that was advantageous to the mining industry. The mining industry's access to inputs was made easier by the abolition of import permit requirements (Mugano et al., 2013). The lack of regulation in the 1990s caused a spike in small-scale illicit gold panning activities in the nation's waterways. These changes in policy encouraged value addition and beneficiation in an indirect way.

The Zimbabwean government has repeatedly launched initiatives aimed at revitalizing the mining industry. One such initiative is the Zimbabwe Program for Economic and Social Transformation (ZIMPREST) from 1998. Several other policies were also introduced to revive the Zimbabwean economy, but their outcomes were largely negative. These include the National Economic Recovery Programme (NERP) of 2003, the Zimbabwe Millennium Economic Recovery Program of 2000, and the National Economic Development Priority Programme (NEDPP) of 2007. These policies led to a decline in investment within the mining sector. According to Hlungwani and Sayeed (2019), none of these economic recovery programs significantly improved the mining industry's declining performance.

In October 2007, the Indigenisation and Economic Empowerment Act (Chapter 14:33) was introduced as a bill, marking the start of Zimbabwe's indigenisation and economic empowerment strategy. Parliament passed it in April 2008 as an Act (Mahonye and Mandishora, 2015). The Indigenisation and Economic Empowerment (General) Regulations, Statutory Instrument 21 of 2010, were released by the Minister of Youth Development, Indigenisation, and Economic Empowerment on January 29, 2010, after the Board was consulted as required by Section 21 of the Act. On March 1, 2010, these rules came into force.

Furthermore, revisions to the Indigenisation and Empowerment (General) Regulations (SI 21/2010) have been supervised by the National Indigenisation and Economic Empowerment Board (NIEEB), which was founded in January 2010 to counsel the Minister on the Act's implementation. On March 25, 2011, Statutory Instrument 34/2011 was released with the intention of making the main legislation's implementation easier. General Notice 114/2011, which specified

the minimal specifications for indigenisation plans in the mining industry, was one of the supplemental revisions that were also released on March 25, 2011 (ZIMASSET, 2013). The modifications, for instance, target mining businesses that are not currently 51 percent owned or controlled by native Zimbabweans and have a net asset worth greater than one US dollar (Makoshori, 2015).

Mining corporations are required under General Notice 114/2011 to transfer their shares or interests in designated entities to the National Indigenisation and Empowerment Fund, the Zimbabwe Mining Development Corporation (ZMDC), or organisations that ZMDC has established specifically for the purpose of indigenisation (Huni, 2018). Broad-based public ownership of mineral resources is the goal of the planned sovereign wealth fund and share ownership trusts for staff, management, or communities. Mavhunga (2018) asserts that the Indigenisation and Empowerment Act has a noteworthy effect on investment due to the mining sector's noteworthy GDP contribution. Zimbabwe's business climate and appeal as a destination for international investment are seriously jeopardised by the way the indigenisation and economic empowerment law is now being implemented.

In October 2013, the government introduced the Zimbabwe Agenda for Sustainable Socio-Economic Transformation (ZIMASSET), aiming for implementation until December 2018. The program was designed with the expectation that the mining industry would remain a major source of foreign exchange and support economic growth through mineral beneficiation and value addition. One of ZIMASSET's clusters focuses on beneficiation and value addition, intending to process Zimbabwe's minerals domestically before exporting them as finished products (Munyanyi, 2018). However, the current form of the indigenization and economic empowerment law holds significant potential to negatively affect the investment climate and reduce Zimbabwe’s appeal to foreign investors

This study aimed at investigating the policy gaps within the Zimbabwean beneficiation policy thrust. This study will show that the mineral sector needs public policy analysis that takes beneficiation and value addition into account. Zimbabwe's constitution is silent on beneficiation value addition. However, the constitution specifies the goals of beneficiation. The equal distribution of national resources and the equitable access of all Zimbabweans to state resources are addressed in the constitution (Constitution of Zimbabwe, 2013). Regarding the beneficiation strategies to be used in order to achieve the stated goals, the Constitution is silent. That fills a gap in the country's supreme law. An average annual rate of 7.3% economic growth is the goal of the ZIMASSET, a policy plan of 2013-2018.

The major goals of the beneficiation policy are to increase fiscal revenues, achieve a net trade gain, improve capacity utilization, and create jobs (ZIMASSET, 2013). Even though the feasibility of this policy objective of the ZIMASSET in line with mineral beneficiation can be measured and the expected outcome cannot be achieved due to the operating environment coupled with policies like the Indigenisation and Empowerment Act, one may argue that it is a sound policy after critically examining it. It is suggested that by repealing such an Act, the government will be able to foster an environment that will encourage the operation of investment, mining, and manufacturing companies (Dube, 2017). Only Zimbabwe's government has the power to encourage and promote beneficiation and value addition. To determine the socioeconomic effect of the ZIMASSET policy on the long-term socio-economic development of Zimbabwe, a thorough impact analysis is required. According to research done by Munyanyi (2018), cross-cutting limitations prevented the ZIMASSET strategy from accomplishing the objectives outlined in the economic blueprint.

The National Trade Policy, which was put into place for the years 2012 to 2016, aimed at enhancing yearly export growth by 10% to reach a target of USD 7 billion by 2016, as well as to consolidate and develop on current markets and discover new ones in the area (ZimStats, 2022). In order to increase the manufacturing sector's contribution to export earnings from 16% to 30%, the National Trade Policy's planned purpose was to promote beneficiation and value addition of primary commodities (Chamber of Mines, 2022). Linkages that add value where anticipated to boost fiscal incomes, expand employment, decrease the trade deficit, and grow exports. The extent to which the operating environment impacts mineral beneficiation is revealed by a thorough review of the policy (Tapera, 2016).

The Indigenisation and Economic Empowerment Act (2010) promotes the economic empowerment of native Zimbabweans. The law encourages native Zimbabweans to exploit natural resources. The law's implementation focuses on mining companies (ZIMASSET, 2013). Beneficiation is one of the strategies for implementing the policy of indigenization (Mukwakwami, 2013). According to the law, mining companies must give 51% of their shares to native Zimbabweans, and a venture capital fund must be established to encourage ownership of mining companies by black Zimbabweans. Because it discourages foreign investment, such a regulation has a detrimental impact on Zimbabwe's execution of the beneficiation policy (Baissac *et al*., 2015).

The proposed Minerals Policy focuses on the downstream connections between all the sectors of the economy that has a potential to beneficiate and add value. This is a sensible policy, and it can

be implemented given the current operating environment. The government has put in place several incentives and disincentives to encourage links between the industrial and mining sectors, such as the requirement of a mining license for crude oil export. Although the Mines and Minerals Act and related regulations are intended to ensure that mining companies establish beneficiation plants, the government also has a role to play in policy evaluation. The Transitional Stabilization Programme (TSP) Reforms Agenda, which covers the period from October 2018 to December 2020, was unveiled by the Zimbabwean government on October 5, 2018 (Government of Zimbabwe, 2018). Towards a Prosperous and Empowered Upper Middle-Income Society by 2030, is the policy's stated goal (Tawanda,2019).

Mineral Beneficiation is a key component of this TSP economic blueprint document's strategy for rebuilding the nation's economy (TSP, 2018). The previous national policy blueprint, the ZIMASSET (2013-2018), contained comparable thorough information on the beneficiation and value addition cluster. Before putting policies into effect, steps should be made to conduct a feasibility assessment. The legislative foundation for beneficiation in Zimbabwe is summarized in Table 2.2.

Gudyanga (2020) examined the impact of inconsistent policy implementation on the mineral beneficiation sector in Zimbabwe. The study found that policies and regulations promoting mineral beneficiation are not consistently implemented, the time frames for the policies are too short leading to a lack of clarity and certainty among investors. Supu (2023) further recommended that the government should improve on policy consistency and implementation to promote investor confidence in the sector. It is therefore argued that there are various challenges facing the mineral beneficiation sector in Zimbabwe, including inadequate infrastructure, limited access to finance, inadequate skills and technology transfer, and inconsistent policies. However, there are opportunities for the sector's growth, and with the right policies and investments, Zimbabwe can fully exploit its mineral resources for the benefit of its citizens.

Table 2. 2 Summary of the legislative framework for mineral beneficiation in Zimbabwe

Policy Measures	Time Frame	Overall Objectives	Beneficiation Objectives	Beneficiation measures	Responsible Ministry
Constitution	NA	NA	Equitable sharing of natural resources.	NA	Ministry of Justice, Legal and Parliamentary Affairs.
ZIMASSET	2013-2018	Economic Growth by an Average of 7.3%	Objectives of the value addition and beneficiation cluster are: Increasing capacity utilization, achieving a net trade gain, creating employment and increasing fiscal revenues.	Government should put measures that promote beneficiation.	Ministry of Youth, Indigenisation and Economic Empowerment
National Trade Policy	2012-2016	Annual export Growth rates of 10% to reach a target of UD$7 Billion by 2016, Expansion of new markets.	Promotion of value addition of raw materials to improve the manufacturing sector production, Value addition linkages are expected to grow exports, create employment, minimize the trade deficit and increase fiscal incomes.	Duty-draw back systems, for local value addition, funding of companies in local in export processing zone and tariffs.	Ministry of Industry and Commerce.
Indigenisation and Economic Empowerment	2010-till present.	Economic Empowerment of indigenous Zimbabweans	The law promotes exploitation of the country's natural resources by local indigenous Zimbabweans, beneficiation is one of the measures in which the government empower people	Mining firms need to cede a 51% stake to black Zimbabweans, to support indigenous players.	Ministry of Youth, Indigenisation and Economic Empowerment
Draft Minerals Policy	NA	Downstream linkages into mineral beneficiation	Government intervention with incentives and disincentives.	Tax policy, Amendment of the mining legislation that include milestones linkages	Ministry of Justice, Legal and Parliamentary Affairs.
Mines and Minerals Act	NA	Governs the mining legislation	Governs the beneficiation legislation	Establishments of beneficiation plant.	Ministry of Mines and Mining Development.

Source: Author's Construct, 2019

2.6 Opportunities and Threats of Zimbabwean Beneficiation Policy.

Through beneficiation, the Zimbabwean government intends to increase the value of the minerals, which presents opportunities and some risks that need to be addressed. The examination of the beneficiation policy is based on coherence, theory, and both anticipated and unanticipated outcomes of the beneficiation endeavour (Marinda, 2018). It will be examined whether Zimbabwe's general operating environment has the ability to support mineral beneficiation. Thus, by evaluating the opportunities and threats of the Zimbabwean beneficiation policy, potential mitigating and enabling factors for the success of the Zimbabwean government's beneficiation strategy that can be classified as either internal or external factors will be assessed based on the existing literature.

According to Chikowore and Shoko (2019), the idea that beneficiation will generate jobs, draw in technical talent, and revive national pride which gives the country reason to be hopeful about the program. Beneficiation is attainable, and while implementing a program like this entails expenses, the advantages are likely to surpass those costs. Zimbabwe faces numerous competitive disadvantages in international trade, which affects whether its efforts to revitalize the industrial sector in its quest for beneficiation are successful or not. The price of metals and minerals decreased by 35% between 2011 and 2018 in the global commodity market (World Bank, 2019).

Zimbabwe is currently joining the value-added market chain later, which limits its market base (Ncube, 2019). Zimbabwe is a landlocked nation, which means that it is not strategically situated as a market base. Because of this, trade and investment opportunities are impacted by its distance from its consumer markets. In Zimbabwe, political patronage and corruption are the main roadblocks to investment. The success of the beneficiation policy has also been severely hampered by governance issues and policy unpredictability.

The Zimbabwean government has the chance to put in place a competitive legislative and regulatory framework that will produce a favourable geological environment that will draw investment in mining development and exploration (Shangahaidhoni and Gundani,2014). Mhaka (2018) makes the case that unfinished business, such as the execution of corporate reforms to improve national competitiveness, must be resolved. The creation of the Mining Cadastre System, the execution of the indigenization and economic empowerment laws, and the completion of the outstanding revisions to the Mines and Minerals Act are also critical in light of the newly stated government position (Gwatidzo and Mbohwa, 2019). The Zimbabwean government wants to evaluate the fiscal structure to align and streamline the various taxes and fees imposed on the

mining sector. Additionally, it aims to put into effect the Reserve Bank of Zimbabwe's new export incentives, finalize the Labour Act amendments to bring it into compliance with industry best practices and trends, and complete the consolidation of the diamond industry (ZIMSTAT, 2022). This action will alter livelihoods and promote sustainable social progress.

2.7 Beneficiation levels for Zimbabwean mines

Mineral beneficiation is the process of increasing the value of minerals through discovery, extraction, concentration, refinement, and the production of consumable end products (Dube, 2017; Kundai, 2017). The five mining processes includes exploration, mining, concentration, smelting and refining, and the beneficiation flow process are used in the majority of mines in Zimbabwe. The Chamber of Mines (2022) also pointed out that fewer than a third of the country's major mining operating firms execute any value addition to the minerals they are extracting, even to the point of exporting the minerals to be processed and smelted abroad. For instance, Zimplats is the only operating PGM entity among the three, and it is the only one to prospect, mine, concentrate, and smelt its PGMs. As a result, PGM converter matte is exported to South Africa for the refinery process through the base metals refinery and precious metals refinery (Chamber of Mines, 2022).

Mimosa and Unki mines solely engage in exploration, mining, and concentration, as a result, they export PGM concentrates for South African smelting and refining processes. The potential for additional beneficiation exists, and preparatory work and consultations are already underway to make this a reality. However, it is important to note at this time that smelters and refineries are mega projects that call for significant capital investment, as well as sustainable feedstock and adequate energy supply (Chamber of Mines, 2018). The government has implemented a number of fines and incentives to encourage beneficiation, such as passing a 15% tax on platinum that has not been beneficiated (Zimbabwe Chamber of Commerce, 2014).

The two mines that export concentrate will be impacted by this tax, nevertheless, as the PGMs must currently be processed up to the smelting stage in order to avoid being subject to it. According to Mandizha (2017), Zimplats is the only entity processing up to the converter matte stage. It is worthwhile to investigate the effects of the 15% tax on export performance and sustainability.

2.8 Key Lessons from Beneficiation Efforts in Selected Countries

The notion of mineral beneficiation and value addition has permeated the mineral value chain discourse across the world. This section provides a focused review of literature in selected countries that have successfully employed the beneficiation and value addition concept in minerals value chain. Particular attention will be given to policy frameworks, regulations and the manner in which beneficiation and value addition has contributed to sustainable socioeconomic development. Country case studies from Australia, South Africa, Botswana, China and Ghana are discussed.

2.8.1 Australia

Australia, as a developed nation, has successfully implemented beneficiation in its steel industry and is often cited as a prime example of the carrot strategy. This strategy combines incentives and penalties to promote desirable behaviours. While many regional efforts in Australia did not succeed, the European Centre for Development Policy Management (ECDPM) achieved notable successes in driving beneficiation through interventionist policy mechanisms. For instance, the production of synthetic rutile, gold bullion, and the conversion of bauxite into aluminium are prominent examples of market-driven, non-mandated beneficiation (International Council on Mining and Metals, 2009).

A more critical perspective suggests that factors such as access to affordable energy, additional water resources, a world-class research environment, and a skilled workforce are the primary drivers behind these investment decisions (Ncube, 2019). The Australian government has also fostered research and development, provided tax incentives, and supported commercialization through advanced capital mechanisms, thereby creating connections between the extractive sector and other economic sectors. By 2010, Australia had become the leading global producer of processed alumina and rutile, exporting processed minerals worth USD 13 billion (Mineral Council of Australia, 2010). According to the Australian Bureau of Statistics (2008), the mining industry employs over 64,000 full-time residents, with 5% classified as low-skilled workers.

2.8.2 Botswana

According to valuation, Botswana is thought to be the world's top diamond producer. Diamond production in the nation reached USD 4 billion in 2012 (Mokwakwa, 2021). An international diamond business called De Beers and the government are partners in a joint venture. De Beers

received a license from the government of Botswana in 2005 under the condition that they help build a sustainable cutting and polishing sector. With more than 3000 individuals working in the polishing operations, Botswana's efforts to establish a domestic diamond manufacturing industry are widely regarded as a success (Mokwakwa, 2021).

Fichani and Masialeti (2019) argued that the beneficiation and value addition policy in Botswana added another dimension of efficient technology use as way of reducing costs and improve the quality of mineral output. De Villers (2017) highlights the use technologies such as Auto tech smelting which eliminates the overreliance on electricity and it reduced operational costs by 40%. Indeed, for beneficiation and value addition to yield positive results, it should create avenues for cost reduction and profit maximization to lure more local participants and effectively compete on the global markets (First Quantum Minerals Ltd, 2021).

Tshiamo and Oluyeju (2018) underpin the success of Botswana’s beneficiation and value addition program on robust laws and policy frameworks that created an enabling environment for it to thrive. Kgoale (2019) notes that the legislative framework established in Botswana is a good standard measure of what is best for the country to realize effective beneficiation and value addition. Following the success of Botswana, Zimbabwe has an opportunity to borrow certain aspects regarding the policy frameworks and implementation.

2.8.3 South Africa

In South Africa, the concept of beneficiation aligns with two key government objectives: achieving state-led industrialization through a developmental state and advancing Black Economic Empowerment (BEE). According to De Bruyne *et al*. (2023), the policy should be seen as a form of social justice aimed at benefiting historically marginalized populations in relation to the country's resource wealth. Another shared goal of the government is to leverage South Africa's mineral resources to gain a competitive edge in manufacturing (Mamina *et al*., 2020; De Villers, 2017).

Following the end of the apartheid regime, which had heavily enforced beneficiation and value addition due to the viability of manufacturing firms, the South African government has since liberalized the economy with less strategic planning. Kgoale and Odegu (2019) highlight that recent proposals for amending the Mineral and Petroleum Resources Development Act (MPRDA) include defining strategic minerals those essential for industrial or commercial purposes. The proposed Bill outlines the requirements for beneficiation for potential mining firms (De Bruyne *et al*., 2023). However, the effectiveness of beneficiation programs in South Africa remains limited due to unforeseen challenges.

2.8.4 Zimbabwe

In an effort to ensure the implementation of mineral beneficiation and value addition, the Zimbabwean government has attempted to implement the ZIMASSET. To promote domestic beneficiation, the government banned the export of raw chrome in 2009 (Loriate *et al*., 2022). The small-scale chrome mining business was rendered unviable, leading to the loss of jobs and potential revenue since the nation lacked smelting capacity and funding (UNCTAD, 2020). The execution of policies for beneficiation faced difficulties as a result of this unsuccessful attempt to ensure the export prohibition on chrome (Murombo, 2022). In addition to numerous businesses that export raw chrome, chrome smelters have historically been a defining feature of Zimbabwe. Since there are currently no refineries operating in Zimbabwe, ferrochrome is the most common form of chrome sold there. Unprocessed ores make up a sizeable component of the exports, nevertheless.

Ferrochrome output appears to have satisfied the nation's beneficiation thrust because there hasn't been any more pressure put on the companies to engage in ferrochrome refining, unlike with platinum. Historically, the production of ferrochrome in Zimbabwe has been dominated by five major smelters: Oliken (Pvt Ltd) in Kwekwe, Rio-chrome in Kadoma, Maranatha (Pvt Ltd), , and Zimasco (Pvt Ltd) in Kwekwe (Tinarwo and Babu, 2022). In recent years, the market has seen the addition of several small-scale smelters processing Dyke ores, such as Mona Chrome in Chegutu, as well as CINA, Jin Anjin Corp, Xinyu, and Wel Mining, all based in Gweru (Oshionebo, 2020). A notable newcomer to the chrome industry is Afrochine Smelting (Pvt), a subsidiary of the Chinese Tsingshan Iron and Steel Group. The company began operations with a US$25 million smelting plant in 2014 and is currently developing a chrome smelter in Selous, near Chegutu.

Zim Alloys has historically been Zimbabwe's second-largest smelter after Zimasco (Chirisa *et al*., 2021). Zim Alloys has been under judicial management since 2013, therefore it has proven to be exceedingly difficult to mine and process chrome in Zimbabwe. At the end of 2015, Zimasco also submitted an application for judicial management to help it manage its growing debts, however, the application is still pending. As a result, only three of Zimbabwe's estimated 12 chromium smelters are now in use (Nu Times Innovations, 2015). These are Xin Yu, Afrochine, and Zimasco (which has applied for judicial management). This highlights the operational difficulties that are typical of Zimbabwe's chrome smelting business. The Empress Nickel Refinery in Kadoma, operated by Rio Zim, refines semi-processed copper and nickel (matte) that is imported from BCL Mining in Botswana. This business has been in operation for thirty years.

An examination of the literature reveals that various factors influence beneficiation in Southern Africa. For instance, Nyarota *et al*., (2015) identified that industrial and trade policies, potentially affected by political exclusion or interference, are significant factors impacting beneficiation in the region. Other hindrances to beneficiation include tariff and duty structures that prevent the importation of essential capital equipment (Mutandwa and Genc, 2018), high capital costs, especially in countries with high inflation (Nzenzema, 2015), a lack of foreign capital inflows in countries with restrictive policies or unstable political climates (Oluyeju and Tshiamo, 2018), and stringent monetary policies.

Lewis (2015) further proposed that fiscal regimes lacking favourable tax rates, investment incentives, or tax shelters for foreign investment negatively impact beneficiation in some Southern African countries. This is due to the combined threats of default on foreign debt, the spill over effects of instability in emerging markets, and general uncertainty. However, this study did not encompass all factors influencing beneficiation.

Soraya and Bellamy (2014) identified several factors impacting beneficiation in Southern Africa, including misguided investments in strategic projects, excessive military spending, financial and trade sanctions promoting the use of unbranded raw materials over branded products, and a lack of technology transfer. Sanctioned nations miss opportunities to develop smokestack industries locally rather than in industrialized countries. This situation applies to Zimbabwe and previously affected the Democratic Republic of the Congo (DRC) during its civil conflict (Cooney, 2016).

Tapera (2016) argues that industrial relations uncertainty, often linked to political affiliations, poses a problem for beneficiation in Southern Africa. Industrial actions may be driven by political motives as much as workplace issues. The region also suffers from a lack of skilled labour, challenges in managing modern beneficiation processes, and colonial legacies that push African nations to export raw materials to developed countries, which benefit from branding and beneficiation.

Radetseki (2017) and Tawanda (2019) highlight additional factors such as the stockpiling of strategic minerals by industrialized nations during global instability and import parity pricing, which can hinder beneficiation. Resource endowment, often leading to investment distortion in specific resource industries during high price periods (Dutch Disease), and import parity pricing resulting in relatively low import costs, also play significant roles (Nu Times Innovations, 2015; Weldegiorgis *et al*., 2021).

Soraya and Bellamy (2014) note that using mining's contribution to GDP and inflation as economic indicators reveals significant uncertainty, painting an unfavourable picture for the development of downstream beneficiation in Southern Africa. Additionally, unreliable information makes it difficult to accurately portray the potential of Zimbabwe and the DRC as major players in the region's mining and minerals sector.

2.9 Feasibility of Beneficiation of Selected Minerals in Zimbabwe

The Zimbabwean beneficiation policy is a good one because it supports the country's economic transition and if implemented in an environment where key enablers like energy, skills, infrastructure, and other operational needs are present, can lead to the socio-economic development of the whole country. The feasibility of implementing beneficiation and value addition of minerals depends on various factors. These will be put into perspective by comparing lithium and vermiculite.

2.9.1 Lithium

Lithium, a mineral that makes petalite, is abundant in Bikita, a town in Zimbabwe's Masvingo Province. Zimbabwe exports its raw lithium ore to South Africa, Japan, Malaysia, and the Netherlands. Lithium carbonate, lithium chloride, and lithium fluoride can all be produced from petalite. The production of lithium batteries uses the above-mentioned mineral properties (Mamina *et al*., 2020). A total of 40 993.32 tonnes of lithium were exported in 2019, bringing in USD 7.6 million at an average price of USD180 per tonne (Reserve Bank of Zimbabwe, 2021). This shows that beneficiation is feasible in Zimbabwe, but what is needed to propel socio-economic growth in Zimbabwe is the creation of an enabling environment and a competitive mineral beneficiation framework.

2.9.2 Vermiculite

One of the greatest resources of vermiculite in the world is produced in the Shava Mine in the Buhera District (Chamber of Mines of Zimbabwe, 2022). The Mine supplies vermiculite to countries like Japan, Australia, Taiwan, Slovenia, and France where it is used to create heat-resistant boards for open fires, ceilings, refractory insulation, acoustic panels, and pipes and structural steel that are fireproof. Additionally, brake linings for automobiles are made from vermiculite. The five stages of the vermiculite value chain include mining, crushing and sorting, exfoliation, production, and retailing.

At Shava Mine, only lithium and vermiculite mining is carried out (Melcher *et al*., 2021). Exfoliation is a technologically straightforward operation, but it must be avoided since vermiculite becomes very fragile and expands in volume by 15 to 20 times after exfoliation. This significantly raises the cost of shipping and renders vermiculite beneficiation impractical. The expansion of mineral production should be accelerated by beneficiation through creating internal mineral value chains. Therefore, contributing to long-term and quantifiable socio-economic progress.

2.10 Potential Benefits of Beneficiation and Value Addition of Mineral Resources in Zimbabwe

Potential advantages include the improvement of skills, the creation of jobs, and the diversification of the economy (Matanhire, 2020; Melcher *et al*., 2021). Fiscal connections, backward linkages, forward linkages, knowledge linkages, and spatial linkages are the five economic linkages that enable resource-led growth. In order to encourage the links, resource-rich nations should build a strong governance framework (De Villers, 2020). For a varied and sustainable economy, such projects must be strengthened. For socioeconomic transformation through mineral beneficiation, it is essential that Zimbabwe realize the advantages of resource-led growth (Murombo, 2022; Musa, 2021; Manyuchi and Mbowa, 2019).

Rich but limited mineral resources are found in abundance around the world, yet these resources can be mined and transformed into money to advance economic development (Supu, 2023). It is not always the case that the later discovery of natural resource reserves and the subsequent extraction of those reserves results in greater economic growth or better human development outcomes (Nzenzema, 2015). Weak connections to the overall economy of a nation might result in the development of an enclave economy which is isolated from other industries and improves some macroeconomic indices without generating employment or widespread wealth. This section will explore briefly how the economies are connected.

Fiscal ties are established through the exploitation and enhancement of mineral resources. Taxes, royalties, and governmental involvement are examples of fiscal linkages (Mberi *et al*., 2022). The laws, rules, and/or individual agreements that specify how resource revenues will be distributed to the government make up the fiscal system of a nation. The government must strike a balance between its desire to maximize revenue and investors' demand for security in a volatile market. Additionally, governments must strategically use the revenues that come their way to strengthen the overall economy (Mhaka, 2018; Mavhunga, 2020). It might be a good idea to set aside a

portion of your earnings, either to invest abroad to generate returns for future generations or to give stability in the event that resource prices fluctuate in the future.

Mengich *et al*., (2019) describe forward linkages as the utilization of resources to generate additional value. Processing natural resources into intermediate or finished products rather than exporting them in their raw form benefits the entire economy (Mutandwa and Genc, 2018). This approach can stimulate job creation, industrialization, and economic diversification, while also retaining more of the nation's natural resource wealth. However, mandating investors to process raw materials within a country as part of their extraction licenses has often been ineffective, as many investors lack forward integration (Oshionebo, 2020; Nyarota *et al*., 2015). Instead, governments could form strategic public-private partnerships to bolster downstream industries and provide fiscal incentives to encourage investors to support beneficiation, even if they do not directly invest in it. These financial incentives are complex, costly to manage, and can have unintended consequences, so they should be used judiciously.

According to Mberi *et al*., (2022), backward linkages refer to the growth of suppliers into the resource sector. These participants are essential to the value chain process. Such a procedure has local content standards that guarantee locals gain employment and training opportunities as well as supplier contracts. These laws and tools increase opportunities for employment when appropriately applied (Moyo, 2020). This is a crucial prerequisite for increasing fiscal revenue, so a modern state must use such creative solutions. Benefits of using local labour and production include lower costs, greater predictability, and assistance in establishing the company in the host nation for the extractive industry (Mberi *et al*., 2021). Such supports the broad-based goals of the thrust on indigenous development and economic empowerment.

Research and development as well as the growth of human capital are related to knowledge linkages (Tinarwo and Babu, 2022). The promotion of innovation and development calls for the development of beneficial talents. To drive the agenda for beneficiation, industry needs research, innovation, and development, and several nations, like Israel, have been able to rank among the top due to their highly skilled labour force (Weldegiorgis *et al*., 2021; Munyanyi, 2018). When a mining firm enters the area, it typically builds its own reliable infrastructure, including its own electricity, water, ICT, and transportation services. Beneficiation and value addition also promote geographical links. For beneficiation to be practical in Zimbabwe, such interventions are essential (Muromo *et al*., 2021). By requiring outside users of the infrastructure, this gives the government the chance to use it to promote more inclusive economic growth in rural areas. Governments can even set up funding for infrastructure deals and advance connections that involve value creation

and benefit. Although these linkages are neither distinct nor immediately visible, they illustrate how various economic sectors can complement each other, leading to benefits that extend beyond the direct impacts expected from the extractives sector. The Ministry of Mines and Mining Development of Zimbabwe, along with other collaborating ministries, should regularly offer facilitation and cross-sector support to foster these relationships. In Table 2.3, the linkages, the corresponding policy tools, and the anticipated results of such connections are summarized.

Table 2.3 Summary of economic linkages

Linkages	Policy Instrument	Expected Outcome
Backward Linages	Local Content Law or Regulation (Indigenization and Economic Empowerment Act).	Growth in investors to increase value addition in the country.
Forward Linkages	Export Regulation and Value Addition rebates	Growth in downstream investors through incentives to upstream producers to earn value addition rebates.
Spatial Linkages	Local economic development incentives (Local Content Law)	Infrastructural development growth. Investment enabling local economic development.
Fiscal Linkages	Public Sector Alignment, resource rent, taxes and fiscal rules.	Capture scarcity rents, prudent spending, efficient allocation of resources for beneficiation and value addition.
Knowledge Linkages	Technology Incentives	Public Private Partnership promotion of domestically based research and development and applied innovation to develop new technologies.

2.11 The Importance of Mining Exports to the Economy

Exports play a crucial role in a nation's development and progress. Zimbabwe's economy has faced trade and balance of payments deficits because its export volumes have not kept pace with its import. The mining industry, like all other industries, has been confronted with a number of issues that have an impact on all other industries in the nation, including a lack of foreign money, investor apathy, inconsistent policy, instability, irregularities, and hyperinflation. Due to liquidity and capitalization issues brought on by the hyperinflationary environment, it was challenging for mining houses to start important capital projects that would allow for production to increase and grow (Chamber of Mines of Zimbabwe, 2022). Zimbabwe was ranked among the ten least desirable countries in the world for mining investment by the Fraser Institute Annual Survey of Mining Companies in 2018 (World Bank,2019).

However, the Reserve Bank of Zimbabwe (RBZ) in 2021 reports that the mining sector has made a substantial contribution to the country's total exports, averaging 51% from 2009 to 2013, 53% in 2014, and 60% in 2018, (Ministry of Finance ,2022). To enhance Zimbabwe's overall performance, it is essential to ensure the mining sector operates efficiently. The mining industry plays a crucial role in supporting the country's economy. Despite economic challenges, Zimbabwe's mining sector remained strong, generating over USD 2.2 billion in the first ten months of 2017. According to the Chamber of Mines of Zimbabwe (2022), gold, platinum, diamonds, chrome, coal, and nickel were the leading minerals, accounting for the majority of export earnings. It was noted that the mining sector now contributes between 65% and 70% of the nation's exports (Ministry of Finance, 2022), indicating that mining has surpassed agriculture as the cornerstone of the national economy.

The gold market is still positive, and miners have promised to increase annual production of the yellow metal to up to 100 tonnes if given sufficient government assistance. For the first time since the nation gained independence, gold miners produced more than 30 tonnes in 2018. During this period, diamond mining experienced a 22% rise, increasing from 1.8 million carats to 2.2 million carats. Lithium mineral production grew by 45%, from 34,110 tonnes to 49,359 tonnes, and granite output rose by 46%, from 109,600 tonnes to 160,600 tonnes. Additionally, coal production saw a 4% increase, going from 2.3 million tonnes to 2.4 million tonnes (Zimbabwe Chamber of Mines, 2022).

Additionally, since 2009, the mining industry's contribution to the GDP has increased. The pattern suggests that the industry is crucial to the economy. From 10.2% in 2013 and a pitiful 7.7% in

2009, the mining sector's contribution percentage to GDP has climbed to between 12% and 16% in 2018. Furthermore, the RBZ in 2018 found that the mining industry accounts for more than 60% of Zimbabwe's export earnings (Chamber of Mines, 2022). According to this scenario, the mining industry is a crucial sector that, if it performs well, has the capacity to influence the performance of the economy. As a result, the sector must improve its performance, which is why the goal of this study is to investigate the key elements of long-term growth and offer suggestions for improvement.

According to the Chamber of Mines (2022), the mining industry has continually contributed significantly to the GDP and exports of the country. Since it is the foundation of the economy, the mining industry should be able to perform well in order to increase the revenue from exports and thereby enhancing the balance of payments (BOP). As a result, the mining industry has significantly boosted Zimbabwe's economy since the country adopted the dollar in 2009. Between 2012 and 2019, an average of 19.2% growth is anticipated annually. Due to a number of circumstances, there has been a decline from levels seen between 2009 and 2011. Since the mining industry has expanded more quickly than other industries, it is essential to Zimbabwe's economic expansion and growth. The sector deserves considerable consideration because it is a significant contributor to economic growth. The main thrust is to investigate and improve factors that affect production, export performance, and sectoral benefit.

In the TSP economic blueprint document, Mineral Beneficiation played a pivotal role as a means for reviving the economic fortunes of the country. Similar policies like the ZIMASSET (2013-2018) have previously been pronounced, but history has proven that the gazetting of a policy alone will not automatically result in economic transformation. It is therefore, imperative that this study was conducted in order to assess the readiness and competitiveness of Zimbabwe’s mining industry towards achieving this endeavour.

The concept of competitiveness has become one of the central preoccupations of industry and governments. Murombo (2022), states that in looking at competitiveness, the analysis should be one that assesses productivity. Traditionally, two ways are used to measure an industry’s competitiveness, thus show-indicators and multifactor comprehensive methods (Oshionebo,2020). Using the multifactor comprehensive method, Michael Porter (2011) developed the Diamond Model which identified four core and two peripheral factors that analysed why certain industries were competitive in certain locations (Tawanda, 2019).

2.12 Competitiveness-Historical Perspective to Present

In the mid-1980s, competitiveness referred to a nation's ability to excel in international trade. Tawanda (2019) explains that during this period, the focus was on maximizing national returns by leveraging comparative advantages. In the 1990s, Paul Krugman viewed competitiveness primarily through the lens of trade, warning that treating nations like competing firms could lead to trade wars and protectionist policies, diverting focus from macroeconomic strategies. Recently, competitiveness has evolved to mean "economic growth" or "productivity" (Tapera, 2016).

The World Economic Forum (WEF) defines competitiveness as a national economy's ability to achieve sustained economic growth over the medium term, considering its current level of economic development. This definition emphasizes the importance of conducive conditions, appropriate policies, and economic characteristics to foster such growth. The WEF proposed a global competitiveness index by combining two sub-indices: the macroeconomic aspects of competitiveness from Jeffrey Sachs' Growth Development Index and the microbusiness aspects from Michael Porter's Business Competitiveness Index (WEF, 2008). This study examines competitiveness based on Michael Porter's theory

2.13 Factors that affect the competitive advantage for beneficiation

Zimbabwe’s hamstrung economy requires serious commitment to fast-track pro-industrialisation polices such as beneficiation and value addition of mineral resources to reclaim its competitive advantage. However, policies cannot work in isolation. It is important to consider factors such as the level of the natural resource’s endowment, availability of labour, skills, innovation and technology, availability of mining infrastructure, adequate energy supply and the availability of transport and road networks when forging a successful program of beneficiation and value addition.

In addition to having abundant primary metals and mineral resources that may be beneficiated, Southern Africa is also well-stocked with many other goods that are needed as catalysts or ingredients in the production process, such as refractants, chemicals, and fluxes (Carter, 2009). Weldegiorgis *et al.,* (2021) also believed that a variety of metals, such as those required to make alloys, are present in large quantities. Whether or not the quantity of resources provides competitive advantage relies on the pricing structure, the use, and the accessibility of skilled labour (Shangahaidhoni and Gundani, 20014). For instance, whereas having access to

inexpensive iron or chrome is a clear advantage for the local steel industry, gold or platinum do not have the same benefit.

The availability of a sufficient and affordable energy source is a further crucial factor to take into account. According to Cooney (2016), Southern Africa has the capacity to produce inexpensive energy through hydroelectric projects like Kariba, Lesotho Highlands, or Cabora Bassa, as well as by the burning of inexpensive or low-grade coal. For instance, Eskom has the capacity to produce energy at a cost per kilowatt hour that is between a third and a half that of its equivalents in the first world (Richards Bay Minerals, 2019). Furthermore, a large grid offers a consistent supply at agreed-upon flexible electricity pricing strategies. Research has helped Southern Africa, and notably South Africa, progress technology, often for pragmatic political reasons (Hlungane and Sayeed, 2019). The development of nuclear fuels technology, coal-to-oil conversion, and blast furnace technology are a few examples of this. Through research and development, research institutions founded during the isolation era are able to offer first-world solutions (Richards Bay Mineral, 2018).

The beneficiation and value addition of mineral resources requires special skills to maintain the adequate output levels. Lack of skills and general labour negatively impact on the competitive advantage of a nation as scarce skills are highly priced causing a rise in the cost of production (Mavhunga, 2015). According to Sanderson et al. (2021), Southern Africa has a unique chance to develop the administrative and technical skills necessary for downstream beneficiation because of the vast pool of unskilled labour that is available there.

Adequate transport and infrastructure have a bearing on improving the competitive advantage as far as beneficiation and value addition is concerned. Foli (2020) contends that when beneficiation is carried out near to the mineral producer, the benefit of lower transport costs to the location of beneficiation becomes obvious. According to Radetzki (2017), this is crucial for businesses that produce concentrate and are connected to the steel industry. For instance, when turned into pig iron, iron ore experiences a weight loss of 30 to 40% (Richards Bay Mineral, 2014). Additional beneficiation results in the export of high-quality, low-volume steel products. However, the location of the sites for beneficiation and value addition also affects the outcome.

Marinda *et al*., (2020) examined the impact of infrastructure on the competitiveness of the mineral beneficiation sector in Zimbabwe. The study found that inadequate infrastructure, such as unreliable power supply and limited transportation networks, negatively affects the sector's

competitiveness. The authors recommended that the government should invest in improving infrastructure to support the mineral beneficiation sector's growth.

Dube (2017) examined the role of access to finance in the development of the mineral beneficiation sector in Zimbabwe. The study found that most small-scale mining companies in Zimbabwe face challenges in accessing finance for mineral beneficiation operations, limiting their ability to invest in new technology and equipment. The authors recommended that the government and financial institutions should develop policies and programs to improve access to finance for small-scale mining companies.

According to Gudyanga (2016), the impact of inadequate skills and technology transfer on the competitiveness of the mineral beneficiation sector in Zimbabwe. The study found that there is a limited pool of skilled personnel in the mining sector, and there are limited opportunities for technology transfer from developed countries. The authors recommended that the government should invest in developing local skills and promoting technology transfer to improve the sector's competitiveness.

Huni (2018) further examined the impact of inconsistent policy implementation on the mineral beneficiation sector in Zimbabwe. The study found that policies and regulations promoting mineral beneficiation are not consistently implemented, leading to a lack of clarity and certainty among investors. The authors recommended that the government should improve policy implementation to promote investor confidence in the sector.

These studies demonstrate that there are various challenges facing the mineral beneficiation in Zimbabwe which include inadequate infrastructure, limited access to finance, inadequate skills and technology transfer, and inconsistent policy implementation. However, there are opportunities for the sector's growth, and with the right policies and investments, Zimbabwe can fully exploit its mineral resources for the benefit of its citizens.

2.14 Fiscal measures for promoting beneficiation and value addition

Economic turmoil in Zimbabwe requires both the fiscal and monetary policy measures to incentivise beneficiation and value addition of mineral resources and reduce financial risks. The monetary policy measures should ensure that inflation is kept at low levels to maintain price stability. Moreover, the products are sold in foreign currency such that the government should implement equitable exchange controls, ensure that taxes are effectively used to support investment initiatives while market risks are reduced.

Inflation and domestic price stability, according to Mahonye and Mandishora (2015), are prerequisites for long-term investment planning. Tilton (2016) goes on to say that the region's varying and volatile inflation rates, fiscal and monetary policies, and government spending are not particularly conducive to luring in investment for economic benefit. Inflation is also linked to fiscal arrangements such as tax holidays, investment spending and increased income for various levels of government employees (Oshionebo, 2020). A high tax regime discourages investment because companies lose their profits through tax. Therefore, the government should ensure that taxes are reasonably attractive to support new businesses which are in the beneficiation and value addition of mineral resources value chain.

The Reserve Bank of Zimbabwe in 2021 issued stricter laws on exchange controls and also officialising the purchase of foreign currency on the black market (Ministry of Finance, 2022). However, these exchange controls impact negatively on small enterprises which are targeting to benefit from the beneficiation and value addition policy. Moreover, investment is also sensitive to interest rates. The government should ensure that the cost of borrowing is low to stimulate investment. Therefore, it is important to maintain an optimum level of interest rate to catalyse investment in beneficiation and value addition program.

2.15 Knowledge Gaps

It is argued that, while previous studies on mineral beneficiation and value addition in Zimbabwe have made significant contributions to the understanding of the country's mineral resources and their potential economic value, there are some knowledge gaps that need to be addressed. For example, one of the significant knowledge gaps is the lack of a comprehensive database on the country's mineral resources. While some studies have identified mineral deposits in Zimbabwe, there is no consolidated database that provides detailed information on the extent, quality, and accessibility of these resources (Matinde *et al*., 2018; Huni, 2018; Mavhunga, 2018). As a result, it is challenging to evaluate the economic potential of these minerals and determine the best value addition initiatives to adopt. Another critical knowledge gap is the limited exploration of innovative value addition techniques. In view of the above issues raised which are an impediment to the implementation of mineral beneficiation and value addition in Zimbabwe, the study seeks to develop a competitive framework for mineral beneficiation and value addition for sustainable socioeconomic development of Zimbabwe.

2.16 Theoretical Framework

A thorough examination of the study's theoretical foundation may be found in this section. The Critical Enquiry Theory, Resources Curse Theory, Systems Theory, and Multi-Sectoral Policy Alignment Theory are among the theories that are being discussed.

2.16.1 Systems Theory

The study argues that systemic thinking can significantly enhance and potentially transform the efficacy and efficiency of governance. By adopting a systems perspective, strategic planning and addressing complex challenges can be more thorough and integrated. Consequently, Ludwig von Bertalanffy's systems theory was applied in the investigation (Mambondiani and Manyuchi, 2021). After a brief introduction to the concept of governance in the context of Zimbabwe, the study reviews system aspects, techniques, and related legal, regulatory, and policy frameworks. These approaches, successfully used to improve governance in many developed countries, offer lessons and recommendations for utilizing systems theory and principles to enhance governance in Zimbabwe's mining and mineral sector.

In Zimbabwe's mining and mineral sector, governance is primarily based on oversimplified procedures that overlook the underlying realities of individuals and corporations. Current practices, unethical behaviours rooted in conventional worldviews, and short-term, simplistic thinking cannot effectively address the complex policy challenges in the sector, especially regarding mineral beneficiation and value addition (World Bank, 2019). The inefficiency and ineffectiveness of Zimbabwe's existing governance structures, particularly in the mining and mineral sector, are evident symptoms of this issue. A systems approach to governance offers powerful methods for achieving more effective and efficient governance. To govern more effectively, policymakers need new perspectives, a holistic and integrated consciousness, and proficiency in systems approaches (Radetzki, 2017). Systems approaches provide new information and insights that aid in making informed decisions. Therefore, this study employs systems theory to develop a framework for mineral beneficiation and value addition.

The significance of systems theory in this study lies in its use to analyse Zimbabwe's governance as a system, applying concepts and approaches from systems thinking. The application of systems methodologies can enhance the effectiveness and efficiency of governance across all government spheres in the mining and mineral sector and among related stakeholders. This is

crucial in the framework developed in this study, which aims to promote the sustainable socio-economic development of Zimbabwe.

2.16.2 Resource Curse Theory

One significant challenge hindering the optimization of Zimbabwe's mineral sector for economic recovery is the country's current political climate, energy deficits, and financial difficulties. Economic recovery will remain unattainable if the mining industry fails to evolve and establish new economic connections. Research indicates that resource-rich nations, especially in Africa, face low economic growth and development due to the resource curse, corruption, and rent-seeking behaviours (Bvirindi, 2021). While the link between mineral wealth and the resource curse is well-recognized, there is limited research on effectively leveraging the mineral industry to mitigate the resource curse and foster economic growth. De Villers (2017) has addressed issues of government transparency and accountability related to rent capture but has not provided concrete solutions for harnessing the mining sector to drive economic recovery and growth.

2.16.3 Multi-sectoral Policy Alignment Theory

A multi-sectoral approach involves intentional collaboration among various stakeholders and sectors to achieve policy outcomes. This study emphasizes the need for such collaboration to achieve mineral beneficiation and value addition in Zimbabwe. Essentially, the study proposes that for mineral beneficiation to be successful, it must integrate systems theory, Multi-Sectoral Policy Alignment Theory, and Critical Enquiry Theory. Additionally, the study draws insights from the Africa Mining Vision and the National Mining Vision, suggesting that successful implementation of the proposed framework could significantly advance sustainable socio-economic development in Zimbabwe.

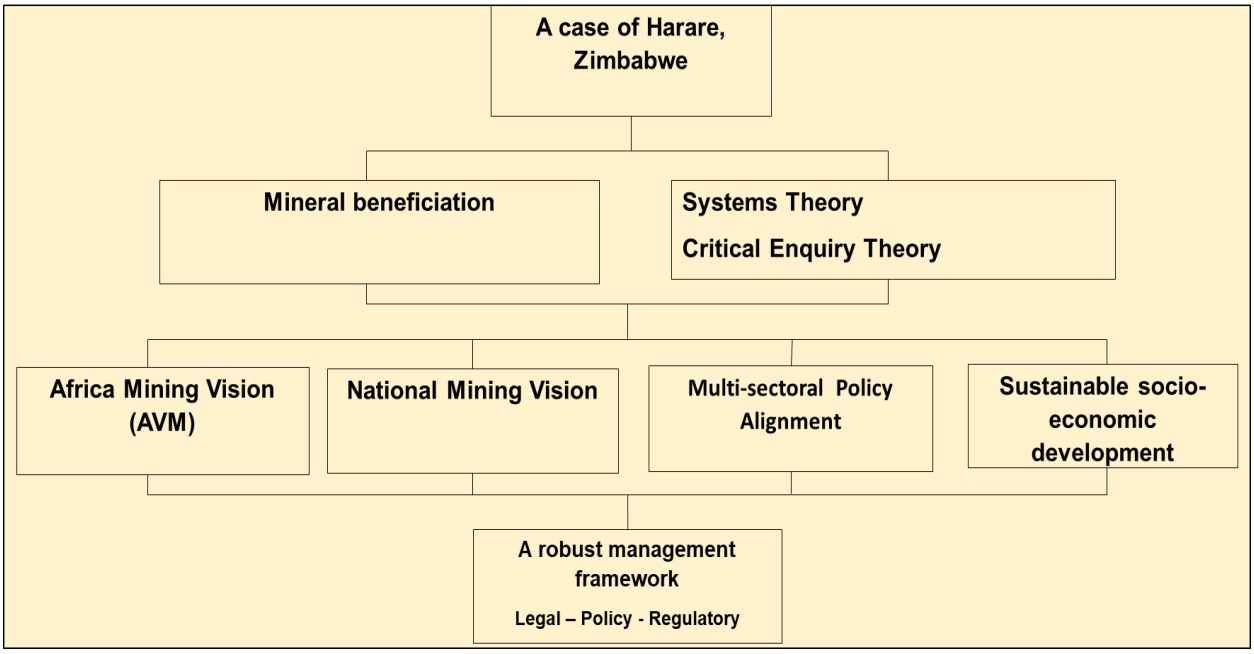


Figure 2.4 Conceptual framework of the study

2.17 Theoretical Gaps in Literature

The underlying political and socioeconomic reasons that cause poor economic growth across nations as a result of historical consequences are not well analyzed by the resource curse theory. The hypothesis doesn't make sense from an economic perspective because it doesn't explain the fundamental principles that influence economies through mineral endowment. Furthermore, the theory has not held up over time, since globalization and economic integration have changed the character of international commerce and economic development, which has been facilitated by Multi-National Corporations (MNCs) that are growing in both political and economic clout (Cooney, 2016).

In addition, the resource curse theory focuses on the fact that slow growth rates in nations with abundant mineral resources are caused by fluctuations in mineral prices during boom and bust periods, while ignoring other significant factors that contribute to fiscal instability, such as high interest rates on foreign debt, trade sanctions, and short-term capital flows (Economic Commission for Africa and African Union, 2011). Additionally, the research on the resource curse and mineral abundance does not sufficiently address how to influence state institutions to promote resource-based development (Fessehaie and Rustomjee (2019).

It is impossible to overstate the importance of establishing production links through the collaboration and coordination of industrial policy. This study fills a significant gap in the literature by examining the ways in which the state intervenes through industrial policy, state capacity, and political incentives to get stakeholders to support a shared national vision of aligning mineral policies with long-term economic development objectives that support socioeconomic development of the country. As a result, the Multi-Sectoral Alignment Policy Theory, and Systems Theory are all used in the study. Fessehaie and Rustomjee (2019) argues that because everything occurs inside a system, a paradigm shift is necessary to address the problems Zimbabwe is currently facing.

2.18 Conclusion

This chapter included a thorough overview of the function of value addition and beneficiation around the globe. The review focused on the rules in place today that allow for the beneficiation of mineral resources. These new laws and policies are meant to fill up the gaps left by earlier mining and industrial development regulations. The Mines and Minerals Act and previous mining development plans like the Industrial Development Policy were insufficient to meet the dynamics of the mining industry and the development process. The necessity to alter ownership structures to support indigenous businesses, local procurement, and mineral beneficiation to develop economic ties as envisioned by the Indigenization program was not taken into account by colonial mining laws. The idea of industrial strategy, which seeks to transform the mining sector through beneficiation and the promotion of regional production, forms the foundation of the new rules.

However, on-going political difficulties may make it difficult to put the plans into action. Local elites and government representatives' conflicts of interest and quest for personal gain pose significant obstacles to the coherence of economic policy and its effective implementation. Some of the most important ideas on the political incentives that influence the actors' decisions on policy making came from the political economy literature. It is necessary to alter the production structure, ownership, and power relations that exist within the mineral industry in order to develop links, and this has substantial ramifications for Zimbabwe's political environment.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

This chapter describes the study's research methodology, including the target population, sample techniques, research design, and ethical considerations. The systematic methods for gathering, arranging, and evaluating data are included in research methodology (Babbie, 2020). To provide a thorough grasp of the research problem, this study uses a convergent parallel design in conjunction with a mixed-methods approach.

3.2. Research Design

This study's research design, a convergent parallel design, is an example of a mixed-methods technique. In order to fully comprehend the study focus, this design entails concurrently gathering qualitative and quantitative data, analysing each form of data independently, and then comparing and integrating the results. Both quantitative and qualitative components are present in the design. The quantitative component entails evaluating potential solutions and barriers to improving mineral beneficiation and value addition in Zimbabwe through statistical analysis and structured questionnaires. To guarantee that the conclusions are generally relevant, the quantitative data were collected from a representative sample of stakeholders in the mining industry.

3.2.1. Mixed Methods Design

The mixed methods approach combines philosophical assumptions and research techniques to collect and analyse data, incorporating both qualitative and quantitative methods to deepen the understanding of research problems (Babbie, 2020). This study used a convergent parallel design to integrate quantitative and qualitative approaches. Data were combined, related, or mixed at various stages of the research process. Utilizing both methodologies, as opposed to relying on just one, provides a more comprehensive view of the study's challenges (Anguera *et al*., 2018). In essence, mixed methods involve integrating quantitative and qualitative data to enhance research insights.

For this study, a major emphasis was placed on qualitative methods, including thorough literature reviews, case studies, and evaluations of industry advancements related to beneficiation and

value addition. The study also incorporated a review of recent research, consultancy reports, and industry papers relevant to the subject. Additionally, quantitative analysis was performed using publicly available secondary data, such as reports from the Zimbabwe National Statistics Agency (ZIMSTAT) and the Zimbabwe Chamber of Mines.

The research involved compiling and analyzing policy statements related to beneficiation and value addition and assessing their market impact. While the study did not extensively explore technical aspects of mining and beneficiation, it did consider technical factors affecting the development and implementation of beneficiation strategies. The study also benchmarked mineral beneficiation practices against those of other mining countries such as Botswana, South Africa, DRC, Ghana, China, and Australia.

In addition to analyzing secondary data, the study collected and examined primary data through discussions with key stakeholders in the mining and manufacturing sectors. This primary data collection complemented the existing analysis and provided additional insights. Key stakeholders were invited to an initial workshop to discuss the study's objectives and offer feedback. The workshop and subsequent interviews targeted mining companies, Ministry of Mines and Mining Development officials, current and potential downstream manufacturers, and other relevant figures within the mining-manufacturing value chain. The six mining companies central to the study were Shamva Gold Mine, Mazowe Mine, Zimplats, Unki Platinum, Zimbabwe Consolidated Diamond Company (ZCDC), and Marange Resources.

To gain insights into the policy perspective on beneficiation and value addition, officials from various government ministries were interviewed. Key informants included the Zimbabwe Miners' Federation, Zimbabwe Mining Development Corporation (ZMDC), Mineral Marketing Corporation of Zimbabwe (MMCZ), Zimbabwe Chamber of Mines, mining and mineral processing lecturers, and other professional bodies within Zimbabwe's mining sector.

The study also aimed to identify barriers and solutions to promoting beneficiation in Zimbabwe. This involved distributing questionnaires to evaluate current policies on beneficiation and their impact on socio-economic development. Face-to-face interviews were conducted to gather stakeholder perspectives on the importance of implementing beneficiation and value addition strategies in Zimbabwe.

3.2.2. Convergent Parallel design

Bazeley (2018) argues that the convergent parallel design is characterized by the researcher implementing both quantitative and qualitative strands simultaneously, giving equal priority to the methods, maintaining their independence during analysis, and subsequently combining the results in the overall interpretation. This design, referred to as a triangulation mixed method design by Creswell and Creswell (2018) represents a one-phase approach where both quantitative and qualitative approaches are utilized concurrently and with equal emphasis to gain a comprehensive understanding of the phenomenon under investigation. In this design, both quantitative and qualitative data are collected and analyzed independently but concurrently. This approach allows for comparing and contrasting the results to identify any differences, thereby enhancing the understanding of the research issue. A convergent design is employed to gather various yet complementary data on the same topic. This methodology aims to leverage the unique strengths and address the limitations of both quantitative and qualitative approaches. It is particularly useful when researchers seek to validate and corroborate findings by directly comparing quantitative statistical data with qualitative insights (Egawa and Akita, 2021).

The convergent design was chosen for this thesis due to its efficiency compared to sequential designs, as it allows for simultaneous data collection and analysis during a single phase of the study (Greene *et al.*, 2018). This setup enables the researcher to gather and analyse data separately using traditional methods suited to each data type. There are some significant difficulties with this design, though. To begin with, collecting and analyzing two complete but distinct sets of data simultaneously take a lot of time and expertise. In addition, if there is a discrepancy between the quantitative and qualitative results, the researchers may be faced with a difficult decision. These variations can be challenging, and it might be necessary to gather further information. Figure 3.1 illustrates the use of a convergent parallel design.

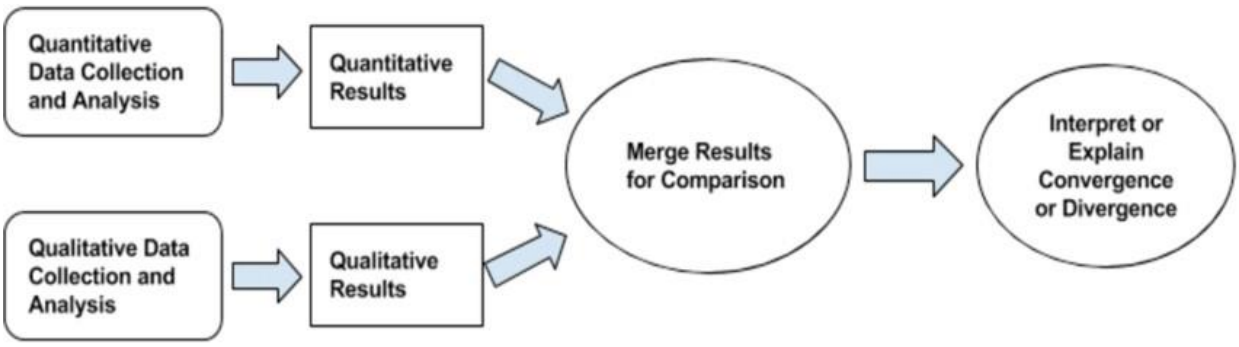


Figure 3. 1 Mixed Methods approach

3.3. Summary of the research methods

Table 3.1 provides an overview of the research methodology, including specifics on the research design, study population, and data collection procedures for each objective. This summary is essential due to the mixed methods approach employed in the study, which is best clarified in tabular form. The table includes details on the study objectives, population, sampling methods, data collection techniques, and data analysis methods.

Table 3. 1 Summary of objectives and data collection procedure

Objectives	Stakeholder	Sampling techniques	Data collection methods	Data analysis methods
To examine the existing policies on beneficiation and their effects on socio-economic development	•Stakeholders (officials from government departments/ Lecturers/ officials from mining and mineral institutions.	•Stratified random sampling	•Official Document Analysis, questionnaire	•Statistical analysis, •Descriptive analysis
To evaluate the barriers for low levels of mineral beneficiation in Zimbabwe	•Expert information	•Purposive sampling	•Unstructured Interviews	•Thematic Analysis
To examine mining stakeholder's views on the need for mineral beneficiation in Zimbabwe.	•Expert information	•Purposive Sampling	•Unstructured Interviews	•Thematic Analysis
Development and Validation of the framework: **To develop the mineral beneficiation framework for socio-economic development of Zimbabwe.**	•Technocrats, experts on beneficiation, policy experts, government officials and NGOs officials.	•Purposive sampling	•Checklist	•Qualitative analysis

3.4. Quantitative Approach

Data collection's initial phase used a quantitative methodology. This was based on the first objective, which looked at the current beneficiation-related policies and how they affected socio-economic growth. Quantitative research was used to accomplish the goal. Quantitative research was employed to achieve the objective. It is characterized by its systematic and objective approach, utilizing numerical data gathered from a specific subset of a population to draw generalizable conclusions about the broader population, as outlined by Creswell and Creswell (2018). In quantitative research, objectivity, numerical data, and generability are crucial components.

The use of a quantitative survey in this study is justified by the fact that it is employed to provide information on the interactions between variables in order to understand, predict, and control the phenomena. Because the procedure, goals, design sample, and measuring equipment all specified, data collection is simple. In other words, it is better to take a methodical approach to figuring out how big the issue, problem, or phenomena is. Data collecting is methodical, standardized, and repeatable. Additionally, the results are generalizable (Leavy,2022). This survey used a cross-sectional design, meaning that data were collected once from a particular sample and from a cross-section of the population at one moment in time. A cross sectional survey has an advantage over a duplicated design in that it is simpler and less expensive to perform.

3.4.1. Research population

The target population, as defined by Tashakkori and Teddlie (2020) is the full set or aggregate of things, people, behaviours, events, or any other single unit of a study that satisfies a sampling criterion. According to Teddlie and Tashakkori (2019) a population is a collection of components that share features with the researcher and who also meet the predetermined qualities of the researcher. According to Bazeley (2018) the study population is the intended target audience. Beneficiation specialists, technocrats from business and academia, as well as other players in the mining industry, make up the population for this phase. The situational analysis in this study is two-tiered and includes expectations for the beneficiation of minerals, representatives from government agencies, and other relevant players from the mining, mineral, and public policy sectors.

Table 3. 2 Population and sampling

Target Population	Estimated Population
Non-Governmental Organisations	145
Zimbabwe Mining Development Cooperation	48
Academics	120
Ministry of Mines and Mining Development	35
Ministry of Finance and Economic Development	45
Zimbabwe Revenue Authority	30
Mineral Marketing Cooperation of Zimbabwe	20
Chamber of Mines	6
Parliament of Zimbabwe	410
Geological Survey of Zimbabwe	10
Institute of Mining Research in Zimbabwe	12
Zimbabwe Economic Policy Analysis and Research Unit (ZEPARU)	03
Diamond Beneficiation Association of Zimbabwe	40
Zimbabwe Platinum Producers Association	25
Metallon Gold Zimbabwe (Pvt) Ltd	20
Parliament of Zimbabwe	120
Zimbabwe Diamond Consolidated Company	38
Zimplats	22
Bikita Minerals	30
Small Scale Miners Association of Zimbabwe	17
Zimbabwe Miners Federation	24
Gold Miners Association of Zimbabwe	30
TOTAL	**1200**

Source: Zim Stats, 2018

3.4.2 Sampling Procedures

During the quantitative survey, a stratified random sampling method was employed. A random sampling technique, according to Terderhost (2016), is a probability sampling procedure wherein every member of the population has an equal chance of taking part in the study. Because the population was too huge and a small sample size that was representative of the population was needed, this sampling technique was appropriate.

3.4.3 Sample size

According to Teddlie and Tashakkori 2021) there isn't a single guideline that can be used to determine sample size. Depending on the research design, different sample sizes are chosen. When conducting a census, for example, every member of the specific populace is chosen to participate in the study, so the sample size is equal to the size of the intended participants. In contrast, when conducting experimental research, where there are treatment and control groups, the sample size may vary in each group.

A sample size can be determined in a variety of ways. For the purpose of this study, sample size was calculated using formula for finite population. The researcher used Krejcie and Morgan formula to calculate sample size. In this study the researcher first calculated sample size for officials within different stakeholders only. Thus, the formula used to calculate the sample size was.

$$n = \frac{N}{1+ N(e)^2} = \frac{1200}{1+ 1200(0.05)^2} = 292$$

N is the total population

n is the sample from the population

e is the error term, which is 5% (i.e. at 95% confidence interval

The researcher stratified the sample size into various strata taking into account the various stakeholders as shown in the table above and calculated the sample size in each stratum proportionally as indicated in Table 3.3. The total sample size is 292.

3.4.4 Proportional stratified random sampling

After the sample size was calculated, the researcher selected respondents using proportional stratified random sampling. The researcher used the relevant ministries, institutions and

organisations to select the respondents according to systematic random sampling in different departments until the sample size of 292 was reached.

Table 3. 3 Composition of the selected sample of respondents

Stakeholders	Estimated Number	Size of each stratum
Non-Governmental Organisations	227	62
Zimbabwe Mining Development Cooperation	48	13
Academics	298	54
Ministry of Mines and Mining Development	285	77
Ministry of Finance and Economic Development	35	10
Zimbabwe Revenue Authority	20	6
Mineral Marketing Cooperation of Zimbabwe	22	6
Chamber of Mines	16	4
Parliament of Zimbabwe	152	33
Geological Survey of Zimbabwe	40	11
Institute of Mining Research in Zimbabwe	12	3
Zimbabwe Economic Policy Analysis and Research Unit (ZEPARU)	10	3
Diamond Beneficiation Association of Zimbabwe	12	3
Zimbabwe Platinum Producers Association	15	4
Gold Miners Association of Zimbabwe	8	2
TOTAL	**1200**	**292**

3.4.5 Inclusion criteria

Respondents with vast experience and knowledge in the academia, mining sector, mineral sector and non-governmental organisation were included in the study. Technocrats were also included

in this study. Respondents with expert knowledge on mineral economics, policies and resources management were also included in the study. Respondents with knowledge of micro economics and macro-economic expertise were also will be included in the study.

3.5.6 Exclusion criteria

Respondents without knowledge on mineral beneficiation and value addition were excluded in this study. Moreso, respondents without knowledge on mineral economics, policies and resource management, public policy making were excluded from this study.

3.6 Data collection

Data collection involves the selection of participants and the gathering of information necessary to investigate a research problem (Egawa and Akita, 2021). During the planning stage, the researcher must establish the approach for determining the sequence of data collection (Leavy, (2022). Data collection refers to the process of preparing for and gathering information, essentially capturing data from the participants. In this particular study, questionnaire surveys and document analysis were employed as data collection methods during the quantitative phase.

3.6.1 Development of the instrument

Bazeley (2018) highlights that the initial stage of developing or selecting a questionnaire involves identifying the desired information. In this study, the questions were formulated based on the research objectives. The subsequent step involves conducting a literature search for questionnaires or questionnaire items that meet the blueprint criteria. To establish the validity and reliability of the questionnaire, the researcher utilized questions developed from the objectives of the study. To ensure content validity, the questionnaire was developed based on the literature review and conceptual framework. Additionally, the questionnaire was distributed to experts and colleagues for review to ensure that it contained relevant and direct questions that could yield useful results. The questionnaire was tested during a pilot study conducted by the researcher. The researcher further emphasises the importance of utilizing items from previously validated questionnaires to enhance the questionnaire's validity and reliability.

3.6.2 Pilot study

Anguera *et al.,* (2018) describe a pilot study as a preliminary, small-scale investigation carried out before a larger, primary study. This initial study, also known as a pre-test, involves recruiting a

small group of individuals who meet the study's criteria but will not be included in the main sample. The purpose of a pilot study is to assess the feasibility of the research and to identify potential issues in the methodology, such as difficulties accessing the target sample (Egawa and Akita, 2021). In this thesis, a pilot study was conducted with a questionnaire, involving several participants including officials from the Ministry of Mines and Mining Development in Mashonaland Central Province, representatives from mining companies, three academics, and an official from the Chamber of Mines of Zimbabwe, prior to the main study

3.6.3 Data collection techniques

During this phase, data was gathered using questionnaires and document analysis. Specifically, a self-administered questionnaire (SAQ) was employed in this survey, where respondents could read and provide their own answers to the questions without assistance. The use of SAQs is recommended when the study participants are sufficiently literate, as was the case for this study. Furthermore, SAQs are preferred for their efficiency in saving time and resources, as noted by Babbie and Mouton (2020).

3.6.4 Data collection plan

The researcher allocated specific time slots to collect data from the respondents. In order to ensure smooth data collection from the stakeholders, the researcher sought permission from relevant institutions and government departments. Additionally, invitations requesting the participation of the respondents were sent via email.

3.7 Reliability and Validity of the Measuring Instruments

This study considered the measures of reliability and validity of the research instrument. Validity was assessed through face validity and content validity to ensure that the instrument is accurate and comprehensive. This process is crucial in eliminating errors and ensuring that the instrument measures what it is intended to measure. This was further cemented during the pilot study. Reliability was assessed using the test-retest method to ensure that the instrument produces consistent results over time.

3.7.1 Face validity

Face validity pertains to the visual appearance or perceived validity of an instrument (Teddlie and Tashakkori, 2021). It is important that each question or item included in the research instrument

demonstrates a logical connection with the study objectives. The presence of this logical link serves as an indicator of the instruments' validity. To ensure face validity of the instruments the questionnaire was submitted to experts in mineral economics, policies and resource management, mineral beneficiation and value addition and public policy making who evaluated it before its final approval.

3.7.2 Content validity

Content validity is the appropriateness of an instrument's sample of items for the construct it measures, as defined by Babbie (2020). The degree of content validity is determined by assessing the extent to which the statements or questions included in the instrument represent the issue they are intended to measure. The content validity is judged by the researcher, readership, and experts in the field. Researchers designing a new instrument should start with a comprehensive conceptualization of the construct, so that the instrument can cover the full content domain. In this research, to ensure content validity, the questionnaire was developed based on the literature review and conceptual framework. Additionally, the questionnaire was distributed to experts and colleagues for review to ensure that it contained relevant and direct questions that could yield useful results.

3.7.3 Reliability

Reliability involves the degree of consistency with which an instrument measures a specific attribute, according to Babbie (2020). It reflects how reliably the instrument produces similar results when used on different occasions. For this study, the stability of the research instrument was evaluated through the test-retest method. Test-retest reliability measures the extent to which the same instrument produces consistent results for the sample on different occasions. The instrument is administered once (test) and then again (retest) under the same conditions. The score or difference between the test and retest scores serves as an indicator of the instrument's reliability. In this study, the researcher administered the questionnaire to a sample consisting of 10 academics and 10 officials within a specific sectors on two different occasions, with a two-week interval between administrations. The scores from the test and retest were compared, and a smaller difference of 2% indicates higher reliability of the instrument with 5% margin of error. The reliability coefficient was calculated, and a higher score affirms the instrument's reliability (Creswell *et al*., 2010). The main advantage of the test procedure is that it allows for the comparison of the instrument with itself, avoiding any issues that may arise when using a different instrument.

3.8 Data analysis

The data cleaning process involved the removal of incomplete questionnaires and any information that appeared inconsistent or nonsensical. Following this, the cleaned data were entered into the Statistical Package for Social Sciences (SPSS) version 27. Each response was systematically coded and categorized according to the relevant sections of the questionnaire.

For the statistical analysis, frequency analysis was employed to summarize the data, providing insights into the distribution of responses across different variables. Graphical representations, such as pie charts, were also generated to visually present the data, enhancing the interpretation of frequency distributions and identifying any notable trends or patterns. The results from these analyses were then extracted and incorporated into the main research document.

3.9 Qualitative Approach

After the quantitative study, the qualitative study was employed which aimed at examining the barriers to low levels of mineral beneficiation and value addition in Zimbabwe, as well as the views of mining stakeholders on the need for mineral beneficiation and value addition. Qualitative research pertains to investigations centred on human experiences and offers an alternative philosophical perspective on reality, distinct from the positivist or scientific approach (Kumar, 2012). This type of research is carried out in natural environments and typically involves extensive, direct interactions between the researcher and participants (Egawa and Akita, 2021)

The study design selected for this phase was qualitative because it allows for a naturalistic inquiry to collect data based on the participants' perceptions. Additionally, it presents the self-constructed meanings of the reasons for low levels of mineral beneficiation in Zimbabwe and stakeholders' views on the need for mineral beneficiation in Zimbabwe as expressed by the participants (experts).

3.10 Study Design

In this study, an exploratory research design was utilized. The purpose of an exploratory design is to establish facts, gather new data, gain insights into phenomena, and provide a comprehensive understanding of a given situation. This perspective is supported by Babbie (2020) and Leavy (2022) who assert the view that an exploratory design aims to develop an initial understanding of a phenomenon and subsequently gain a clear understanding of research participants within a specific setting or context. The exploratory approach was deemed appropriate for this study since

the researcher had limited prior knowledge about the reasons for low levels of mineral beneficiation in Zimbabwe and stakeholders' views on the need for mineral beneficiation in the country.

3.11 Research Population and Sampling Procedure

The researcher employed purposive sampling to select individuals who possessed knowledge and information about mineral beneficiation and value addition in the mining sector. This sampling technique involves the intentional selection of participants based on their experience and expertise in the relevant field, in order to provide a comprehensive and diverse range of views (Creswell and Creswell, 2018). The researcher utilized various communication methods such as telephone, email, and social media to contact the selected population. The study benefited from experts from academic institutions offering mining engineering qualifications, mineral policy experts, stakeholders associated with the mining and mineral sector, and government line ministries associated with mining.

During the interviews, stakeholders were asked questions regarding the role of mineral beneficiation in resuscitating the economy, how mineral resources contribute to creating linkages and diversification, the distinctive activities that the government of Zimbabwe should carry out in collaboration with stakeholders to achieve the beneficiation strategy, the implementation matrix of mineral beneficiation in Zimbabwe, policy incoherence, and how to improve the ease of doing business, among other issues. The purposive sampling technique is a type of non-probability sampling that is most effective when studying a specific cultural domain with knowledgeable experts.

3.11.1 Sample size

A total of twenty-five (25) respondents were purposively targeted to be included in the study, however data saturation was reached at the 15th respondent. The sample consisted of experts representing various entities, including the Ministry of Mines and Mining Development, mining company officials, mining institutions, academia, and other stakeholders within the mining and mineral sector of Zimbabwe. The final sample size was determined based on data saturation, which is when no new information or concepts are being added by the participants (Babbie, 2020).

In this study, data saturation was achieved when the participants reiterated previously mentioned issues or concepts without providing any additional information. Therefore, the views of 15 respondents were ultimately utilized in this study. After discussing the criteria and procedures for

selecting study participants, the researcher then focused on describing the data collection procedures adopted in this study.

3.12 Data Collection

In this thesis, qualitative research methods were utilized for data collection, which involves the gathering of non-numerical information from the research participants. The process of collecting data started with developing a plan and the research instrument. A research assistant was trained and other data collection aids such as voice recorders were assembled. The steps followed during the data collection process are further discussed.

3.12.1 Data collection plan

The researcher was the chief collector of the data being assisted by two research assistants. The researcher collected the data using in-depth semi-structured interviews and official document review as outlined in the study research instruments. The research assistants were utilised since this was an extensive study so a total of two research assistants was employed in this study. Data collection took about 5-6 weeks. Arrangements were made with the selected mineral beneficiation experts and other experts in the broader field of mineral economics, policies and resources management to interview them and they made provision of 40-50 minutes. The in-depth interviews and official document review was designed by the researcher according to the objectives: To explore the barriers for low levels of mineral beneficiation in Zimbabwe and to explore mining stakeholders' views on the need for mineral beneficiation in Zimbabwe. The interviews were recorded after getting approval from the participants.

3.12.2 Training of the research assistants

The researcher recruited and trained a research assistant who assisted in collecting data throughout the study. The training was prior to data collection and it was done for three days. The research assistant was trained on the following aspects, how to conduct interviews, use tape recorders, questionnaire development, assist with interview logistics. Furthermore, a post graduate student with social science, economics or earth sciences background was recruited.

3.13 Data Analysis

In this study, data analysis involves qualitative data analysis, which involves searching for general statements about relationships among categories of data. This agrees with Leavy (2022) who view qualitative analysis as a process of interpreting data to gain understanding and develop

empirical knowledge. Babbie (2020) also states that qualitative data analysis is a creative, challenging, time-consuming and expensive process.

In this study, data was analysed through a descriptive examination of the participants' narratives, discussion of field notes, and data arrangement and storage. Categories and clusters were used where appropriate to make sense of the data. The researcher used Tesch's method of open coding as suggested by Creswell and Creswell (2018) to analyse the data. This process involves separating, examining, comparing, and categorizing raw data in a new way. This method was chosen for its systematic approach and clearly described procedures. The data was analysed thematically by arranging the information into sub-themes and analyzing it.

3.14 Measures for Ensuring Trustworthiness

During a qualitative inquiry, it is important to ensure that the information being provided by respondents is reliable. The responses from the interviews must be trusted and researcher used several measures to ensure that the responses are trustworthy. In so doing, criteria for ensuring the trustworthiness of the responses include dependability, conformability, transferability and credibility.

3.14.1 Credibility

Credibility entails the degree of confidence in the accuracy of data and the interpretations made from it (Babbie, 2020). It focuses on whether the findings align with reality and how the researcher ensures that the results are trustworthy for readers (Creswell and Creswell, 2018). In this study, credibility was bolstered through methods such as extended engagement, continuous observation, triangulation, and member checking (Anguera *et al*., 2018). These techniques were utilized to enhance the research's trustworthiness and validity.

3.14.2 Dependability

Dependability refers to the assurance that if the study were conducted again with the same or similar participants and in the same setting, the results would remain consistent (Creswell and Creswell, 2018). It is concerned with the stability of data over time and serves as an alternative measure to reliability in quantitative research. Achieving dependability is essential for establishing credibility. The methods used to ensure credibility, such as maintaining an audit trail and employing triangulation, also contribute to dependability.

Audit trail ensured that a detailed record was maintained of the decisions made before and during the research, as well as descriptions of the researcher's actions and non-verbal cues. Since the study employed a mixed-methods approach, triangulation was utilized. This involved providing a detailed description of the research methodology, using open coding during data analysis to ensure data reliability, and involving research experts to ensure compliance with institutional protocols. These strategies were instrumental in promoting dependability in the study, ensuring that the findings were consistent and reliable over time.

3.14.3 Transferability

Transferability, as described by Babbie (2020), is a strategy used to ensure the applicability of research findings. It pertains to the extent to which the data from a specific study can be transferred or applied to other individuals in a similar context. The responsibility for determining the transferability of findings lies with the potential users of the research, rather than the researcher. In this study, the researcher enhances transferability by providing a comprehensive and detailed description of the research methodology and findings, particularly from the fieldwork. This approach enables readers to establish connections and relevance between the study's findings and their own context.

3.14.4 Confirmability

Conformability, in this context, relates to the potential alignment of data in terms of accuracy, relevance, and meaning. To ensure conformability in this study, an independent coder was employed. This approach was further reinforced by implementing an audit procedure, where the researcher provided a thorough account of the research processes, including explanations and justifications for their decisions. Additionally, the researcher conducted an extensive literature review to identify any similarities and differences, and to verify whether the literature supports the study's findings. These measures were taken to enhance the conformability of the research outcomes.

3.15 Ethical Considerations

Ethical considerations encompass the principles and practices that guide research involving human or animal subjects. In this study, an ethical clearance certificate was secured from the University of Venda Ethics Committee after a thorough evaluation process. Before starting the interviews, various ethical standards were adhered to, including obtaining informed consent,

ensuring voluntary participation, preventing harm, maintaining confidentiality, and guaranteeing anonymity.

To ensure informed consent, the researcher made certain that respondents signed a consent form, which was attached to the questionnaire and the semi-structured interview guide. Only those participants who willingly agreed to sign the consent form were allowed to take part in the study. The consent form clearly outlined the purpose of the study and its intended objectives. Participants were made aware that their involvement was entirely voluntary, with the option to withdraw from the study at any time if they wished. They were assured that all information they provided would be kept strictly confidential. Access to this information was limited to the researcher and authorized personnel involved in the study, and it would not be used for any other purposes. To safeguard confidentiality, pseudonyms were assigned to respondents instead of their actual names to protect their identities. The interviews were held at a location that was convenient for both the researcher and the participants, with the intention of minimizing any potential risk of physical harm. Furthermore, the researcher ensured that the questions asked during the interviews remained within the scope of the study, to prevent any potential psychological harm to the participants. These measures were implemented to uphold ethical considerations throughout the research process.

3.16. Conclusion

This chapter offers a detailed overview of the research methodology used in this study. It highlights the integration of both quantitative and qualitative approaches to effectively address the research objectives. For the quantitative aspect, a descriptive research design was adopted, and a two-stage stratified sampling method was employed to choose participants. Data for this component were gathered through a questionnaire and analyzed using descriptive statistics.

In contrast, the qualitative component utilized an exploratory research design. A purposive sampling method, a non-random technique, was used to select participants. The qualitative data gathered from interviews were analyzed thematically, providing a deep exploration of the research topic. To ensure the study's credibility, various methods were applied, including prolonged field engagement, debriefing with participants, and persistent observation. These practices strengthened the study’s credibility and rigor. The chapter concludes with a discussion on the ethical considerations observed throughout the study, ensuring the protection of participants' rights and the integrity of the research process.

CHAPTER 4

RESULTS AND DISCUSSION

4.1 Introduction

This chapter details the study's findings, which include both quantitative and qualitative components. The initial section presents the results from the quantitative analysis, offering a thorough description and interpretation of the descriptive statistics obtained. The subsequent section explores the qualitative findings, which were examined using a thematic approach. This portion of the chapter discusses the significant themes and patterns identified in the qualitative data. The chapter concludes with a summary that synthesizes both qualitative and quantitative results, providing a comparative analysis of the overall research findings.

4.2 Response Rate of Participants

As defined by Fowler (2004), the response rate is the percentage of sample members whose data is included in the final dataset. It is calculated by dividing the number of respondents who completed and returned questionnaires or participated in interviews by the total number of individuals initially sampled, including those who chose not to participate.

In the quantitative study conducted in this research, the response rate of the participants was 100%. This indicates that all 292 participants responded without any errors. Figure 4.1 illustrates the response rate and the number of questionnaires received in this study.

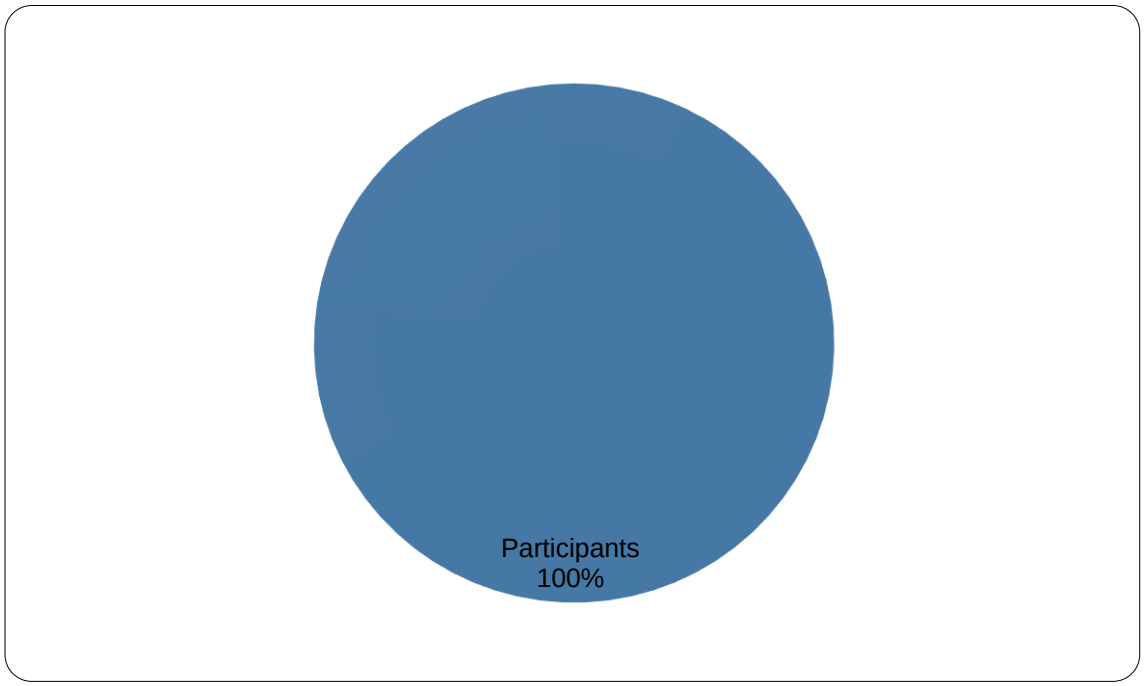


Figure 4. 1 Response rate of the study

4.3 Demographic Information

In this section, the focus is on presenting the demographic characteristics of the study participants. Demographic information refers to data that pertains to personal attributes of the respondents, including factors such as gender, age, employment status, level of education, and income level. This information is valuable as it helps establish a connection with the participants and provides insights into the characteristics of the population being studied.

4.3.1 Gender of respondents

Figure 4.2 shows the gender distribution of the respondents. It shows that 74% of the participants were males and only 26% were females. Gender is important because it reveals the distribution of males and females in fields which have little opportunities for females. In this study beneficiation and value addition of mineral resources is an important industry which should create opportunities for both males and females but this study reveals that the industry is still male dominated including the fact that the participation of women even in government positions in the mining sector is very low. However, it was equally important to capture the views of both genders.

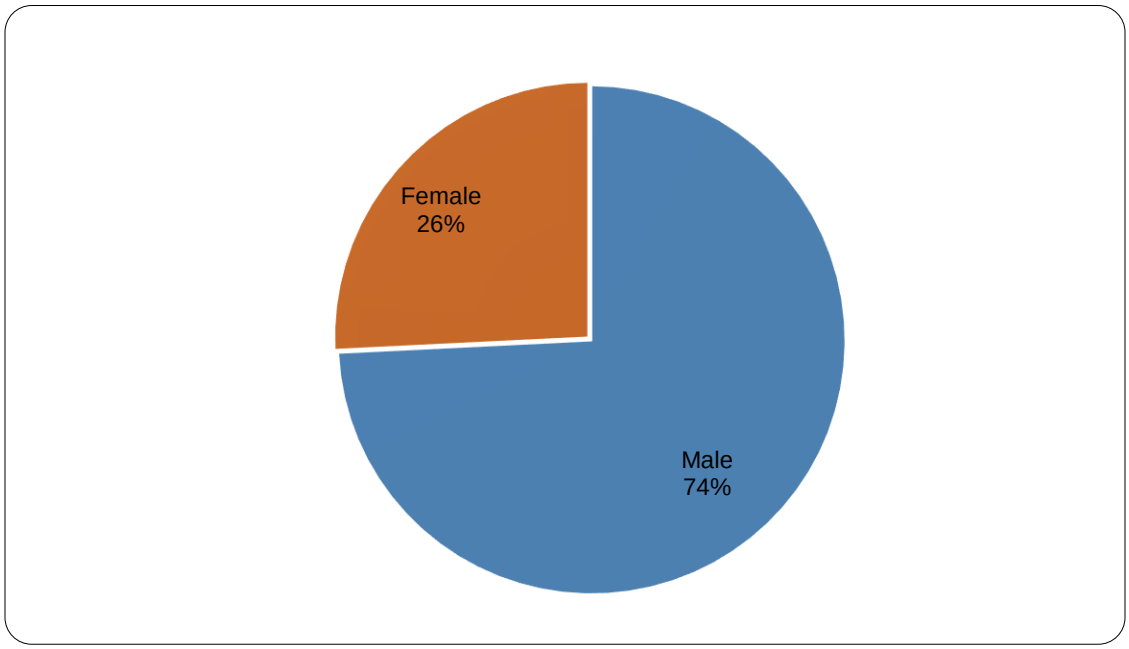


Figure 4. 2 Gender of respondents

4.3.2. Age of respondents

The results regarding the age of respondents are shown in Figure 4.3. It shows that most of the respondents constituting about 62% were within the age range of 31-40 years, followed by 14% of the age range between 20-25 years. The last age groups of 50 and above and 26-30 years of age were represented by 12% each. Age group 31-40 had the highest number of the respondents because it constituted professionals from various departments ranging from academia, the mining and mineral sector and other institutions within the mining sector who are professionals occupying management positions in their different institutions. Age is important in this study because it portrays the population characteristics within the mining industry. Beneficiation and value addition of mineral resources was channelled through the Ministry of Indigenisation and Youth Empowerment to promote employment creation for the youth. Hence, most the participants fall within the youthful category of below 36 years.

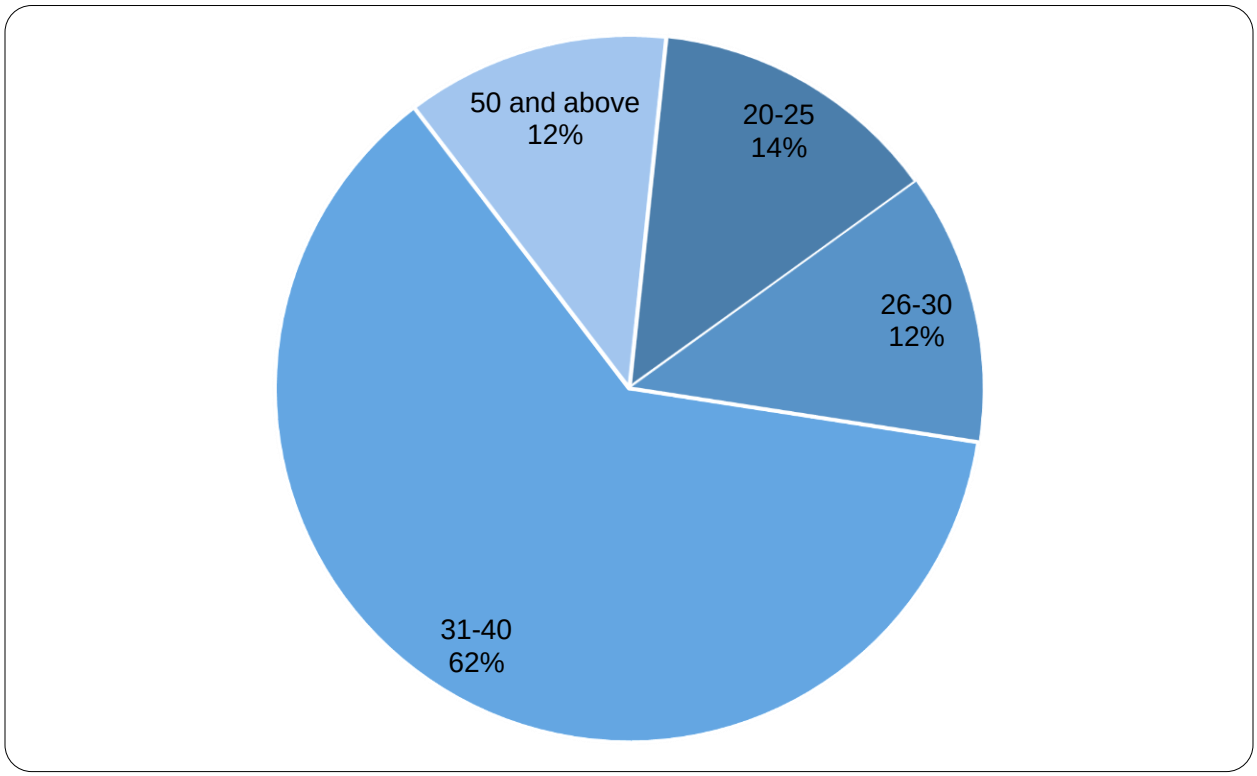


Figure 4.3 Age of respondents

4.3.3 Education of the respondents

The level of education of respondents were categorised into three distinct groups. Figure 4.4 shows the distribution of respondents according to their level of education. Most of the respondents constituting 42% were having a degree while another 31% were having diplomas. Only 27% were having a high school qualification. The level of education was important because most respondents who occupy high offices should have a higher level qualification for them to understand the beneficiation and value addition discourse. Moreover, some respondents were from various professional fields including academia and researchers. Although the qualifications were not targeted at mining and minerals, having a qualification of some sort is a pedestal for initiating and implementing a complex policy such as that of beneficiation and value addition.

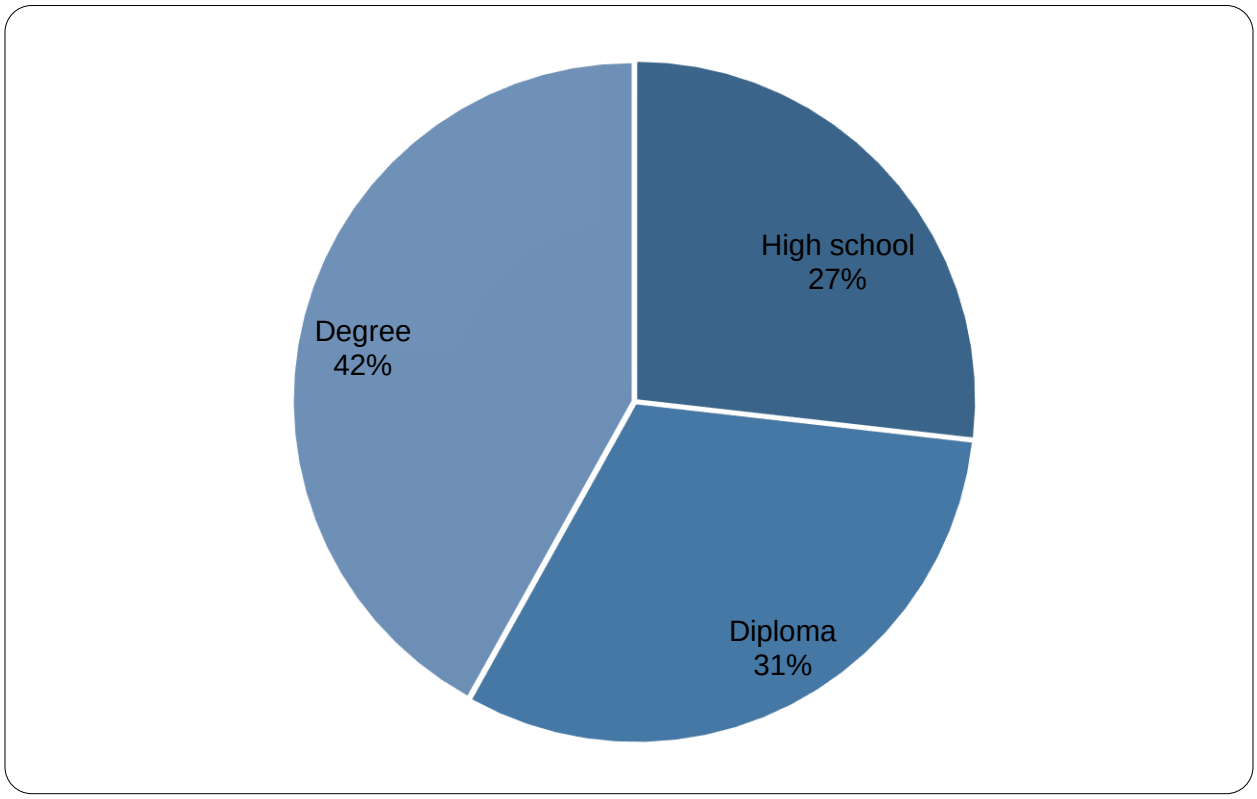


Figure 4.4 Level of education of respondents

4.4 Challenges Affecting the Implementation of Beneficiation and Value Addition Policy in Zimbabwe

This section provides an interpretation of the challenges that affect the implementation of beneficiation and value addition policy in Zimbabwe. The results are presented in segments as structured in the questionnaire. The key issues that are presented include the challenges posed by legal and policy inconsistencies which result in high policy volatility. The results are important for crafting strategies for developing a robust beneficiation and value addition framework in Zimbabwe.

4.4.1 High policy volatility in Zimbabwe

High policy volatility has been a huge impediment to the effective implementation of development policies such as the beneficiation and value addition of mineral resources in Zimbabwe. It refers to the level at which the current policies are susceptible to change within a short space of time. Figure 4.5 shows the responses harvested regarding the high level of policy volatility and its impact on the beneficiation and value addition of mineral resources in Zimbabwe.

As depicted in Figure 4.5, most of the participants, comprising 37%, expressed a strong agreement that Zimbabwe's political economy is marked by substantial policy volatility, which impedes social progress. Additionally, 55% of the respondents agreed with this statement. On the contrary, only 6% disagreed, while a mere 2% strongly disagreed. These findings suggest that a significant portion of the population is aware of the inconsistencies within the policy framework. The inconsistent changes in policies have an adverse impact on both local and international investors.

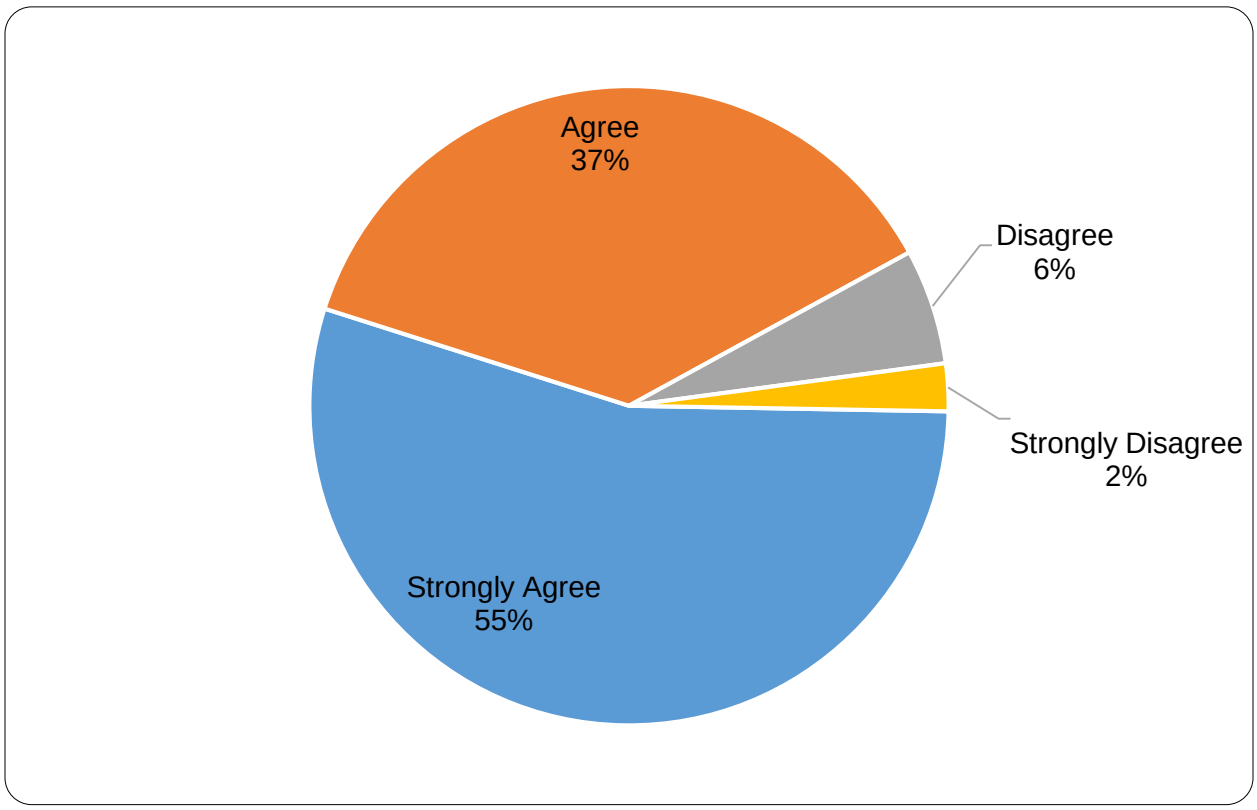


Figure 4.5 Responses regarding high policy volatility

As depicted in Figure 4.5, a majority of the participants, comprising 37%, expressed strong agreement that Zimbabwe's political economy is marked by substantial policy volatility, which impedes social progress. Additionally, 55% of the respondents agreed with this statement. Conversely, only 6% disagreed, while a mere 2% strongly disagreed. These findings indicate that a significant portion of the population recognizes the inconsistencies within the policy framework.

In analyzing these responses, it becomes evident that the inconsistent changes in policies have an adverse impact on both local and international investors. This policy volatility creates an unpredictable business environment, discouraging long-term investment and planning. The

findings align with Saunders *et al*., (2015), who noted that a decline in investment in beneficiation and value addition of mineral resources was triggered by sudden shifts in monetary policy instruments by the Reserve Bank of Zimbabwe. This instability extends beyond the mining sector, affecting other macroeconomic policies such as exchange control policies, monetary policies, and fiscal policies.

Tinarwo and Babu (2022) argue that Zimbabwe's macroeconomic indicators have been unstable over a long period. The failed attempt to de-dollarize brought overlapping challenges across the economy, further exacerbating the situation. The overreliance on short-term five-year policy blueprints reflects the shortcomings of periodic policies without appropriate assessments. In reality, no substantial investment can mature in five years, let alone recoup the initial outlay of a mining project. Since the promulgation of the ZIMASSET policy in 2008, numerous economic blueprints have been instituted without adequate review of the impact made by preceding policy documents.

From the researcher's perspective, it can be argued that for empowerment and development-based policies to yield better results, there is a need to ensure that policies are less volatile. Stable policies would create a more predictable and secure environment for investors, encouraging more significant investments in the mining sector. A long-term, consistent policy framework is crucial for fostering sustainable socioeconomic development in Zimbabwe. Reducing policy volatility would not only attract investment but also provide a stable foundation for the beneficiation and value addition of mineral resources, ultimately contributing to the country's economic growth and social progress

4.4.2 Policy inconsistency

The results from responses regarding policy inconsistency are shown in Figure 4.6. It is indicated that 84% of the respondents strongly agreed and another 12% agreed that policy inconsistency impedes the implementation of beneficiation and value addition policy. About 2% and 3% disagreed and strongly disagreed respectively.

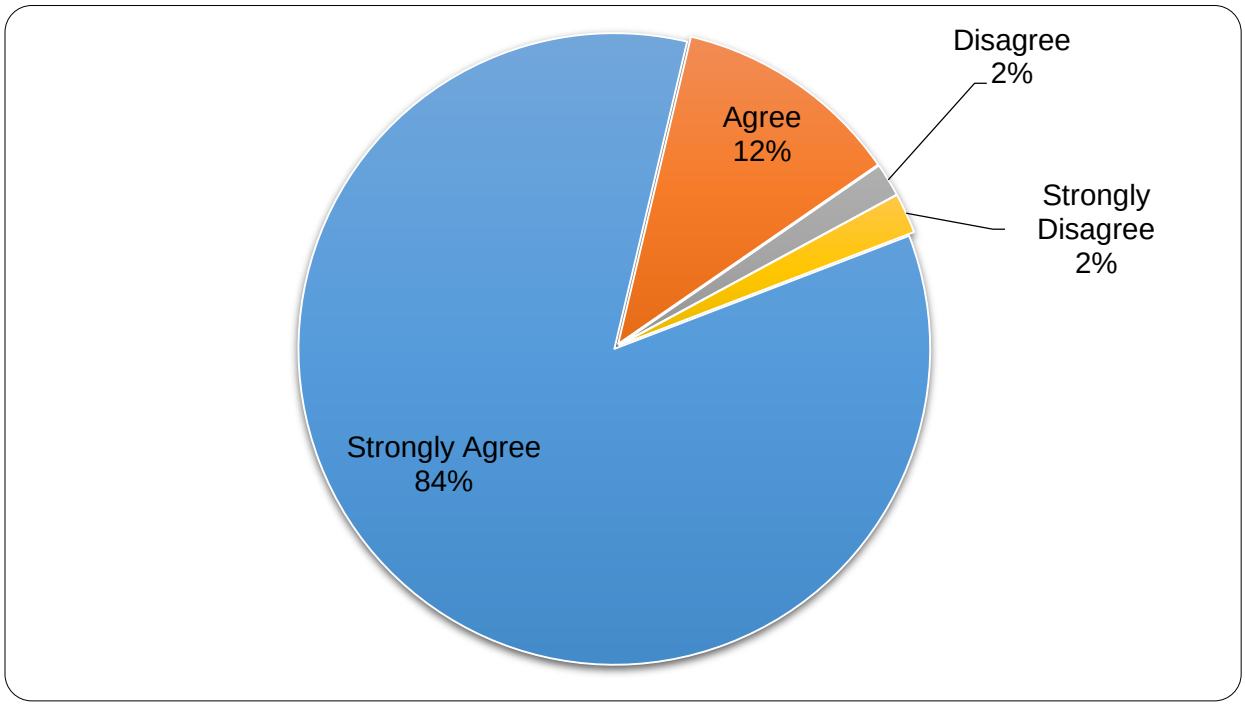


Figure 4.6 Responses regarding policy inconsistency in Zimbabwe

The results of this study on mineral beneficiation and value addition in Zimbabwe suggest that the government is aware of the challenges posed by policy inconsistency, which has contributed to the economic meltdown. Policy inconsistencies give rise to various challenges, including diminished revenue generation, increased indebtedness, limited liquidity in the financial system, and a decline in confidence in the government. According to Kola (2019), mineral beneficiation has been prominently positioned in the development of economic policies and planning since 2013.

Several policy documents attest to this assertion, including the ZIMASSET policy, National Trade Policy, ZANU PF 2014 party resolution on mineral beneficiation, Mines and Minerals Act, Draft Minerals Policy, and Indigenisation and Economic Empowerment Act, among others. However, these policy blueprints have also contributed to a burden of policy inconsistency in Zimbabwe. Such inconsistency and incoherence are detrimental to the implementation of mineral beneficiation.

A closer examination suggests that the Department of Policy Monitoring and Coordination in the Office of the President and Cabinet is ineffective in managing policy coordination, monitoring and

evaluation due to the crisis of policy inconsistency and incoherence within various pieces of legislation across different government departments. This fragmentation creates a disjointed policy environment that hinders coherent and sustainable socio-economic development of the nation.

From the investigator's perspective, it is imperative that the government commits to developing robust policy frameworks that offer both long-term and short-term benefits. These policies should be constantly reviewed and updated to remain relevant and effective in promoting socioeconomic development. By ensuring consistency and coherence in policy-making, the government can create a more stable and predictable environment for mineral beneficiation and value addition, which is essential for attracting investment and fostering economic growth.

In conclusion, the study findings highlight the need for the government to address policy inconsistency broadly. Establishing a stable policy framework will not only enhance the implementation matrix of mineral beneficiation but also contribute to broader socioeconomic development goals in Zimbabwe.

4.4.3 The effect of ZIMASSET policy

Respondents were asked about the effects of the ZIMASSET policy on sustainable socioeconomic development of Zimbabwe and the results are presented in Figure 4.6. It shows that 74% of the participants strongly agreed and another 22% agreed that the ZIMASSET policy relatively posed substantial effects on beneficiation and value addition of minerals in Zimbabwe. Only 4% and 1% disagreed and strongly disagreed respectively. Although beneficiation and value addition of mineral resources was being practiced previously on a small scale, implementing it as a policy was critical for unleashing a new avenue of economic activities. Introducing beneficiation and value addition of minerals resources created opportunities for the youth and women who were often marginalised in the mainstream economic activities such as mining (Manyuchi *et al*., 2019). However, Bvirindi (2022) castigates the lack of a fully-fledged implementation plan of policy blueprints as the major impediment to the realisation of the country’s socio-economic goals. Most respondents noted the view that the intended objective of the policy to advance social and economic transformation was a pipe dream. It is argued that Zimbabwean polices are appealing on paper but their piecemeal implementation thwarts its socio-economic development initiatives (Matanhire, 2020).

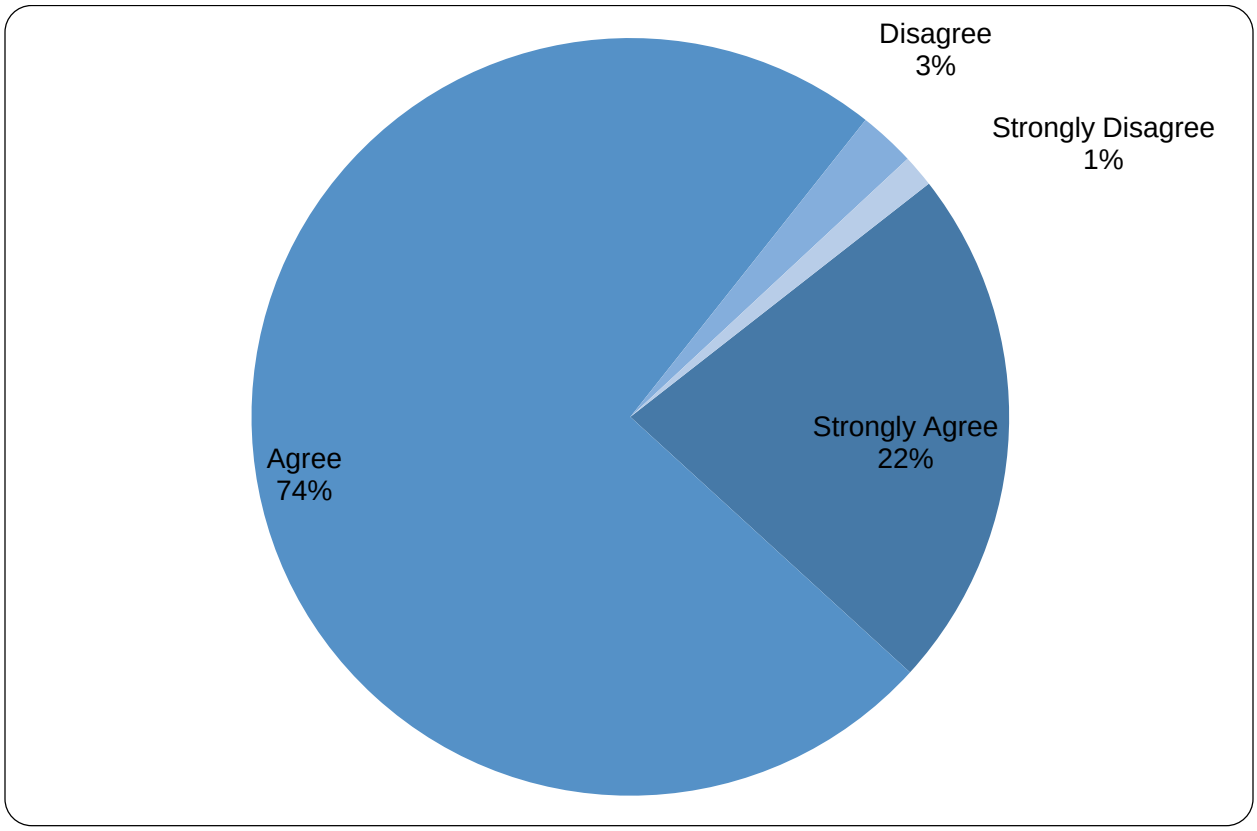


Figure 4.7 Responses on the effect of ZIMASSET policy on beneficiation and value addition

In analyzing these findings, it becomes evident that while the ZIMASSET policy was well-intentioned, its impact has been limited by inadequate implementation and lack of continuity. Bvirindi (2021) suggests developing long-term policy plans that supersede electoral terms to create space for full implementation and evaluation of policy blueprints. This is important because as the five-year term expires, new policy blueprints are introduced, often lacking connection with the preceding ones. The lack of backward linkages between policy blueprints promotes corruption. Saunders *et al*., (2015) argue that inconsistency in policy implementation negatively affects good governance principles such as transparency and accountability. Over the years, the Zimbabwean government reportedly lost over 5 billion US dollars through corruption (Chitando, 2018). The current issues regarding the smuggling of precious minerals highlight the pitfalls of inconsistent policy implementation, including the beneficiation and value addition policy contained in the ZIMASSET blueprint.

The researcher argues that, it is imperative that the government addresses these challenges by establishing a robust and coherent policy framework that ensures continuity and effective implementation. Long-term policies should be designed with mechanisms for regular review and

adjustment to remain relevant and effective. Moreover, integrating comprehensive implementation plans and ensuring accountability at all levels of government can mitigate the risks of corruption and policy failure.

In conclusion, the study findings emphasize the need for a more strategic approach to policy-making and implementation. By addressing the issues of inconsistency and lack of continuity, the government can enhance the effectiveness of policies like ZIMASSET and achieve meaningful socioeconomic development. Creating a stable and transparent policy environment will not only facilitate mineral beneficiation and value addition but also foster broader economic growth and social progress in Zimbabwe.

4.4.4 Policy unpredictability

The Zimbabwean policy landscape is characterized by multiple inconsistences due to constant policy shift. In this section respondents were asked if the policy unpredictability has an effect on beneficiation and value addition and the results are shown in Figure 4.8. 67% of the respondents, and 28% strongly agreed and agreed respectively that policy unpredictability negatively affect beneficiation and value addition of mineral resources in Zimbabwe. About 3% disagreed and 2% strongly disagreed. The results suggest that the Zimbabwean government's policy terrain is unpredictable such that investment in capital intensive business ventures in beneficiation and value addition becomes difficult. The effect of policy unpredictability has crosscutting effects across the various government organs. For example, the indigenization policy which required all foreign owned companies to cede 51% ownership to locals negatively impacted on beneficiation and value addition.

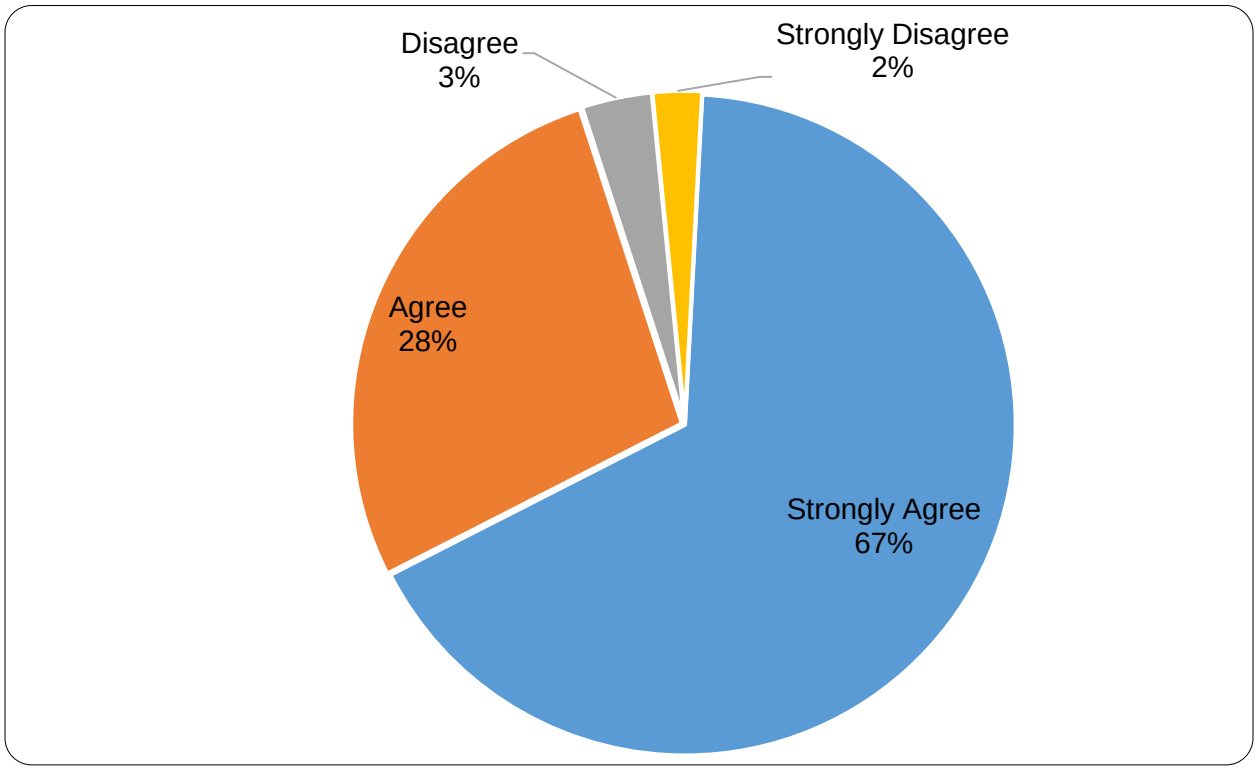


Figure 4.8 The effect of policy unpredictability on beneficiation and value addition in Zimbabwe

The existing situation in Zimbabwe demonstrates the presence of policy unpredictability, as evidenced by the introduction of the Transitional Stabilisation Programme (TSP), a two-year policy document that was subsequently replaced by the end of 2020 (Government of Zimbabwe, 2019). Such unpredictability in the policy environment can undermine investor confidence, as it is essential for the government to develop long-term policies rather than short-term ones like the TSP. Dube (2016) further argues that the recurring mention of mineral beneficiation in various policy documents in Zimbabwe reflects a need for comprehensive policy alignment and coherence among government institutions.

These findings reveal that policy unpredictability poses a significant challenge in Zimbabwe. The study findings suggest that beneficiation policies carry considerable risks, with the uncertainty of lengthy processes often resulting in companies holding back investments until the policy's outcome is clearer. The Economic Commission for Africa and the African Union (2011) opine that to avoid policy uncertainty, policy predictability and credibility are key. Without these, companies would challenge the government's ability to implement beneficiation programs. This view is supported by De Villiers (2017), who argues that governments should not simply legislate for

beneficiation and industrialization. Instead, significant government capacity, complex decision-making, and coordination with the private sector are required.

From the researcher's viewpoint, it is imperative that the government focuses on creating a stable and predictable policy environment. This includes developing long-term policies with clear implementation plans and mechanisms for regular review and adjustment to ensure they remain relevant and effective. By enhancing policy predictability and credibility, the government can foster a more conducive environment for investment in beneficiation and value addition, thereby promoting sustainable socioeconomic development.

In conclusion, the study findings emphasize the need for a strategic approach to policy-making and implementation. Addressing the issues of policy unpredictability and ensuring consistency can significantly improve the effectiveness of policies like beneficiation and value addition. This, in turn, will attract investment, boost economic growth, and contribute to the broader socioeconomic development goals of Zimbabwe

4.4.5 Industrial Development Policy

The Industrial Development Policy is an overarching policy document that seeks to regulate the industrial activities across the economy. Over the past years, the policy document has highlighted the importance of the beneficiation and value addition as a strategic thrust within the reindustrialisation program of Zimbabwe. Respondents were asked whether the industrial policy development policy promotes beneficiation and value addition and the results are presented in Figure 4.9.

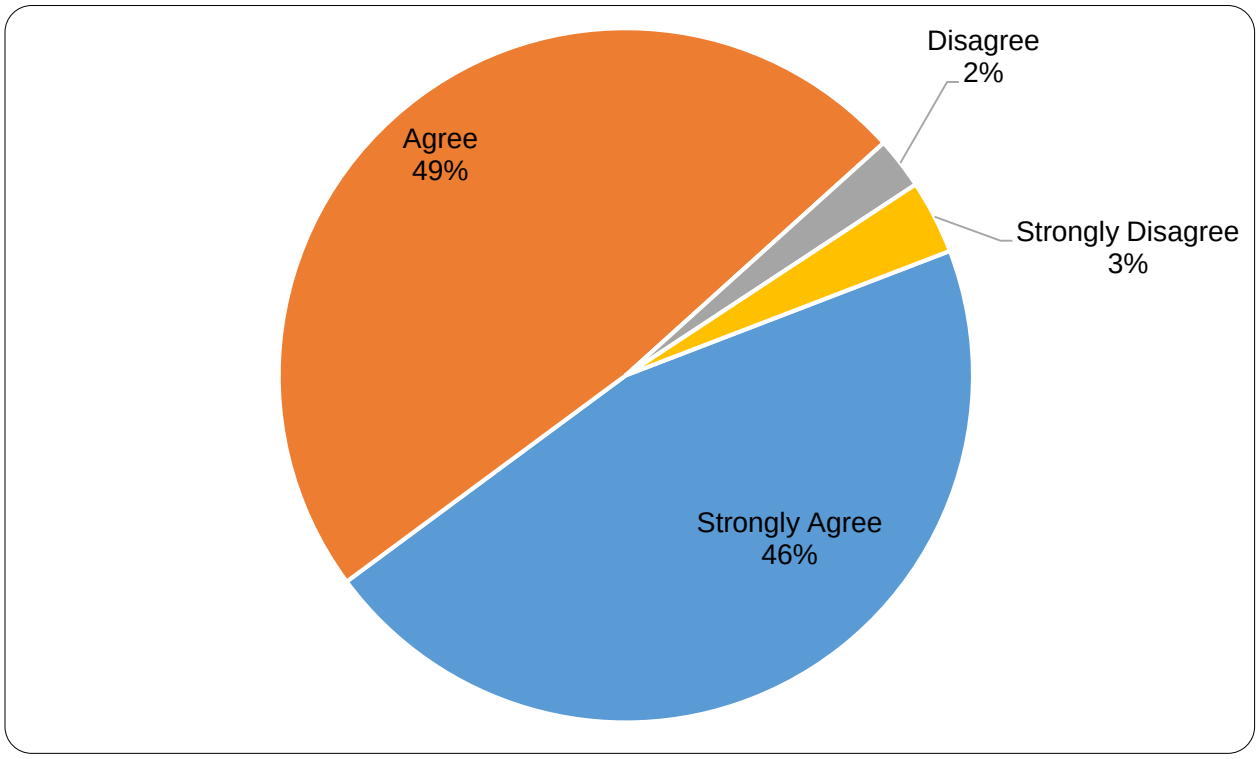


Figure 4.9 The effect of the Industrial Development policy on beneficiation and value addition in Zimbabwe

The results indicate that 49% of the respondents strongly agreed, and an additional 46% agreed that the Industrial Development Policy had a positive effect on beneficiation and value addition. Conversely, a small percentage of respondents, 3% strongly disagreed, and 2% disagreed respectively. These findings suggest that Zimbabwe possesses significant potential to revive its economy through the utilization of its abundant mineral resources, which can serve as a catalyst for creating linkages and fostering diversification. Tinarwo and Babu (2021) reported similar findings, emphasizing the importance of incorporating beneficiation and value addition into the industrial development strategy to fully harness the potential of mineral resources.

When examining these findings, it becomes clear that the Industrial Development Policy has been effective in promoting beneficiation and value addition to some extent. The high levels of agreement among respondents indicate a general consensus on the policy's positive impact. However, the challenge lies in the consistent and effective implementation of this policy. The potential benefits of beneficiation and value addition, such as attracting investment, generating employment opportunities, and contributing to sustainable socioeconomic development, can only be fully realized if the policy is implemented coherently and consistently across all sectors.

From the researcher's standpoint, the Industrial Development Policy must be accompanied by robust implementation frameworks and continuous monitoring to ensure its goals are met. The government should focus on creating an enabling environment for industries involved in beneficiation and value addition by providing necessary infrastructure, incentives, and support. Additionally, regular reviews and updates of the policy should be conducted to align it with evolving economic conditions and technological advancements.

In conclusion, the study findings underscore the importance of the Industrial Development Policy in promoting beneficiation and value addition. By addressing the challenges in policy implementation and ensuring consistent application, Zimbabwe can harness its mineral resources more effectively to drive economic growth and sustainable socio-economic development. A strategic and well-implemented Industrial Development Policy can significantly contribute to the country's reindustrialization efforts and broader socioeconomic progress.

4.4.6 Industrial transformation

The results show that 76% of the respondents strongly agreed, and another 20% agreed that industrial transformation positively impacts the beneficiation and value addition of mineral resources in Zimbabwe. About 2% disagreed. These findings are similar to those of Fessehaie and Rustomjee (2018), who concur that industrial transformation is an important prerequisite for the realization of beneficiation and value addition.

However, upon analyzing these findings, it becomes evident that Zimbabwe’s efforts to initiate industrial transformation have faced significant challenges due to a lack of innovative strategies to enhance beneficiation and value addition of mineral resources.

The government was unable to provide alternative financial assistance to beneficiation and value addition ventures to replace the huge capital outflows. Moreover, industrial transformation requires state-of-the-art infrastructure. A study conducted in China has shown that industrial transformation has been a key driver of beneficiation and value addition of mineral resources because it ignited capacity building in both infrastructure and skills development (Mengich *et al*., 2019).

From the researcher's viewpoint, while the industrial transformation policy has the potential to positively impact beneficiation and value addition, its success hinges on addressing several critical factors. To commence with, there is a need for substantial investment in modern infrastructure and technology to support these activities. In addition, capacity building in terms of

skills development and financial support is essential to ensure that local industries can effectively participate in beneficiation and value addition.

Additionally, industrial transformation should be entrenched in policy and legal reforms to create a conducive environment for conducting business. It is further argued that real transformation does not come merely from processing raw materials but from specializing in activities that are close in terms of technology and factor intensity or existing areas of competitive advantage (Mavhunga, 2018; Gudyanga, 2020).

In conclusion, the study findings highlight the potential benefits of industrial transformation for beneficiation and value addition in Zimbabwe. However, to fully realize these benefits, the government must address the existing capacity constraints, invest in infrastructure and skills development, and implement supportive policy and legal frameworks. By doing so, Zimbabwe can leverage its industrial transformation policy to drive sustainable economic growth and social development.

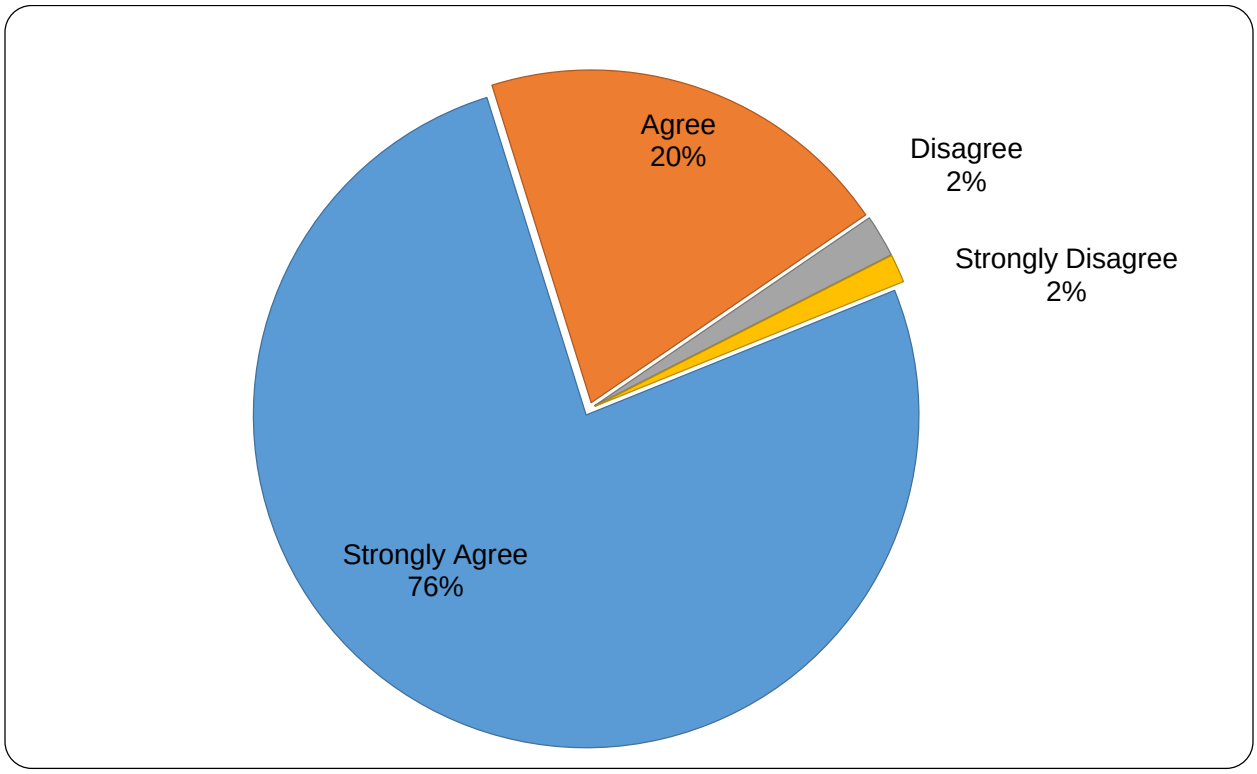


Figure 4.10 The role of industrial transformation on beneficiation and value addition in Zimbabwe

4.4.7 National Trade Policy

The National Trade Policy has been instrumental in prohibiting the sale of raw mineral resources in Zimbabwe, thereby creating avenues for beneficiation and value addition. Respondents were asked to indicate whether the National Trade Policy promotes beneficiation and value addition of mineral resources in Zimbabwe, and the results are shown in Figure 4.11.

The results reveal that 40% of the respondents strongly agreed, and 31% agreed that the National Trade Policy positively impacts beneficiation and value addition. Conversely, 29% disagreed. These findings suggest that while the National Trade Policy aims at promoting beneficiation and value addition, it has not been effective in achieving the annual export growth rate as outlined in the policy document.

Thoroughly scrutinising these findings, it is evident that the National Trade Policy had mixed results. On the one hand, the policy has created a framework for enhancing beneficiation and value addition by restricting the sale of raw minerals. On the other hand, the policy's effectiveness

in driving substantial export growth and broader economic benefits remains limited. This discrepancy points to a need for more comprehensive and aligned economic strategies.

The findings agree with Grynberg and Sekelela (2015), who argue that Zimbabwe's economic strategies should be aligned with National Development Plans to keep abreast to industrial demands and global best practices that promote mineral beneficiation through trade policies. Moyo (2020) echoes similar sentiments, emphasizing the need for Zimbabwe to develop a national vision premised on a comprehensive strategy for mineral beneficiation and value addition. This strategy should be underpinned by a national beneficiation framework rather than relying on short-term policies, which have limited impact on sustainable socioeconomic development.

The researcher is of the view that the National Trade Policy must be supported by a cohesive and long-term national beneficiation framework. This framework should integrate various economic strategies and policies to create a conducive environment for sustainable beneficiation and value addition. Furthermore, the government should focus on building the necessary infrastructure, providing financial support, and fostering skills development to ensure the effective implementation of the policy.

In conclusion, the study findings highlight the potential of the National Trade Policy to promote beneficiation and value addition of mineral resources in Zimbabwe. However, to fully realize this potential, there is a need for a more strategic and integrated approach that aligns with national development goals. By developing a robust national beneficiation framework and ensuring consistent policy implementation, Zimbabwe can enhance its economic growth and achieve sustainable socio-economic development.

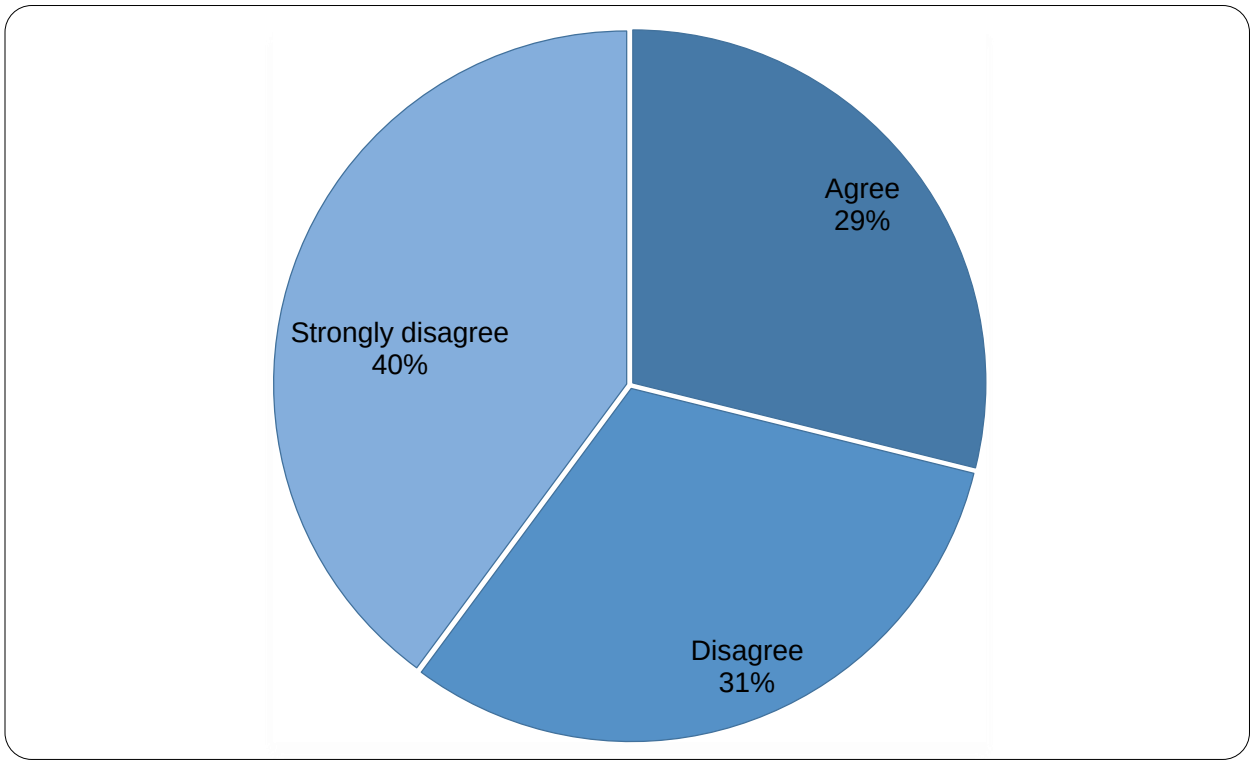


Figure 4.11 The effect of the National Trade policy on beneficiation and value addition in Zimbabwe

4.4.8 The importance of beneficiation and value addition linkages

Figure 4.12 shows the distribution of responses regarding the importance of beneficiation and value addition. 53% of the respondents strongly agreed and 43% agreed that beneficiation and value addition foster multiple linkages which support sustainable socioeconomic development. About 2% strongly disagreed and disagreed respectively with the notion that beneficiation and value addition create multiple linkages which foster socio-economic development. While the findings reveal the importance of beneficiation and value addition in the mining value chain, Nyarota *et al*. (2016) argue that the government of Zimbabwe has not achieved the intended objectives due to policy misalignment. Makaye and Mapuva (2016) reiterate that Zimbabwe has all the plans well-crafted but, it lacks commitment to convert the potential into tangible results. Kgalo (2019) argues that beneficiation and value addition of mineral resources creates multiple linkages such as market linkages, backward and forward linkages as well as horizontal linkages. These linkages are important because they promote employment creation and expansion of industrial activities.

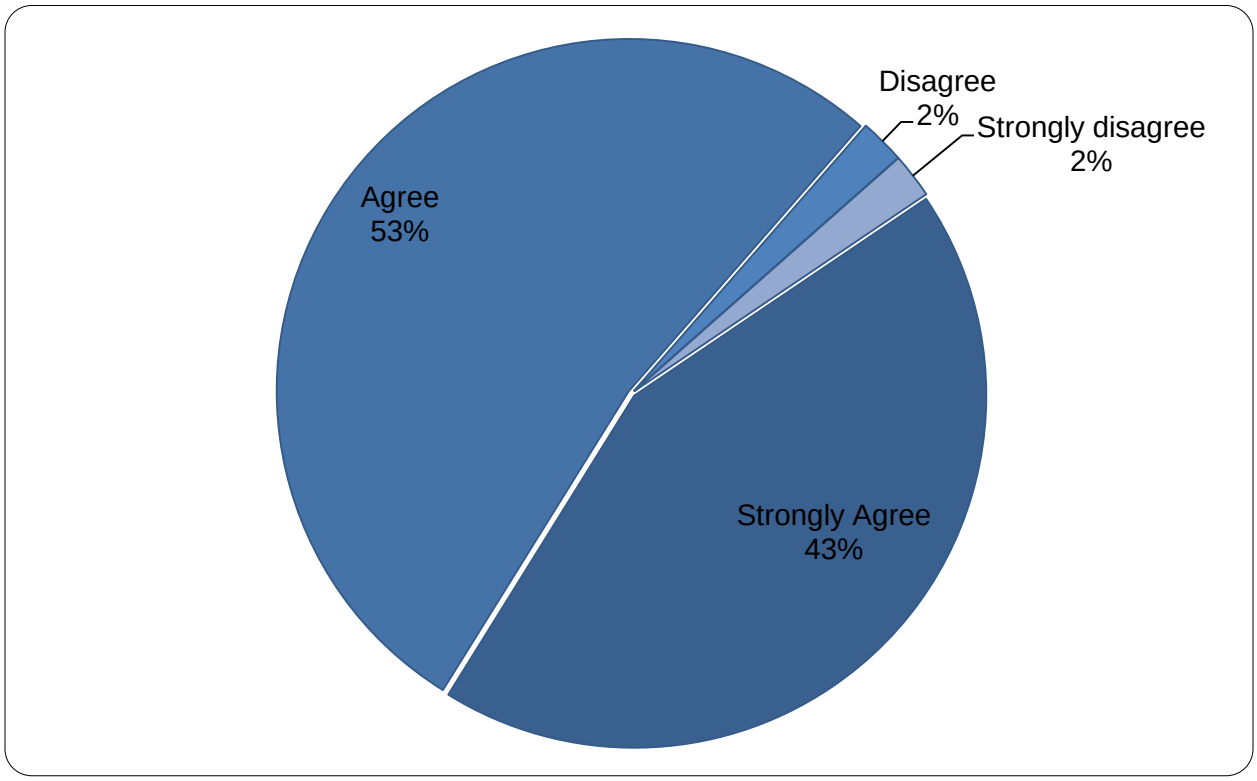


Figure 4.12 The importance of beneficiation and value addition linkages

Mugano *et al* (2013) suggest the view that when looking at prosperity of a country one has to look at the life style of the citizens. In this case, one may explore Zimbabwe per capita income to ascertain the quality of life of the citizens. Per capita income is a measure of the amount of money earned per person in a nation or geographic region (ZIMSTATS, 2022). Considering the current per capita figures it can be argued that ordinary Zimbabweans quality of life is poor hence one may suggest the view that the National Trade Policy made less impact on the general populace in terms of sustainable socio-economic development of Zimbabwe.

Critically examining the findings, it is evident that while there is recognition of the importance of beneficiation and value addition, the practical implementation of these strategies has been hindered by several factors. Policy misalignment and lack of commitment from the government are significant obstacles. The creation of multiple linkages through beneficiation and value addition can drive economic growth by fostering industrial activities and creating jobs. However, these benefits are contingent on the effective execution of policies.

The researcher is of the view that government needs to address the gaps in policy alignment and ensure a consistent and committed approach to implementing beneficiation and value addition

strategies. The potential for these strategies to create market, backward, forward, and horizontal linkages is substantial, but realizing this potential requires a coherent policy framework and sustained governmental support.

In summation, the study findings underscore the critical role of beneficiation and value addition in fostering multiple linkages that support sustainable socioeconomic development. However, to fully leverage these benefits, Zimbabwe must address policy misalignment and demonstrate a committed approach to policy implementation. By doing so, the country can enhance its economic growth, improve the quality of life for its citizens, and achieve its socioeconomic development goals.

4.4.9 The effect of the Indigenisation and Economic Empowerment Act

The Indigenisation and Empowerment Act was one of the most controversial policies which affected the functioning of the economy. Respondents were asked as to whether the Indigenisation and Empowerment Act impacted on beneficiation and value addition and the results are present in Figure 4.13. 89% the participants strongly disagreed with the notion that the Indigenisation policy positively impacted on beneficiation and value addition of mineral resources and a further 10% disagreed. Only 1% agreed that indigenisation helped in the implementation of the beneficiation and value addition of mineral resources. The indigenisation policy can be analysed in two lenses, i.e., from the side of beneficiaries and from the side of investors. According to the Government of Zimbabwe (2018) the indigenisation policy was the cornerstone of empowerment and employment creation. However, the costs outweighed the benefits. As indicated by the current results, the indigenisation policy triggered the exodus of foreign investors who felt that their fortunes were being eroded for a poor return.

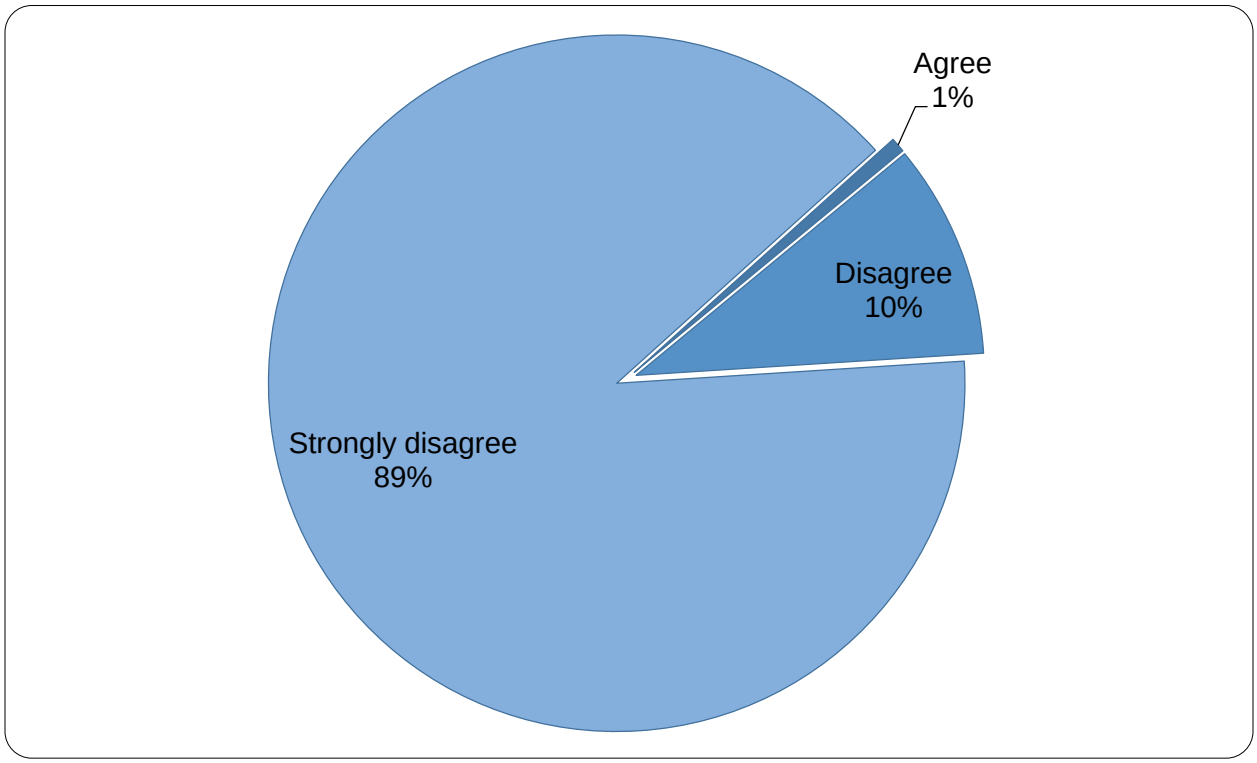


Figure 4.13 The effect of indigenisation and empowerment policy on beneficiation and value addition in Zimbabwe

The findings of this study indicate that the current implementation of the Indigenization and Economic Empowerment law in Zimbabwe has the potential to significantly hinder the country's investment climate and competitiveness, as evidenced by the state of the economy. While the government has made amendments to the Indigenisation and Empowerment Act to accommodate investors, certain provisions, such as the 49%/51% shareholding requirement in strategic minerals like platinum and diamond mining, still remain in place. The study findings suggest that the Indigenisation and Economic Empowerment Act has had a negative impact on the nation's economic growth and development. These findings align with the observations made by Gudyanga (2020), who highlighted that such stringent laws deter both existing and potential investors. He argues that such laws have a detrimental effect on investments and investment decisions, even if there is support for the objectives that the law aims to achieve. Therefore, it is crucial for the government to amend such legislation in order to attract investment opportunities that can contribute to the sustainable socio-economic development of Zimbabwe.

while the goals of empowerment and employment creation are laudable, the approach taken by the Indigenisation policy has proven counterproductive. The negative impact on foreign

investment has stifled economic growth and hindered the development of the beneficiation and value addition sectors. It is crucial for the government to amend such legislation to create a more investor-friendly environment. This would involve revising the shareholding requirements and providing more incentives for both local and foreign investors.

In conclusion, the study findings indicate that the Indigenisation and Economic Empowerment Act, in its current form, poses significant challenges to Zimbabwe's investment climate and economic development. To attract investment opportunities that can contribute to sustainable socioeconomic development, it is essential for the government to make substantial amendments to the legislation. By creating a more favourable investment climate, Zimbabwe can enhance its economic growth and achieve its development goals.

4.4.10 Public policy

Respondents were asked to indicate their views regarding the crafting of public policies and the results are shown in Figure 4.14. 79% of the respondents, strongly agreed and another 19% agreed that public policy should involve community participation. Only 2% disagreed. The findings of this study postulate the view that beneficiation policies in Zimbabwe are not community driven.

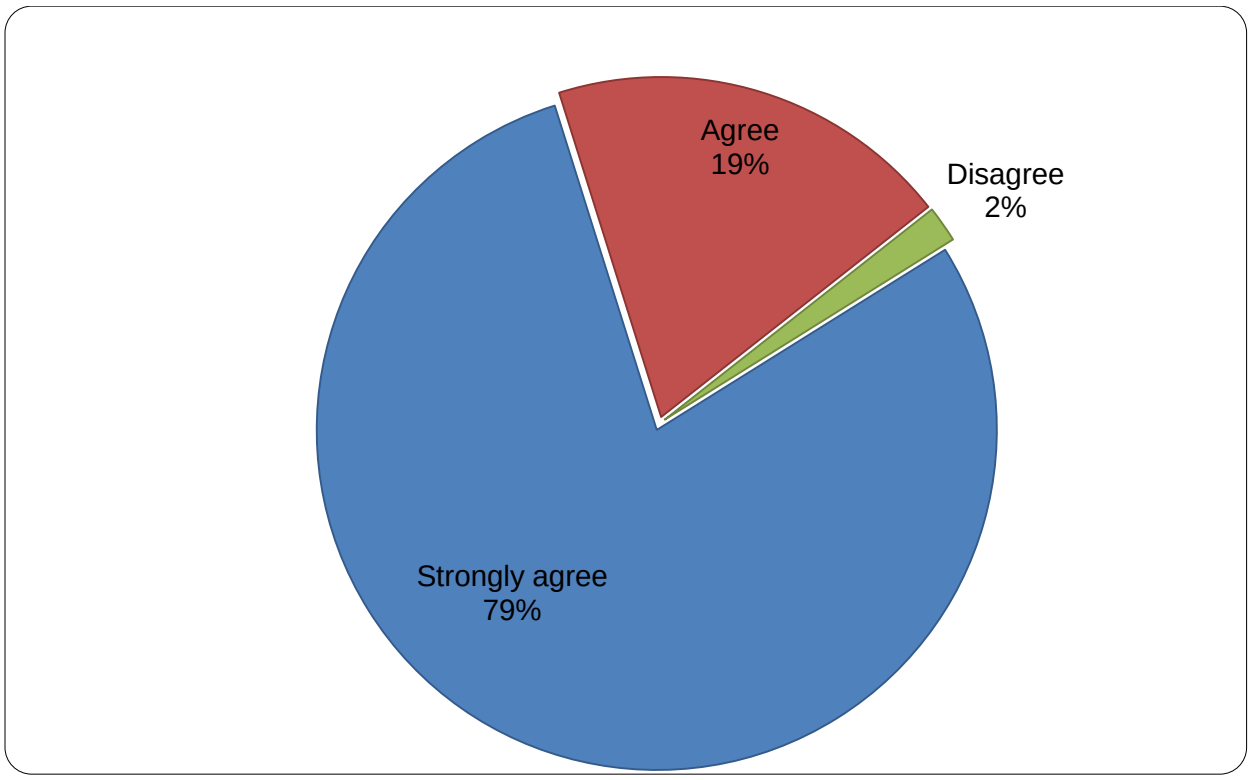


Figure 4.14 Responses regarding the crafting of public policy in Zimbabwe

According to Huni (2018) for mineral beneficiation to be feasible it should not be based on theoretical assumption but should be based on a practical implementation strategy. This notion of Huni (2018) cannot be over emphasized as the government of Zimbabwe needs to conduct a value chain analysis to identify the various steps required for the implementation of the beneficiation policies. The findings of this study are in tandem with the literature on the view that policies should be community driven not politically driven, as the case with public policies on beneficiation and value addition in Zimbabwe. Gwatidzo and Mbohwa (2019) reiterate that there is need for separation of politics and governance. This is contrary to the Zimbabwean situation in that ZANUPF is government and there seems to be no difference between the two. Such a position affects governance and hence the government of Zimbabwe ought to implement the necessary measures to address such an anomaly.

The researcher suggests the involvement of community participation in the crafting of public policies as a crucial tool for ensuring that these policies are relevant, practical, and sustainable. Community-driven policies are more likely to gain local support and be effectively implemented, leading to better socioeconomic outcomes. The government should prioritize conducting thorough value chain analyses and actively involve communities in the policy-making process to ensure that beneficiation policies are well-aligned with the practical realities on the ground.

In conclusion, the study findings highlight the importance of community participation in the crafting of public policies. To improve the effectiveness of beneficiation policies in Zimbabwe, it is essential to separate political interests from governance and involve communities in the policy-making process. By doing so, the government can develop more relevant, practical, and sustainable policies that better support the socioeconomic development goals of Zimbabwe.

4.4.11 The contribution of beneficiation and value addition to economic recovery

As a strategic thrust in the National Industrial Policy, beneficiation and value addition of mineral resources is expected effectively to contribute to economic recovery in Zimbabwe. Figure 4.15 shows the results of the expected contribution of beneficiation and value addition to economic recovery. 86% of the respondents strongly agreed and another 13% agreed respectively that beneficiation and value addition are poised for economic recovery. Only 1% disagreed.

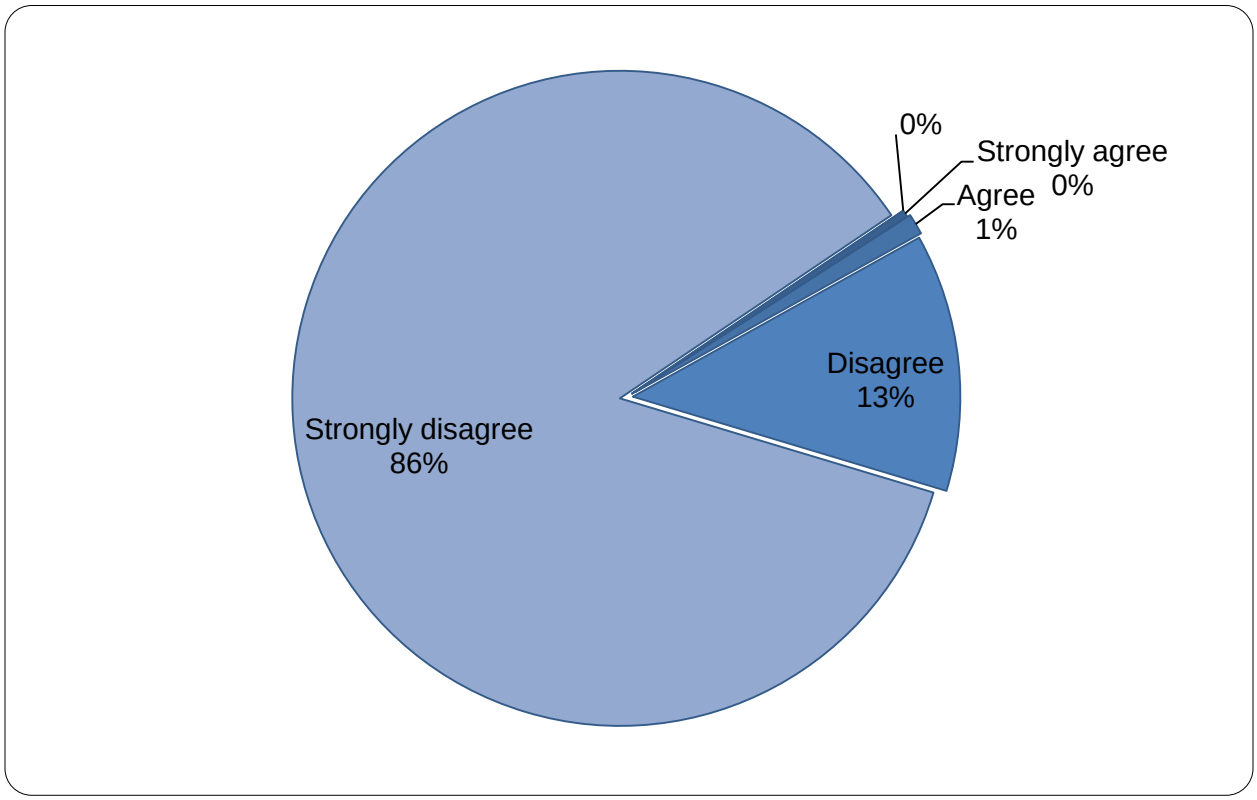


Figure 4.15 The contribution of beneficiation and value addition of mineral resources to economic recovery

The results show that the government's effort to stimulate economic recovery is aligned to its policies such as the beneficiation and value addition policy. These policies include the ZIMASSET, National Trade Policy, Indigenisation and Economic Empowerment Act, The draft Mineral Policy and Mines and Minerals Act. However, it is argued that government's efforts to turn the sector as a springboard has been futile as investors have seen the policies as not conducive for investment in Zimbabwe. Mamina *et al.,* (2020) reiterate that the political environment is also a factor when it comes to choosing a destination of investment. The Africa Mining Vision assert the view that many factors count when a potential investor intends to do business in a country and amongst the factors to consider is the issue of easy of doing business and the issue of red tapes (UNCTAD,2018). One may observe that investing in Zimbabwean mining sector where there are political constraints and political power struggles would be a crisis of expectation which may not be validated through scientific reckoning on the part of the government of Zimbabwe.

Zimbabwe is restricted by shortage of energy, infrastructure and skills amongst other key enablers hence Zimbabwe ought to identify its competitive advantage and agree on an implementation

matrix whether through a corporate buy in or through arbitrary enforcement. Hence the researcher is of the view that for Zimbabwe to achieve economic recovery there is need for a vested interest approach between government of Zimbabwe, the private sector and all the stakeholders within the mining and mineral sector. Sustainability should be the key theme between the government and the mining sector and such collaboration should develop beyond a single event.

UNCTAD (2018) further suggest that government and stakeholders must move closer to each other in order to understand the varying challenges and perspectives. That demonstrates the need for strong alignment between business and government if beneficiation is to take place and yield meaningful impact in Zimbabwe that will enable economic recovery. The study findings collaborate with literature on the notion of policies and the political context in Zimbabwe. Mungoshi (2011) opines that Zimbabwean approach of quick fix for economic redress without laying a robust base for economic growth will not address the challenges the country is facing. Central to economic recovery is macroeconomic stability, growth and institutional reforms.

4.4.12 Policies and political context

The Zimbabwean political context has been turbulent for over three decades and the government relied on changing policies to solve the long term challenges that systematically emerged. The results regarding the policies and the political context are shown in Figure 4.16 The results show that 53% of the respondents strongly disagreed and another 43% disagreed with the notion that the current policies are aligned to the political context. Only 2% and 2% agreed and strongly agreed that the current policies are aligned to the political context. The study findings suggest that a lack of coherent and aligned policies is the major challenge in Zimbabwe. There is need for holistic ideas not quick fix ideas as seen in the short-term policies like ZIMASSET, TSP amongst others which do not provide a long-term plan for Zimbabwe. Zimbabwe has a cyclical economy which requires fiscal policies to address such a challenge but due to the current political climate prospects of linkages creation will be a nightmare.

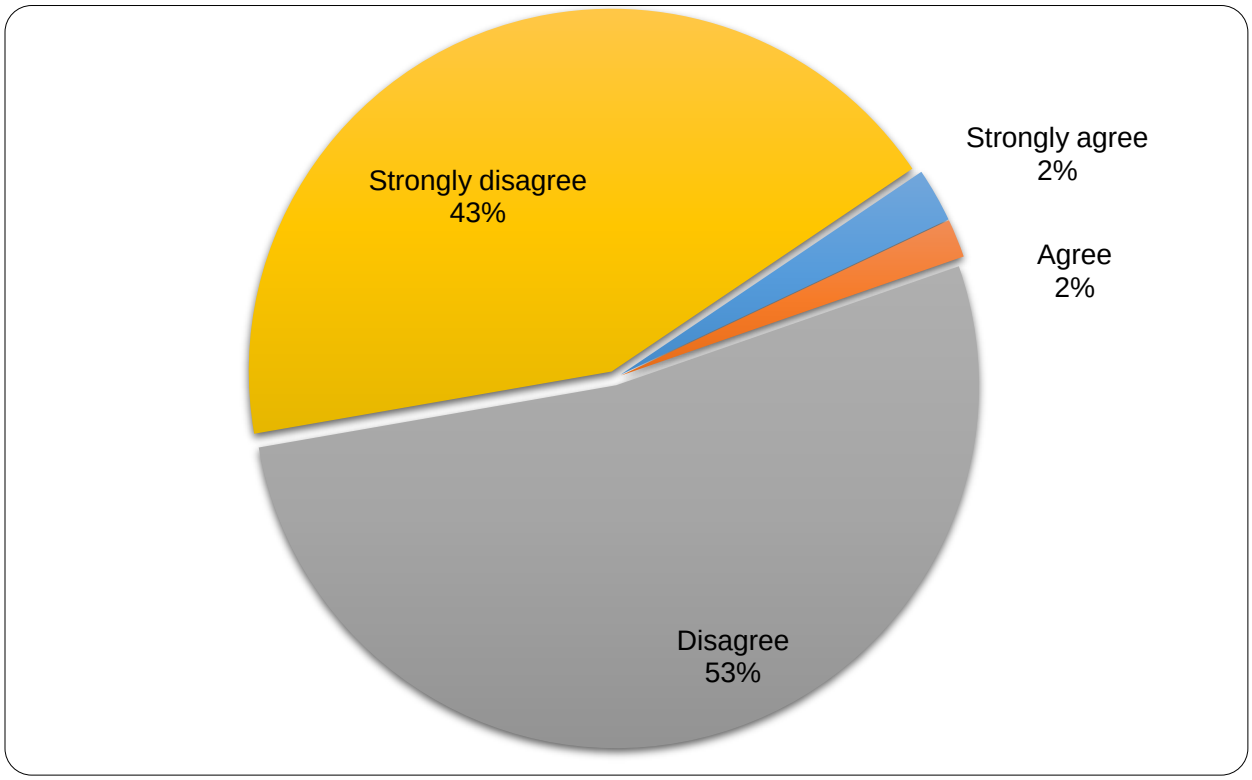


Figure 4.16 Responses regarding the relationship between policies and the political environment

The government's economic reform approach, which includes austerity measures and market-oriented reforms, is ambitious and has sparked controversy in some areas. The current focus has understandably been on short-term crisis management due to severe shortages of cash, water, and electricity. However, it is crucial for the government not to lose sight of its long-term objectives. To translate ambition into tangible economic growth, clear and consistent policies are needed, along with the establishment of trust between citizens, businesses, and the government.

Despite the constitutional requirement in 2013 for citizen involvement in policy formulation, the voices of the private sector have often been ignored. The creation of the Presidential Advisory Council (PAC) is expected to bring significant changes in terms of public consultations. The PAC consists of business leaders from various sectors who advise the government on economic policies. Additionally, the Tripartite Negotiating Forum, which involves business, the civil service, and the government, serves as a crucial platform for dialogue. The private sector has shown willingness to engage and can provide innovative ideas. Therefore, it can be argued that the government of Zimbabwe should align its policies with the socio-economic development needs of the mining sector. Political inclusiveness is a key factor for the economic transformation and

development of Zimbabwe. Therefore, the government should focus on creating policies that not only address immediate issues but also build a robust foundation for long-term economic stability and growth.

In summary, the alignment of policies with the political context remains a significant challenge in Zimbabwe. Effective economic recovery and transformation require a shift from short-term fixes to long-term strategic planning, with active participation from all stakeholders. Political inclusiveness and consistency in policy-making are essential for achieving meaningful and sustainable socio-economic development.

4.4.13 Policy framework and political context

The Zimbabwean political context overlaps into the various policy frameworks, most of which are dormant or do not exist. This ultimately impact on the beneficiation and value addition of mineral resources. The responses regarding policy frameworks and the political context are presented in Figure 4.17. It is shown that 62% of the respondents strongly disagreed that the policy framework and the political context impact on the beneficiation and value addition of mineral resources in Zimbabwe. About 3% disagreed while 33% and 2% strongly agreed and agreed respectively.

The Zimbabwean policy framework is marred by uncertainty and the variability of its political context. However, Gudyanga (2020) argues that the current government has tried to stabilise the political environment despite a series of demonstrations which have dovetailed into political violence. Moreover, the Zimbabwean political environment is known for being investor unfriendly. It is argued that the political context and policy frameworks have negatively impacted on the achievement of the beneficiation and value addition of mineral resources. Tawanda (2019) argues that for a country to achieve full beneficiation and value addition of mineral resources there is need for consistency within the political context and the policy frameworks. This is important for attracting both internal and external investment. The political context should also allow the policy frameworks to thrive and be implemented without any form of interference. As Zimbabwe continue to be a hotspot for corruption, the policy frameworks have been susceptible to manipulation for self-gain of the elite.

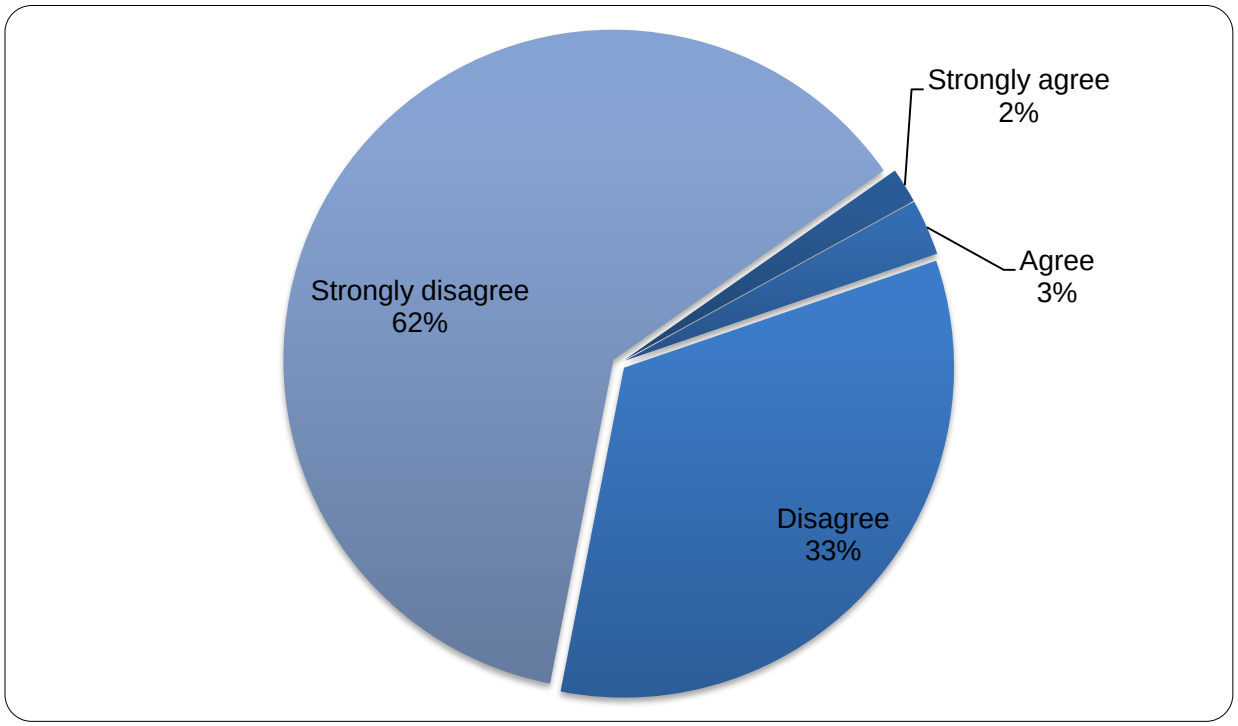


Figure 4.17 Responses on the policy framework in Zimbabwe, Source

To achieve long-term economic growth and sustainable socio-economic development in Zimbabwe, significant policy and political reforms are necessary. It is crucial to establish clear and consistent policies and engage a wide range of stakeholders through consultations to ensure success. Although there are challenges, they can be overcome, and there are opportunities for short-term progress along the way. There is a strong demand for an industrialization policy that acknowledges and capitalizes on Zimbabwe's rich resources. The government needs to adopt a value-chain approach, considering the entire sectors where Zimbabwe can develop a competitive advantage. Businesses within each value chain should identify the necessary incentives, such as tax benefits or depreciation allowances, to encourage development and unlock potential. Deregulation could also stimulate expansion and should be considered.

Infrastructure investment, particularly high-quality infrastructure, is essential to support industrialization. The private sector can play a pivotal role in developing viable infrastructure projects. Additionally, the workforce needs to be appropriately skilled to compete in industries that require technical expertise. Despite high literacy rates, the overall capacity and skills of the Zimbabwean workforce may be insufficient. It is important for the private sector to collaborate with universities and technical colleges to promote capacity building and skills development. Mining serves as Zimbabwe's primary source of foreign currency, but it was argued that the government

is not providing enough support to the sector. This highlights the need for a comprehensive policy framework that addresses these concerns and prioritizes the development of the mining industry.

In summary, Zimbabwe must undergo extensive policy and political reforms, implement clear and consistent policies, engage stakeholders, and address challenges to achieve long-term economic growth. Industrialization, infrastructure development, workforce capacity building, and support for the mining sector should be key components of the policy framework.

4.4.14 Draft Minerals Policy

The draft minerals policy is one of the milestones which is meant to leverage the minerals sector for achieving sustainable socio-economic development through the establishment of cross-cutting linkages in technology and innovation, knowledge and skills and infrastructure development. Figure 4.18 shows the distribution of responses regarding the effect of the draft minerals policy on beneficiation and value addition. 50% of the respondents strongly agreed and another 2% agreed that the draft minerals policy positively impacted on the beneficiation and value addition of mineral resources in Zimbabwe. About 46% strongly disagreed and another 2% disagreed that the draft minerals policy positively impacted on the beneficiation and value addition of mineral resources in Zimbabwe. An overview of the results reflects an environment with conflicting ideas. Although the draft minerals policy document highlights important issues that seek to leverage the mining industry, it is marred with some inconsistencies and loopholes which certainly creates doubts over its impact. For beneficiation to be realised, the draft minerals policy should go far beyond minerals and consider other factors that impact on the beneficiation and value addition.

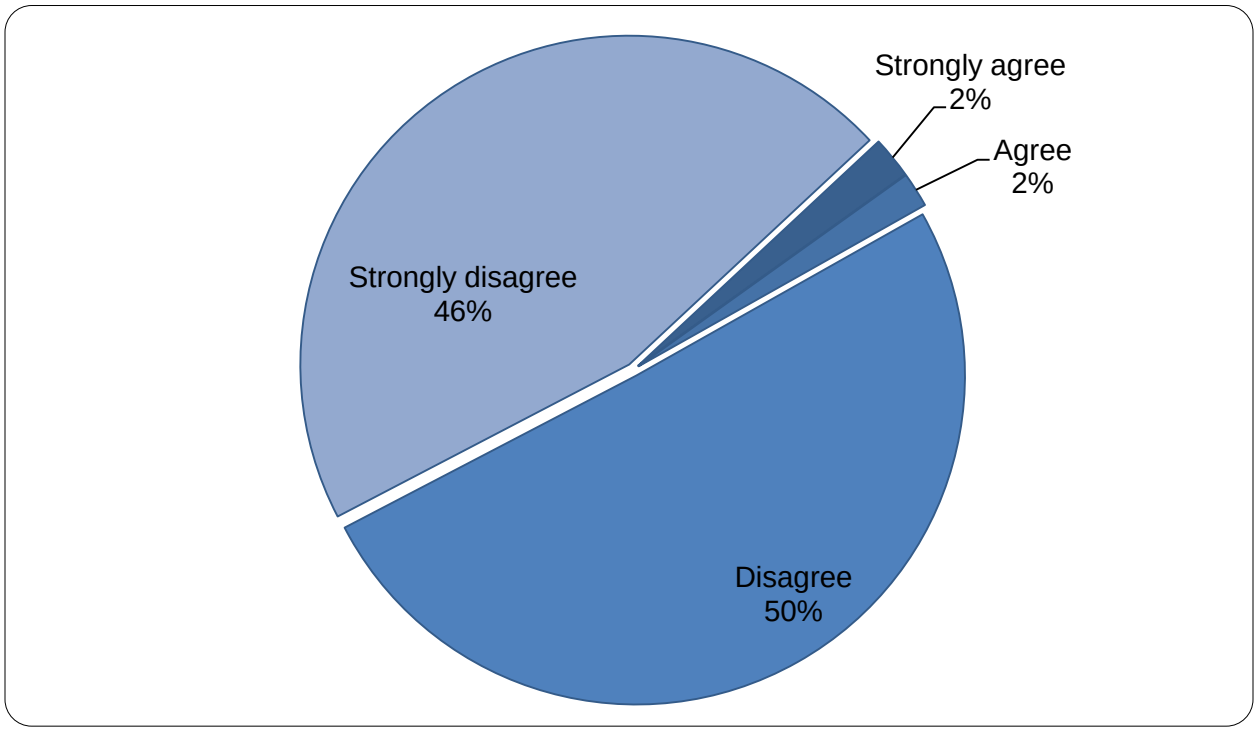


Figure 4.18 Responses regarding the effects of the Draft minerals Policy on beneficiation and value addition

The mixed views in the results reflect an environment with conflicting opinions. While the Draft Minerals Policy highlights key issues and aims at leveraging the mining industry, it is criticized for inconsistencies and loopholes that cast doubt on its potential impact. For effective beneficiation, the policy must address not only mineral-related aspects but also other factors influencing beneficiation and value addition.

The World Bank (2019) emphasizes that merely formulating policies does not automatically grant a country a competitive advantage in beneficiation. For instance, South Africa faces significant challenges in iron ore beneficiation due to factors such as limited local demand, high costs, and geographical disadvantages (Nyarota *et al*., 2015). Oshionebo (2020) supports the view that competitive advantage in beneficiation is driven by factors like production capabilities, infrastructure, energy, skills, research and innovation, rather than just policy presence. According to the World Economic Forum (2013), competitiveness involves institutions, policies, and factors that influence productivity, which in turn affects economic prosperity and growth.

In Zimbabwe, despite having several laws related to the mining sector, the Mines and Minerals Act (Chapter 21:05) enacted in 1961 remains the primary legislation. This Act has limited

provisions for beneficiation and value addition, as it does not mandate the beneficiation of minerals before export. Ncube (2019) notes that while the Act defines an "approved beneficiation plant" and outlines the process for obtaining approval and specifying the degree of beneficiation for a royalty rebate, it lacks comprehensive measures for beneficiation.

The ongoing efforts by the Government of Zimbabwe to amend the Mines and Minerals Act and finalize the Minerals Policy are positive developments. However, the experience from other countries underscores that effective beneficiation requires more than just policy changes, it demands a holistic approach that includes enhancing production capabilities, infrastructure, and skills.

In summary, while policy formulation is an important step, it alone does not guarantee a competitive advantage in beneficiation. The example of South Africa highlights the necessity of considering various factors beyond policies. Zimbabwe's current mining legislation, although lacking specific beneficiation provisions, is undergoing revisions, which is a step in the right direction towards incorporating effective beneficiation and value addition strategies in the mining sector.

Section B: Results from a qualitative study

This section presents the results from a qualitative study. In this study, 25 key informants were interviewed on various matters regarding beneficiation and value addition in Zimbabwe. The respondents were selected purposively from the Ministry of Mines and Mining development, IDC, MMCZ, Chamber of Mines and the Civic organisations. The responses are further discussed to indicate the various factors and constraints that are affecting the implementation of beneficiation and value addition in Zimbabwe.

4.5 Cross-cutting constraints and associated interventions for promoting beneficiation in Zimbabwe.

The Zimbabwean beneficiation and value addition of mineral resources has attracted mixed attention, from researchers, policy makers and the international community. The civil society and the general populace have also raised concerns about the policy. This section presents and discusses results regarding the mineral beneficiation and value addition challenges in Zimbabwe, impediments and key drivers of beneficiation and value addition and other important enablers which help to achieve sustainable socio-economic development.

4.5.1 Mineral beneficiation challenges in Zimbabwe

Key informant interviews were conducted at the Institute of Mining Research, Zimbabwe Mining Development Cooperation, Zimbabwe Economic Policy Analysis and Research Unit (ZEPARU), Mineral Marketing Cooperation of Zimbabwe, Ministry of Mines and Mining Development, Chamber of Mines, University of Zimbabwe Faculty of Mining Engineering academics, which revealed one key underlining factor causing low levels of mineral beneficiation in Zimbabwe. The core issue raised by several respondents during the interviews was that the government of Zimbabwe lack political will.

"The current government has not gone full force regarding beneficiation and value addition because of lack of political will to liberalise the investment climate. We are worried that such a brilliant idea of mineral beneficiation and value addition will go down the drain as if it never existed because some individuals do not like to reform. Moreover, the lack of political will to reform manifests itself in issues of corruption, and very tight investment climate." Respondent 1

The results show that the issue of beneficiation and value addition was rather a political issue than an economic aspect. It was further noted that the challenge of lack of political reform is widely spread across Africa. This view is supported by the study of Matinde *et al.,* (2014) which postulated the view that Zimbabwean beneficiation challenges are context specific factors that underpin the government's intentions including the current government budgetary deficits, economic turmoil, a regional and continental policy thrust as well as a strained relationship with the mining sector.

According to the Orthodox approach, the crucial factors underpinning the failure or success of government motivated beneficiation strategy is the stability of the economy (Matinde *et al*., 2014). Two factors at play in the beneficiation endeavour is technological requirements and factor intensities for instance skills and other inputs are critical components for realisation of beneficiation and value addition. These factors enable structural industrial transformation as opposed to existence of mere natural resources endowment. Japan and Jamaica are illustrations of the significance of technological requirements and factor intensity as opposed to mineral endowments. Zimbabwe lack mineral beneficiation and value addition framework as well as a strategy on how beneficiation is to be implemented in Zimbabwe. Such lack of a clearly defined beneficiation and value addition strategy is a major constraint (Nu Times Innovations, 2015).

4.5.2 Impediments of mineral beneficiation in Zimbabwe

Many experts from different stakeholder groups share the perspective that despite Zimbabwe's favourable mineral resource endowment, the country has experienced low levels of mineral beneficiation, primarily concentrated in the high-capital segments of the value chain. Technocrats and specialists in mineral resource economics, policies, and resource management emphasize that the mere presence of natural resources does not guarantee downstream beneficiation. Instead, dedicated interventions are necessary to address potential constraints and foster a competitive advantage for the mineral beneficiation sector in Zimbabwe.

This section aims to highlight the current inhibiting factors that hinder the effective implementation and development of beneficiation programs in Zimbabwe, as well as to propose interventions to promote beneficiation and value addition in the country. Most of the qualitative data from the experts and technocrats across the participants ranging from academia, private sector, NGOs, and the government provided similar responses which led to data saturation.

4.5.2.1 Lack of appropriate technology

Expert information obtained during the key informant interviews pointed out that Zimbabwe lacks developed technological advancement to drive the beneficiation agenda. This technological advancement can be sought from research and development initiatives.

"We have Universities of Technology in Zimbabwe including the University of Zimbabwe itself which are responsible for ushering technology based equipment so that beneficiation and value addition are harnessed. However, the change in the learning curriculum seems to dampen the spirit of innovation and technology such that most industries remain trapped in old fashioned machinery which is basically manual." Respondent 15

The findings point to the view that it was an error for governments to assume legislation will be sufficient for successful beneficiation. It was noted that beneficiation is an industrialization and trade policy issue. Government intervention is a requisite, as there is a correlation between the country's technological capacity to support industry and the successful performance of industry (Dube, 2017). This view is supported in the literature of this study that technology is a key enabler of mineral beneficiation, policies that advance mineral beneficiation on technological advancement without the practical realization is not feasible (Hawkins, 2009). Zimbabwe faces a lack of significant engagement in innovative research and technological development initiatives due to misplaced government priorities. Indeed, there has been little focus

on investing in research and development initiatives in the country. Such hinders the creation of new products and systems for beneficiation and value addition. To address this challenge, stakeholders must actively promote, support, and foster the development of competitive technologies in the country (Laisani *et al*., 2023; Mutandwa and Genc, 2018). It is crucial for Zimbabwe to establish partnerships with the business community to leverage their expertise and resources in driving technological advancement through research and innovation. By collaborating with the private sector, the country can access valuable solutions and advancements that will contribute to the growth and success of the beneficiation sector.

The study found that limited technological capabilities are also a significant challenge facing the mineral beneficiation industry in Zimbabwe. The industry has been slow to adopt new technologies, which has led to lower efficiency and competitiveness. This finding is supported by previous studies, which have highlighted the need for Zimbabwe to improve its technological capabilities to improve the efficiency of the mining sector (Tawanda, 2019).

4.5.2.2 Poor investment levels

This theme of poor investment levels was well articulated by many experts particularly captains of industries, officials from the Chamber of Mines of Zimbabwe and academic experts on mineral resource economics, polices and resources management.

"The government of Zimbabwe ought to repeal the Indigenisation and Economic Empowerment Act. This is so because all the strategic minerals like the PGM, diamonds, Chrome, Gold, Limestone, Copper just to mention but a few should have policies earmarked to attract Foreign Direct Investment…." Respondent 8

The results suggest that the current policy landscape shuns investors. A better way of doing it is to utilise the notion of Special Economic Zones (SEZ) in various mineral endowments regions to encourage investments for strategic minerals. Such a drive would address the poor investment levels in Zimbabwe. Centre for Natural Resources Governance (2013) advance the view that government choice of beneficiation strategy is driven fundamentally by an economic need to diversify and grow the economy informed by various economic, theoretical and political circumstances. Cooperation between private and the public sector is critical in achieving growth and diversification.

The analysis of poor investment levels in Zimbabwe's mineral sector reveals a critical barrier to achieving significant socio-economic development through beneficiation and value addition. The

consensus among industry experts and stakeholders is that current policies, particularly the Indigenisation and Economic Empowerment Act, have created a challenging environment for attracting Foreign Direct Investment (FDI). The policy has been criticized for its stringent requirements, which are seen as a deterrent to potential investors, particularly in the strategic mineral sectors.

The suggestion to utilize Special Economic Zones (SEZs) is noteworthy. SEZs are designed to create favourable conditions for businesses, including tax incentives, regulatory relaxations, and improved infrastructure. By establishing SEZs in mineral-rich regions, Zimbabwe could address the current investment deficits and attract both domestic and international investors. This approach could enhance the attractiveness of the mining sector and stimulate investment in beneficiation and value addition.

The findings highlight a fundamental issue, the misalignment between Zimbabwe's policies and the needs of the investment community. While policies may be well-intentioned, their practical implications often fall short of creating a conducive environment for investment. The Indigenisation and Economic Empowerment Act, despite its objectives, appears to have had unintended consequences that have discouraged investment rather than encouraging it. To address these challenges, it is crucial for the government to reassess its approach to policy formulation and implementation. The creation of SEZs could be a strategic move to attract investment, but it should be part of a broader strategy.

4.5.2.3 Access to finance

Zimbabwe has experienced multiple crisis but the most devastating one is the liquidity crunch which has continued to weaken the fiscal space and banks are no longer willing to extend credit because of the loss of value of currency.

"The reserve bank has made frantic efforts to address the challenge of liquidity but the financial markets seem to take long to recover from its effects because the cost of borrowing is no longer predictable. Even the savings which we used to rely on have been eroded to nothing. Moreover, you are aware that our external lines of credit are seemingly welcoming but they are only accessed by big wigs. We definitely need free access to cheaper finance as small businesses." Respondent 10

The study found that access to finance is essential for the growth and competitiveness of the mineral beneficiation industry in Zimbabwe. Companies require financing to invest in mineral

processing plants and to modernize their operations. The availability of affordable and accessible finance can increase the competitiveness of the industry. This finding is supported by previous studies, which have highlighted the challenges facing the Zimbabwean banking sector and the limited access to finance for SMEs and large corporates (Dube, 2017).

The analysis of access to finance highlights a significant challenge for the mineral beneficiation and value addition industry in Zimbabwe. The liquidity crunch and the instability of the currency have severely impacted the fiscal environment, making it difficult for businesses to obtain the necessary financing for growth and modernization

In conclusion, improving access to finance is crucial for enhancing the competitiveness of Zimbabwe's mineral beneficiation industry. By addressing the current financial barriers and creating a more supportive financing environment, Zimbabwe can stimulate investment, drive technological advancement, and ultimately achieve its economic development goals.

4.5.2.4 Policy uncertainty

The issue of policy uncertainty was a major issue affecting the implementation of mineral beneficiation in Zimbabwe.

"Yes, I agree with you, our policies have undergone several changes and are likely to continue like that because we lack the grant pillars for supporting our policies. And you can see that lack of coordination is one of the challenges because a policy change from one department affects five or so departments and this brings ripple effects on dependent industrial initiatives such as beneficiation and value addition of mineral resources…" Respondent 15

The findings reveal a significant lack of coordination among various ministries collaborating with the Ministry of Mines and Mining Development, which hampers efforts to enhance mineral beneficiation and value addition. Fessehaie and Rustomjee (2018) note that the new policies and legislation aim to address gaps left by previous industrial and mining policies, such as the Industrial Development Policy and the Mines and Minerals Act. These earlier policies failed to adapt to the evolving dynamics of the mining sector and development processes (Ministry of Mines, 2019; Laisani *et al*., 2023). Colonial-era mining policies did not address the need for changing ownership structures to support local entrepreneurs, enhance local procurement, or advance mineral beneficiation as envisioned by the Indigenisation policy. The new policies focus on using industrial policy to transform the mining sector through beneficiation and fostering domestic production (Chitando, 2018). However, their implementation may be hindered by

ongoing political tensions. Conflicts of interest and the self-enrichment pursuits of local elites and government officials pose significant challenges to maintaining policy consistency and successfully implementing economic strategies. Establishing effective linkages in the mineral sector involves altering production structures, ownership, and power dynamics, which has substantial political implications for Zimbabwe (Huni, 2019). Therefore, analyzing the development of mining linkages requires not only an economic perspective but also an understanding of the political economy.

The study findings are in tandem with the view of Gudyanga (2020) who examined the impact of inconsistent policy implementation on the mineral beneficiation sector in Zimbabwe. The study found that policies and regulations promoting mineral beneficiation are not consistently implemented, leading to a lack of clarity and certainty among investors. The study therefore recommends that the government should improve policy implementation to promote investor confidence in the sector.

4.5.2.5 Low Foreign Direct Inflows

An official from the Ministry of Mines and Mining Development stressed the view that only the Special Economic Zones have been addressed. The government has signed various memorandum of Understanding with various international companies in strategic minerals like Platinum Group Metals and diamond according to the Ministry of Mines and Mining Development official. According to an official from the Ministry of Finance

"Although the country has endured several trade restrictions including sanctions, the government has been seeking loans from International credit providers like the International Monitory Fund (IMF), the World Bank, Chinese Government and other financial institutions." Respondent 12

There is an orientation that the Bretton woods institutions are warming up to financing some of Zimbabwe's industrial projects but the injections remain quite minimal. UNCTAD (2018) suggests that the limited foreign direct investment (FDI) in Zimbabwe is partly due to difficulties in accessing international markets for processed products. The Chamber of Mines of Zimbabwe (2022) adds that existing trade barriers, including both tariff and non-tariff barriers, create obstacles to entering these markets. It is advised that these barriers be reassessed and that future trade agreements, particularly with China and other trading partners, be structured to promote FDI in beneficiation and value addition while improving market access in these countries, especially China. Moreover, the high cost of doing business in Zimbabwe ranked 161 out of 189 countries by the World Bank

in 2016 diverts FDI to other nations (World Bank, 2019). These findings highlight areas for improvement to ensure a smoother flow of beneficiation activities in Zimbabwe.

The researcher views the issue of low foreign direct inflows as a multifaceted problem that requires a comprehensive and strategic approach to address effectively. Revising trade barriers, strengthening international partnerships, improving the business environment amongst other interventions are essential for improving FDI inflows and enhancing the beneficiation sector in Zimbabwe.

In conclusion, improving FDI inflows into Zimbabwe's mineral beneficiation sector requires addressing trade barriers, enhancing investment incentives, reducing the cost of doing business, and strengthening international partnerships. By implementing these strategies, Zimbabwe can create a more attractive environment for foreign investors and drive sustainable socio-economic growth through beneficiation and value addition.

4.5.2.6 Lack of skills

Skills shortage has been identified as the major stumbling block for beneficiation to be feasible in Zimbabwe.

"The beneficiation and value addition initiative brought an impetus to find new skills which are not yet present. The government tried to send about 30 trainees to China but it does not suffice to service the huge potential of beneficiation because we have too many minerals." Respondent 13

The results show that in addressing this challenge, the government of Zimbabwe has opened various state universities to address the skills shortages. However, the reality is that the country has lost several skills through brain-drain. Zimbabwe has been facing a significant brain drain and skills shortage for more than twenty years, and there has been a failure to replenish the supply of professionals such as geologists, chemists, mining engineers, metallurgists, and other engineers needed to drive the beneficiation sector (Ministry of Mines, 2020). It is crucial to prioritize the development of technical skills necessary for mineral beneficiation and value addition and take proactive measures to promote their growth.

Moyo *et al*., (2020) found that there is a limited pool of skilled personnel in the mining sector, and there are limited opportunities for technology transfer from developed countries. The respondents were of the view that the government should invest in developing local skills and promoting technology transfer to improve the sector's competitiveness. Gudyanga (2016) suggests the

notion that Zimbabwe has experienced a persistent brain drain and skills shortage for more than twenty years, resulting in an inadequate supply of professionals such as mineral resource economists, geologists, chemists, mining engineers, metallurgists, and other engineers essential for driving beneficiation and value addition. Consequently, it is argued that there is a need to prioritize the development of technical skills required for mineral beneficiation and value addition.

4.5.2.7 Inefficient bureaucratic system

The study identified inefficient bureaucratic system in the governance within the republic of Zimbabwe.

"Most of the government operations are still centralised and this has caused delays in many processes, especially investment. Imagine that applying for a licence for processing mineral resources alone takes more than six months to a year. If we are to continue this way, achieving Africa Mining Vision beneficiation goals will just be a dream. And you can see that the bureaucratic systems are the main sources of corruption because people are tempted to use shortcuts." Respondent 10

The results show contradicting viewpoints regarding the inefficiency of the bureaucratic systems in Zimbabwe. It is argued that nothing yet has been improved to address the issue of bureaucracy as the issue of the Rapid Results Initiatives (RRI) was just a rhetoric, it was not implemented, it was just a policy formulated but not being implemented. Eliminating barriers to efficient functioning of government agencies requires that the government decentralise some of its operations (Chitando, 2018).

The study highlights that Zimbabwe's bureaucratic system is marred with inefficiencies that significantly hinder economic progress and investment. Centralized government operations result in prolonged processing times for essential permits and licenses, creating barriers for investors and contributing to a frustrating business environment. This inefficiency is compounded by corruption, as the complex and slow-moving bureaucracy often pushes individuals to seek shortcuts, undermining the system's integrity. The gap between policy formulation and practical implementation exacerbates the problem, with initiatives like the Rapid Results Initiative (RRI) failing to deliver meaningful improvements. To address these issues, decentralization of government functions is suggested as a means to streamline processes and reduce delays. By spreading decision-making authority and simplifying regulatory procedures, Zimbabwe can enhance efficiency and attract more investment. Additionally, strengthening implementation

mechanisms and anti-corruption measures is crucial to ensure that reforms are effective and genuinely improve the bureaucratic landscape. Engaging with stakeholders and fostering transparency are also important steps in creating a more responsive and trustworthy governance system.

4.5.2.8 Poor infrastructure

The study identified poor infrastructure as a key impediment affecting the actual realization of beneficiation.

"The government lacks in developing infrastructure that support the current beneficiation initiative. Most of the mining equipment is obsolete. Moreover, the railway system is completely dysfunctional… How do we make it to the top if the transport networks are in this dire state?" Respondent 15

The results show that the government has lagged behind in addressing key issues such as road, rail and air infrastructure which are very crucial for effective implementation of beneficiation and value addition program. The perspective of AMV (2015) aligns with the study's findings, which highlight the detrimental effects of inadequate infrastructure, including rail, ports, and electricity supply, on the promotion and sustainability of beneficiation and value addition. Specifically, the National Railways of Zimbabwe's network and signalling system were found to be in a deteriorated condition, with only 3,369 out of 7,269 wagons are operational.

According to Marinda (2018) the study found that inadequate infrastructure, such as unreliable power supply and limited transportation networks, negatively affects the sector's competitiveness. The respondents recommended that the government should invest in improving infrastructure to support the mineral beneficiation sector's growth.

The findings of the study underscores that inadequate infrastructure is a critical barrier to the successful realization of beneficiation in Zimbabwe. Respondents highlighted the severe shortcomings in the country's transport networks, including outdated railway systems and a generally dysfunctional infrastructure, which significantly hampers the movement of mining equipment and materials. This situation is corroborated by the Africa Mining Vision (AMV, 2015), which notes that poor infrastructure undermines the efficacy and sustainability of beneficiation efforts. Specifically, the deteriorating state of the National Railways of Zimbabwe, with a large proportion of wagons that are non-operational, exemplifies the infrastructural challenges facing the sector. Marinda (2018) further supports these findings by indicating that unreliable power

supply and limited transportation networks weaken the sector's competitiveness and hinder its potential growth.

The researcher share the view that lack of infrastructure investment is a major impediment that directly affects the viability and success of beneficiation initiatives. Effective beneficiation relies heavily on robust infrastructure, including efficient transport and reliable energy sources. Without significant improvements in these areas, efforts to enhance mineral beneficiation and value addition will struggle to achieve their full potential. The researcher advocates for a strategic focus on upgrading infrastructure as a prerequisite for supporting and advancing the beneficiation sector. By investing in modernizing transport networks, improving power supply, and addressing other infrastructural deficiencies, Zimbabwe can enhance its competitiveness and ensure that its beneficiation initiatives are sustainable and successful.

4.5.2.9 Energy constraints

The study identified energy constraints as a key enabler and that energy constraints are an impediment to mineral beneficiation.

"Energy is critical to beneficiation and nothing has been done to address power shortage except that mining companies can have power generation licenses to cater for their own requirements. As you can see that there is no significant beneficiation taking place due to energy constraints."
Respondent 12

It was indicated that there is need to expand the Hwange thermal plant to increase energy output. According to Dube (2017), the opinion expressed is that insufficient electricity supply, combined with relatively high energy costs, contributes to an increase in the expenses associated with beneficiation and value addition.

The energy crisis presents distinct challenges for Zimbabwe due to its rich mineral resources and the critical role of mineral beneficiation and value addition in the nation's economic development. Beneficiation involves processes such as extraction, refining, and transformation to enhance the value of minerals, but these processes are energy-intensive and require a stable power supply and infrastructure (Fessehaie and Rustomjee, 2018). With ongoing energy shortages and an unreliable power grid, Zimbabwe's mineral beneficiation sector faces diminished productivity, higher operational costs, and limited value addition opportunities.

To mitigate these issues, exploring renewable energy sources is essential for strengthening the mineral beneficiation and value addition sector in Zimbabwe. Renewable energy sources like solar, wind, and hydroelectric power provide sustainable alternatives to fossil fuels, minimizing greenhouse gas emissions and environmental impact. By leveraging its abundant renewable energy resources, Zimbabwe can build a more resilient and efficient energy infrastructure, rejuvenate its mineral beneficiation sector, and open new value addition opportunities.

Zimbabwe suffers from energy poverty due to overconsumption amidst population growth (Gwatidzo and Mbohwa, 2019). Contributing factors to energy poverty include aging infrastructure, lack of strategic planning, misapplication of human capital, energy wastage, climate change, geopolitics, unexplored energy options, failure to align economic growth with energy development, and delays in commissioning power plants.

The increasing population in Zimbabwe exacerbates energy consumption, which hinders the potential for mineral beneficiation and value addition. According to Laisani *et al.,* (2023), an energy crisis occurs when demand exceeds supply, and overconsumption challenges the mineral beneficiation and value addition sector. Limited natural resources for energy production, coupled with rising energy demands, strain the country's energy infrastructure, which is outdated and poorly maintained. Many power plants are inefficient, and transmission and distribution networks are often in disrepair, leading to frequent breakdowns, reduced power generation, and inefficiencies.

Zimbabwe's energy sector lacks long-term strategic planning and investment in infrastructure development, resulting in an inability to meet growing energy demands (World Bank, 2019). The sector has also experienced a brain drain, leading to a shortage of skilled professionals and ineffective utilization of human capital, hindering sustainable energy solutions. Inefficiencies and energy wastage, due to a lack of conservation practices and outdated technologies, further strain the energy supply.

Climate change impacts, such as altered rainfall patterns and droughts, have reduced water levels in reservoirs and rivers, decreasing hydroelectric power output. Geopolitical factors, including regional power dynamics and trade relations, have also affected access to reliable and affordable energy imports. Limited exploration of alternative energy sources like solar, wind, and biomass has resulted in overreliance on fossil fuels, impeding the transition to sustainable energy systems.

The researcher further argues that insufficient attention to the energy needs of various sectors has led to a mismatch between supply and demand, hampering economic productivity and growth. Delays in commissioning new power plants and expansion projects have further constrained reliable power supply, leading to frequent power cuts and energy shortages.

4.5.3 High Policy Volatility

Zimbabwe's political economy is characterized by high policy volatility which hampers mineral beneficiation and value addition. In addressing this challenge an official at the department of Policy Coordination at the Office of the President and Cabinet indicated that the country should come up with a robust mineral policy framework.

"The presence of high policy volatility in Zimbabwe reflects the leadership crisis that has permeated all the government departments. We no longer have policies that last… but variability even when it is not necessary…..the country cannot continue like this, beneficiation and value addition is long term and direction must be firm." Respondent 9

This study provided an important opportunity to advance an understanding of the effects of high policy volatility which has a bearing on sustainable socio-economic development in Zimbabwe. The study offers an important insight into the need to address various policies which governs mineral beneficiation within Zimbabwe which needs to be revised. Previous research findings into the issue of high policy volatility have been inconsistent and contradictory, a study conducted by UNCTAD (2018) share the same optimism. A suggestion put forward by a member of the Mines and Energy portfolio committee in the Zimbabwean parliament emphasizes the importance of maintaining consistent policies and regulations within the mining sector over an extended period. This viewpoint aligns with the findings of a study conducted by Mutandwa (2018), which highlights a lack of commitment from the government in maintaining consistent policies, resulting in a sense of inconsistency. Additionally, an official from the Department of Research, Value Addition, and Beneficiation in the Ministry of Mines and Mining Development emphasized the need for implementing investment-friendly policies, while also stressing the importance of prior consultation in policy-making processes.

In a nutshell, the findings of qualitative research conducted demonstrates the view that high policy volatility is a major finding that demonstrates the need for realignment of the mineral beneficiation policies with best international standards.

4.5.4 Poor governance and lack of institutional capacity

Policy inconsistency, corruption and lack of government capacity are perceived to be the major challenges that negatively impact on beneficiation and value addition in Zimbabwe. It was noted that the impediments seem to be perpetuated by lack good governance practices.

"The current government cannot be trusted when it comes to policy …… It is also known that corruption has been very rampant as the elite twist government and created opportunities for their own self-aggrandisement. So, the concept of beneficiation has remained a talk that is never practised." Respondent 4

The study findings are in support of the view that policy inconsistence, low government capacity and a high degree of state intervention has greatly impacted mineral beneficiation in Zimbabwe. This view is supported by the inconsistence demonstrated by various government department policies which does not align with each other on mineral beneficiation and value addition as demonstrated in the literature of this study.

The findings of the current study show that that the government ought to be consistent and have integrity to maintain a single position. Such a view is supported by a study conducted by Mutandwa (2018) which suggest the view that lack of consistence is the major stumbling block causing lack of socioeconomic transformation of the nation. It is argued that the department of policy coordination in the Office of the President and Cabinet is not responsive to the pertinent issues within the mining sector. This notion is supported by the view that the department of Policy Coordination has the mandate of sectoral coordination of government policies across various ministries and departments to ensure they are aligned to the national vision of sustainable socio-economic development of the country (Ncube, 2019). In addition, the views expressed by the responded within the Department of Policy Coordination in the Office of the President and Cabinet (OPC) suggest enough evidence of lack of coordination between government departments and various stakeholders and such demonstrates the need of a proactive approach.

World Bank (2019) warns that to avoid uncertainty, policy commitment and credibility are key, as without these companies would challenge the government's ability to implement beneficiation programs. Significant government capacity, complex decision and coordination with the private sector are required. Companies in turn need to understand the pressure that government often faces, and if they are concerned about the impact of the public policies, the onus is often on the company to engage the government in dialogue and suggest alternatives. A study by ZEPARU

(2014) suggest the need for state intervention through regulation of cross cutting policies and the custodianship of such a role lies within the state within the ambit of policy regulation.

4.5.5 Erratic power supply

Since the dawn of the new millennium, Zimbabwe has grappled with unstable and unsustainable power supply. Although the declining water levels have been blamed for the reduced capacity generation of electricity, it can be argued that there have not been adequate attempts to promote the construction of new power supply stations.

"We would like to participate in beneficiation and value addition of mineral resources because we have the knowledge and skills, but imagine if the Zimbabwe Electricity Supply Authority(ZESA) continue with its load-shedding strategy, all our investment will be at risk. I don't advise the young people to risk their hard earned incomes in a country that does not have a solid power supply mechanism." Respondent 2

The study's findings reveal that Zimbabwe faces load shedding, which negatively impacts mineral beneficiation and value addition. Several factors contribute to this challenge. The energy sector struggles with poor asset management and maintenance, issues within the Independent Power Producer framework (IPP), corruption, incompetence, and lack of funding. Zimbabwe's current energy demand is 1700 Megawatts, but dependable generation is only 1000 Megawatts, resulting in a 700 Megawatt deficit. The country imports 400 Megawatts, leaving a shortfall of 300 Megawatts that causes load shedding, Parliament Portfolio Committee on Mines and Energy (2024).

Solar photovoltaic systems generate 42 Megawatts as an alternative solution to power cuts. However, Laisani *et al.,* (2023) suggests that Zimbabwe's energy sector needs additional strategic interventions, such as incorporating wind energy, to supplement the power supply. According to ZEPARU (2015), a critical challenge for mineral beneficiation and value addition is the failure to align energy generation capacity expansion with economic and population growth. A comparative analysis of energy-efficient technologies for mineral beneficiation is essential for Zimbabwe's sustainable socioeconomic development. While energy efficiency is vital for addressing the energy crisis, there is limited research comparing various energy-efficient technologies and their applicability to specific mineral beneficiation processes. Investigating advanced comminution methods, sensor-based sorting, or innovative flotation techniques could provide valuable insights for optimizing energy consumption in the sector (Tapera, 2016).

Establishing smelters and beneficiation plants requires substantial energy, which cannot be solely provided by mining companies. The government should incentivize and support mining companies in setting up these plants. Erratic power supplies reduce beneficiation levels, as most mines rely on electricity, leading to reduced ore processing and beneficiation. Studies by the Zimbabwe Economic Policy Analysis and Research Unit (ZEPARU, 2020) highlight the lack of readiness for mineral beneficiation in Zimbabwe due to an unsupportive environment. Reducing electricity tariffs is necessary to lower the costs of beneficiation and value addition

4.6 The significance of mineral beneficiation in Zimbabwe

Beneficiation and value addition of mineral resources in Zimbabwe is a strategic thrust that can help to achieve socio-economic development in Zimbabwe. Firstly, the addition of economic value to mineral exports translates to increased revenue and improvement in foreign currency earnings. Already, the mining industry contributes nearly one quarter to the GDP and beneficiation can catalyse economic activity to improve its current share of GPD (Chitando, 2018). In this study, key stakeholders within the mining sector which includes the Ministry of Mines and Mining Development, Chamber of Mines of Zimbabwe, academics within the mining and mineral processing discipline, mineral beneficiation experts in various key institutions including research institutions and associations on mineral beneficiation in Zimbabwe. The responses obtained on this objective were similar in nature which resulted in data saturation. This led to the study to focus on 15 respondents in respect of this objective to avoid duplication of the results obtained during data collection.

4.6.1 The importance of mineral beneficiation in Zimbabwe's mining value chain

In 2023 the mining sector in Zimbabwe played a significant role in the country's economy contributing around 12% to Gross Domestic Product and accounting for more than 60% of Zimbabwe's export earnings (World Bank, 2023). Therefore, the addition of beneficiation and value addition bring several opportunities for sustainable growth of the economy. The importance of beneficiation and value addition was also stated by respondents in this study.

"The beneficiation and value addition is a golden opportunity for the government and small business to thrive. Currently, the government is under European sanctions which prohibit the sale of mineral resources which gives us an opportunity to unlock value of our minerals, beneficiate and add value so that we don't sell them in common European dominated markets. As we all know that Zimbabwe is struggling with domestic unemployment, I think this is an opportunity for

the youth to start creating their own jobs navigating through the opportunities that prevail in the minerals value chain. Therefore, I can say that beneficiation should never be overlooked because it is one of the essential elements of a thriving and empowered economy." Respondent 2

If successful, beneficiation can help governments engage their populations, as well as add value for investors by stabilizing the business environment. This view is in tandem with the literature of this study according to a study conducted in Zimbabwe by ZEPARU (2020) where it was demonstrated that beneficiation will require a comprehensive strategic assessment as a business case and by assessing opportunities of beneficiation one may assert the view that mineral beneficiation is critical in Zimbabwe.

Established by African Heads of State in 2009, the Africa Mining Vision (AMV) serves as a crucial framework for promoting structural transformation and development centred around mineral resources throughout the continent. It places a strong emphasis on the efficient, equitable, and transparent use of mineral resources to promote socioeconomic advancement and sustainable growth. The need of resource beneficiation is also emphasised in Agenda 2063's first goal, which supports the AMV's push for industrialisation based on mineral resources. These observations align with the literature on the Roadmap (2015–2063) and industrialisation plan, which highlights the need of value addition and mineral beneficiation for economic change (AMV, 2015).

This study underscores the vital role of mineral beneficiation and value addition, which are central to the Zimbabwe Agenda for Sustainable Socioeconomic Transformation (ZIMASSET). Enhancing local beneficiation and value addition is critical for advancing industrial growth and job creation in Zimbabwe (UNCTAD, 2018). Currently, Zimbabwe's dependence on exports of raw or semi-processed minerals makes it susceptible to price volatility, affecting government planning. In contrast, value-added metal products like jewellery and electronics are less prone to price declines compared to raw materials like gold or platinum (UNDP, 2017). This highlights the need to focus on selling value-added products rather than raw minerals.

Trade theory suggests that primary commodity prices tend to decrease over time relative to manufactured goods, which can negatively impact economies reliant on commodity exports. Given that 60% of global trade involves intermediate products, Zimbabwe's case for beneficiation and value addition becomes more compelling, emphasizing the need to move away from exporting raw and semi-processed minerals (World Bank, 2019).

A 2018 report by the World Bank (2019) on Africa's mining regimes reveals that the value of beneficiated minerals can increase significantly by a factor of at least 400 when processed from extraction to final product. For instance, the value of copper in a motor vehicle is 117 times greater than copper in its raw cathode form, and the value of platinum can increase fourfold when it is used in auto catalysts.

4.6.2 Effectiveness of beneficiation and value addition in the minerals value chain

Beneficiation was perceived to be an effective measure that is likely to produce results that can lessen the burden of sustainable socio-economic development of Zimbabwe. This was echoed by respondents from various sectors indicating that beneficiation is the ideal solution to current challenges in the mining sector.

"The government demonstrated that, it has the commitment to serve its people through the promulgation of the beneficiation and value addition of mineral resources…. I strongly believe that it is an effective measure towards economic growth as well as sustainable socio-economic development. Look… the policy is for the formally marginalised groups comprising the youth and women and targeting the groups to participate. Its efficacy is beyond measure. We are going to witness more at community level since most of the precious minerals are scattered all over the country. If beneficiation is in full throttle, communities will be champions of development because already we have the Indigenisation and women empowerment policies which are there to support beneficiation and value addition." Respondent 5

Although beneficiation and value addition of mineral resources has been rebuked for its shortcomings, it can be argued that the era of overreliance on exporting raw minerals is over. The country is set to maximize revenue through the beneficiation of minerals like platinum group metals (PGMs), gold, chrome, limestone and diamonds which have potential to accelerate economic growth and social transformation (Dube, 2017). Insufficient attention has been given to policy analysis and research regarding the current state of beneficiation and value addition in the country, leading to a lack of valuable insights that could inform the development of an effective strategy for these processes.

The country lacks a rigorous implementation framework for ensuring beneficiation is decentralised at grassroots level. This is so because, empowerment cannot be in urban areas, it should flow to the communities who should be afforded an opportunity to make decisions for themselves. Moreover, beneficiation does not occur in a vacuum. Zimbabwe has experienced the huge loss

of investor confidence and it lacks capacity to attract internal investment. The lack of capacity has some overarching effects across the mineral value (Mberi *et al.,* 2022). For example, it was noted that the Zimbabwean economy suffers from erratic power supply. The fact that the country fails to provide power to its internal industries means that beneficiation and value addition is also at risk. The lack of advanced technologies and innovation to support beneficiation also renders beneficiation ineffective.

"I have witnessed several policies in Zimbabwe failing not because of anything… capacity. We simply don't have the capacity in terms infrastructure. Look at the number of offices here which were abandoned due to lack of capacity. All the youth who benefited from the Youth Fund opened offices in Harare in anticipation of good business in beneficiation. Indeed, they had very good business plans but capacity was the elephant on their route to glory…." Respondent 3

The findings indicate that Zimbabwe needs to adopt a multi-sector approach when implementing complex policies such as beneficiation and value addition. This is evident in the government's actions concerning chrome ore exportation. Initially, a ban was imposed, which was later lifted but replaced with a 20% export tax in 2009. Subsequently, the ban was reintroduced in April 2011 to promote local beneficiation and value addition of chrome ore. However, the ban was subsequently lifted again due to several factors, including the lack of advanced technology for processing chrome ore to ferrochrome, declining international prices of ferrochrome, and high electricity tariffs (Mamina *et al.*, 2020; Chitando, 2018).

Such demonstrates high level of unpreparedness by the government of Zimbabwe in as far as beneficiation is concerned. There is need for the government to invest into the key enablers for beneficiation for instance technological innovations and infrastructure and the energy required. The government of Zimbabwe has put in place some measures that ensure that the beneficiation of minerals such as gold, platinum and chrome is expedited.

4.6.3 Feasibility of beneficiation costs in Zimbabwe

Although beneficiation and value addition of mineral resources is critical for improving economic growth and creating employment, the level of initial investment required inhibits many aspiring participants in the minerals value chain. Currently, the country is struggling with liquidity problems and the oscillations between the use of local currency or the American Dollar which restrains the availability of loanable funds. It was revealed that the high cost of initial investment makes beneficiation and value addition of mineral resources an unfeasible attempt.

"We support beneficiation and value addition but our economic outlook has not been appealing for years now. Instead of accumulating capital through investor friendly policies, we have experienced a huge outflow of investment. The costs of starting business in a capital intensive sector like mining, the costs are just unfeasible. Only those who have access to foreign capital markets have the potential to invest, unfortunately business does not operate that way. No one can just give you their money and you chase them away… Unless new ideas to accumulate capital emerge then beneficiation and value addition can start to effectively contribute to the minerals value chain…." Respondent 13; 15

Over the past three decades, the Zimbabwe Stock Exchange has crushed many times. This has negatively contributed to the functioning of the capital market in Zimbabwe. Among the major cause of stock exchanges crushes seem to emanate from currency instability and lack of capital flows. The failure to nurture a vibrant capital market means that internal investment lost confidence which further affected the lending and borrowing or the banking system. Besides loans and grants from the Ministry of Youth and Empowerment, other financial sectors have not been willing to participate in recapitalisation of business due to many factors. For example, policy inconsistencies between the use of foreign currency and local currency after de-dollarisation kept the markets unstable. The prevailing condition makes it difficult to establish the real interest rate especially from the lenders' perspective. Therefore, the cost of establishing polishing plants or any other form of refinery centres is nearly impossible in an economy where capital markets are not functional.

According to Mahonye and Mandishora, (2015) feasibility of costs does not end at purchasing equipment, but extend to other areas of business such skills acquisition, erection of modesty infrastructure and tax payments (Lin *et a*l., 2022). Gudyanga (2016) argues that, Zimbabwe's potential to harness the economic contribution of mineral resources through beneficiation and value addition requires investment in human skills and technology. Since the initiation of beneficiation and value addition, Zimbabwe forged a skills training partnership with China so that skills are transferred back to the country. However, the lack of financial capacity meant that only few candidates were deployed for skills training.

"When beneficiation and value addition were introduced about 30 candidates were sent to China to acquire skills in that area. Now with the vast endowments we have in mineral resources scattered all over the country, certainly 30 people is just a small number because we have

numerous minerals some of which are yet to be discovered. Zimbabwe needs a significant number of people to drive the beneficiation and value addition agenda……" Respondent 7

The human capital development imperative requires both the private and public sector to invest in skills development. Various research institutes should promote ways of enhancing skills transfer as well ensuring that the country produces home-grown skills that are useful for advancing the beneficiation and value addition of minerals and other resources. For example, the agricultural sector is currently making better progress towards beneficiation and value addition and the skills can easily be transferred to mining (Mberi *et al*., 2022). Such can assist in reducing costs as well as ensuring that there is independence among various industrial players. Skills development should be yoked with technology and innovation. Lewis (2015) argues that Ghana's beneficiation and value addition initiative succeeded because of high investment in technology and innovation. Beneficiation is concerned about further improvement which means that it employs some level of technological equipment to add value to the raw materials. Zimbabwe can replicate the innovation and technology strategy which was adopted by South Africa to effectively maximize its beneficiation initiative. Technology and innovation have long term benefits of reducing costs and improving product outlook. Therefore, it is vital for the country to establish technology and innovation hubs to improve the competitiveness of its value added mineral products to realise the gains of beneficiation and value addition.

4.6.4 Contribution of beneficiation and value addition to social growth

From time immemorial, the mining industry was detached from the society, yet all the negative impacts of mining activities affected the local communities. The introduction of beneficiation and value addition concept in the mining value chain creates ample opportunity to engage communities and ensure that they benefit from the mining activities. The gains from the beneficiation and value addition were also discussed during the interviews.

"For long, we have advocated for mining companies to take care of the communities surrounding their mines because they are susceptible to both environmental and social ills that exist in mining communities. With beneficiation we are going to persuade the mining companies to benefit in terms of income sharing through the development of community trusts which will have some share ownership in the mines. If the community is involved then the environment can survive because they will be involved in decision making….. Through beneficiation, communities are able to improve their lives and send their children to school….." Respondent 2; 5

Besides, targeting improved foreign currency earning and economic growth, beneficiation and value addition is an important vehicle for improving social growth. Social growth embraces a good standard of living that is supported by the proceeds of beneficiation such as employment creation, improved access to social amenities such as health care facilities, schools and shopping facilities (Chamber of Mines, 2022). For example, a beneficiation project established in Mhondoro Ngezi attracted several facilities including shopping malls and supermarkets, ATMs, sport facilities and education facilities (Munyanyi, 2018). Communities which relied on hand to mouth are now able to enjoy their leisure watching various sports events which are brought by the project. This means that opportunities for employment increases as the local youth get exposed to other non-academic carriers.

Beneficiation promotes social cohesion which again strengthen social capital (Mawowa, 2018). As people from other areas decent for employment, they bring new skills to the surrounding communities. Social networks are crucial for the exchange of culture and also nurturing career development of the youth. Through social networks, the local communities get exposed to the world at large because people of various capabilities are in their vicinity. Moreover, beneficiation fosters the empowerment of previously disadvantaged groups such as the girl children and women. Increasing opportunities for girls and women is undoubtedly the cornerstone for sustainable socio-economic development because it reduces unnecessary burden of carrying out household duties. The study highlights that effective beneficiation not only stimulates economic growth but also enhances social capital and cohesion, making it a cornerstone for comprehensive and sustainable community development.

4.6.5 Enhancing the mining value chain in Zimbabwe

Respondents shared the view that mining value chains can be enhanced through beneficiation and value addition. Respondents from the Ministry of Mines, academics, and mining companies concurred that effecting value addition into the mining activities essentially expands the mineral value chain. Prior to mineral beneficiation, the value chains ended in the extraction of raw mineral resources and the activities were confined to mineral extraction.

"Beneficiation has the potential to expand operations and influence industrial growth and development. Considering the volume of mineral output annually, Zimbabwe can develop a huge mineral processing industry if beneficiation is fully adopted in the value chain. This is important for attracting foreign currency. I strongly believe that value addition creates employment for the youth". Respondent 1

The above sentiments are congruent with previous studies carried out in the SADC region on mineral value chain and beneficiation. Enhancing the mineral value chain is the key to economic expansion, job creation and poverty alleviation. The mineral value chain has potential to unlock value through further processing and changing the raw form which is relied on. Most of the key informants asserted that countries that inclined their economic activities on mineral beneficiation and value addition have realised perpetual growth (Mawowa, 2018; Dube, 2017). For example, one participant mentioned that the key pillar supporting the booming contribution of mineral resources to economic growth is beneficiation and value addition. Indeed, such economies have realised other benefits such as currency stability.

Mineral beneficiation and value addition play a double barrel role in supporting currency stability through improved foreign currency earnings as well as being used to support the value of the currency internally. An increase in the quantity of gold in its refined form is critical for supporting currency stability. The role of mineral beneficiation and value addition in achieving all the macroeconomic objectives cannot be underestimated due to the overarching benefits which can be yielded. For example, the historic mineral endowments in Ghana have recently become a hub of economic activities that have benefited the country. Since the dawn of the new millennium, Zimbabwe has experienced a drastic economic meltdown, but the minerals sector has been quite resilient. Therefore, enhancing the activities in the minerals industry through beneficiation and value addition can help to sustain the economy.

The above argument holds because the loss of value in Zimbabwean currently fuelled by inflation is blamed on an inadequate supply of gold reserves. Beneficiation and value addition act as incentives to maintain the supply of gold internally and counter the illegal exports which lead to loss of value and income. Participants concurred that enhancing the mineral value chain elongates the mineral holding time which eliminates the unnecessary bureaucracies which are currently present in the minerals industry. The Zimbabwean situation requires robust interventions starting with understanding the mineral value chains. Participants emphasised the need to establish a further inquiry into potential sources of value chains to identify avenues for innovation and value addition. This will lead to the development of multiple interconnected businesses within the industry. The ZIMASSET blueprint is consistent with understanding mineral value chains based on the type of mineral resource endowment.

4.6.6 The role of government in supporting mineral beneficiation and value addition

Participants shared the view that the government of Zimbabwe championed the beneficiation and value addition of mineral resources in its ZIMASSET blueprint. Earlier, the concept was not in existence, but little emphasis and priority given for full implementation. Participants reiterated that the indigenisation and empowerment policy were the key enablers of the mineral beneficiation and value addition. The minerals sector was targeted because during the recession experienced during 2000-2008, the minerals sectors was booming and making significant contribution to the economy. Therefore, the government championed the beneficiation and value addition of minerals to spur the indigenization and empowerment programs which aimed at creating employment opportunities for the youth.

"The government of Zimbabwe should be credited for finding solutions such as beneficiation and value addition of mineral resources in the time when the economy was struggling to expand. The beneficiation and value addition were a critical niche for sustainable economic growth because it relied on the use of indigenous resources which are abundantly available. Already we had artisanal miners doing well but most of the challenges needed to be eliminated through government intervention. For example, the government provided the necessary machinery through loans. Youth small business groups were assisted with the necessary funding and machinery. Previously, there were no laws that guided self-grown initiatives such as mineral beneficiation and value addition, but the Indigenisation and empowerment law was one of such kind. By legalizing artisanal mining and incorporating them in the mainstream mining industry, the government made it clear that its focus is to empower the youth and women. All I can say is that the government continue to play an important role in supporting the mineral beneficiation and value addition initiative". Respondent 4

Participants shared a clear of view that the government initiative was vital for enhancing mineral beneficiation and value addition. In as much, the government also introduced other potential avenues which were previously regarded as illegal (Gudyanga, 2020). These include backyard mineral smelting and processing. Mineral beneficiation and value addition should also be linked to innovation and technical knowledge of the mineral resources. Innovation and technology are important for reducing costs and improving productivity. Mining involved capital intensive investments and absorbs intensive labour. Therefore, the technology and innovation thrust are critical in the value addition and beneficiation of mineral resources. Participants mentioned that the ZIMASSET blueprint clearly indicated the linkages between technology and innovation in

beneficiation and value addition processes (Mberi *et al*., 2021; Mavhunga, 2019). However, having terms outlined in the five-year plan may not easily translate to effective results. The process of giving access to the local communities has been largely contested by the international community and human rights organisations. The critics point out that the beneficiation and value addition initiative is marred with politically motivated draconian laws such as the Indigenisation Laws, nepotism, and political connectedness. These loopholes blocked potential investors who had the financial capacity to transform the mining sector in the country.

Some participants argued that the principle of beneficiation and value addition was well crafted but unfavourable foreign policies such as the Look East Policy shifted opportunities to Russian and Chinese companies. For example, the Diamond mines in Chiadzwa in Manicaland province were all controlled by Chinese companies and local communities were not allowed to participate in both extraction of raw diamond ore and beneficiation. Further, the Look East Policy did not provide the required market for the processed minerals (Nayak *et al*., 2022). The main aim could not be achieved due to lack of profitability. Therefore, the only market was the government-controlled Fidelity Company which has exclusive rights for precious minerals. Due to liquidity crunch, the company failed to provide adequate cash to sellers. Instead, the government cried foul for USD15 billion loss through clandestine market deals. Moreover, the government of Zimbabwe was still under sanctions which prohibited them from accessing world minerals markets such as Antwerp. However, the government maintained that all mineral resources be traded in foreign currency which eased the costs for local mineral producers. There is no doubt that the mineral beneficiation and value addition coined in the ZIMASSET offered critical insights on transforming economic activities and enhancing livelihoods.

4.6.7 The role of Public and Private Partnerships in enhancing beneficiation and value addition

Government initiatives gain considerable traction if economic players such as businesses properly engaged. Businesses are known for advancing profitable economic activities and have financial resources to start or support such activities. During the interviews it was reveal that the government and the business community were disengaged. This means there was no mutual agreement on the terms which guided the participation of various business players in the value addition and beneficiation. One of the participants said,

"The business community does not trust the government policies." Respondent 9

The beneficiation and value addition initiative emerged at a time when relations between the government and the business community were deteriorating. The business community blamed the government for polices inconsistences which caused uncontrolled losses. For example, one of such policies was the Indigenisation policy which targeted foreign owned companies. Participants noted that due to policy inconsistencies major mining companies such as Lornho, Bindura Nickel Mine and Rio Tinto closed their operations because they could not cope with the new policy requirements (Chamber of Mines, 2020). Indeed, the government approach towards the supposedly financial sources was hostile.

On the other hand, the Industrial Development Cooperation (IDC) issued several complaints about the lack of appropriate policies and budget for the business community with limited opportunities for the business community to participate in government-led initiatives such as beneficiation and value addition. The changes within the minerals sector were also unstable and troublesome particularly after the discovery of new mining sites for diamond and Lithium (Chamber of Mines, 2022). For example, the business community expressed dismay over the import quotas on certain industrial products which were useful in the mining industry. Hefty duties were also marked on such products and the cost of production increased. Meanwhile, individual businesses were not allowed to export minerals without approval from the government. To date, the business community remains pessimistic about government-led initiatives (Kalili, 2021). Yet in Botswana, the success of the beneficiation program rested on the mutual agreement between the government and the business community.

In contrast, the successful model observed in Botswana, where mutual agreements between government and businesses facilitated effective beneficiation, serves as a crucial lesson. The Zimbabwean experience demonstrates that the absence of such cooperative frameworks not only undermines the efficacy of beneficiation initiatives but also stifles economic and social development.

To resolve these challenges, it is imperative that Zimbabwe adopts a more integrated approach, fostering genuine partnerships between the public and private sectors. This involves not only crafting stable and inclusive policies but also addressing systemic issues such as skills shortages and regulatory burdens. Establishing a trust-based relationship between government and business stakeholders is essential for optimising the benefits of mineral beneficiation and value addition and ensuring sustainable growth in the mining and mineral sector. The critical analysis suggests that without a fundamental shift towards collaborative and coherent policy-making, the

potential of beneficiation to drive substantial economic and social development will remain underutilized.

4.7 Promoting beneficiation and value addition in Zimbabwe

The government of Zimbabwe crafted the ZIMASSET document containing various economic aspirations including the beneficiation and value addition of mineral resources. However, it was difficulty to onerously promulgate a policy for beneficiation and value addition because there were several loopholes which needed to be fixed.

"The government programs we have far promote beneficiation and value addition because we have also put in place measures such as prohibiting the sale of certain mineral ores in their raw form…." Respondent 11

However, supporting polices such as the Indigenous policy, the empowerment policy were cornerstone policies which anchored the success of the beneficiation and value addition initiative. In 2011 Zimbabwe banned chrome exports in order to develop internal refining capacity (World Bank, 2019). The ban was subsequently relaxed after mines shut down due to a lack of smelting capacity. It was noted that thousands of jobs and millions of dollars of revenue were lost. Despite the experience, the Zimbabwean government is now considering a similar plan on platinum exports. The current restrictive policies seem to be more of reactionary than proactive; hence they contradict the current status quo hindering the successful implementation of value addition and beneficiation (Maponga and Musa, 2021; Mutandwa 2018). Other policies on currency exchange and inflation thwarted the survival of beneficiation and value addition.

In light of these findings, it is clear that Zimbabwe's efforts in beneficiation and value addition have been hampered by a combination of well-intentioned but poorly executed policies. A more strategic approach is needed, one that emphasizes infrastructure development, capacity building, policy stability, and effective stakeholder engagement. Investments in infrastructure, such as smelting and refining facilities, as well as improvements in transportation and power supply, are essential to support the successful implementation of beneficiation policies. Additionally, addressing skills gaps and fostering technological advancements through partnerships with educational institutions and the private sector can enhance internal capacity for beneficiation.

Ultimately, the effectiveness of Zimbabwe's beneficiation and value addition efforts will depend on a coherent and stable policy framework, aligned with long-term economic goals and supported by robust implementation plans. Effective engagement with local and international stakeholders

will be crucial to align interests and drive collaborative efforts towards achieving the country's beneficiation objectives.

4.7.1 Strategic policy analysis

Strategic policy analysis is a long-term process which should be informed by past, current and future insights. In Zimbabwe Policy reviews are rarely conducted due to inconsistencies of the policies.

"Instead of strategic policy analysis we always have legal amendments. The top-level management only care about the political viability of such policies." Respondent 15

This indicates that strategic policy analysis is not prioritized even when there is need to do so. The government promulgated the beneficiation value addition and value addition of mineral resources, but the mining board has not been able to adequately analyse the policies and align them to current and future needs of the economy. This is demonstrated through failure of the initiative to yield positive results (Nyarota *et al., 2015*).

Another dimension of strategic policy analysis considers the relationship between the current policies, particularly those guiding the beneficiation and value addition of minerals and other policies in other departments. This is important for establishing common interests for the betterment of the economy. In this regard, participants disagreed with the notion of strategic policy analysis because most of the policies conflict with other policies in other departments such as ZIMRA, ZINARA and Fidelity. However, the essence of policy reviews cannot be underestimated as they align the mandate of the government to the needs of its people (Matanhire, 2020).

It is crucial to underscore the essential role that systematic and forward-looking policy evaluations play in achieving sustainable socio-economic outcomes. The current scenario in Zimbabwe reveals a significant gap in strategic policy analysis, largely due to a tendency to focus on legal amendments rather than comprehensive reviews that align policies with long-term economic needs. The observation that policy adjustments are often driven by political considerations rather than economic viability highlights a critical issue without thorough strategic analysis, policies risk becoming reactionary rather than proactively addressing evolving challenges.

The lack of alignment between the beneficiation and value addition policies and the broader economic context further illustrates this disconnect. The inability of the mining board to effectively analyse and adapt these policies contributes to their failure to deliver the anticipated positive

outcomes. Moreover, the observed conflicts between policies governing beneficiation and those from other departments, such as ZIMRA and ZINARA, exacerbate the inefficacy of the current policy framework. These conflicts undermine the coherence needed for policies to support each other and contribute to a unified economic strategy.

Therefore, the necessity for a robust strategic policy analysis framework cannot be overstated. Effective strategic policy analysis should not only focus on the immediate implications but also consider long-term economic goals and the integration of policies across different sectors. This holistic approach would ensure that policies are not only reactive but are designed to anticipate and mitigate future challenges, fostering a more stable and prosperous economic environment.

4.7.2 Coordination and monitoring of policies in Zimbabwe

Participants were asked if policies are coordinated and monitored and most of the responses show that the challenge facing the Zimbabwean economy is of conflicting policies.

"*Imagine the buy local policy which was being pursued during that time and the machinery required were not found in any local market. Then the manufacturer was forced to buy from China, goods of less quality just because the government imposed double duty on any goods imported from the western countries. This affected the ordinary citizen who was in need of such machinery because of the punishing policies regarding imports and exports. The major challenge is that the lack of policy coordination and monitoring does not affect the high-level government officials because they are exempted from paying duty."* Respondent 3

In Zimbabwe, there has never been coordination and monitoring department focusing on policy alignment, implementation and evaluation. Such loopholes create opportunities for corruption and nepotism. For instance, the youth groupings who were the beneficiaries of the beneficiation and value addition and youth and empowerment policy were connected to high-level ministers or rank and file in the army (Murombo, 2022). The lack of policy monitoring and coordination also prevailed during the dispute between the Chamber of Mines, Fidelity and the MMCZ. These organisations are prominent stakeholders of the Ministry of Mines but the conflict in the liberisation of minerals particularly handling and sales revealed some institutional challenges that are rooted with corruption and maladministration of state institutions.

Participants noted that lack of coordination indicate the absence of transparency. Indeed, transparency is critical issue in the entire management of government entities. The Auditor General Report of 2019 indicated that most government departments lack transparency in their

execution of duties and the negative consequences were barely outlined. It was further noted that coordination of policy is further weakened by the creation of parallel structures within one department. Bureaucracy and lack of accountability hinder the efficient coordination and monitoring of policies. For example, the creation of the Zimbabwe Investment Program which was coined to the one stop shop for investment attraction did not give the expected results because of the bureaucratic processes and lack of accountability (Tinarwo and Babu, 2021). The pillars for the ZIP were further violated in the process including the policies which were meant to protect local investors. The beneficiation and value addition also suffered the same fate as the country constantly manipulated and shifted policies without proper coordination.

Participants indicated that monitoring is being done on piecemeal basis. Only departments which are suspected to be politically misaligned are monitored and any deviation is publicized in face value to cover the multiple errors that occur in other departments. For example, the Mineral Marketing Corporation of Zimbabwe saga of gold smuggling is one of the cases that indicated the selective application of policy to solve internal problems (Chitando, 2018). Since its inception, the beneficiation and value addition policy has never been reviewed due to lack of monitoring and evaluation. Policy monitoring and evaluation is linked to strategic policy analysis because it communicates policy outcomes which are used to inform strategic alignment of the policy. The disconnection between these processes creates doubts on whether the policies are implemented (Gudyanga, 2020). Moreover, the complex nature of the mineral resources requires appropriate scrutiny because it is argued that some precious minerals such as gold are difficult to add value and beneficiate. This is mainly attributed to the spatial distribution of these minerals which makes it difficult to further process due to diseconomies of scale.

4.7.3 Beneficiation and value addition framework in Zimbabwe

The absence of a framework for beneficiation and value addition of mineral resources is the hallmark of multiple failures of the government policy. However, the government made attempts to link beneficiation and value addition to the indigenisation and empowerment policy.

"*Youth groups which intended to partake beneficiation and value addition were supported through the Youth, Indigenisation and Empowerment department without involving the Ministry of mines and Mining development. This created gaps which were often fulfilled by conflict because operations were supervised by another Ministry while support was sourced from another Ministry.*" Respondent 13

It is argued that, in the absence of a concrete framework, the beneficiation and value addition remains a political gimmick for the ruling government which does not produce tangible results. Similar findings are echoed by Mberi *et al.,* (2022) who noted that beneficiation and value addition framework in Zimbabwe has failed to take shape due to the existence of conflicting interests from various stakeholders.

In conclusion, the absence of a hybrid framework for beneficiation and value addition in Zimbabwe underscores a significant impediment to the effective implementation of government policies. The existing approach, characterized by fragmented initiatives and inconsistent oversight, has resulted in a lack of tangible outcomes and persistent conflicts among stakeholders. This disjointed policy environment reveals that beneficiation and value addition efforts often become political tools rather than drivers of genuine economic progress.

The government's attempts to integrate beneficiation with broader policies, such as the indigenisation and empowerment initiatives, have frequently led to misalignment and operational inefficiencies. These policies, though well-intentioned, have suffered from inadequate coordination between relevant ministries and a failure to address the complexities of the mining sector comprehensively. For example, youth groups supported through one department without proper integration with the Ministry of Mines have often faced operational conflicts and inefficiencies.

The framework's absence not only hinders effective policy execution but also exacerbates the challenges of aligning mineral resource management with economic development goals. The need for a well-defined, cohesive framework is evident; it would ensure a unified approach, mitigate conflicts among stakeholders, and enhance the alignment of policies across different government departments. A structured framework could provide clear guidelines, facilitate better coordination, and foster a more predictable and supportive environment for beneficiation and value addition activities. Thus, establishing a comprehensive framework is essential for translating policy intentions into meaningful and sustainable outcomes, driving economic growth, and addressing the systemic issues that have plagued Zimbabwe's beneficiation efforts.

4.7.4 Perceived components of beneficiation and value addition framework in Zimbabwe

Participants from various organisation indicated mixed views on the components of the beneficiation and value addition of minerals in Zimbabwe. The suggested components of the

framework for beneficiation and value addition cut across various sectors from the public and private sectors.

"*I think the framework must be detailed and collaborative indicating the duties of each role player. For example, value addition is only mentioned at national level and the industry, but we have not heard about research institutions, the academia, NGOs and the private sector. In fact, this is the first research I encountered focusing on beneficiation and value addition with this rigorous engagement*." Respondent 1

The above sentiment suggests multiple components that should be included in the framework for value addition and beneficiation of minerals. Participants indicated that the major players should be drawn from the public and private sector. Beneficiation and value addition is relatively new concept, therefore technical knowledge need to be outsourced from various stakeholders both locally and internationally because some of the methods and technics are not currently present in the country (Murombo, 2022). The technical team will help develop and monitor policies as well as advising the Minister of Mines and Mineral Resources on appropriate strategies which should be implemented to ensure that the policy achieve the desired results.

Other important players are the academia and research institutions. Participants noted a gap wherein beneficiation and value addition are seldom researched, and the concept does not appear in the academic curriculum. It is argued that encouraging research and learning of beneficiation and value addition of mineral resources is critical for establishing a base grooming competent technical and academic personnel who will contribute their knowledge to institutions (Mavhunga, 2018). Development of intellectual capital in the aspect of beneficiation and value addition strengthens the competitive advantage of mineral output of the country. Moreso, public engagement is a critical strategy for enhancing community participation. This also includes NGOs and other stakeholders who should act as watchdogs for abuse and assisting in training and financing research activities.

Participants noted that the outcomes of the framework should be linked to sustainability. The main purpose of businesses is to make profit and maximize shareholder value, create employment and growth. In the process, resources are depleted, and the environment is affected. The government should ensure that the businesses involved in the extraction of raw minerals, beneficiation and value addition value chain preserve the environment and the lives of the surrounding communities are improved (Makaye and Mapuva, 2016). As the government enforce policies such as

beneficiation and value addition, it should also be sensitive to external market forces and international policy. This will make beneficiation an internationally attractive policy for investors.

4.8 Strategies for maximizing value addition and beneficiation of minerals in Zimbabwe

"We have for many years – not just in South Africa but in many parts of the continent – spoken about beneficiation. And I think part of the secret, in relation to beneficiation, is you have got to make it attractive, profitable, for the private sector – and it will take off." Extract from the Africa Mineral beneficiation vision.

The above sentiments indicate that governments should make beneficiation an attractive policy that does not shun investors because business's shareholders desire greater returns. On the other hand, the government has political pressure to respond to public demands particularly when the history of exploitation from colonial masters is still visible. Hence, it is of utmost importance for governments and businesses to collaboratively devise a mutually advantageous approach, as inadequately executed beneficiation efforts can lead to the destruction of value (Moyo, 2020).

As such, commitment and cooperation from both parties are essential for addressing the major challenges. For instance, in the context of beneficiation, businesses look for a sustainable margin; sustainable domestic industry, which requires skills training rather than subsidies; and support from the government through clear legislation that is applied consistently and fairly, constant, and effective monitoring, less bureaucracy, a fast response time, sufficient infrastructure and a competitive tax regime (Mberi *et al*., 2022). Governments desire sustainable revenue; job creation; well-regulated industry; skills development and a commitment from business to develop local industry and go beyond the minimum requirements of corporate social responsibility; and positive public relations to indicate their capacity to host foreign investors and thereby attract investment beyond natural resources (Mamina *et al*., 2020). Without mutual agreement these gains are lost through corruption and wasteful expenditure.

Another dimension is to develop appropriate legislation, regulatory frameworks and strong democratic institutions to promote transparency and accountability. Transparency must exist throughout the value chain, beginning with the negotiation of exploration contracts. The private sector should support increased transparency, as this is in their long-term interests. Without transparency, the government can recall agreements that are not suitably beneficial to the country. Effective regulatory frameworks strengthen Public Private Partnerships which lead to inclusive and sustainable development.

The government should encourage competitive pricing of inputs, skill levels and technical capacity to promote beneficiation and value addition. It is argued that SADC countries are restricted by a shortage of energy, infrastructure and skills. Therefore, Zimbabwe needs to identify its competitive advantage and agree on an implementation method, whether through a corporate buy in or through arbitrary enforcement. This is because domestic beneficiation can only be successful in situations where there are already sufficient levels of physical and human capital to process materials, rather than relying on enforced processing to develop the necessary skills and infrastructure.

In this regard, the relationship between business and the state must be based on trust, and mutual understanding. This should be supported by tailor making beneficiation policies that are robustly implemented together with flexible tax regimes to promote local value addition without undermining businesses. Although beneficiation is targeted at local communities it is still important to consider foreign based partnerships with countries such as China with high level mining equipment and financial power.

The government should cap investment incentives in pursuit of the beneficiation policy ambitions. This will lead to formation of huge industrial companies situated in selected areas which are earmarked for development. For example, Mashonaland and Masvingo provinces are prominent gold producers, and they can be selected for such investments. Additional incentives encompass customs support services, duty-free importation of raw materials for production, and tax exemptions. It is essential for the Zimbabwean government to enhance and unify the beneficiation initiative in order to align policies and mining regulations, considering that neighbouring countries share similar mining resources and encounter the same multinational companies. Recognizing that beneficiation and value addition extend beyond national borders, it is crucial to establish regional partnerships that facilitate peer review and monitoring.

For example, most of the SADC member states are already taking beneficiating their mineral resources and this could be helpful for Zimbabwe to learn from experiences of those already

implementing the policy. This is because Zimbabwe’s policy on beneficiation and value addition is blamed for being overzealous and undermining the business aspect of it.

4.9 Chapter Synthesis

The current chapter presented results from a concurrent convergent research design. The initial phase dealt with quantitative results which utilised descriptive statistics to explore the existing

policies on beneficiation and value addition and their effects on socio-economic development. The results indicate that the current policies in Zimbabwe are ambitious but their real effect on socio-economic development is very minimal. The policies are more of deterrence than being enablers of beneficiation and value addition of mineral resources in Zimbabwe. However, it is also vital to credit the policy initiatives regarding beneficiation and value addition as they provide a foundation for effectively utilising the abundant mineral resources in the country.

The results of the descriptive study concurred with the qualitative results harvested in the study. The results also indicated stakeholder views on the need for beneficiation and value addition were positive, but they also argued that the current policies, economic hardships and a volatile political climate are hindering beneficiation implementation as indicated in the qualitative study. This is necessary for enhancing sustainable socio-economic development in Zimbabwe. Moreover, the findings indicate that the adoption of a beneficiation and value addition strategy is crucial for driving economic recovery, growth, and transformation. Consistent policy application in this strategy is essential to prevent expensive policy uncertainties arising from frequent, unplanned changes. The insights from this study are pivotal for guiding discussions between the Ministry of Mines and Mining Development and stakeholders in the minerals sector, emphasizing the need for a comprehensive approach to mineral beneficiation and value addition. This approach will promote steady and coordinated execution of the related policies

One of the major themes that emerged from the data is the issue of policy inconsistency and instability. Respondents expressed concerns that frequent changes in policy and regulatory frameworks create an uncertain environment for investors and industry stakeholders. This instability discourages long-term investments in mineral beneficiation projects, as stakeholders are hesitant to commit resources without clear and stable guidelines. The analysis reveals that consistent and stable policy frameworks are crucial for fostering investor confidence and encouraging investments in beneficiation initiatives. The government needs to ensure that policies are not only clear and transparent but also consistent over time to build trust among industry participants.

The findings of the study highlighted various regulatory and legal barriers that hinder the effective implementation of mineral beneficiation. These include cumbersome licensing processes, bureaucratic red tape, and unclear regulatory requirements. Additionally, there are conflicting regulations between different government agencies, which create confusion and inefficiencies. Streamlining regulatory processes and reducing bureaucratic obstacles are essential for

facilitating the smooth implementation of beneficiation projects. Harmonizing regulations across different government agencies can eliminate contradictions and ensure a coherent approach to policy enforcement. Simplifying licensing procedures and providing clear guidelines can also significantly reduce delays and costs associated with compliance.

The study found that there is a lack of adequate incentives for companies to engage in value addition activities. Respondents noted that current policies do not provide sufficient financial or fiscal incentives to encourage the beneficiation of minerals locally. Instead, the focus remains on the extraction and export of raw minerals. Introducing targeted incentives such as tax breaks, subsidies, or grants for companies investing in beneficiation can stimulate local value addition. Policies should be designed to make value addition financially attractive and economically viable. Additionally, creating special economic zones or industrial clusters focused on beneficiation could further incentivize companies to engage in these activities.

Infrastructure deficiencies, particularly in energy, transportation, and processing facilities, were identified as significant impediments to beneficiation. Respondents also pointed to a lack of access to advanced technologies and expertise required for effective value addition. Addressing infrastructure and technological constraints is critical for the success of beneficiation projects. Investment in infrastructure development, such as reliable power supply and efficient transport networks, is necessary. Moreover, policies should promote the transfer of technology and skills through partnerships with international firms and capacity-building programs for local enterprises.

The findings indicate that there is insufficient engagement and participation of key stakeholders, including local communities, industry players, and civil society, in the policy-making process. This lack of inclusive dialogue often results in policies that do not adequately address the needs and concerns of all stakeholders. Effective policy formulation requires the active involvement of all relevant stakeholders. Inclusive and participatory approaches to policy development can ensure that the policies are well-informed, balanced, and widely accepted. Establishing formal mechanisms for stakeholder consultation and feedback can enhance the relevance and effectiveness of beneficiation policies.

Through triangulating qualitative and quantitative findings, the study overcame the limitations of each approach and achieved a more robust interpretation of the phenomenon under investigation. This approach allowed for a richer and more nuanced analysis, as the strengths of both qualitative and quantitative methods were employed.

In summation, the analysis of the findings underscores the importance of coherent, stable, and inclusive policy frameworks for the effective implementation of mineral beneficiation in Zimbabwe. Addressing policy-related issues such as consistency, regulatory barriers, lack of incentives, infrastructure constraints, and stakeholder engagement is vital for promoting sustainable socioeconomic development through beneficiation and value addition. The insights provided by this analysis can guide policymakers in formulating strategies that foster a conducive environment for mineral beneficiation and value addition to contribute to the broader development goals of the country.

4.10 Conclusion

This chapter presented a comprehensive analysis of the research findings, highlighting several key factors impacting mineral beneficiation and value addition in Zimbabwe. The study revealed that while current policies provide a foundation, their practical effects are limited by economic, political, and regulatory challenges. Additionally, energy constraints, skills shortages, infrastructure deficiencies, lack of technological advancement, and insufficient stakeholder engagement further constrain progress. The integration of quantitative and qualitative data has provided a nuanced understanding of these issues, emphasizing the need for coherent strategies to address the identified barriers. In a nutshell, the findings point to the necessity of a multifaceted approach that not only refines policy frameworks but also addresses the broader cross-cutting constraints to enhance sustainable socio-economic development in Zimbabwe.

CHAPTER 5

FRAMEWORK FOR MINERAL BENEFICIATION AND VALUE ADDITION IN ZIMBABWE

5. 1 Introduction

The preceding chapter summarized the study's findings, emphasizing the absence of a cohesive framework for mineral beneficiation and value addition in Zimbabwe. Numerous countries have acknowledged the critical role of mineral beneficiation and value addition in driving economic growth. Consequently, there is a crucial need for a framework tailored to Zimbabwe's unique context to foster sustainable socio-economic development. This chapter details the steps involved in developing this framework, its various components and elements, and the validation process.

5.2 Steps in Developing the Framework

This section presents the steps undertaken to create a beneficiation and value addition framework for Zimbabwe. These steps include a summarized review of literature, the development and explanation of the framework's elements, and finally, the validation of the framework.

5.2.1 Summarised review of literature

The first stage in crafting the framework for mineral beneficiation and value addition aimed at Zimbabwe's socio-economic development involved a literature review. The goal was to identify best practices in the field and ensure the framework aligns with stakeholders' needs.

In Australia, the beneficiation framework targeted specific minerals, establishing strong linkages between the government and mining companies (Lewis, 2015). However, it primarily focused on environmental preservation and economic output, neglecting socio-economic aspects like inclusivity and community participation. Conversely, the Chinese framework emphasized community participation and institutional capacity (Mambondiani and Manyuchi, 2021). The Chinese government's decentralized approach involved various stakeholders, ensuring mining proceeds benefited both the community and the government (Mamina *et al*., 2020), creating robust internal markets and a thriving mineral ecosystem.

South Africa's policy framework on beneficiation and value addition reflects a commitment to adding value to minerals before they reach global markets. However, it has yet to be fully tested for applicability and primarily aims at removing constraints on beneficiation and value addition.

Huni (2018) notes that Botswana's framework, focused on diamonds the primary foreign currency source is considered the best in Southern Africa due to its practical implementation aspects (Kgola, 2019). Successful aspects include effective stakeholder engagement and public participation (UNCTAD, 2018), crucial for Zimbabwe's framework development. Despite Botswana's framework's strengths, it cannot be entirely replicated in Zimbabwe due to differences in mineral endowment. RIA (2014) highlighted that policy inconsistency and political unrest hindered the DRC's framework's success.

For Zimbabwe's framework development, leveraging policy terrain, improving governance, and eliminating bureaucratic obstacles are essential. Matinde *et al.*, (2014) argue that Zimbabwe's mining sector has suffered from fragmented policies lacking a comprehensive view. Historically, colonial policies benefited only mining companies and owners, with little focus on beneficiation and value addition (Murombo, 2021). Despite the ZIMASSET economic blueprint promoting beneficiation since 2008, colonial frameworks still influence policy-making (Tinarwo and Babu, 2022). Thus, in order to help Zimbabwe with beneficiation and value addition, a novel hybrid framework is suggested. The objective of this framework is to improve living standards in neighbouring communities by achieving sustained socio-economic development through community involvement, institutional capacity enhancement, and the establishment of a strong legal framework.

5.2.2 Development of the beneficiation and value addition framework

The second step involved developing a framework for beneficiation and value addition, which serves as the foundation for comprehending and fully realizing the concepts beneficiation and value addition. Figure 5.1 illustrates this framework, highlighting the connections between different stakeholders who need to be involved in various processes to achieve socio-economic development. These stakeholders, which are vital to the success of the beneficiation program, include the government, academia, civil society, and local communities. The foundation for the framework's creation is the belief that the government is committed to maximising the value of its mineral resources for the good of the surrounding communities (Laisani *et al*., 2023).

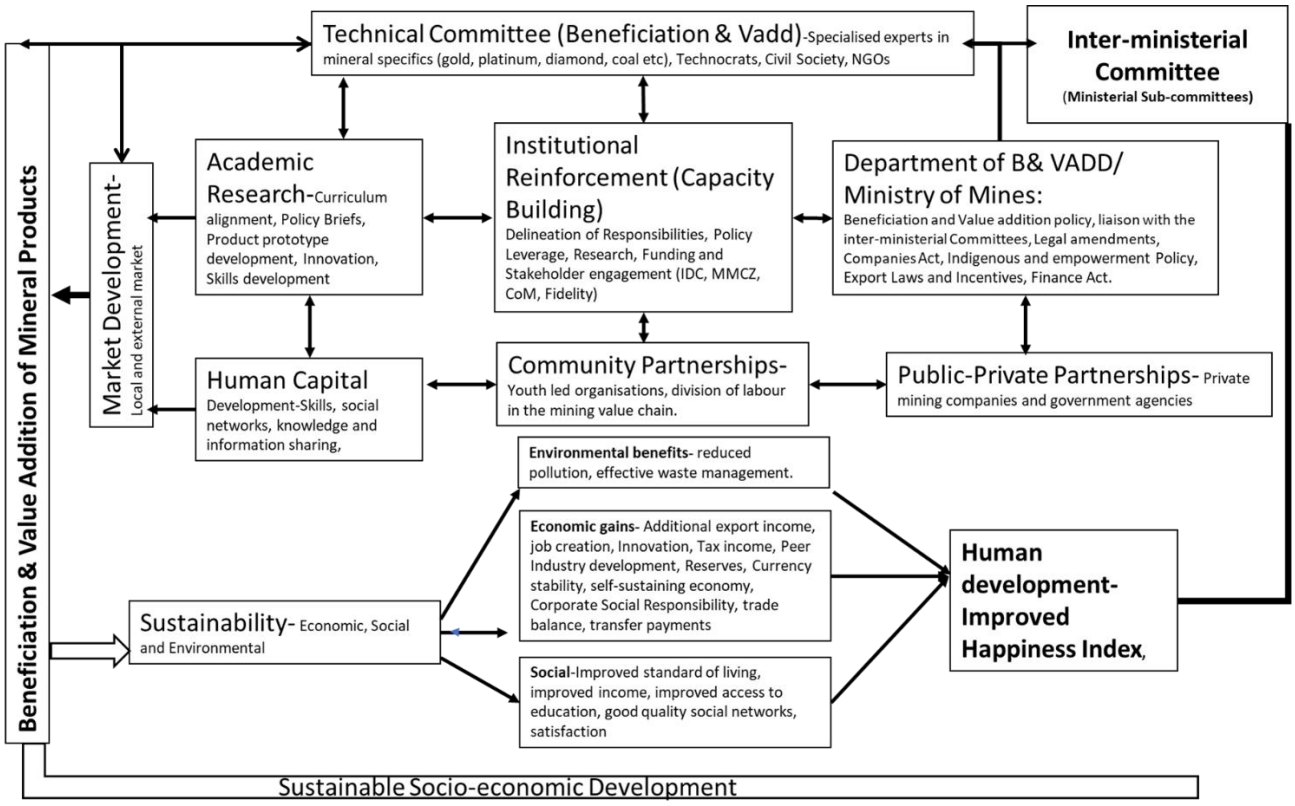


Figure 5.1 Framework for beneficiation and value addition of mineral resources in Zimbabwe

5.3 Components of the Framework

Five essential elements make up the suggested framework for mineral beneficiation and value addition in Zimbabwe, which is intended to promote sustainable socioeconomic development. These elements are covered in more detail below (Laisani *et al*., 2023).

5.3.1 Governance

The framework for value addition and mineral beneficiation must be implemented effectively, and this requires good governance. Its main responsibility is to guarantee that policies are created, carried out, and overseen in a transparent and coordinated manner. The inter-ministerial committee, which is essential to the governance component, is in charge of supervising the framework's application and guaranteeing stakeholder participation all along the way. As shown in Figure 4.2, this group, which is made up of senior government representatives from several

important ministries, such as Directors, Chief Directors, Permanent Secretaries, and Ministers, should also handle any cross-cutting problems that could make the framework less effective.

Effective framework implementation requires the use of good governance principles, such as accountability, transparency, and participation. By include all parties in the decision-making process, these procedures will guarantee that the advantages of value addition and mineral beneficiation are distributed fairly. Governance should also see to it that laws and rules are put in place to safeguard the environment and ensure that the communities that live nearby benefit from mineral resources.

Essentially, governance makes sure that all pertinent parties are involved and that policies are implemented in a transparent and coordinated manner. This strategy maximises the advantages of mineral resources for Zimbabwe and its people while fostering sustainable socioeconomic growth in that nation.

5.3.2 Infrastructure development

Creating the infrastructure necessary to enable mineral beneficiation and value addition processes is the second component. This include creating efficient water supply systems, building transportation infrastructure, supplying energy that is both affordable and dependable, and enhancing telecommunications to support mining activities. Building infrastructure is essential to maintaining mining operations and optimising the advantages of value-added and beneficiation processes.

5.3.3 Technical assistance

The third element is all about offering technical support to encourage the growth of mineral beneficiation initiatives. To encourage the use of cutting-edge technologies in the mining industry, this involves creating technology transfer channels, creating research and innovation centres, and providing training courses. This component also includes experts who deal with issues unique to minerals. For example, the committee would receive technical advice on the special possibilities and problems in the diamond beneficiation cluster from a specialist in the field. These experts are essential in making sure the framework is customised to meet the unique requirements of various minerals, which improves the efficiency of beneficiation and value addition processes.

For the mining industry to have the expertise needed for beneficiation and value addition processes, technical support is crucial. Through the involvement of experts, the framework may

tailor support and expertise to the specific needs of various minerals, improving the overall performance of the beneficiation and value addition operations.

5.3.4 Financing mechanisms

The creation of funding channels to assist mineral beneficiation and value addition operations is the fourth component. To encourage investment in the mining industry, this involves creating venture capital funds, lending money, grants, and other forms of financial assistance to mining enterprises. It also entails creating public-private partnerships. Creating financing channels is essential to guaranteeing that the mining industry has access to funds for beneficiation and value-addition.

5.3.4 Stakeholder engagement

In order to support mineral beneficiation initiatives, the last component places a strong emphasis on involving stakeholders, such as local communities, government representatives, mining corporations, and civil society organisations. This entails setting up forums for stakeholders, offering venues for discussion and collaboration, and encouraging public awareness initiatives to inform stakeholders of the advantages of these endeavours. In order to guarantee the inclusive, transparent, and sustainable growth of mineral beneficiation and value addition activities, stakeholder engagement is crucial.

5.4 Elements of the Beneficiation and Value Addition Framework

The elements of the designed framework for mineral beneficiation and value addition are described in depth in this section. This study's framework includes a number of players from the mining sector as well as outside of it. The Inter-Ministerial Committee, which is made up of ministers, directors, chief directors, technocrats, permanent secretaries, and other senior government officials from different ministries, is a crucial component of this system. The Zimbabwean Parliament receives reports from this committee, which is under the jurisdiction of the relevant parliamentary portfolio committee. For instance, the Ministry of Mines and Mining Development is within the jurisdiction of the Mines and Energy portfolio committee. The Inter-Ministerial Committee creates an environment that is conducive to value addition and mineral beneficiation by tackling cross-cutting obstacles to beneficiation.

The Ministry of Mines and Mining Development of Zimbabwe oversees parliamentary proceedings on matters of beneficiation and value addition. This includes the enactment of legal instruments

and national policies and leading debates on appropriate channels for value addition and beneficiation. The Ministry coordinates with other laws, such as the Indigenous and Empowerment Act, the Finance Act, and the Companies Act, in consultation with the technical committee. With the technical committee's assistance, the Ministry works in tandem with many legislation, including the Companies Act, the Finance Act, and the Indigenous and Empowerment Act.

A diverse range of professionals, including mineralogists, engineers, geologists, policy makers, and metallurgists with specialised knowledge of specific minerals (such as platinum, diamond, gold, coal, and chrome), make up the technical committee. NGOs, economists, environmentalists, surveyors, and representatives of civil society round out this team. These technocrats' responsibilities include encouraging scientific innovation, helping to formulate policies, and identifying and implementing opportunities for beneficiation and value addition. The technical committee is essential to the framework because it provides the government with direct reporting on field research findings.

Existing organisations like the Chamber of Mines, Fidelity, the Industrial Development Corporation, and the Minerals Marketing Commission of Zimbabwe must receive enough funding in order for beneficiation and value addition to take off. This involves offering financial support and human capital to boost industrial process efficiency and value addition. It is understood that these institutions are capable of much higher performance than they now do if given enough support. It is commonly acknowledged that corruption and a lack of expertise are the two main obstacles to these agencies' effective operation. Improving institutional capability should include defining roles and eliminating overlaps that make tasks more difficult to complete. Additionally, these groups must to be able to engage stakeholders and support policy alignment.

To take advantage of the vast experience that private enterprises have in the mining sector, the Ministry ought to establish collaborations with the private sector. These businesses can help the government enhance the value addition of mineral resources. De Beers and the government of Botswana, for example, collaborated to improve value addition and beneficiation. In order to create community partnerships where young people are taught different skills through corporate social responsibility initiatives, private enterprises are also essential. These channels can be used to create agreements for the artisanal mining of skills among a variety of staff members. There is more room for creativity and revenue generation the more skilled one is. The improvement of

human capital development through hands-on techniques like teaching, learning, and workshops should be the goal of both the public and commercial sectors.

Academic and research institutions should also have a strong integration of value addition and beneficiary. Academic institutions should design their curricula at different levels of education to incorporate value addition and the development of skills in the beneficiation of minerals, which are usually restricted to lower levels and concentrated in vocational colleges. It is important to promote innovation in academia at all levels. Nowadays, due to limited access to cutting-edge learning platforms, there is little innovation and technological application in the processing of minerals, especially in value addition. Thus, channels for the creation of new products utilising natural resources ought to be opened up by the academic sector.

The output that research institutions now produce in relation to beneficiation and value addition is minimal. On the other hand, this emphasis may lead to creative ideas that are vital for raising the competitiveness of mineral resources and products. Policy and business should be informed by research to guarantee that value addition and beneficiation are acknowledged. Crucially, research contributes to the development of standards, which at the moment are restricted to Zimbabwe's raw mineral resources. Beneficiation is hampered by the lack of standards for processed mineral resources. This challenge can be solved by creating suitable standards or implementing international standards to guarantee value-added goods satisfy the demands of the global market.

Finally, a developed domestic and international market is necessary for beneficiation and value addition. Inter-industrial connections between industry, retailer, and consumer should be present in the local market. There aren't enough industry connections at the moment to show multistage value addition. Only completed goods are bought by local consumers from overseas; raw minerals including gold, platinum, diamond, lithium, and iron ore are mainly shipped abroad. Therefore, beneficiation won't be accomplished in its whole unless the value-added industrial cycle starts and finishes locally. It is imperative to supply processed products to worldwide markets in order to maximise their value and guarantee that beneficiation produces adequate outcomes.

Beneficiation and value addition function as means, not as objectives in and of themselves, to promote sustainable human growth. Sustainability is based on three fundamental pillars: the environment, society, and economy. The primary objectives of social sustainability include raising living standards, improving access to resources, healthcare, and education, as well as encouraging the development of healthy social networks. They contribute very little directly to the

economy, but they do provide clothing, food, and proper care for the elderly. These measures, which are crucial indicators of how beneficiation impacts average people, will raise the welfare of the population.

Beneficiation and value addition serve as a means to promote sustainable human development rather than an end goal in themselves. Sustainability is supported by three key pillars: social, economic, and environmental. Social sustainability focuses on enhancing the standard of living, improving access to education, resources, and health facilities, and fostering healthy social networks. It also encompasses access to food, clothing, and proper care for the elderly, even if their direct contribution to the economy is limited. These indicators are critical measures of beneficiation's impact on ordinary individuals, ensuring that the welfare of the population improves as a result.

Economic sustainability refers to the ongoing generation of income within the beneficiation and value addition system. This aspect is the primary driver of beneficiation and value addition initiatives. Currently, much economic potential is trapped in raw mineral resources or lost through informal markets. Achieving economic sustainability means creating a self-sustaining environment where value is generated domestically, and investment sources come from the proceeds of value-added minerals. Various channels can promote economic sustainability, such as increasing the competitiveness of the country's exports, which boosts foreign currency inflows, enhancing revenue through taxes and levies, and ultimately achieving a positive balance of payments. Value-added mineral resources also play a crucial role in strengthening the local currency, as its value is bolstered by strong mineral assets like gold. A robust economy should be capable of meeting its needs through locally generated income. The ZIMASSET blueprint has already emphasized provincial devolution and the establishment of Special Economic Zones. The aim is to ensure that economic benefits are not confined to national interests but also extend to local communities.

Through beneficiation and value addition, operating entities should create jobs for local youth. Corporate Social Responsibility (CSR) programs are vital for giving back to the community, and their full potential is realized through beneficiation and value addition. Enhanced economic gains will help sustain economic activities through transfer payments, making mineral resource management a cornerstone of the economy when managed effectively (Laisani *et al*., 2023).

Beneficiation and value addition are not ends in themselves but means to promote sustainable human development, which relies on three pillars: social, economic, and environmental

sustainability. Social sustainability involves enhancing the standard of living, improving access to education, resources, health facilities, food, and clothing, and fostering healthy social networks. These indicators are crucial for assessing beneficiation's impact on the average individual, ensuring that even the elderly, whose contribution may be limited, are well cared for.

The goal of economic sustainability is to maintain revenue creation within the system of value addition and beneficiation. It serves as the main driving force behind these projects. A large portion of economic potential is either squandered through unofficial marketplaces or locked up in raw mineral resources. In order to achieve economic sustainability, one must establish a self-sufficient setting where value is produced locally and investment sources are derived from the sales of value-added minerals. This can be done in a number of ways, like making the nation's exports more competitive, which increases foreign exchange inflows, raising money through taxes and levies, and eventually attaining a positive balance of payments. Because strong mineral assets like gold increase the value of the local currency, value-added mineral resources are also essential to its strength.

A healthy economy should be able to generate enough revenue locally to cover its demands. In order to guarantee that economic advantages are not limited to national interests but also extend to local communities, the ZIMASSET blueprint has already placed a strong emphasis on provincial devolution and the creation of Special Economic Zones. Using beneficiation and value addition, operating organisations should give young people in the community jobs. Programs for corporate social responsibility (CSR) are essential for giving back to the community, and they reach their full potential when they benefit and add value. When mineral resources are managed well, increased economic gains will support economic activity through transfer payments, making mineral resource management a key component of the economy (Laisani *et al*., 2023).

5.5 Uniqueness of the Framework

The framework's involvement of different stakeholders in the mining value chain is another noteworthy aspect. Value addition initiatives in Zimbabwe are beset by a number of intersecting issues, many of which originate from various ministries.

Zimbabwe's framework for mineral beneficiation and value addition is unique for a number of reasons. It begins by taking a comprehensive approach to the mineral industry, covering every step of the value chain, from exploration to production and marketing. The importance of local

value addition which can boost employment and national income is emphasised by this all-encompassing approach.

The framework also emphasises the significance of technological transfer and development, which is necessary for the effective and long-term processing of mineral resources. The framework's involvement of different stakeholders in the mining value chain is another noteworthy aspect. Beneficiation initiatives in Zimbabwe are beset by a number of intersecting issues, many of which originate from various ministries.

As seen in Figure 5.2, an Inter-Ministerial Committee was proposed to deal with these problems. It is composed of subcommittees that included directors, permanent secretaries, technocrats, academics, and ministers from different ministries. This committee's main objective is to address cross-cutting restrictions from the pertinent ministries. Directors at the Ministry of Energy and Power Development, for example, are responsible for formulating and documenting strategies to lessen the negative effects of ongoing blackouts, which have a detrimental effect on the beneficiation and value-adding of mineral resources. As energy is an essential component of the mining value chain, maintaining a steady power supply is of utmost importance.

Ministries like the Ministry of Local Government must also guarantee stakeholder participation and promote grassroots involvement in value addition and beneficiation initiatives. At the local level, attaining sustainable socio-economic development is the responsibility of the Ministry of Local Government. In collaboration with the Ministry of Higher Education and Technology Development, it ought to enable investigations and create criteria for gauging happy index. Prioritising sustainable socioeconomic transformation in Zimbabwe, the Inter-Ministerial Committee reports to Parliament on its mandate to resolve the cross-cutting obstacles preventing the implementation of value addition and mineral beneficiation (Laisani *et al*., 2023)

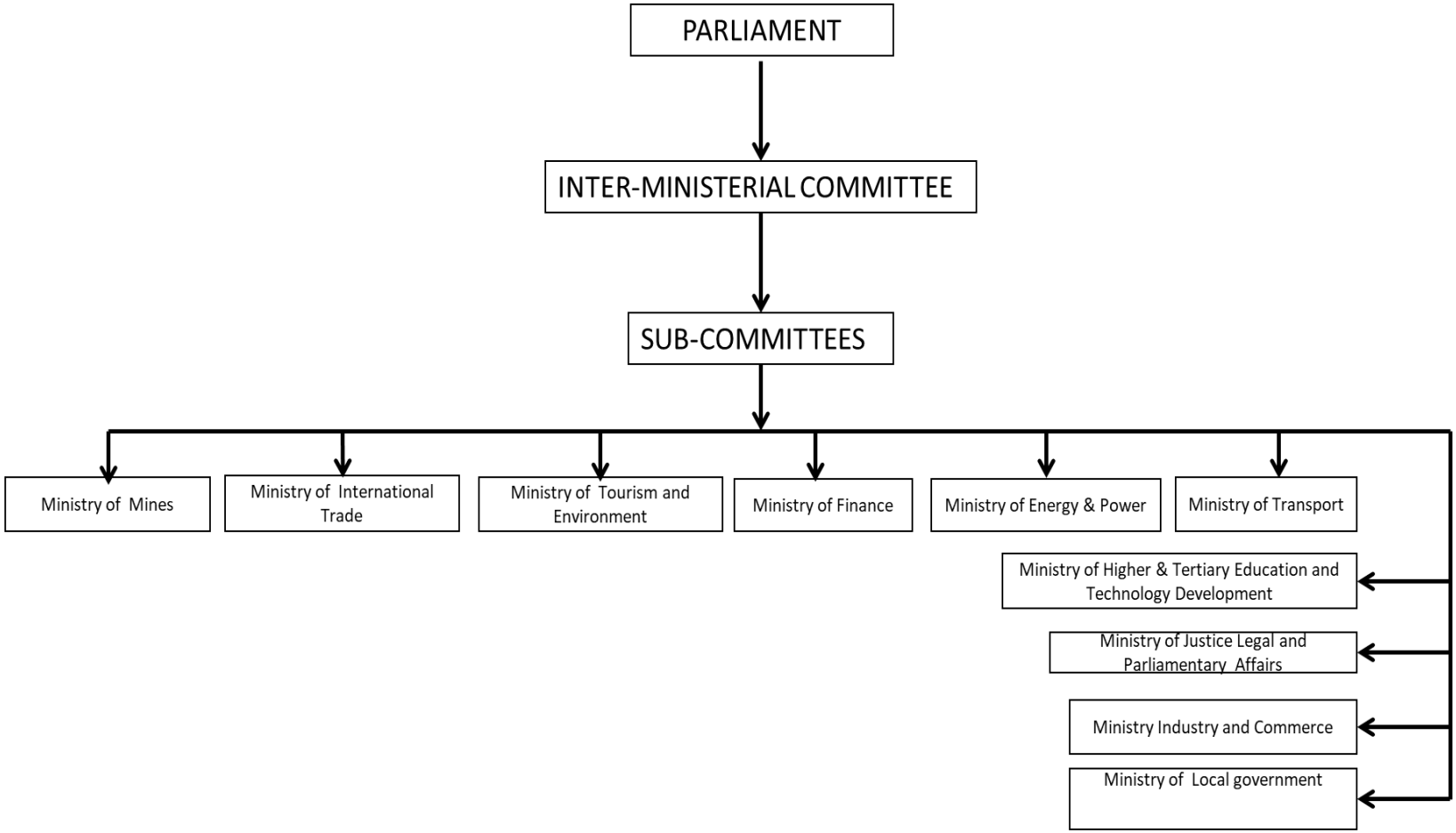


Figure 5.2 Composition of Inter-ministerial Committee for Beneficiation and Value Addition

5.6 Validation of the Framework

A framework's validation is a multi-step procedure with many deadlines and tasks. The beneficiation and value addition framework for this study was validated in five steps. Presenting the framework to stakeholders during a workshop was the first step. In the second phase, stakeholders from the Chamber of Mines, MMCZ, the Ministry of Mines and Mining Development, academic institutions, and other pertinent stakeholders were asked for their opinions and suggestions. The framework was revised and refined at the third stage in response to the input that was obtained. Experts evaluated the updated framework in the fourth stage, and their suggestions were included into the final framework, which was finished in the fifth.

Step 1: Presentation of the framework to stakeholders

The framework was introduced to stakeholders in a workshop intended to gather their perspectives on the proposed framework for mineral beneficiation and value addition in Zimbabwe. During this session, stakeholders received copies of the framework for review.

Step 2: Feedback and inputs

In the second stage, feedback and input were collected from stakeholders. They were encouraged to provide comments on the framework, suggest additional activities, assess the feasibility and relevance of specific interventions, and voice any concerns about the framework's impact on their operations or communities. The collected feedback was documented, and stakeholders were given the opportunity to discuss the framework among themselves to enhance mutual understanding. Some feedback included: One respondent mentioned, "This framework addresses crucial aspects needed for socio-economic development in Zimbabwe, though it lacks consideration of environmental factors."

While some stakeholders highlighted the need for incorporating environmental considerations, the framework was designed in alignment with the ZIMASSET blueprint, which focuses on socio-economic development through mineral beneficiation and value addition. The framework is aimed at achieving sustainable development, with outcomes assessed through the happiness index, reflecting shared economic benefits between the government and communities. It was noted that the framework would extend benefits to rural areas, offering various opportunities for young people.

Stakeholders also appreciated the framework's emphasis on capacity building. It includes human capital development across all levels, from community participants to highly skilled professionals tasked with policy implementation. Involving the community in beneficiation and value addition is considered vital for sustainable development, fostering development-focused interactions. The collaboration between the government, private sector, and communities demonstrates a commitment to shared socio-economic progress.

Another stakeholder commented, "The framework's outcomes are measurable, which is a notable strength. Although the Happiness Index metrics are still being developed, the framework shows promising intent. Such frameworks are essential as they provide a basis for suggested actions. I am confident the government will adopt this framework with minimal modifications."

During the validation process, there were suggestions to streamline repetitive elements, such as multiple government agencies and inter-ministerial committees, into a single entity to reduce complexity. While the idea of a one-stop shop for mineral beneficiation and value addition was proposed, concerns were raised about potential corruption with multiple connections. However, it was argued that maintaining these connections is necessary.

Step 3: Revision and refinement

The framework was revised and refined based on stakeholder feedback to ensure it was comprehensive, relevant, and actionable. Adjustments were made to specific activities and interventions to address concerns, and the overall coherence and consistency of the framework were improved.

Step 4: Expert Review

Experts in the field, including technocrats, professors, researchers, and practitioners with knowledge in mineral beneficiation and value addition, evaluated the revised framework. To make sure the framework was founded on best practices and current information, an expert assessment was essential.

Step 5: Finalisation

The framework was finished in the last phase using the suggestions and information that experts and stakeholders had provided. The finalised framework was intended to be useful, implementable, and in line with the priorities and requirements of the stakeholders.

5.6.1 Summary of the validation process

Table 5. 1 Summary of the validation report

Participants	Number of Participants	Validation session output
District Development Coordinator (Ministry of Local Government)	1	-The framework is sound but it should show the policy as the major component of the framework. -The linkages show that the framework is well researched and informed by practical information. -The most interesting part of the framework is the outcome of sustainability especially the concept of sustainable socio-economic development. -Development initiatives should result in benefiting the communities and this framework says just as that.
Development Studies Professor (University of Zimbabwe)	1	-Generally, the framework provides important insights as afar as development is concerned because it involves multiple stakeholders. -The framework should have indicated the hierarchical operations from strategic top level to the tactical level. However, this can be explained in the discussion.
Geologist (Zimbabwe)	1	-No feedback due to time constrains
Deputy Director (Policy coordination)	1	-The participant noted that the current framework follows a well-defined systematic approach and warned that some of the components were repetitive and need to be pruned. -It was indicated that some of the functional branches were amalgamated and the current value addition and beneficiation policy should be taken into consideration going further.
Provincial Mining Director – Ministry of Mines	1	-The participant noted that certain components were omitted in the framework and should be rephrased.
Permanent Secretary (Ministry of Mines of Zimbabwe)	1	-The participant applauded the current framework with some suggestions. -Participant indicated that the framework has omitted certain structures considering

		beneficiation and value addition is under review. Therefore, it must be reviewed.
Summary of resolutions		-All participants endorsed the adoption of the framework as providing a logical approach to the beneficiation and value addition initiative that seeks to achieve sustainable socio-economic development in the country. -Participants agreed that the adoption of the framework is a major step towards the achieving Africa mining Vision 2030.

5.7 Conclusion

To conclude, developing a framework for mineral beneficiation and value addition is crucial for promoting investment, maximizing mineral resource benefits, and fostering inclusive and sustainable development in Zimbabwe. The legislative and regulatory framework, infrastructure development, technical support, finance mechanisms, and stakeholder involvement are the five main components of the proposed framework. It was crafted through consultations and reviews with various sector stakeholders and validated through feedback, revisions, and expert reviews. Although influenced by existing frameworks from other countries, this framework is unique due to its specific features, facilitating implementation and effectively addressing challenges. It seeks to direct Zimbabwe's implementation of mineral beneficiation and value addition, fostering inclusive and sustainable growth.

CHAPTER 6

CONCLUSION AND RECOMMENDATIONS

6.1 Introduction

The current chapter provides conclusion and discusses the contribution of the study to the body of knowledge. Thereafter, recommendations are made based on the findings and the framework that has been developed in the preceding chapter

6.2 Summary of the Study

This study analyzed the role of beneficiation and value addition of mineral resources as a policy tool for achieving socio-economic transformation. The problem statement highlighted that Zimbabwe's lack of a well-designed framework for value addition and beneficiation negatively impacts the broader African vision for mineral value enhancement. Despite the Zimbabwean government's proposal for beneficiation and value addition in its 2008 ZIMASSET blueprint, the desired outcomes have not been realized since its introduction.

6.2 1 Objective 1: To examine the effect of existing policies on beneficiation and value addition and their effects on socio-economic development

To assess the effects of existing policies on the value addition and beneficiation of natural resources, as well as their influence on socioeconomic development, a descriptive research was conducted. Findings indicate that while the existing policy provides a solid base for expanding the mineral value chain, it positively influences socio-economic development through job creation, enhanced national output, and the empowerment of youth and women. The beneficiation and value addition policy emerged from the ZIMASSET policy, which aimed at promoting sustainable development through resource utilization. However, despite its importance in promoting beneficiation and value addition, the empowerment policy had a negative effect on foreign direct investment. The indigenisation policy, in particular, led to capital flight, resulting in foreign currency shortages and reduced participation of youth and women in the mineral value chain.

Beneficiation and value addition are capital-intensive processes, which can hinder the growth of small businesses due to capital constraints. Capital is crucial for infrastructure development, skill acquisition, and market development. Additionally, Zimbabwe's national trade policy does not support individual mineral sales, as most minerals are sold to Fidelity Printers. It is suggested that

the government should liberalize the mineral selling process to enable small businesses to trade internally or externally. The Draft Minerals Policy currently supports small-scale actors in the mining industry but does not clearly address key issues affecting beneficiation and value addition. The draft policy still needs to outline its role in socio-economic development, particularly as minerals are increasingly transformed into finished products.

The findings suggest that the draft minerals policy should promote industrial transformation, as highlighted in the industrial development policy. Expanding the mineral value chain is crucial for broader industrial transformation and offers cross-sector benefits beyond the mining industry. While beneficiation and value addition could contribute to economic recovery and socio-economic development, the policy environment in Zimbabwe remains marked by uncertainty and unpredictability. This lack of policy stability, characterized by inconsistency and poor coordination, adversely affects sustainable development.

In a nutshell, the findings have shown that existing policies on mineral beneficiation in Zimbabwe are fragmented and lack cohesive implementation. The misalignment between stakeholders has limited the policies' contribution to socio-economic development. Harmonizing regulations across agencies can eliminate contradictions and ensure coherent policy enforcement. Lack of strategic policy analysis has an effect on sustainable socio-economic development of Zimbabwe.

6.2.2 Objective 2: To evaluate the crosscutting constraints and associated interventions to encourage beneficiation and value addition of mineral resources in Zimbabwe

The Zimbabwean economy struggles with challenges such as policy uncertainty, capital flight, and long hours of power cuts, ageing infrastructure and lack of human capital and such constraints have also affected the beneficiation and value addition of mineral resources program. To derive a competitive beneficiation and value addition initiative, the country should have adequate supply of power, modern infrastructure and the required human resources. Since the early 2000, Zimbabwe lost its human capital to the diaspora as the economic conditions hardened. There has been little attempt to retain or replace the skills lost. For example, about 40 candidates were sent to China to acquire beneficiation and value addition skills but the significance of a meagre human resources up skilling is very low for a multiple mineral resource endowed country like Zimbabwe. However, the government is shifting to renewable sources of energy to encourage consistent power supply including tax incentives for companies engaged in beneficiation and value addition of mineral resources.

6.2.3 Objective 3: To examine the perceptions of stakeholders regarding the need for mineral beneficiation and value addition in Zimbabwe.

The results reveal strong stakeholder support for the beneficiation and value addition of mineral resources in Zimbabwe. The ZIMASSET policy outlines that the goal of mineral beneficiation and value addition is to enhance mining value chains, thereby creating job opportunities for youth and women. Findings from this study indicate that, despite existing policy gaps and deficiencies reflective of the broader economic challenges in Zimbabwe, beneficiation and value addition are seen as essential solutions. Stakeholders believe that beneficiation and value addition have the potential to positively impact other sectors, such as agriculture, by encouraging the transformation of raw products into value-added goods. They also recognize additional benefits of beneficiation, such as fostering internal industrial growth and contributing to socio-economic development.

The results underscore that beneficiation and value addition are crucial for driving industrial transformation. Since the early 2000s, Zimbabwe's industrial sector has struggled to regain its strength, partly due to policies like indigenisation that marginalized existing industrial players. Beneficiation and value addition are considered vital for economic recovery because they help recover value lost through derivative products and attract foreign currency while boosting national revenue.

6.2.4 Objective 4: To develop competitive mineral beneficiation and value addition framework for the minerals sector in Zimbabwe.

The results indicated that the government does not have a well-defined framework for value addition and beneficiation beyond the ZIMASSET blueprint. This lack of a clear framework contributes to the policy’s shortcomings. It was noted that the Indigenisation and Economic Empowerment policy and the beneficiation policy were sometimes managed together under the same office, leading to confusion. This situation highlights the risks of politically driven proposals that lack economic grounding and support. For example, discussions about mineral beneficiation and value addition in Botswana, as reported by Chatham House, suggested that such initiatives might be politically motivated rather than economically viable. Nevertheless, the Zimbabwean government has been proactive in encouraging idea generation from local youth. While the program has not yet achieved its desired production levels, it remains in development, with room for implementing necessary adjustments

6.3 Concluding Remarks

In conclusion, the study findings highlight the impact of existing policies on mineral beneficiation and value addition in Zimbabwe and their effects on socio-economic development. The current policy framework provides a foundation for expanding the minerals value chain and is positively linked to employment creation, improved national output, and empowerment of youth and women. However, certain policies such as the Indigenisation policy have negatively impacted foreign direct investment, leading to capital flight, foreign currency shortages, and limited participation of youth and women in the minerals value chain. The study also reveals the importance of capital, infrastructure development, skills acquisition, and market liberalization for successful beneficiation and value addition. In a nutshell, the findings emphasize the need for policy stability, coordination, and consistency to promote sustainable development through effective implementation of beneficiation and value addition initiatives.

The study findings demonstrate that Zimbabwe faces various constraints, including policy uncertainty, capital flight, power cuts, ageing infrastructure, and lack of human capital, which have hindered the success of the mineral beneficiation and value addition program. To establish a competitive initiative, the country requires adequate power supply, modern infrastructure, and the necessary human resources. The loss of human capital to the diaspora has been a significant challenge, and efforts to upskill the workforce have been insufficient. However, the government's shift to renewable energy sources and the provision of tax incentives for companies engaged in beneficiation and value addition show promising interventions. Addressing these constraints is crucial for creating a conducive environment for successful beneficiation and value addition of mineral resources.

The study further reveals that stakeholders in Zimbabwe acknowledge the importance of mineral beneficiation and value addition for socio-economic development. Stakeholders recognize the potential of value chains in creating employment opportunities, driving industrial growth, and contributing to overall socio-economic development. The study also highlights the positive ripple effects of beneficiation and value addition, such as extending industrial growth to other sectors like agriculture. Additionally, stakeholders perceive value addition to attract foreign currency and boost national revenue. The findings underscore the recognition of beneficiation and value addition as critical pillars for industrial transformation and economic recovery in Zimbabwe.

The study reveals the absence of a clearly defined framework for beneficiation and value addition in Zimbabwe, outside the ZIMASSET blueprint. The lack of a comprehensive framework has

contributed to policy failures and blurred lines between the Indigenisation and economic empowerment policy and the beneficiation and value addition policy. This lack of clarity poses risks and hinders effective implementation. However, the study highlights the government's encouragement of idea generation from local youths and the need for testing and implementing corrective measures. The findings underscore the importance of developing a competitive framework to guide value addition and beneficiation initiatives, ensuring economic thought, and avoiding politically motivated propositions. It is crucial to establish a framework that aligns with economic goals, promotes sustainability, and allows for continuous improvement.

6.4 Contribution of the Study to the body of knowledge

The study on mineral beneficiation and value addition in Zimbabwe offers several valuable contributions to knowledge, detailed as follows:

- The study presents a comprehensive framework for advancing mineral beneficiation and value addition in Zimbabwe. This framework adopts a holistic approach to the mineral sector's development and can be utilized by policymakers and stakeholders to shape policies, programs, and investments that support the sector's sustainable advancement.
- It delivers a thorough analysis of the current state of mineral beneficiation and value addition in Zimbabwe, pinpointing both the sector's challenges and opportunities. This insight is useful for policymakers, investors, and other stakeholders to identify key areas for intervention and investment.
- The research identifies essential factors for the effective development of mineral beneficiation and value addition, including policy, legal, technological, infrastructure, human capital, and market considerations. These findings can guide the formulation of policies and strategies that promote sustainable socio-economic growth within the mineral sector.
- The research underscores the significance of local value addition, which can foster job creation and generate additional revenue for Zimbabwe. This information is valuable for developing policies and strategies that encourage local processing of minerals and reduce the export of raw materials.
- The study highlights the critical role of technology development and transfer, essential for the efficient and sustainable processing of mineral resources. This emphasis can inform policies and strategies that promote technological advancements and knowledge transfer within the mineral sector

6.5 Limitation of the Study

There were some limitations in carrying out the current study which are stated as follows:

- The lack of funding restricted the study's scope, limiting the resources available for data collection and analysis. This geographical limitation might have prevented the researcher from exploring certain areas in-depth, potentially impacting the comprehensiveness of the findings.
- The findings might be specific to the particular context of Zimbabwe's mining sector and may not be easily generalizable to other contexts or countries. This contextual limitation can restrict the applicability of the study's conclusions to different settings

6.5 Recommendations for Practice

In light of the study's limitations, the following recommendations are proposed:

- Draft and advocate for the enactment of a Mineral Beneficiation and Value Addition Act to consolidate and harmonize existing laws.
- The Zimbabwean government should focus on enhancing infrastructure, especially in power and transportation, to support the efficient and sustainable processing of mineral resources.
- Propose the creation of a statutory body, such as the Zimbabwe Mineral Beneficiation Authority (ZMBA), responsible for inter-ministerial coordination, policy implementation, and compliance monitoring.
- Development of human capital in the mineral sector should be prioritized, especially in research and development. This will aid in the advancement and adoption of new technologies vital for the effective and sustainable processing of minerals.
- The regulatory framework for the mineral sector needs to be improved to enhance transparency and accountability, and to attract foreign investment. Additionally, establishing a one-stop-shop for investors in the sector should be considered.
- Legally mandate stakeholder involvement in the policy-making process through public consultations, advisory committees, and impact assessments.

6.6 Recommendations for Further Study and Development

• Exploration of new technologies for the efficient and sustainable processing of minerals is essential, particularly those that minimize the environmental impact of mining activities.

- Strengthening the capacity of local institutions, such as research centres and universities, is necessary to support the sector's development.

- A comparative analysis of mineral sectors in other countries with similar mineral resources should be conducted to identify best practices that could be implemented in Zimbabwe.

- Developing a monitoring and evaluation framework is crucial for tracking progress in the mineral sector’s development and guiding policy and strategy formulation.

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APPENDICES

ETHICAL CLEARANCE

ETHICS APPROVAL CERTIFICATE

ETHICS APPROVAL CERTIFICATE

FACULTY OF SCIENCE, ENGINEERING AND AGRICULTURE
RESEARCH ETHICS COMMITTEE

NAME OF RESEARCHER/INVESTIGATOR: J LAISANI

STAFF/STUDENT NO: 11605708

PROJECT TITLE: Development of mineral beneficiation and value addition framework for sustainable socio-economic development of Zimbabwe

ETHICAL CLEARANCE NO: FSEA/19/MEG/05/1707

SUPERVISORS/ CO-RESEARCHERS/ CO-INVESTIGATORS

NAME	INSTITUTION & DEPARTMENT	ROLE
Dr Dacosta	University of Venda, Department of Earth Sciences	Supervisor

Type: **Student research**

Risk: **Minimal risk to humans, animals, or environment (Category 1)**

Approval Period: **June 2022-May 2023**

The Faculty Research Ethics Committee (FREC) of the Faculty of Science, Engineering and Agriculture hereby approves your project as indicated above.

General Conditions
While this ethics approval is subject to all declarations, undertakings and agreements incorporated and signed in the application form, please note the following.

- **The project leader (principal investigator) must report in the prescribed format to the REC:**
  - **Annually (or as otherwise requested) on the progress of the project, and upon completion of the project**
  - **Within 48hrs in case of any adverse event (or any matter that interrupts sound ethical principles) during the project.**

University of Venda

PRIVATE BAG X5050, THOHOYANDOU, 0950λ LIMPOPO PROVINCEλ SOUTH AFRICA
TELEPHONE (015) 962 8504/8313. FAX (015) 962 9060
"A quality driven financially sustainable, Comprehensive University"

ETHICS APPROVAL CERTIFICATE

- Annually, research projects may be randomly selected for auditing.

• The approval applies strictly to the protocol as stipulated in the application form. Should a change to the protocol be deemed necessary during the project, the project leader must apply for approval of these changes before their implementation. Should there be a deviation from the study protocol, without the necessary approval for the change, the ethics approval is automatically forfeited.
• The date of approval indicates the earliest date that the project may begin. Should the project have to continue after the expiry date; a new application must be made, and a new approval received before or on the expiry date.
• In the interest of ethical responsibility, the FREC retains the right to:
  - Request access to any information or data at any time during the course or after completion of the project,
  - To ask further questions; Seek additional information; Require further modification or monitor the conduct of your research or the informed consent process.
  - withdraw or postpone approval if:
  - Any unethical principles or practices of the project are revealed or suspected.
  - It becomes apparent that relevant information was withheld from the REC or that information has been false or misrepresented.
  - The required annual report and reporting of adverse events was not done timely and accurately,
  - New institutional rules, national legislation or international conventions deem it necessary

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ISSUED BY:
FACULTY OF SCIENCE, ENGINEERING AND AGRICULTURE RESEARCH ETHICS COMMITTEE

Date considered: June 2022

Chairperson: Prof. P.O Bessong

University of Venda

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SURVEY QUESTIONNAIRE

University of Venda

QUESTIONNAIRE

KINDLY NOTE

All information provided would be treated confidentially and under no circumstance will this information be used for any other purpose apart from the purpose of this study. Every detail provided here will be used only for the purpose of this study. If any of the questions in this questionnaire does not apply to you, you are under no obligation to answer it. The questionnaire seeks to gather information on the topic: "***Development of mineral beneficiation and value addition framework for sustainable socio-economic development of Zimbabwe"*.**

Please choose the appropriate answer to help us fill this questionnaire

SECTION A: DEMOGRAPHICS

This part of the questionnaire requires basic information about you.

1. **Gender:**

Male ☐ Female ☐

2. **Age:** 20-25 ☐ 26-30 ☐ 31-40 ☐ Above 50 ☐ ☐

3. **Religion:** Christianity ☐ Muslim ☐ Traditional/Spiritualist ☐ Other ☐

4. **Level of Education:**

High school ☐

Diploma ☐

Degree ☐

Masters ☐

Doctorate (PhD) ☐

If you would like to receive feedback from the research, please fill in your details

Name	
Email	

SECTION B

1	2	3	4	5
STRONGLY AGREE	AGREE	NEITHER AGREE NOR DISAGREE	DISAGREE	STRONGLY DISAGREE

	STATEMENT	SCALE				
		1	2	3	4	5
1.	Zimbabwe's political economy is characterized by high policy volatility which hampers social growth.					
2.	Zimbabwe political economy is characterized by policy inconsistence, low government capacity and a high degree of state intervention and regulation which affects socio-economic development.					

3.	ZIMASSET is essentially a wish list of economic and social targets and reforms, at the same time very broad and loosely defined.					
4.	The unpredictable policy environment makes investments in local refining less likely.					
5.	The government has failed poorly by relying on legislation and policies and seeing beneficiation as a natural phenomenon.					
6.	The Industrial Development Policy and the Mines and Minerals Act are not enough to address the dynamics of the mining industry and of development process					
7.	State capacity is insufficient to implement large-scale industrial transformation under the Zim ASSET policy (2013-2018) due to the timeline needed for such an immense development step					
8.	The beneficiation policy of Zimbabwe is a sound policy in that it advocates for economic transition of Zimbabwe and if applied in a conducive atmosphere where there are key enablers like energy, skills, infrastructure and many other operational requirements it can translate to socioeconomic development of the nation.					

9.	The ZIMASSET beneficiation cluster led to Improvement of capacity utilization in the mining and mineral sector between the period 2013-2018					
10	The ZIMASSET beneficiation cluster led to net trade gain in the mineral sector					
11	The ZIMASSET policy led to creation of employment (2.2 Million jobs)					
12	ZIMASSET beneficiation cluster led to the Increase of fiscal revenues between the period 2013-2018.					
13	The National Trade Policy of 2012-2016 led to annual export growth rates of 10% and reached a target of USD7 billion in 2016.					
14	The National Trade Policy of 2012-2016 on value addition linkages grew exports, created employment, minimized the trade deficit, and increased fiscal incomes					
15	The Indigenisation and Economic Empowerment Act of Zimbabwe led to the empowerment of indigenous Zimbabweans through mineral beneficiation programs					
16	Public policy should be evidence-based, unfortunately many policies implemented in Zimbabwe are politicians' own goals, policies that undermine their stated goals (socio-economic development of the nation).					

17	The Zimbabwean challenge is not whether it pursues beneficiation or not. Its challenge is what to beneficiate and to what extent do we beneficiate it?					
18	Various policy measures, and legislation have been introduced in the mining sector as government attempts to turn the sector into a springboard to economic recovery					
19	Policy framework and the political context in Zimbabwe impacts mineral development and linkages creation.					
20	10% that goes to Community Share Ownership Trusts (CSOTs) under the Indigenisation and Economic Empowerment Act is going towards socio-economic development of communities.					
21	The Indigenisation policy enacted by the government aspires to establish a normal mining regime with high indigenous development.					
22	The Draft Minerals Policy aims at leveraging the mineral sector for sustainable development of the country through linkages, (including beneficiation) and the development of a national competitive advantage, through knowledge-intensification, technology development and infrastructure development					

Section C

Consider each of the following statements in this section and indicate the extent of your agreement with each statement. Remember that this is about your own perceptions – there are no wrong answers.

		Strongly disagree	Disagree	Agree	Strongly agree
1.	**The following factors have been supportive of competitive advantage for mineral beneficiation and value addition in Zimbabwe for sustainable socio-economic development of the nation.**				
1.1	Resource endowment				
1.2	Energy				
1.3	Technology and Research				
1.4	Policies				
1.5	Transport network				
1.6	Infrastructure				
1.7	Location				
1.8	Skilled and qualified labour				
2.	**The following conditions are critical for mineral beneficiation in the mining sector.**				
2.1	Reliable and constant power supply is important for mineral beneficiation and value addition in the sector				
2.2	Reliable transport systems in the sector are important for mineral beneficiation and value addition in the sector.				
2.3	Availability of skilled and qualified labour is important for mineral beneficiation				
2.4	Physical Resources are critical for mineral beneficiation in Zimbabwe				

2.5	Capital Resources are important for mineral beneficiation				
2.6	Knowledge Resources are important for mineral beneficiation in the sector				
2.7	International demand is important for mineral beneficiation in the sector				
2.8	Local demand for value added products is critical for mineral beneficiation in Zimbabwe.				
2.9	Supporting industries that provide inputs for innovation & internationalisation are important for mineral beneficiation in the sector				
2.10	Collaborations with related industries are important for mineral beneficiation in the sector				
2.11	Firm organisational structure is important for future competitiveness in the sector				
2.12	A robust and innovative management team and structure is important for mineral beneficiation and value addition in the sector				
2.13	Good performance in the domestic market is important for future competitiveness in the sector				
2.14	Stimulating domestic demand for beneficiated products, is important for future competitiveness in the sector				
2.15	Creating specialised factor conditions such as infrastructure, education and system, is important for mineral beneficiation in the sector				
2.16	Encouraging change is important for future competitiveness in the sector				

3. To what extent do you agree with the need for the following improvements to ensure minerals beneficiation in Zimbabwe is a success					
3.1	Inflation				
3.2	Domestic price stability				
2.3	Exchange controls				
3.4	Tax rates and incentives				
3.5	Addressing market risks by:				
3.5a	a. Opening economies to international competition				
3.5b	b. Reducing political and social risks				
3.5c	c. Facilitation role of governments				

We have come to the end of the questionnaire. Thank You for your time and corporation!!!!!

Mr. John Laisani

PhD Candidate - Department of Earth Sciences, Faculty of Science, Engineering and Agriculture, University of Venda.

laisanij@gmail.com

INTERVIEW GUIDE

University of Venda

SURVEY (STRUCTURED INTERVIEW)

KINDLY NOTE

All information provided would be treated confidentially and under no circumstance will this information be used for any other purpose apart from the purpose of this study. Every detail provided here will be used only for the purpose of this study. If any of the questions in this questionnaire does not apply to you, you are under no obligation to answer it. The survey seeks to gather information on the topic: "***Development of mineral beneficiation and value addition framework for sustainable socio-economic development of Zimbabwe"*.**

Please choose the appropriate answer to help us fill this survey.

SECTION A(PERSONAL DETAILS)

This part of the survey requires basic information about you.

Name of interviewee ……

Name of Government Department / Mining Company / or any stakeholder affiliated to mining sector.

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Occupation……

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Professional Qualifications.

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Gender

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SECTION B

1.What challenges are to be expected when introducing Beneficiation in Zimbabwe.

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2. How has the government and the mining sector been addressing the following impediments or key drivers of mineral beneficiation in Zimbabwe.

a) Lack of appropriate technology

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b) Poor investment levels

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c) Uncertainty in policy

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d) Low Foreign Direct Inflows (FDI)

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e) Lack of skills

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f) Inefficient bureaucratic system

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g) Poor Infrastructure

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h) Energy constraints

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3. Zimbabwe's political economy is characterized by:

a) high policy volatility which hampers beneficiation. How do you think this challenge can be addressed?

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b) Policy inconsistence, low government capacity and a high degree of state intervention and regulation which is an impediment to mineral beneficiation. What do you think needs to be done as a solution?

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4. Mineral beneficiation is an energy intensive activity yet Zimbabwe has witnessed erratic power supplies to the detriment of mining and processing sector. To what extent can this challenge affect beneficiation in Zimbabwe.

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Section C

1. Is mineral beneficiation critical in Zimbabwe? In your view, what are the potential benefits of mineral beneficiation and value addition.

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2. Is beneficiation an effective measure? Effectiveness – this is the likelihood that beneficiation will produce results that lessen the actual problem i.e. increase the mineral production's contribution to growth and development.

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3. Are the potential costs of beneficiation feasible in Zimbabwe or are a constrain to the fiscus and or a burden to the mining companies?

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3. In your view, can beneficiation contribute towards social growth?

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4. How well has the value chain been enhanced through value addition in Zimbabwe?

Section D

1. What role has the government played so far towards mineral beneficiation and value addition

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2. Has the government been working closely with the business community towards enhancing mineral beneficiation and value addition in Zimbabwe?

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3. What policies does the government put in place that promote mineral beneficiation in Zimbabwe?

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4. How often does the government carry out strategic policy analysis, is there a department meant for such in Zimbabwe?

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5. How is policy coordination monitored in Zimbabwe and what steps are taken in addressing policy inconsistency.

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6. Does the government of Zimbabwe have a mineral beneficiation and value addition framework?

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7. What type of a framework and components of a framework would you propose to solve the Zimbabwean beneficiation challenge in a bid to address socio-economic development of Zimbabwe?

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8. To the best of your knowledge, what strategies should the government put in place to maximize mineral beneficiation in Zimbabwe?

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