

BINDURA UNIVERSITY OF SCIENCE EDUCATION



FACULTY OF COMMERCE

THE INFLUENCE OF GREEN PROCUREMENT ON THE SUSTAINABILITY PERFORMANCE OF THE MINING SECTOR IN ZIMBABWE

SUBMITTED BY

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**IN PARTIAL FULFILLMENT OF THE MASTER OF SCIENCE DEGREE IN
PURCHASING AND SUPPLY CHAIN MANAGEMENT.**

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APPROVAL FORM

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ABSTRACT

The study was set out to investigate the influence of green procurement on the sustainability performance of the mining sector in Zimbabwe. The study was directed by four objectives which were, to evaluate the impact of green packaging on the sustainability performance of the mining industry in Zimbabwe, to examine the influence of green distribution on the sustainability performance of the mining industry in Zimbabwe, to assess the effects of green supplier selection on the sustainability performance of the mining industry in Zimbabwe and to analyse the impact of reverse logistics on the sustainability performance of the mining industry in Zimbabwe. The study was hinged on the theories of classical conditioning, resource-based theory, institutional theory and stakeholder theory. A quantitative methodology was adopted using a sample of 94 respondents questionnaire survey was carried out. The study adopted descriptive statistics of the central limit theorem and inferential analysis of correlation and regression analysis was used through SPSS 26. The study revealed significant impacts of green packaging, green supplier selection, and reverse logistics on sustainability performance in the mining sector. Supported by literature, green packaging was found to influence product market value. Similarly, green supplier selection positively affected sustainability, contrasting with insignificant effects of green distribution. Reverse logistics significantly impacted sustainability, aligning with prior research highlighting its role in waste reduction and resource conservation. The study's recommendations encompass government policies incentivizing green practices, stringent environmental regulations, collaboration between the Ministry of Mines and stakeholders to develop green guidelines, training programs, integration of green procurement, investment in reverse logistics infrastructure, regular environmental audits, and fostering a sustainability culture within mining companies.

Table of Contents

APPROVAL FORM	i
RELEASE FORM.....	ii
ABSTRACT.....	iv
1 CHAPTER ONE	1
INTRODUCTION	1
1.1 Introduction.....	1
1.2 Background of the study	1
1.3 Problem Statement	4
1.4 Research Objectives.....	4
1.5 Research questions.....	5
1.6 Significance of the Study	5
1.7 Assumptions.....	6
1.8 Delimitation of the study	6
1.9 Definition of Key Words	6
1.10 Structure of the Dissertation	8
1.11 Chapter Summary	8
2 CHAPTER TWO	Error! Bookmark not defined.
LITERATURE REVIEW	Error! Bookmark not defined.
2.1 Introduction.....	Error! Bookmark not defined.
2.2 Theoretical Framework.....	Error! Bookmark not defined.
2.2.1 Classical Conditioning Theory.....	9
2.2.2 Resource-Based Theory	10
2.2.3 Stakeholder Theory	11
2.2.4 Institutional Theory.....	12
2.2.5 Theoretical Framework and Appalication.....	13
2.3 The Concept of Green Procurement	15
2.4 Sustainability Performance	16
2.5 Green Packaging and Sustainability Performance	18
2.6 Green Distribution and Performance	19
2.7 Green Supplier Selection and Performance	20
2.8 Reverse Logistics and Performance.....	20
2.9 Sustainability Performance of the Mining Industry.....	21
2.10 Research Gap Analysis	22
2.11 Conceptual Framework.....	23
2.12 Hypotheses	23
2.13 Chapter Summary	24
3 CHAPTER 3: RESEARCH METHODOLOGY	25
3.1 Introduction.....	25
3.2 Research Paradigms	25
3.2.1 Positivist Philosophy.....	25
3.3 Research Approach	26
3.4 Research Method	26
3.5 Research Strategy.....	27

3.5.1	Survey Strategy	27
3.5.2	Case Study.....	28
3.6	Research design	28
3.6.1	Explanatory Research.....	28
3.6.2	Descriptive Research.....	29
3.7	Population	29
3.8	Sampling	29
3.9	Research instruments	30
3.9.1	Collection: Self-administered structured online questionnaire survey	30
3.10	Validity	30
3.11	Reliability.....	31
3.12	Data Analysis	31
3.12.1	Normality Test.....	31
3.12.2	Multi-collinearity Test.....	32
3.12.3	Correlation Analysis.....	32
3.12.4	Multivariate Ordinary Least Square (OLS) Regression Analysis	32
3.13	Ethical Considerations	33
3.14	Chapter Summary	34
4	CHAPTER FOUR.....	35
	DATA PRESENTATION, ANALYSIS, INTERPRETATION AND DISCUSSION.....	35
4.1	Introduction.....	35
4.2	Reponses Rate.....	35
4.3	DEMOGRAPHIC DATA ANALYSIS	36
4.3.1	Ownership	36
4.3.2	Operations	37
4.3.3	Years in the Industry	37
4.4	Descriptive Analysis	38
4.4.1	The impact of green packaging on the sustainability performance of the mining industry in Zimbabwe	38
4.4.2	The influence of green distribution on the sustainability performance of the mining industry in Zimbabwe.	39
4.4.3	The effects of green supplier selection on the sustainability performance of the mining industry in Zimbabwe.....	40
4.4.4	The impact of reverse logistics on the sustainability performance of the mining industry in Zimbabwe	41
4.5	Inferential Analysis.....	42
4.5.1	Reliability.....	42
4.5.2	Normality Test.....	43
4.5.3	Multicollinearity.....	44
4.6	Correlation Analysis	44
4.7	Regression.....	46
4.7.1	Model Summary	46
4.7.2	Anova	46
4.7.3	Coefficients	47
4.7.4	Hypotheses Test	48
4.8	Discussion.....	49

4.9	Chapter Summary	50
5	CHAPTER FIVE	52
	SUMMARY, CONCLUSIONS AND RECOMMENDATIONS.....	52
5.1	Introduction.....	52
5.2	Summary of findings.....	52
5.3	Conclusions.....	53
5.4	Recommendations.....	53
5.5	Suggested Areas of further Study	55
	REFERENCES	56
	APPENDIX I: QUESTIONNAIRE	59

1 CHAPTER ONE

INTRODUCTION

1.1 Introduction

This chapter is an introduction which seeks to provide a background to the influence of green procurement on the sustainability performance of the mining sector in Zimbabwe with a special focus on the case of Rio Zim mining corporation. Green procurement is rapidly gaining attention worldwide, with both private and public sector entities being urged to adopt sustainable procurement practices so as to enhance performance. This chapter will introduce the study by outlining the study's background, the problem statement, research objectives, research questions, and the study's significance. Additionally, it will address the delimitations, assumptions, definitions of key terms, and provide an overview of the dissertation's structure.

1.2 Background of the study

Globally, supply chain operations in mining are laden with substantial environmental and social risks, which are closely linked with economic factors (Antwi, et al., 2022). Extended producer responsibility for environmental consequences and sustainable production and consumption are two ideas that have been increasingly important in the mining and related industries' environmental concerns throughout time (Niza et al., 2014). These guidelines support an all-encompassing strategy for resolving environmental problems brought on by mining operations by promoting a life cycle viewpoint and assessment. Consequently, supply chain operations encompass both the manufacturing and consuming facets for businesses. The aforementioned activities encompass the procurement of raw materials, the characteristics of production procedures (such prospecting, mining, mineral processing, and extractive metallurgy), and the handling of produced waste via closed-loop systems, industrial ecosystems, or disposal techniques.

The mining industry is notorious for its poor environmental history (Appolloni, et al., 2014). This negative reputation, along with the operational and supply chain practices of mining companies, has exposed them to competitive, regulatory, and community pressures, leading to an increased focus on making their supply chains more environmentally friendly. Thus far,

efforts by mining companies to adopt environmentally friendly practices have predominantly concentrated on internal supply chain activities within their operations. These reactive and localized methods of environmental management, however, frequently necessitate costly expenditures for waste management, cleanup, and remediation and are not consistently effective in lowering pollution emissions. A comprehensive approach is necessary in order to truly minimize or eradicate the detrimental ecological impacts of mining business supply chains.

The notion of "green procurement" offers a framework for assessing the systemic and worldwide mitigation of environmental impact (Muduli et al., 2013; Kumar et al., 2014). Green procurement, as an element of green supply chain management, is a methodical and all-encompassing approach that enables businesses to create plans to meet targets for market share and profitability while enhancing environmental performance (Tseng & Chiu, 2013; Wong et al., 2015). Nevertheless, environmental management practices have received the majority of research attention when it comes to the application of green procurement in the mining industry, leaving out the holistic application of the practices for efficient financial and non-financial performance of the industry. Kusi-Sarpong et al. (2016) contended that understanding the importance and interconnections of GSCM practices, particularly from the viewpoint of mining industry managers in emerging economies, can aid in clarifying and implementing these practices effectively.

Khan (2012) describes green procurement as the process of acquiring materials that are easily decomposable, environmentally benign, and can be recycled for reuse. These materials, often called green materials, are made of non-toxic substances that safeguard both consumers and the environment (Guo et al., 2020). The practice of green procurement yields various advantages, including the creation of superior goods and services with reduced ecological footprint, facilitation of material recycling for future use, and an improvement in customer contentment (Miao & Xi, 2017). Supporting this view, Cox (2010) emphasised that the importance of green procurement stems from its capacity to tackle climate change issues. Consequently, organisations must strategically implement green procurement to achieve both corporate and environmental benefits (Sarpong et al., 2016).

Holmberg (2000) underscores the competitive advantages afforded to organisations that embrace green procurement. Because of the advantages that green products and services provide for both the environment and human health, consumers are favoring them more and more.

The success of green procurement relies on key stakeholders, including governments, organizations, suppliers, and consumers. Governments are essential in developing and enforcing green procurement policies, and it is imperative for organizations and suppliers to integrate these policies into their corporate practices. Consumers also play a pivotal role by consistently expressing a preference for green products and services, despite potential cost differences with conventional alternatives (Tseng, 2014). The commitment of these key players is essential for the successful implementation of green procurement, as any failure to fulfill their respective roles may hinder the realization of the environmental and corporate advantages associated with green procurement.

The mining sector holds a crucial position in Zimbabwe's economic landscape, contributing substantially to employment and export revenue. While private sector entities are not mandated to adhere to public sector procurement guidelines, they are obligated to align with sustainable procurement initiatives as part of their corporate social responsibility (CSR) efforts. The mining industry, which contributes approximately 13% of Zimbabwe's Gross Domestic Product (GDP), is especially crucial in terms of sustainability due to the environmental impact of mining activities during the extraction and processing of minerals from the ground (Nduna, 2021). Therefore, it becomes imperative for the mining sector to prioritise sustainability practices. Despite its pivotal role, the industry confronts significant challenges, particularly in equipment procurement. The prevalent reliance on substandard imports lacking sufficient environmental safety features raises concerns about potential repercussions on both human health and the environment. The Zimbabwean mining industry encounters various hurdles that hinder firm performance, notably in areas such as environmental management, labour, and operational matters. A significant research gap exists concerning how the implementation of green procurement practices could help alleviate some of these challenges. This study investigates the connection between green procurement and sustainability performance in the mining sector in Zimbabwe. There is a compelling need for a paradigm shift towards the adoption of green procurement practices within the mining sector. Without the impetus to include green procurement, most companies are under threat of sustainability performance in Zimbabwe. Recent reports indicate that some leading mining corporations are retrenching due to sustainability challenges. This study will focus on RioZim, an integrated mining and metallurgical corporation based in Zimbabwe, which possesses a varied array of resources including gold, base metals, diamonds, coal, and chrome. In addition to the Cam & Motor Gold

Mine and Empress Nickel Refinery, RioZim also operates the Renco Gold Mine. Taking into consideration the general difficulties faced by Zimbabwe's mining industry, especially with regard to equipment procurement, the study seeks to analyse the impact of green procurement practices in the context of sustainability performance.

1.3 Problem Statement

The mining industry in Zimbabwe encounters substantial challenges in equipment procurement, heavily relying on low-quality imports devoid of environmental safety features. Imported machinery, constituting approximately 95% of the total, poses significant health risks and contributes to environmental degradation. Industries in Zimbabwe, including mining, often neglect human health and environmental safety in procurement, resulting in widespread environmental damage. Studies indicated that violations of regulations are common, with a huge percentage of mining industry purchases considered non-compliant. Harmful chemicals, nearly all of which are poisonous, are major contributors to environmental pollution. Mining emissions, comprising 40% of the total industry emissions, exacerbate climate change. Inadequate waste management practices which are poorly managed, lead to considerable environmental pollution. Studies in the past have focused on the impact of these procurement practices on financial and non-financial performance. Sustainability performance has become a major concern globally as it helps in the measurement and evaluation of an organization's efforts and achievements in environmental, social, and economic sustainability. However, there is limited literature that has researched how procurement practices have impacted the sustainability performance of the mining sector in Zimbabwe. Failure to address the sustainability performance issues in the mining sector can lead to devastating effects to the national economy and the well-being of employees and humanity in general. The study therefore seeks to research how the adoption of green procurement can influence the sustainability performance of the mining sector in Zimbabwe with a specific focus on Rio Zim.

1.4 Research Objectives

The objectives of the study will be as follows;

1. To evaluate the impact of green packaging on the sustainability performance of the mining industry in Zimbabwe.

2. To examine the influence of green distribution on the sustainability performance of the mining industry in Zimbabwe.
3. To assess the effects of green supplier selection on the sustainability performance of the mining industry in Zimbabwe.
4. To analyse the impact of reverse logistics on the sustainability performance of the mining industry in Zimbabwe

1.5 Research questions

The research questions of the study are as follows;

1. What is the impact of green packaging on the sustainability performance of the mining industry in Zimbabwe?
2. What is the influence of green distribution on the sustainability performance of the mining industry in Zimbabwe?
3. What are the effects of green supplier selection on the sustainability performance of the mining industry in Zimbabwe?
4. What is the impact of reverse logistics on the sustainability performance of the mining industry in Zimbabwe?

1.6 Significance of the Study

The study is significant due to its currency in the understanding and enhancement of sustainable practices within the Zimbabwean mining sector. Firstly, the study contributes to the corpus of knowledge on the impact of green procurement on mining performance. The study bridges a critical research gap in the existing literature, providing a comprehensive exploration of the interplay between environmental sustainability and procurement strategies. This academic contribution not only enriches the body of knowledge but also lays the groundwork for informed decision-making within the industry.

Furthermore, the outcomes of this study hold pragmatic significance for policymakers, industry stakeholders, and RioZim, providing tangible guidance on implementing environmentally sustainable procurement methods. Given the mining sector's crucial contribution to Zimbabwe's economy, the study's results can inform strategic policymaking aimed at balancing economic development with environmental responsibility.

Lastly, this research extends its significance to the broader discourse on corporate social responsibility and sustainable development within the mining industry. The study will inform the fostering of a more responsible and environmentally conscious approach to business operations, the study contributes to shaping a future where mining practices are harmonized with ecological well-being, promoting a balanced and sustainable coexistence between industrial progress and environmental preservation. In essence, this research transcends its immediate focus, catalysing positive changes in the mining sector's ethos and practices

1.7 Assumptions

The study will be carried out under the following assumptions

- The participants in the study will provide accurate and truthful information regarding procurement practices in the mining sector.
- The selected sample, particularly from Rio Zim, is representative of the broader mining industry in Zimbabwe.
- The procurement regulations, environmental regulations and policies in place are followed and enforced consistently within the mining sector.
- The study assumes a willingness among mining industry stakeholders to consider and implement green procurement practices for the overall benefit of the sector.

1.8 Delimitation of the study

The study's theoretical focus will be on the relationship between Zimbabwe's mining industry performance and green procurement practices.

The study will use the case study of Rio Zim Limited mines which are Renco Gold Mine, Cam & Motor Gold Mine , Empress Nickel Refinery, Murowa Diamonds (Private) Limited and Marnatha Ferrochrome.

The participant of the study will include procurement staff, managers and suppliers

The data used in this study will be from 2018 to 2023.

1.9 Definition of Key Words

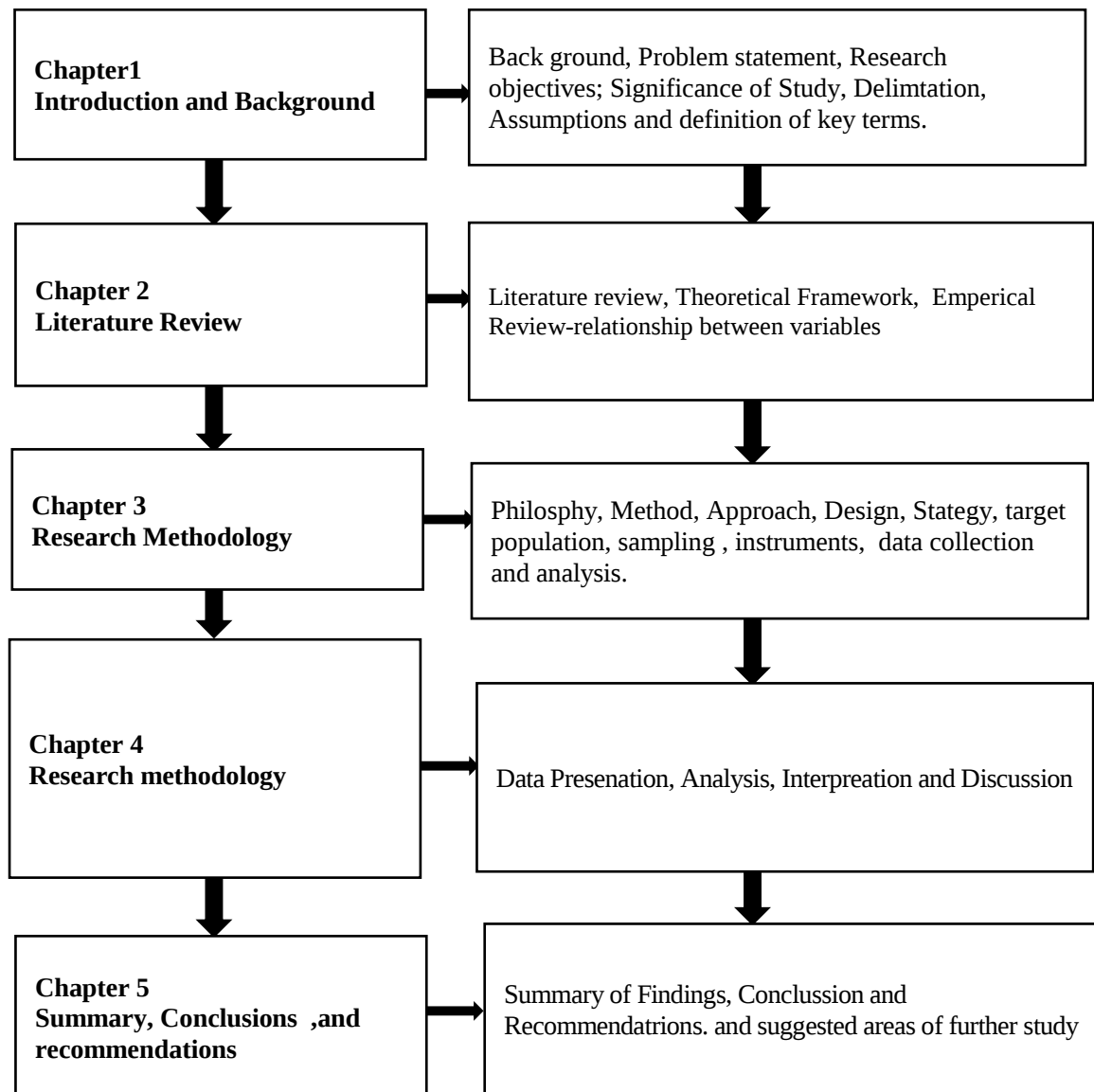
Green Procurement refers to the process of purchasing goods, services, and materials that have minimal environmental impact throughout their lifecycle (Guo, et al., 2020). Green

procurement entails taking into account environmental aspects such as energy efficiency, recyclability, utilization of renewable resources, and minimization of greenhouse gas emissions when choosing suppliers and products (Sarpong et al., 2016). The goal of green procurement is to minimise environmental harm while meeting the organisation's needs and objectives.

Green Supply Chain Management (GSCM) can be defined as a strategic approach to orchestrating the entire supply chain in an environmentally responsible manner (Kusi-Sarpong et al., 2016). It entails integrating environmental considerations into every stage of the supply chain, ranging from sourcing raw materials to product disposal or recycling. GSCM emphasises streamlining processes, minimising waste, reducing resource consumption, and fostering sustainability across the supply chain network (Sarpong, et al., 2016). In this study, GSCM will be utilised to evaluate the equilibrium between economic, environmental, and social objectives while ensuring the long-term sustainability of the supply chain.

Sustainability performance is the evaluation and measurement of an organisation's efforts and achievements in environmental, social, and economic sustainability (Antwi, et al., 2022). It encompasses various aspects such as resource efficiency, carbon footprint reduction, social responsibility, ethical business practices, and financial viability (Yildiz C & Sezen, 2019)

1.10 Structure of the Dissertation



1.11 Chapter Summary

The chapter was mainly focused on the introducing the study's background and rationale by clearly stating the objectives and research questions of the study. The chapter also developed the hypotheses of the study which will be tested in the proceeding chapters. The chapter also discussed the significance, delimitation and assumptions of the study. Key definitions and the layout of the study was also outlined. The next chapter will focus on literature review.

2 CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter is dedicated to reviewing the pertinent literature concerning green procurement and sustainable performance. The chapter will begin by discussing the theoretical underpinnings that will be the lenses through which this study will be hinged upon. The review will also focus on the relationship between the variables in the literature. The empirical literature review will also be carried out. Research gaps will be discussed so as to establish the niche of the present study leading to the development of the conceptual framework.

2.2 Theoretical Framework

The study is hinged on four theories which are the institutional theory, classical conditioning, resource-based theory, and the stakeholders theory.

2.2.1 Classical Conditioning Theory

Classical Conditioning Theory, as introduced by Pavlov and discussed by Kumar (2012), posits that consumers' perceptions of a product are intricately linked to the packaging employed. The theory suggests that consumers tend to value a product based on the packaging design, with well-designed packages that ensure product protection attracting a larger consumer base. Packaging nature becomes a crucial determinant in attracting specific consumer demographics.

Notably, environmentally conscious consumers show a consistent preference for green packaging due to its inherent lack of environmental hazards. In contrast, products packaged conventionally often appeal to lower-income consumers, either because they cannot afford green packaging or are uninformed about its benefits. Standard product packaging typically utilizes common materials without environmental protection features, resulting in affordable products. These packages are tailored for average or low-income consumers and middle-class earners.

In contrast, green product packaging is produced using cutting-edge, health-conscious production techniques and environmentally friendly raw materials because of its many benefits

for the environment and human health. Green packaging is distinctive and appealing when compared to traditional packaging methods because of its inherent increased economic value (Preuss, 2021). Contrary to popular belief, Mazumder (2019) demonstrates that the materials utilised in green packaging do not always determine the quality of the enclosed green product. Manufacturers utilise diverse green packaging technologies, enabling high-quality green products to be housed in less costly and aesthetically less appealing green packages

However, consumer behaviour often diverges from this understanding. Despite the high-quality green products housed in less appealing packaging, consumers tend to avoid such packages. This phenomenon is observed across consumer demographics, including highly educated individuals and affluent consumers, who may dislike and become irritated by unattractive green packaging (Lisa, 2016). According to Odhiambo (2018), consumers should carefully consider all green products, regardless of how attractive their packaging may be, rather than judging the quality of green products only on the basis of their appearance. Making educated selections and avoiding potential deceit and disappointment related to false impressions of green product packaging requires obtaining more information from manufacturers, suppliers, and other customers who have used these items (Luce & Hill, 2021). In essence, classical conditioning theory sheds light on the complex interplay between consumer preferences, packaging aesthetics, and product quality, emphasising the need for a nuanced understanding to guide purchasing decisions.

2.2.2 Resource-Based Theory

Liu and Zhu (2019) attribute the formulation of the Resource-Based Theory to Penrose in 1959, a theory designed to address the environmental challenges confronting global institutions. The essence of this theory lies in asserting that institutions can attain success by efficiently managing their resources in environmentally safe ways. It underscores the significance of effective resource management, especially through the implementation of green distribution systems, as a pivotal strategy in minimising environmental degradation (Appolloni, et al., 2014).

The transport industry, serving as a crucial player in the distribution of resources, assumes a central role in the resource-based theory (Guo, et al., 2020). Collaboration between the transport industry and environmental authorities becomes imperative to ensure strict adherence to safety regulations. Manufacturers play a vital role in advancing green distribution by offering eco-friendly transportation options, such as clean idle trucks and electric trains. This not only

minimises resource consumption but also reduces energy use, contributing to the overall environmentally conscious approach (Heinemann, et al., 2018). As part of the broader implementation of green distribution, delivery trucks now incorporate advanced technologies like eco-tyres and electric vehicles, ensuring energy efficiency and a notable reduction in environmental impact.

Furthermore, the resource-based theory extends its influence to warehousing facilities, which form an integral component of the distribution process (Kansake, et al., 2019). Warehouses now integrate green practices into their operations, adopting low-wattage lighting systems and harnessing solar energy for sustainable and environmentally friendly activities. This shift towards greener warehousing operations aligns with the resource-based theory's emphasis on environmentally conscious resource management throughout the distribution process (Simpson, 2018).

The resource-based theory, as elucidated by Liu and Zhu (2019), directs attention to the vital role of efficient resource management in achieving success for institutions, particularly in the context of addressing environmental challenges. By integrating green distribution systems and embracing eco-friendly technologies, the theory advocates for a holistic approach that extends from the transport industry to warehousing facilities, ensuring a comprehensive and sustainable strategy for managing resources in an environmentally responsible manner.

2.2.3 Stakeholder Theory

Freeman, in 1984, formulated a theory emphasising the pivotal role of stakeholder relationships in an organisation's progress, positing that organisational success is intricately tied to the quality of its relationships with stakeholders (Kusi-Sarpong, et al., 2016). Those organisations fostering healthy relationships with their stakeholders invariably emerge as the most successful. This success stems from organisations recognising the significance of their stakeholders, treating them with the utmost care and respect, and thereby cultivating loyalty and trust in return. Conversely, struggling or unproductive organisations often exhibit poor relationships with their stakeholders, leading to frustration and withdrawal of support from these key actors (Melewar, 2014).

In the current competitive era, organisations cannot afford to neglect the comfort and welfare of their stakeholders. Prioritising stakeholder satisfaction becomes imperative, and one effective strategy involves incorporating stakeholders into every decision-making process within the organisation. This inclusive approach allows stakeholders to contribute to strategic

decisions, fostering enhanced trust and commitment, and ultimately boosting profit margins. In addition, organisations can gain valuable insights into policies and environmental safety measures by incorporating stakeholders in discussions about environmental safety. These insights may not be easily obtained from the organisations alone (Miao & Xi, 2017).

Muma (2014) highlights the substantial contribution of suppliers to global environmental safety issues, given their direct involvement with products, services, and the environment. Suppliers possess extensive knowledge of the effects of materials, products, and services on consumers and the environment throughout the business cycle. Consequently, supplier selection becomes a critical management commitment for organisations. The choice of suppliers can either assist organisations in meeting their targets or lead them astray. Suppliers are essential to the realisation of the green procurement vision within the supply chains of organisations when it comes to implementation. Emphasising green supplier selection is vital for organisations, as it ensures access to safe goods and services from environmentally friendly suppliers. Organisations must prioritise green suppliers to prevent the acquisition of harmful products and services from suppliers lacking consideration for both consumer and environmental safety (Maria, 2011).

2.2.4 Institutional Theory

DiMaggio and Powell introduced this theory in 1983, asserting that companies must integrate environmental safety considerations into their management policies to achieve success in the competitive global market. The increasing global focus on environmental safety has pushed companies to adhere to environmental standards set by regulatory bodies on both global and national scales. As a result, companies that integrate these safety regulations into their management approaches are likely to excel globally compared to those that resist compliance (Ninlawan, 2014).

Peterson and Handfield (2019) underline the direct influence of corporate social responsibility, particularly concerning the environment, by asserting that reverse logistics plays a crucial role. Industries that prioritise and effectively implement strong reverse logistics practices set themselves apart from competitors who do not give reverse logistics due consideration. This differentiation holds particular importance in sectors such as mining, where the impact on the environment is profound. From the procurement of defective mining materials and equipment to unsustainable mineral extraction practices and insufficient management of mining waste, the mining industry substantially contributes to environmental degradation. Toxic mining

chemicals released into the atmosphere exacerbate global climatic effects. Given these impacts, it becomes imperative for mining industries to prioritise and implement effective reverse logistics to monitor and mitigate the environmental consequences of their activities (Preuss, 2018).

Industry is exclusively responsible for ensuring that environmental safety standards established by national and international regulatory bodies are followed (Qinghua, 2017). To guarantee that their operations do not endanger the environment, industries must incorporate efficient reverse logistics into their strategic planning. This entails gaining the expertise, know-how, and technological resources required to successfully execute reverse logistics. Industries should provide training to their staff on reverse logistics-related knowledge and skills, imposing penalties, such as fines, suspension, or even dismissal, on staff refusing to adhere to reverse logistics principles. According to Mohan (2016), reverse logistics has the potential to become a highly valued solution for environmental problems in both the public and commercial sectors by implementing these steps.

2.2.5 Theoretical Framework and Application

Theory	Description	Application
Classical Conditioning Theory	This theory, pioneered by Pavlov and discussed by Kumar (2012), suggests that consumers' perceptions of a product are closely tied to its packaging. Consumers often associate well-designed packaging, particularly those ensuring product protection, with higher product value. Green packaging appeals to environmentally conscious consumers, while conventional packaging may attract lower-income demographics. Despite the quality of green products,	In our study of green procurement's impact on sustainability in Zimbabwe's mining, including Rio Zim, organizations can adopt green supply chain practices. This includes renewable energy use, carbon emission reduction in transportation, and sustainable packaging. Implementing energy-efficient technologies aligns with resource-based theory, promoting sustainability. Collaboration with suppliers is vital for environmental sustainability and Rio Zim's competitiveness.

	consumers may overlook them if packaged unattractively.	
Resource-Based Theory	Originating from Penrose in 1959, this theory, as explained by Liu and Zhu (2009), emphasizes the importance of efficiently managing resources for organizational success, particularly in addressing environmental challenges. It underscores the role of green distribution systems, eco-friendly transportation, and sustainable warehousing practices in minimizing environmental impact throughout the distribution process.	In this study of green procurement's impact on sustainability in Zimbabwe's mining, including Rio Zim, organizations can adopt green supply chain practices. This includes renewable energy use, carbon emission reduction in transportation, and sustainable packaging. Implementing energy-efficient technologies aligns with resource-based theory, promoting sustainability. Collaboration with suppliers is vital for environmental sustainability and Rio Zim's competitiveness.
Stakeholder Theory	Formulated by Freeman in 1984, this theory highlights the significance of stakeholder relationships in organizational success. Organizations fostering healthy relationships with stakeholders tend to be more successful. Stakeholders, including suppliers, play crucial roles in influencing organizational decisions and environmental safety measures. Inclusive stakeholder involvement enhances trust, commitment, and profitability.	The stakeholder theory helps in understanding how engagement with stakeholders helps in understand their needs, concerns, and expectations regarding environmental sustainability. Involving stakeholders in decision-making processes related to green initiatives can increase their buy-in and support. Collaborating with suppliers to source sustainable materials and products and transparently communicating environmental efforts to customers and investors can enhance stakeholder trust and loyalty. Establishing partnerships with

		environmental organizations and regulatory bodies demonstrates a commitment to sustainability and fosters positive relationships with key stakeholders.
Institutional Theory	Introduced by DiMaggio and Powell in 1983, this theory emphasizes the integration of environmental safety considerations into management policies for global competitiveness. Compliance with environmental safety standards, facilitated by robust reverse logistics practices, is crucial for industries, particularly those with significant environmental impacts like mining. Effective reverse logistics ensures compliance and mitigates environmental consequences.	The institutional theory helped to provide lenses on the alignment of environmental policies and practices with regulatory requirements and industry standards. Implementing robust reverse logistics systems to manage product returns, recycling, and disposal can help minimize environmental impact and ensure compliance with environmental regulations. Investing in employee training and education on environmental best practices and conducting regular audits and assessments to monitor environmental performance are essential for maintaining institutional legitimacy and credibility.

2.3 The Concept of Green Procurement

Business operations extend beyond economic realms and profoundly impact both the environment and society (Guo, et al., 2020). Ignoring environmental concerns when conducting business can worsen air, water, and soil pollution, which can lead to climate change and other environmental problems (Kansake, et al., 2019). Additionally, a company's performance is linked to a variety of stakeholders, including its local community, suppliers, consumers, employees, and shareholders. This results in a complex web of interests where each group influences and is influenced by the business (Antwi et al., 2022).

Different definitions of Green Procurement (GP), also known as environmental purchasing or procurement, have been provided by numerous authors (Kusi-Sarpong, et al., 2016). Although the phrase "green purchasing" is frequently used, its implications—particularly with regard to suppliers' "greenness"—have not been thoroughly explained (Nagel, 2013). Environmental procurement, often known as green procurement, is defined by Large and Thomsen (2016) in a recent study as the integration of environmental factors into purchasing policies, initiatives, and practices. This means promoting recycling, reuse, and resource conservation while including the purchasing function into supply chain management initiatives like life-cycle analysis (LCA) and environmental design (Guo et al., 2020).

A thorough description is given by Sarpong et al. (2016), who propose that purchasing policies, initiatives, and collaborations created in response to environmental concerns constitute environmental procurement for a specific business (Guo et al., 2020). These issues include the acquisition of raw materials, the selection, evaluation, and improvement of suppliers, as well as the supplier's operations, inbound distribution, packaging, recycling, reuse, resource reduction, and the ultimate disposal of the company's products. By contrast, the definitions offered by Zsidisin and Siferd (2021) and Large and Thomsen (2018) are comparable, but the definition from Carter et al. (2018) is considered out of date since it focuses mostly on technical elements like recycling and life cycle assessment.

2.4 Sustainability Performance

The supply chain encompasses the entities responsible for converting raw materials into finished products and delivering them to consumers. Procurement activities are distributed throughout this chain, aiding in cost reduction and waste minimization. In today's dynamic business environment, the strategic significance of procurement is apparent across organisations, irrespective of their size or sector (Carter & Narasimhan, 2019; Weele, 2015). Procurement plays a crucial role in attaining strategic objectives by influencing factors such as product/service delivery time, operational expenses, and quality, all of which are key components of operational strategy (Gaither & Frazier, 2021). According to Carr & Smeltzer (2019), strategic procurement aligns its endeavours with long-term goals to confer a competitive edge to the organisation.

Literature agree that the concept of sustainability must undergo thorough examination due to its multidimensional character (Ruparathna, 2015). A company's corporate reputation, which

encompasses economic, environmental, and social conduct, heavily relies on the sustainability performance of its entire supply chain, encompassing both primary and secondary suppliers (Xie, 2016). The triple bottom line concept, which combines ecological responsibility, social equality, and economic viability, is the focus of definitions of sustainability. While environmental conservation deals with effects on social and ecological systems, economic development concentrates on creating wealth, and social inclusion deals with concerns of opportunity, health, and income distribution (Xie, 2016).

The measurement of an organization's social performance involves evaluating its impact on various stakeholders, such as workers, partners, suppliers, consumers, and the larger community (Heinemann et al., 2018). Environmental sustainability entails scrutinising operations from an ecological standpoint, prompted by a transformation in corporate cultural values from dominance to collaboration and from an emphasis on economic expansion to environmental sustainability (Kusi-Sarpong et al., 2016). Fundamentally, environmental sustainability aims to bolster the Earth's capacity by harnessing the potential of ecosystems while mitigating degradation.

Industrialisation has driven economic growth, precipitating structural changes and disseminating capital and technology (Kiwili & Ismail, 2016). However, it has also exacerbated market failures and policy distortions while escalating environmental degradation and neglecting social concerns (Appolloni, et al., 2014). Economic sustainability encompasses all aspects of economic engagements between an organisation and its stakeholders, encompassing conventional financial measures (profitability indicators) as well as metrics assessing stakeholder effects.

Corporate sustainability has gained prominence due to its potential to confer competitive advantages (Ruparathna, 2015). Companies are gradually incorporating the Triple Bottom Line strategy into their strategic planning and management, aiming to balance organisational growth and market sustainability with social and environmental responsibility (Antwi et al., 2022). Consequently, a new paradigm of business oriented toward sustainability practices has emerged, characterised by efforts to minimise environmental and social impacts through product, process, and organisational adaptations, with a commitment to environmentally respectful operations (Kiwili & Ismail, 2016).

Ruparathna & Hewage (2015) advocate for advancing sustainable development through procurement, aiming to address deficiencies found in conventional procurement practices.

Sustainable procurement aims to mitigate negative impacts on human health, the environment, and human rights by integrating social and environmental considerations into all phases of the procurement and contracting process (Guo et al., 2020).

Kansake, et al., (2019) enumerate several benefits of sustainable procurement for both society and organisations. Improved results (lower operating costs, less energy and water use), risk mitigation (fewer accidents, lower direct and indirect costs), and improved reputation (showing commitment to sustainability and social responsibility, better working conditions) are some of these benefits for organisations (Kiwili & Ismail, 2016). Benefits for corporations include, a healthier environment (reducing waste, maximising raw material utilisation), a stronger economy (helping the market for sustainable goods and services, lowering energy and material costs for reinvestment), and an improvement in social well-being (promoting local supplier growth, supporting suppliers who are dedicated to environmental and social responsibility, and supporting local communities) (Kuranchie-Mensah & Amponsah-Tawiah, 2016).

2.5 Green Packaging and Sustainability Performance

Green Packaging stands out as a pivotal process crucial for determining the market value of products (Lisa, 2018). In the fiercely competitive global market, companies vie for consumer attention by enhancing their product packaging through advanced technologies. Green packaging is essential for products to succeed in this competitive market, according to Guo et al. (2020). According to Lisa (2018), there is a significant positive correlation ($r=0.668$, $P < 0.05$) between manufacturing organizations' sustainability performance and their use of green packaging. According to the computed adjusted R^2 value of 0.759 for green packaging, adopting green packaging solutions can account for a considerable 75.9% of the variance in manufacturing business performance.

In a study conducted by Liu and Zhu (2019), they shed light on the historical evolution of green packaging. Traditionally, green packaging served the primary purpose of storing and protecting products, with little consideration for safeguarding consumer health and the environment. However, the landscape has transformed, and green packaging is now recognized as a catalyst influencing product development and sales returns, thereby enhancing the overall

competitiveness of manufacturing firms in China. According to Liu and Zhu's research, company competitiveness and green packaging have a strong positive and statistically significant link ($r=0.789$, $P<0.05$).

Both studies underscore the transformative impact of green packaging on manufacturing firms. Lisa's findings emphasize the significant role of green packaging in determining market success, while Liu and Zhu elaborate on its evolving role from a protective measure to a key driver of competitiveness in the Chinese manufacturing sector. These insights collectively highlight the integral nature of green packaging in contemporary business strategies, reflecting an increased awareness of its impact not only on product performance but also on overall firm competitiveness in the global market

2.6 Green Distribution and Performance

Mwaura (2016) conducted a study titled "Green Distribution Practices and Competitiveness of Food Manufacturing Firms in Kenya," which shed light on the significant contribution that green distribution makes to the improvement of manufacturing enterprises' competitiveness in Kenya. Beyond the mere dissemination of environmentally conscious products, green distribution encompasses the efficient and secure distribution of goods, ensuring the protection of both human health and the environment. Mwaura's findings establish a profound impact of green distribution on organisational profitability, with an impressive predictive value of 81%. This underscores the substantial influence that adopting green distribution practices can have on a firm's financial success.

Offering a complementary perspective, Ninlawan (2015) conducted a study on the "Implementation of Green Supply Chain Management Practices in the Electronic Industry in Japan." In this study, it was revealed that green distribution played a pivotal role in influencing organizational performance. Key aspects of green distribution, such as robust green distribution policies and environmentally friendly transport facilities, emerged as significant contributors to improved performance. The research found that adopting green distribution practices can lead to decreased transportation expenses for raw materials, shortened lead times, and enhanced overall profitability.

These positive outcomes not only contribute to the financial success of the organization but also enhance its reputation among consumers. Furthermore, the environmental impact of green distribution extends to conducting deliveries in an eco-friendly manner, aligning with principles of environmental safety.

2.7 Green Supplier Selection and Performance

Hussein and Shale (2014) chose Unilever Kenya as the main case study for their study on the impact of sustainable procurement on organisational performance in the Kenyan manufacturing industry. The research underscored the vital role of dedicated suppliers in ensuring the production of high-quality goods and services that prioritise consumer and environmental safety, thereby enhancing overall organisational productivity. To achieve this, organisations must establish precise and stringent criteria for supplier selection. The study highlighted the diverse criteria available for supplier evaluation, emphasising that organisations bear the responsibility of selecting criteria that best safeguard consumer health and environmental well-being. Particularly, the research revealed that green supplier selection can significantly amplify organisational performance. The results demonstrated a strong positive correlation between green supplier selection and organisational performance ($r=0.888$, $p=0.000<0.05$), highlighting the crucial importance of environmentally conscious supplier selection in enhancing organisational success.

Similarly, Pun (2013) delved into the determinants of environmentally responsible operations in his study. The research concluded that the strategic decision-making process of green supplier selection holds the power to either enhance or impede organisational performance. Remarkably, with a highest t-value of 6.874, the study determined that the choice of green suppliers had the greatest impact on organizational performance. In the context of environmentally conscious operations, this emphasizes the strategic importance of choosing green suppliers and the critical role that they play in shaping an organization's overall success.

2.8 Reverse Logistics and Performance

Wanjohi (2016) examined the moderating effect of putting in place a green environment on the association between organizational characteristics and Kenyan manufacturing enterprises' performance. Additionally, Wanjohi (2016) underscored the significance of reverse logistics practices as long-term solutions to environmental deterioration. Specifically, practices such as remanufacturing, recycling, and landfill management were identified as effective measures to address environmental pollution and contamination. The study's conclusion emphasized the role of reverse logistics in reinstating environmental integrity and enhancing overall environmental comfort.

Odhiambo (2018) expanded on the significance of reverse logistics in organizational performance within his study. He asserted that reverse logistics substantially contributes to the success of supply chain management within an organisation. A pivotal aspect of this contribution lies in product remanufacturing or refurbishment, which is facilitated through effective organisational policies supporting these processes in the realm of reverse logistics. Remanufacturing practices emerge as a crucial element in the restoration of environmental values associated with products, thereby rendering them more environmentally friendly. By incorporating such reverse logistics practices, organizations not only enhance their operational efficiency but also play a fundamental role in environmental sustainability, aligning their activities with eco-friendly principles.

2.9 Sustainability Performance of the Mining Industry

In a study evaluating the performance of mining sectors, Nduro (2014) conducted research specifically examining artisanal gold mining and its impact on surface water pollution in Ghana. The evaluation identified the extraction of high-grade minerals with a dedication to environmental protection, cost-efficient operations, and environmentally conscious production as key performance metrics for mining industries. The research emphasised that these three performance aspects hold equal significance for the global success of mining industries. The study's recommendation underscored the importance for mining industries to prioritise due diligence and careful attention to these performance indicators, as doing so is deemed essential for enhancing overall productivity and ensuring environmental preservation and protection in the mining sector.

Kuranchie-Mensah & Amponsah-Tawiah (2016) conducted an empirical comparison of employee motivation and its effect on performance in Ghanaian mining companies using the work satisfaction model as a performance measuring tool. Using an exploratory research approach, the study collects information from four significant Ghanaian gold mining businesses in order to assess the frameworks and policies of these organizations with respect to the effectiveness of motivational techniques and instruments. The findings imply that, in light of the risk elements that are intrinsic to the mining industry, management ought to give employee motivation top priority in order to reduce labor disputes, which would subsequently affect overall performance.

The study underscores the importance of employee adherence to health and safety regulations, given the significant contribution of the industry to the country's Gross Domestic Product

(GDP). While the research acknowledges limitations, such as the inability to reach out to additional mining firms, it proposes avenues for future investigation, including expanding the sample size and addressing the safety and health concerns of staff exposed to hazardous. The research highlights the significance of workers adhering to health and safety protocols, considering the industry's substantial contribution to the nation's GDP. The study identifies its shortcomings—for example, it was unable to get in touch with other mining companies—but it also suggests directions for further research, such as increasing the sample size and addressing the health and safety issues of employees who are exposed to dangerous materials.

2.10 Research Gap Analysis

While studies by Lisa (2018) and Liu and Zhu (2019) highlight the positive impact of green packaging on manufacturing firms' sustainability performance, there is a gap in understanding the mechanisms through which green packaging contributes to overall sustainability performance. This study seeks investigate the specific environmental and social metrics affected by green packaging implementation and their implications for sustainability performance assessment.

It is also notable that Mwaura (2016) focused on the role of green distribution in enhancing competitiveness in the Kenyan manufacturing sector, while Ninlawan (2010) examines its influence on organizational performance in the Japanese electronic industry. There is a gap in understanding how green distribution practices vary across different industries and geographical contexts, as well as their specific impacts on sustainability performance metrics such as resource efficiency, emissions reduction, and social responsibility.

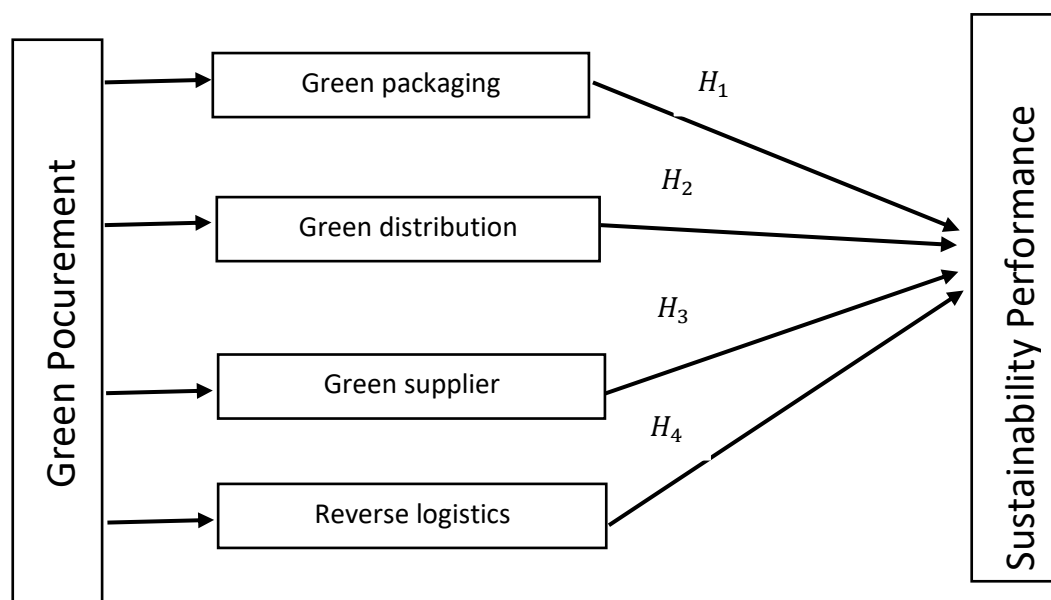
Previous studied by Hussein and Shale (2014) and Pun (2013) underscores the importance of green supplier selection in enhancing organizational performance. However, there is a gap in understanding the specific criteria used by organizations for green supplier selection and their effectiveness in driving sustainability performance outcomes. Further research could explore the selection criteria employed by organizations in different sectors and regions, as well as their alignment with broader sustainability goals.

It was further established Wanjohi (2016) and Odhiambo (2018) highlight the role of reverse logistics in environmental sustainability, there is a gap in understanding the specific practices and strategies employed by organizations to integrate reverse logistics into their sustainability initiatives. Further research could explore the effectiveness of different reverse logistics

practices, such as remanufacturing and recycling, in reducing environmental impact and enhancing overall sustainability performance. Nduro's study (2014) emphasizes the importance of environmental safety, cost-effective operations, and environmentally friendly production in mining industry performance. However, there is a gap in understanding how these performance indicators are measured and evaluated in the context of sustainability performance assessment. This study seeks to explore the development of comprehensive sustainability performance metrics tailored to the mining industry, taking into account its unique environmental and social challenges.

2.11 Conceptual Framework

The present conceptual framework is supported by the studies of Kaiaka and Mose (2020) and Yildiz C & Sezen, (2019) who used the quantitative methodology based on Ordinary Least Squares model to test their proposed hypotheses on the impact of green procurement (multidimensional variable) on sustainability performance.



2.12 Hypotheses

H_1 Green packaging on the sustainability performance of the mining industry in Zimbabwe?

H₂ What is the influence of green distribution on the sustainability performance of the mining industry in Zimbabwe?

H₃ What are the effects of green supplier selection on the sustainability performance of the mining industry in Zimbabwe?

H₄ What is the impact of reverse logistics on the sustainability performance of the mining industry in Zimbabwe?

2.13 Chapter Summary

The chapter focused on the review of literature from current sources such as journal articles and other published sources. The chapter commenced with the presentation of the theoretical framework which had four theories to underpin that study. There was an review of the key concepts of the study followed by empirical literature review. The chapter also focused on research gap analysis and the development of a conceptual framework. The next chapter will focus on research methodology.

3 CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter will provide a comprehensive overview of the research methodology employed in this study, outlining a systematic approach to addressing the research problem. The chapter will elucidate the positivist philosophy that underlies the chosen research methodology and delineate the research design effectively. Furthermore, it will discuss the study population, sampling techniques, and the determination of sample size. Additionally, the chapter will delve into the data collection process, including the research instrument utilized, as well as outline the procedures for data analysis. Moreover, considerations of validity and reliability of the study findings will be examined, alongside the establishment of ethical guidelines relevant to the researcher's conduct in the field of study.

3.2 Research Paradigms

Research paradigms create their own set of presumptions and guiding principles, which act as frameworks for scientific inquiry (Park, et al., 2020). Having a thorough awareness of these paradigm-specific presumptions makes it easier to assess the veracity of results pertaining to scientific studies and to spot any possible weaknesses in producing strong evidence (Varpio & MacLeod, 2020). In the process of creating a research framework, a research philosophy must be established because it forms the basis of important presumptions that influence the study's overall viewpoint (Saunders et al., 2019). The importance of research philosophy is found in its ability to clarify presumptions about the nature and source of knowledge. These presumptions facilitate a thorough examination of the conception and application of knowledge to a particular research problem by the researcher.

3.2.1 Positivist Philosophy

This study is in line with the positivist research paradigm, which was selected because it is appropriate for answering inquiries that call for quantitative analysis (Bryman, 2016; Weber, 2017). Using a value-free approach to provide causal explanations, positivism, which has its roots in rationalistic and empiricist philosophy, asserts that the social world may be examined similarly to the natural world (Mertens, 2015). It is based on the viewpoint of a natural scientist and attempts to produce generalizations that resemble laws from observed social reality

(Saunders et al., 2019). Positivists emphasize objectivity and argue that only science can produce true, certain, and accurate knowledge (Creswell & Creswell, 2018). Although positivism is appealing because it emphasises empirical evidence, it does not sufficiently address human behaviour.

According to positivists, reality is unchanging and observable in an objective manner without affecting the phenomena being examined. Adhering to positivism, the researcher uses study participants' responses as factual data to infer results from the environment. The study uses descriptive statistical probability analysis in an effort to produce results and conclusions that may be applied broadly. Selecting a positivist research philosophy ensures little involvement with respondents and preserves an objective approach to data collecting (Bryman, 2016). This method makes it easier to gather and analyze data, leading to study findings that are visible and measurable.

3.3 Research Approach

The study uses a deductive research strategy, which is a popular scientific method that involves creating and evaluating hypotheses in order to generate new knowledge. This method creates a theory, puts it to the test with assertions, and bases explanation on laws, which allow for prediction, control over phenomena, and anticipation. This study used the deductive method, which entails putting forth a preliminary hypothesis, developing a theory, and investigating causal links between ideas and variables.

Following data collection and hypothesis testing, theory revision or rejection may be necessary if results conflict with presumptions. The deductive approach complements the study's highly organized methodology and is useful in guaranteeing replicability and reliability. Concepts are operationalized for accurate measurement, and generalization based on a well chosen sample size is made easier by its deductive nature.

3.4 Research Method

This study will use a deductive methodology and the quantitative research strategy to evaluate preconceived notions (Apuke, 2017). The deductive method is commonly employed in quantitative research, when data is gathered and analyzed to evaluate theories, with an emphasis on analyzing the correlations between variables (Apuke, 2017). It places a strong emphasis on data quantification and analysis, using statistical techniques to answer who, what, where, when, how many, and how much questions (Apuke, 2017). Similar to an experimental

design, variables are quantitatively measured and then submitted to various statistical and graphical analysis. Controls are frequently used for validation.

According to Rovi et al. (2014), quantitative researchers divide down reality into smaller chunks for observation and hypothesis evaluation, viewing the world as an objective reality that is independent of observations. According to Almalk (2016), this method involves the selection of research topics, development of hypotheses, measurement of variables, application of statistical analysis, and interpretation of results. According to Almalk (2016), quantitative research entails gathering numerical data and analyzing it using mathematical methods, especially statistics. The advantages of quantitative research in addressing the shortcomings of qualitative approaches are examined by Atieno (2009), as referenced in Mohajan (2021).

Using a descriptive quantitative approach, the study seeks to address Creswell's (2018) claim that elements influencing typical social exploration difficulties can be identified by quantitative approaches by starting from a general perspective and going into particular.

3.5 Research Strategy

A research strategy describes how a researcher collects the information needed to answer certain research questions (Glaser and Strauss, 2017). According to Saunder et al. (2019), a researcher's philosophical position, time restrictions, available resources, research questions and objectives, and current knowledge should all be taken into consideration when selecting a research approach. This component is considered in spite of the wide range of alternative approaches that have been documented in the literature (Saunder et al., 2019). These include surveys, action research, grounded theory, archival research, experiments, and case studies..

3.5.1 Survey Strategy

The research will employ a survey as its chosen method for data collection, a decision driven by the survey's capacity to efficiently gather extensive quantitative information essential for both descriptive and inferential statistical analyses. The survey will target a representative sample, selected through a stratified random sampling approach, as it would have been impractical and redundant to collect data from all the mines operated by Rio Zim Limited. To ensure adequate representativeness, Yamani's formula will be applied to calculate a large sample, facilitating the generalization of findings. Moreover, the survey methodology proves suitable for the intended multivariate regression analysis, which aims to explore the

relationships between green procurement practices and the organizational performance of mining companies (Yamani, 1967).

3.5.2 Case Study

In this study, the association between green procurement and organisational performance will be scrutinised through the utilization of a case study approach.. A case study is an empirical research technique that, according to Yin (2016), completely investigates a modern phenomena in the context of real-life events, particularly in situations when it is difficult to distinguish the phenomenon from its context (Saunders et al., 2019).

Punch (2011) highlights the case study's merits, emphasizing its holistic elucidation and in-depth analysis of real-world events, processes, and phenomena within a connected system, along with its heuristic impact. This research conducts a comprehensive exploration of the mining sector, focusing specifically on the mines operated by RioZim Limited in Zimbabwe, serving as a case study to elucidate the real-life contextual relationship between the two variables under consideration..

3.6 Research design

According to Marczyk et al. (2017), a research design serves as a strategic framework employed by researchers to address research questions in their studies. This framework distinguishes three primary research designs: exploratory, descriptive, and explanatory. Descriptive studies aim to answer fundamental questions such as "who, what, where, when, why, and how," while exploratory designs are utilised when researchers seek fresh insights into emerging problems characterized by vaguely defined variables (Sekaran and Bougie, 2016).. In this study, both explanatory and descriptive research designs are employed, as they contribute to establishing causal relationships by rigorously testing hypotheses..

3.6.1 Explanatory Research

This research adopts an explanatory research design, primarily chosen for its suitability in quantifying and elucidating the strength of the association between green procurement (as the independent variable) and organizational performance (as the dependent variable). This design aligns with the approaches employed in prior studies on similar subjects, (Ruba et al. (2021), Awwad and Abu-Karaki, 2021, Urban et al.,2012, and Oni et al.,2019). The study features clearly defined independent variables, and their impact on the dependent variable specifically, the organizational performance of mining companies is empirically examined through the formulation and testing of four hypotheses..

3.6.2 Descriptive Research

Descriptive research, commonly known as statistical research, provides a comprehensive portrayal of information pertaining to the studied population or phenomenon (Bryman & Bell, 2015). The researcher opted for a descriptive research approach, as it facilitates the synthesis of extensive data obtained from respondents into a concise set of summary measures. This design was chosen for its compatibility with quantitative instruments, particularly questionnaires, in data collection, thereby contributing to the overall reliability of the study. Additionally, the descriptive design enables the utilization of statistical analysis methods for the extrapolation, interpretation, and generalization of the findings.

3.7 Population

Population means "the complete population of individuals or other study-relevant factors" and refers to the entire set of cases from which a sample is produced (Polit & Beck, 2010; Collins, 2010). Moreover, Bhattacharjee (2012) and Kothari (2014) expound on the notion, characterizing the population as a vast collection of examples, the cosmos, the range, the collection of items, or the units in a certain region (geographical or sociological). Researchers choose a sample for data gathering from this demographic (Majumdar, 2011). The population of the current study consists of 1000 managers, procurement authorities, and supply chain participants connected to the mines owned by RioZim Limited..

3.8 Sampling

In order to produce results that can be applied to the full group, sampling entails the deliberate selection of a representative subset from the complete population; the sample that is chosen must have characteristics in common with the community that is being studied (Burns & Burns, 2012). Sampling becomes essential for efficiency given the time limits in this study. It helps with faster data manipulation, less data entry, and faster organizing and presentation of results.

To implement systematic random sampling, the researcher will derive the sampling frame from all identified companies of RioZim Limited. The process involves numbering all cases in the sampling frame uniquely, selecting the first case randomly, calculating a sample fraction, and subsequently choosing subsequent cases systematically based on the sampling fraction and selection frequency.

In this research, the systematic random sampling technique will be applied to 10 mining companies, with 10 respondents from each company, resulting in a total sample size of 100 respondents. The selected respondents will include Procurement Managers, Procurement Officers, Accountants, Safety and Health Executives, Suppliers, and Environmental Officers..

3.9 Research instruments

The research is a quantitative survey which uses a suitable quantitative research instrument in the mould of a questionnaire.

3.9.1 Collection: Self-administered structured online questionnaire survey

The distribution of the questionnaires will take place using an online survey platform that can be accessed by email or Google Docs sharing, which is a feature that makes conducting online surveys convenient. This approach was selected because it is simple for participants to use, allowing the researcher to collect data at a reasonable cost from a large number of respondents. Convenience is ensured by the approach's good alignment with respondents' geographic locations.

The questionnaire format, which uses the Likert scale for ratings, will be taken from earlier research. Using a five-point Likert scale (Likert, 1932), respondents will assess statements as follows: 1 = Strongly Disagree (SD), 2 = Disagree (D), 3 = Neutral (N), 4 = Agree (A), and 5 = Strongly Agree (SA). The survey will be conducted in an orderly, self-regulatory manner. Because it is simple to code, this scale is recommended. A cover note explaining the objective of the questionnaire and guaranteeing respondents' anonymity and the academic character of the research will be attached. Respondents will receive precise and brief instructions on how to fill out the questionnaire, and they will have at least one week to do so. To increase the response rate, the researcher will use a structured questionnaire, making sure that the instructions given to respondents are clear and coherent.

..

3.10 Validity

Heale and Twycross (2015) defined validity as the degree to which an instrument measures what it is supposed to measure. Construct and content validity will both be used in the study. An instrument's content validity is evaluated based on how well it captures pertinent information. The researcher will discuss the instrument's content with the supervisor and two corporate leaders from mining companies in order to confirm content validity. The pilot research will also help to improve the instrument's general validity.

The degree to which an instrument assesses the intended constructs is known as construct validity, which is another aspect of instrument validity (Heale and Twycross, 2015; Hair et al., 2014). Convergent and discriminant validity will be evaluated by means of confirmatory factor analysis in this study.

3.11 Reliability

Heale and Twycross (2015) defined reliability as the consistency with which an instrument measures the constructs it is supposed to measure. Three features—internal consistency, stability, and equivalency—that are commonly covered in the literature will be examined in this study (Korb, 2012; Shuttleworth, 2015). The assessment of internal consistency, which gauges how consistently each item on the scale rates the same construct, will be carried out utilising Cronbach's alpha, a frequently used metric. (Shuttleworth, 2015; Heil and Twycross, 2015). Because Cronbach's alpha was used, it is possible to evaluate the instrument's items for evaluating green procurement from all four perspectives, including their overall consistency and internal consistency. Although most academics agree that a minimum value of 0.7 is suitable for reliability, there is continuous discussion among researchers about appropriate cutoff thresholds for reliability assessments (Heale and Twycross, 2015).

Cronbach's alpha	Reliability strength
$\alpha < 0.5$	Unacceptable
$0.5 \leq \alpha < 0.6$	Poor
$0.6 \leq \alpha < 0.7$	Questionable
$0.7 \leq \alpha < 0.8$	Acceptable
$0.8 \leq \alpha < 0.9$	Good
$\alpha \geq 0.9$	Excellent

3.12 Data Analysis

The collected data will be cleaned up, coded, and filtered before being loaded as quantitative information into SPSS Version 26. Thereafter, a thorough statistical analysis will be conducted using analysis of variance, multivariate regression, correlation analysis, and tests for independence..

3.12.1 Normality Test

Normality testing is a crucial precondition for statistical analysis, since it facilitates the selection of relevant statistical tests (Mertler and Reinhart, 2017). When data are non-normally distributed, non-normality affects standard error estimates, making parametric tests

inapplicable (Hair et al., 2010). Examples of these tests are t-tests and Pearson correlation analysis. Non-parametric tests like Spearman Rho for correlation analysis and Mann-Whitney and Kruskal-Wallis tests for independence are considered appropriate in these situations. The Central Limit Theorem, which states that data tend to approach a normal distribution as sample size increases, will be used in this investigation (Ruxton, Wilkinson, and Neuhauser, 2015).

3.12.2 Multi-collinearity Test

To address the statistical situation that arises in multivariate analysis when independent variables show high correlation, a multi-collinearity test will be performed (Tabachnick and Fidell, 2013). Because multi-collinearity causes exaggerated regression variances, evaluating the effect of independent factors on the predicted variable becomes more difficult. A correlation value of less than 0.9 is considered acceptable when evaluating multi-collinearity among independent variables through correlation analysis. Correlation analysis will be enhanced by tolerance values and the Value Inflation Factor (VIF); tolerance values less than 0.10 will indicate multi-collinearity, while VIF values more than 10 would indicate its existence (Meyers et al., 2013)..

3.12.3 Correlation Analysis

Correlation coefficients, which range from 0 to 1, are used in correlation analysis to quantify the strength and direction of a link between variables. According to Shuttleworth (2015), values below 0.3 signify a weak correlation, 0.3 to 0.5 suggest a moderate correlation, and above 0.5 show a strong correlation. The analysis takes into account statistical significance ($p < 0.05$), as well as the intensity and direction of the link. Correlation coefficients will be computed using two approaches: the non-parametric Spearman's Rho and the parametric Pearson Product Moment.

3.12.4 Multivariate Ordinary Least Square (OLS) Regression Analysis

Regression models that use two or more variables as independent variables are subjected to statistical analysis in multivariate analysis (Hayes, 2017; Mertler & Reinhart, 2017). In order to determine the effect of green procurement on the sustainability performance of mining businesses in Zimbabwe, this study uses multivariate ordinary least squares (OLS) regression. The generic model proposed by Kopia et al. (2017) will be changed for this study in order to

examine its effectiveness in estimating the multivariate regression model. Models from previous studies will be adapted.

$$PERF = \alpha + \beta_1 GNPk + \beta_2 GNDT + \beta_3 GNSS + \beta_4 RVLG + \mathcal{E}$$

Where

PERF= The dependent variable measuring Sustainability Performance

α = Constant

β_1 = This measures the partial change in the PERF variable due to a one-unit change in the independent variable i .

GNPK= Independent variable measuring the impact of green packaging measures on organisational performance

GNDT= Independent variable measuring the impact of green distribution measures on organisational performance

GNSS= Independent variable measuring the impact of green supplier selection measures on organisational performance

RVLG= Independent variable measuring the impact of reverse logistics measures on organisational performance

$\mathcal{E}$ = Error Term

3.13 Ethical Considerations

The research will be conducted solely for academic purposes, and participants will be duly informed before data collection begins. Participants will be informed of their right to voluntarily choose whether to respond to questions or not..

Voluntary participation

The research respondents will be asked to participate in the study by giving voluntary approval and agreement so that they are aware they will take part in the study without being coerced or forced to take part.

Anonymity

Respondents will be informed of respect to anonymity prior to finishing the survey, names will not be needed.

Confidentiality

Respondents will be advised that the data gathered was for instructive and research purposes and they will be treated privacy if they decide to take an interest in participating

3.14 Chapter Summary

The preceding chapter detailed the research methodology which is the blue for the research process. It encompassed the research philosophy, mainly positivist, emphasizing knowledge generation. The discussion covered research design, methodology, approach, and strategy, along with the creation and validation of data collection tools. Population, sampling frame, element, design, method, and size were thoroughly explored. Techniques ensuring credibility, focusing on internal and external validity and reliability, were discussed. The chapter concluded with a review of data analysis techniques and ethical considerations. The subsequent chapter presented research findings, supported by statistical analysis, validating or refuting research hypotheses.

4 CHAPTER FOUR

DATA PRESENTATION, ANALYSIS, INTERPRETATION AND DISCUSSION

4.1 Introduction

The purpose of this chapter is to comprehensively present, analyze, and interpret the data, and engage in a discussion. It aims to fulfil the study's objective by addressing the research question and testing hypotheses regarding the influence of green procurement on the sustainability performance of Zimbabwe's mining sector. The chapter commences with reporting the survey response rate, followed by a descriptive assessment of demographic data to illuminate sample characteristics. Both descriptive and inferential statistical analyses will be conducted, guided by the study's objectives, determining the subtopics for analysis. Finally, the findings will be discussed in connection with the literature reviewed in Chapter 2 to affirm or challenge the outcomes..

4.2 Responses Rate

The researcher administered 100 to the respondents and 94 were returned and this gave a response rate of 94%. The table below summarises that response rate.

Administered	Responses	Unusable	Percentage
100	94	0	94%

Achieving a high response rate of 94% is deemed credible and acceptable, ensuring reliable results and allowing for generalisation to the population from which the sample was drawn (Malone, Nicholl, & Coyne, 2016). Consequently, the findings of this study will have the statistical power to generalise to the broader population of Zimbabwe's mining sector. The high

response rate can be attributed to the research being conducted in the respondents' real-life context.

4.3 DEMOGRAPHIC DATA ANALYSIS

The data in this section focuses on the analysis of the characteristics of the mining sector from which the respondents were drawn.

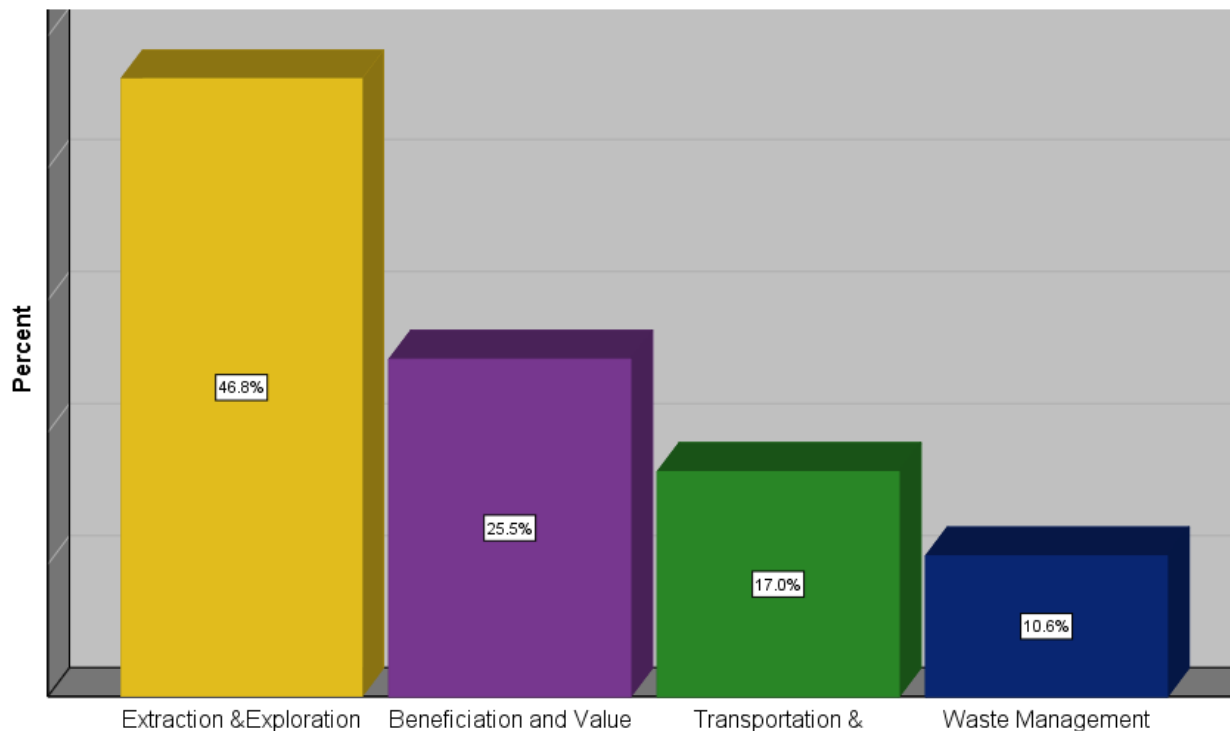
4.3.1 Ownership

The table below summarises the ownership patterns in the mining sector from which the respondents were drawn.

Ownership					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Government	27	28.7	28.7	28.7
	Private	26	27.7	27.7	56.4
	International Conglomerate	41	43.6	43.6	100.0
	Total	94	100.0	100.0	

The ownership distribution among respondents in the Zimbabwean mining sector shows a varied landscape. Out of 94 respondents, 27 (28.7%) are from government-owned mining enterprises, indicating that over a quarter of the sample is state-controlled. Private ownership is represented by 26 respondents (27.7%), suggesting a significant presence of private companies in the sector. The largest group, comprising 41 respondents (43.6%), is from internationally owned conglomerates, highlighting the dominant role of foreign investment in Zimbabwe's mining industry. This distribution underscores a balanced mix of government, private, and international ownership, each likely influencing the sector's sustainability performance and operational strategies.

4.3.2 Operations



The operations of the mining companies from which the respondents were drawn in the Zimbabwean mining sector highlight diverse activities. Nearly half of the respondents (46.8%) are involved in extraction and exploration, indicating a strong focus on the initial stages of mining. A significant portion (25.5%) is engaged in beneficiation and value addition, emphasizing efforts to enhance the value of raw materials. Transportation and logistics account for 17% of the respondents, underscoring the importance of moving materials within the supply chain. Lastly, 10.6% of the respondents are dedicated to waste management, reflecting attention to environmental sustainability. This distribution showcases the varied and comprehensive nature of mining operations in Zimbabwe.

4.3.3 Years in the Industry

Years_In Mining					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 -5 Years	23	24.5	24.5	24.5
	6-10 Years	30	31.9	31.9	56.4
	11-20 Years	11	11.7	11.7	68.1

	21+ Years	30	31.9	31.9	100.0
	Total	94	100.0	100.0	

The experience data reveals a balanced mix of both relatively new and highly experienced individuals in the Zimbabwean mining sector. The largest groups, those with 6-10 years and over 21 years of experience (each 31.9%), suggest a stable workforce with a substantial amount of industry knowledge and expertise. Meanwhile, the presence of respondents with 1-5 years of experience (24.5%) indicates ongoing growth and new talent entering the sector. The smaller proportion of respondents with 11-20 years of experience (11.7%) highlights a transitional phase between mid-career professionals and more seasoned veterans.

4.4 Descriptive Analysis

The descriptive statistics in this study rely on the central limit theorem, using measures of central tendency (mean) and dispersion (standard deviation). In this context, a mean greater than 3 ($M > 3$) indicates that respondents agree with the construct in the questionnaire. Standard deviation measures the extent of variation; a large standard deviation suggests diverse opinions among respondents, while a small standard deviation indicates similar opinions.

Skewness assesses the symmetry of the data distribution. In this examination, a skewness value approaching zero indicates a normal distribution. A negative skewness denotes left-skewed data, while a positive skewness indicates right-skewed data. Kurtosis measures the heaviness of the tails in the data distribution relative to a normal distribution. In this study, kurtosis values near or below 3 suggest a normal distribution.

4.4.1 The impact of green packaging on the sustainability performance of the mining industry in Zimbabwe

This section evaluates the impact of green packaging on the sustainability performance of the mining industry in Zimbabwe.

		Mean	Std. Dev	Skew	Kurt
	Green packaging practices contribute significantly to reducing environmental impact in the mining sector.	3.62	0.607	0.423	2.639
	The implementation of green packaging initiatives positively affects the overall sustainability performance of mining operations.	3.4	0.92	0.305	2.961
	Stakeholders perceive green packaging as essential for promoting environmental responsibility within the mining industry.	3.73	0.736	0.353	3.277

	Green packaging solutions enhance the reputation and credibility of mining companies in terms of sustainability practices.	3.99	0.711	-1.086	2.178
	The adoption of green packaging strategies leads to measurable improvements in resource conservation and waste reduction within the mining sector.	3.86	1.093	0.879	2.417

The analysis shows that respondents generally agree that green packaging has a positive impact on the sustainability performance of the mining industry in Zimbabwe. The strongest agreement is seen in the statement about enhancing reputation and credibility (Mean = 3.99), while the lowest is in the overall positive effect on sustainability performance (Mean = 3.4). Standard deviations range from 0.607 to 1.093, indicating varying degrees of consensus. Skewness values suggest most responses lean towards agreement, with only one statement showing left skewness, indicating strong agreement. Kurtosis values are close to normal distribution, indicating typical tail behaviour. The data supports the perception that green packaging is beneficial for the mining sector's sustainability efforts.

4.4.2 The influence of green distribution on the sustainability performance of the mining industry in Zimbabwe.

This section examines the influence of green distribution on the sustainability performance of the mining industry in Zimbabwe.

Statistics		Mean	Std. Dev	Skew	Kurt
	Green distribution methods contribute to minimizing carbon emissions and environmental footprint in mining operations.	4.34	0.422	1.575	2.527
	The implementation of green distribution practices enhances the efficiency and effectiveness of logistics operations in the mining sector.	3.87	0.279	0.747	1.381
	Stakeholders recognize the importance of green distribution in promoting environmental sustainability within the mining industry.	2.81	0.247	0.036	2.976

	Green distribution initiatives positively impact the reputation and brand image of mining companies in terms of sustainability efforts.	2.44	0.316	0.474	1.036
	Adopting green distribution strategies leads to tangible improvements in resource efficiency and environmental conservation within the mining sector.	3.01	0.886	0.453	2.2

The analysis shows varied perceptions regarding the influence of green distribution on sustainability in the Zimbabwean mining sector. Respondents strongly agree that green distribution methods significantly minimize carbon emissions and environmental footprint (Mean = 4.34). There is also strong consensus that green distribution enhances logistics efficiency (Mean = 3.87). However, opinions are more neutral or slightly negative regarding the recognition of green distribution's importance by stakeholders (Mean = 2.81), its impact on reputation and brand image (Mean = 2.44), and its tangible improvements in resource efficiency (Mean = 3.01). The data highlights areas where green distribution is viewed positively and areas where there is room for improvement or greater awareness.

4.4.3 The effects of green supplier selection on the sustainability performance of the mining industry in Zimbabwe.

This section assesses the effects of green supplier selection on the sustainability performance of the mining industry in Zimbabwe.

		Mean	Std. Dev	Skew	Kurt
	Green supplier selection criteria contribute significantly to enhancing environmental sustainability practices within the mining industry.	3.17	0.033	0.068	2.449
	Companies that prioritise green supplier selection demonstrate improved sustainability performance in their operations.	3.15	0.047	0.155	2.411
	Stakeholders acknowledge the crucial role of green supplier selection in promoting sustainable practices within the mining sector.	3.37	0.95	0.508	2.237
	Green supplier selection initiatives positively influence the reputation and trustworthiness of mining companies in terms of sustainability.	3.26	0.015	0.283	2.762

	Adopting green supplier selection strategies leads to measurable improvements in environmental impact and resource management within the mining sector.	4.01	0.796	1.063	2.062
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The analysis indicates that respondents generally view green supplier selection positively, with the strongest agreement being that such strategies lead to measurable improvements in environmental impact and resource management (Mean = 4.01). The mean values for other statements range from 3.15 to 3.37, indicating neutral to moderate agreement. Standard deviations are very low for most statements, indicating strong consensus, except for stakeholder acknowledgment (Std. Dev = 0.95), which shows higher variability. Skewness values suggest most responses lean towards agreement, with significant right skewness for the statement on measurable improvements. Kurtosis values are close to normal distribution, with some statements showing slightly heavier or lighter tails. Overall, the data supports the perception that green supplier selection positively influences sustainability performance in the Zimbabwean mining industry.

4.4.4 The impact of reverse logistics on the sustainability performance of the mining industry in Zimbabwe

This section analyses the impact of reverse logistics on the sustainability performance of the mining industry in Zimbabwe

		Mean	Std. Dev	Skew	Kurt
	Reverse logistics practices contribute significantly to reducing waste and promoting recycling initiatives within the mining sector.	3.74	0.927	0.542	2.452
	Companies that prioritize reverse logistics demonstrate improved sustainability performance and resource efficiency in their operations.	3.52	0.758	0.3	2.571
	Stakeholders recognize the importance of reverse logistics in promoting environmental sustainability within the mining industry.	3.93	0.591	-1.581	6.969
	Reverse logistics initiatives positively influence the reputation and credibility of mining companies in terms of sustainability efforts.	3.46	1.152	-0.11	-1.456

	Adopting reverse logistics strategies leads to tangible improvements in waste management and environmental conservation within the mining sector.	4.07	0.871	-0.746	0.455
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The analysis shows that respondents generally view reverse logistics positively, with the strongest agreement being that adopting reverse logistics strategies leads to tangible improvements in waste management and environmental conservation (Mean = 4.07). Other statements also indicate positive perceptions, with means ranging from 3.46 to 3.93. Standard deviations suggest moderate to high variability in responses, particularly for the statement about influencing reputation and credibility (Std. Dev = 1.152). Skewness values indicate that most responses lean towards agreement, with significant left skewness for recognizing the importance of reverse logistics, suggesting strong agreement. Kurtosis values vary, with some statements indicating heavy-tailed distributions and others light-tailed. Overall, the data supports the perception that reverse logistics positively influences sustainability performance in the Zimbabwean mining industry.

4.5 Inferential Analysis

The analysis will be based on the following equation

$$PERF = \alpha + \beta_1 GNPk + \beta_2 GNDT + \beta_3 GNSS + \beta_4 RVLG + \mathcal{E}$$

4.5.1 Reliability

The research performed reliability assessments to gauge the internal consistency of the survey instrument. The subsequent table showcases the outcomes of these reliability tests, displaying the Cronbach's alpha values for various constructs of the independent variable and the construct of the dependent variable.

Reliability Test Results

RELIABILITY TEST STATISTICS			
Variable Construct	Items	Cronbach's Alpha Score	Reliability
Green Packaging	5	0.74	Very Good
Green Distribution	5	0.78	Very Good
Green Supplier	5	0.91	Excellent

Reverse logistics	5	0.85	Excellent
Sustainability Performance	5	0.75	Very Good

4.5.2 Normality Test

The assessment of normality is a fundamental pre-requisite for any inferential analysis since normality determine the appropriate statistical tools to use between parametric and non-parametric analysis (Hair, et al., 2015). Parametric tests such as the Pearson correlation analysis and t-tests are suitable for normally distributed data while for non-parametric data

Tests of Normality						
	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
PERF	.158	94	.219	.919	94	.220
GNPK	.236	94	.520	.877	94	.523
GNDT	.144	94	.971	.945	94	.968
GNSS	.134	94	.528	.945	94	.533
RVLG	.141	94	.194	.955	94	.210
a. Lilliefors Significance Correction						

The normality test was conducted after computing the variables to create the five target variables using the SPSS transform function. In the table above, the Shapiro-Wilk test was employed, as it is suitable for datasets with fewer than 100 cases (Bryman & Bell, 2015). The test's null hypothesis assumes that the data are normally distributed. This null hypothesis is rejected if the alpha level is 0.05 and the p-value is less than 0.05. If the p-value exceeds 0.05, the null hypothesis is not rejected. In this test, the p-value was 0.00, which is greater than 0.05, indicating that the null hypothesis is accepted and the data are normally distributed. The log-transformed variables also showed a p-value of 0.00, greater than 0.05, as indicated in the highlighted significance section above. Thus, it is concluded that the variables are normally

distributed, justifying the use of parametric tests such as Pearson's Correlation and OLS regression analysis.

4.5.3 Multicollinearity

Before interpreting the results from the multivariate regression analysis, the study first tested for multicollinearity using correlation analysis, tolerance values, and the Variance Inflation Factor (VIF). This step was crucial because the presence of multicollinearity affects the interpretation of regression coefficients. Multicollinearity occurs when independent variables are highly correlated, making it challenging to determine which independent variables account for the variance in the dependent variable. Correlations between variables below 0.9 are considered acceptable, while correlations above 0.9 indicate excessive correlation (Tabachnick & Fidell, 2013). Similarly, Meyers et al. (2013) suggest that tolerance values below 0.10 and VIF values above 10 indicate the presence of multicollinearity

Collinearity Statistics		
Variable	Tolerance	VIF
GNPK	.643	1.554
GNDT	.393	2.542
GNSS	.401	2.496
RVLG	.698	1.432

The correlation matrix in the table above shows that although there is a significant positive correlation among the independent variables, none of the correlations exceed 0.9, which would indicate problems with multicollinearity (Tabachnick and Fidell, 2013). The evaluation of tolerance values and VIF, obtained from SPSS and displayed in the table, supports the findings of the correlation analysis. All VIF values are below 10, ranging from 1.432 to 2.542, and none of the tolerance values fall below 0.1, ranging from 0.393 to 0.698. These results demonstrate that multicollinearity is not an issue, ensuring the reliability of the multivariate regression model.

4.6 Correlation Analysis

The correlation analysis provided in the table examines the relationships between five variables: PERF, GNPK, GNDT, GNSS, and RVLG. Each cell in the table displays the correlation coefficient (r) between two variables.

Correlations					
	PERF	GNPK	GNDT	GNSS	RVLG
PERF	1				
GNPK	.552**	1			
GNDT	.506**	.140	1		
GNSS	.606**	.203	.334	1	
RVLG	.450**	.137	.230	.252	1
**. Correlation is significant at the 0.01 level (2-tailed).					
*. Correlation is significant at the 0.05 level (2-tailed).					

The correlation coefficient between PERF and GNPK is 0.552**, indicating a strong positive relationship between Sustainability Performance (PERF) and the impact of green packaging measures (GNPK). This correlation is statistically significant at the 0.01 level (2-tailed), meaning the observed relationship is highly unlikely to have occurred by chance.

Similarly, the correlation coefficient between PERF and GNSS is 0.606**, suggesting a strong positive relationship between Organizational Performance (PERF) and the impact of green supplier selection measures (GNSS). This correlation is also statistically significant at the 0.01 level (2-tailed).

Conversely, the correlation coefficient between PERF and GNDT is 0.506**, indicating a moderate positive relationship between Organizational Performance (PERF) and the impact of green distribution measures (GNDT). This correlation is statistically significant at the 0.01 level (2-tailed).

Additionally, the correlation coefficient between PERF and RVLG is 0.450**, signifying a moderate positive relationship between Organizational Performance (PERF) and the impact of reverse logistics measures (RVLG). This correlation is statistically significant at the 0.01 level (2-tailed).

In essence the correlation analysis suggests significant positive relationships between Organizational Performance and the impact of green packaging, green distribution, green supplier selection, and reverse logistics measures. These findings provide valuable insights into

the interconnections between these variables, which can inform decision-making processes within the organization.

4.7 Regression

4.7.1 Model Summary

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.705 ^a	.497	.474	.33722
a. Predictors: (Constant), RVLG, GNSS, GNPk, GNDT				

The regression analysis results indicate that the model has some explanatory power for the dependent variable, as shown by an R-square value of 0.497. The R-square value means that approximately 49.7% of the variance in the dependent variable (Sustainability Performance) can be explained by the independent variables (Reverse Logistics, Green Supplier Selection, Green Packaging, and Green Distribution measures) included in the model.

The adjusted R-square value, which takes into account the number of predictors in the model, is 0.474. This adjusted value is slightly lower than the R-square value, suggesting that the inclusion of predictors in the model may have slightly reduced its explanatory power.

The standard error of the estimate, reflecting the typical difference between observed and predicted values of the dependent variable, is 0.33722, signifying prediction accuracy.

The regression model demonstrates a moderate level of explanatory power, suggesting that the included predictors (Reverse Logistics, Green Supplier Selection, Green Packaging, and Green Distribution measures) collectively have a meaningful impact on sustainability performance. However, additional factors not included in the model may also influence sustainability performance.

4.7.2 Anova

The ANOVA table provides information about the overall significance of the regression model in predicting the dependent variable, which in this case is Sustainability Performance (PERF).

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	9.989	4	2.497	21.960	.000 ^b
	Residual	10.121	89	.114		
	Total	20.109	93			

a. Dependent Variable: PERF

b. Predictors: (Constant), RVLG, GNSS, GNPk, GNDT

The regression model proves statistically significant with an F-statistic of 21.960 and p-value < .000, indicating substantial explanation of variance in sustainability performance. The Regression sum of squares is 9.989, with 4 degrees of freedom and a mean square of 2.497, signifying predictor variance. Residual sum of squares is 10.121, with 89 df and a mean square of 0.114, denoting unexplained variance. Total sum of squares is 20.109, with 93 df, representing overall variance in the dependent variable. ANOVA confirms the regression model's predictive ability, incorporating Reverse Logistics, Green Supplier Selection, Green Packaging, and Green Distribution predictors.

4.7.3 Coefficients

The research employed standardized beta coefficients to adjust for sampling errors. Each standardized beta coefficient quantifies the impact of each green procurement dimension (independent variable) on sustainability performance (dependent variable), with larger absolute values indicating a stronger effect. The table below illustrates the outcomes of the multivariate regression, showcasing the beta coefficients for the five independent variables along with the control variable.

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.135	.315		3.602	.001
	GNPK	.232	.095	.229	2.445	.016
	GNDT	.030	.089	.041	.341	.734
	GNSS	.328	.085	.458	3.852	.000

RVLG	.213	.076	.252	2.802	.006
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The results indicate that GNPK (Green Packaging), GNSS (Green Supplier Selection), and RVLG (Reverse Logistics) have statistically significant impacts on the performance of engineering firms, as their p-values are less than 0.05. Specifically, GNPK has a positive and statistically significant effect ($\beta=0.229$, $t=2.445$, $p=0.016$), indicating that for every unit increase in green packaging measures, there is a predicted increase of 0.229 standard units in the sustainability performance of mining firms.

Similarly, GNSS demonstrates a positive and statistically significant effect ($\beta=0.458$, $t=3.852$, $p=0.000$), implying that for every unit increase in green supplier selection measures, there is a predicted increase of 0.458 standard units in sustainability performance.

Additionally, RVLG shows a positive and statistically significant effect ($\beta=0.252$, $t=2.802$, $p=0.006$), suggesting that for every unit increase in reverse logistics measures, there is a predicted increase of 0.252 standard units in performance.

Conversely, GNDT (Green Distribution) does not have a statistically significant impact on performance, as its p-value is greater than 0.05 ($\beta=0.041$, $t=0.341$, $p=0.734>0.05$).

4.7.4 Hypotheses Test

Hypothesis	Results	STATUS
H₁ Green packaging on the sustainability performance of the mining industry in Zimbabwe	($\beta=0.229$, $t=2.445$, $p=0.016<0.05$),	ACCEPTED
H₂ Green distribution has an influence on sustainability performance of the mining industry in Zimbabwe	($\beta=0.041$, $t=0.341$, $p=0.734>0.05$)	REJECTED
H₃ Green supplier selection has an effect on sustainability performance of the mining industry in Zimbabwe	($\beta=0.458$, $t=3.852$, $p=0.000<0.05$),	ACCEPTED

H₄ Reverse logistics has an impact on sustainability performance of the mining industry in Zimbabwe	($\beta=0.252$, $t=2.802$, $p=0.006<0.05$),	ACCEPTED

4.8 Discussion

The results of the regression analysis suggest that green packaging (GNPK), green supplier selection (GNSS), and reverse logistics (RVLG) have significant positive effects on the sustainability performance of engineering firms, aligning with previous literature findings.

The positive and statistically significant effect of GNPK ($\beta=0.229$, $p=0.016$) on sustainability performance indicates that investing in environmentally friendly packaging practices can lead to improved sustainability outcomes for mining firms. This finding corroborates existing research that emphasises the importance of green packaging in reducing environmental impact and enhancing overall sustainability performance (Li et al., 2020). Literature indicates that green packaging plays a pivotal role in determining product market value (Lisa, 2018), crucial in competitive global markets (Guo et al., 2020). Lisa (2018) found a positive correlation between green packaging and manufacturing firm sustainability ($r=0.668$, $p < 0.05$), explaining 75.9% of performance variability. Liu and Zhu (2019) highlight green packaging's evolution from a mere protective function to a key influencer of product development and firm competitiveness in China.

Similarly, the significant positive effect of GNSS ($\beta=0.458$, $p=0.000$) underscores the importance of selecting green suppliers to enhance sustainability performance. This finding is consistent with prior studies highlighting the positive impact of green supplier selection on environmental responsibility and sustainability performance within the mining industry (Sarkis et al., 2017; Zhu et al., 2019).

Hussein and Shale (2014) investigated sustainable procurement's impact on organizational performance using Unilever Kenya as a case study. They emphasized the critical role of dedicated suppliers in enhancing organizational productivity by prioritizing consumer and environmental safety, highlighting green supplier selection's positive relationship with organizational performance ($r=0.888$, $p=0.000<0.05$). Similarly, Pun (2013) emphasized green

supplier selection's pivotal role in driving organizational success, noting its highest t-value of 6.874 among determinants of environmentally responsible operations.

Furthermore, the significant positive effect of RVLG ($\beta=0.252$, $p=0.006$) indicates that implementing reverse logistics practices can contribute to improved sustainability performance. This finding is supported by literature emphasizing the role of reverse logistics in waste reduction, resource conservation, and overall environmental sustainability (Kumar et al., 2018; Liu et al., 2021). Wanjohi (2016) emphasized the importance of reverse logistics practices, such as remanufacturing and recycling, in addressing environmental degradation. These practices were found to enhance environmental integrity and organizational performance. Odhiambo (2008) also highlighted the significance of reverse logistics, particularly in product remanufacturing, for organizational success and environmental sustainability.

However, the non-significant effect of green distribution (GNDT) on sustainability performance ($\beta=0.041$, $p=0.734$) suggests that green distribution practices may not have a direct impact on sustainability outcomes for mining firms. This finding contrasts with some prior research that has highlighted the importance of green distribution in reducing carbon emissions and enhancing environmental sustainability (Huang et al., 2019). Mwaura's (2016) study on "Green Distribution Practices and Competitiveness of Food Manufacturing Firms in Kenya" highlighted the vital role of green distribution in enhancing firms' competitiveness and profitability. Ninlawan (2010) revealed that embracing green distribution practices can lead to improved organisational performance and lower transportation costs, aligning with principles of environmental safety.

In conclusion, the results of this study provide valuable insights into the relationship between green practices and sustainability performance in the mining industry, reaffirming the significance of green packaging, green supplier selection, and reverse logistics in driving sustainability initiatives within engineering firms.

4.9 Chapter Summary

This chapter thoroughly presented, analysed and discussed data concerning the impact of green procurement on the sustainability performance of Zimbabwe's mining sector. It began by reporting the survey response rate and conducting a descriptive evaluation of demographic data. Both descriptive and inferential statistical analyses were performed, guided by the study's

objectives, determining the subtopics for analysis. Finally, findings were discussed in relation to literature reviewed in Chapter 2 to confirm or challenge results, effectively addressing the research question and hypotheses.

5 CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter aims to summarize the findings, draw conclusions, and offer recommendations to conclude the study. It will synthesize the findings discussed in the preceding chapters along with relevant literature. Conclusions will be derived from the study's findings and applicable to Zimbabwe's mining sector. Recommendations will stem from these conclusions, and the chapter will conclude with suggestions for future research directions.

5.2 Summary of findings

The research aimed to explore how green procurement affects the sustainability performance of Zimbabwe's mining sector. It pursued four objectives: assessing the impact of green packaging, examining green distribution's influence, evaluating the effects of green supplier selection, and analyzing the impact of reverse logistics. The study drew upon theories of classical conditioning, resource-based theory, institutional theory, and stakeholder theory. Employing a quantitative methodology, it conducted descriptive and inferential analysis, including correlation and regression analysis using SPSS 26.

The study found that green packaging significantly impacts sustainability performance ($\beta=0.229$, $p=0.016$). This was supported by literature by Lisa (2018) highlights its role in determining product market value, crucial in competitive global markets, and Guo et al. (2020) emphasised its importance for product success.

The study further found that green supplier selection positively influences sustainability performance ($\beta=0.458$, $p=0.000$). Studies by Sarkis et al. (2017) and Zhu et al. (2019) support the positive impact of green supplier selection on environmental responsibility and sustainability performance within the mining industry.

It was also found that reverse logistics significantly impacts sustainability performance ($\beta=0.252$, $p=0.006$). Research by Kumar et al. (2018) and Liu et al. (2021) highlights its role in waste reduction, resource conservation, and overall environmental sustainability.

The study however found that green distribution does not significantly affect sustainability performance ($\beta=0.041$, $p=0.734$). This was contrary to Mwaura (2016) who emphasised the role of green distribution in enhancing firms' competitiveness, but this variable does not directly influence sustainability outcomes for mining firms.

5.3 Conclusions

Based on the findings of the study the following conclusions are made;

The study demonstrates that green packaging, green supplier selection, and reverse logistics significantly impact sustainability performance within the mining sector in Zimbabwe. These findings align with existing literature, highlighting the importance of environmentally conscious practices in enhancing sustainability outcomes. Specifically, green packaging practices play a crucial role in determining product market value, while green supplier selection contributes to environmental responsibility and sustainability performance.

The study concludes that green supplier selection has an impact on sustainability performance within the mining sector in Zimbabwe. These findings underscore the importance of prioritising green supplier selection strategies to promote sustainability and environmental stewardship in Zimbabwe's mining sector.

Additionally, the study concludes that the adoption of reverse logistics leads to waste reduction and resource conservation, further enhancing overall environmental sustainability in the mining sector in Zimbabwe.

However, the study concluded that green distribution does not directly influence sustainability outcomes for mining firms, contrary to previous research emphasizing its role in enhancing competitiveness. These conclusions underscore the importance of implementing targeted green practices to promote sustainability within the mining sector in Zimbabwe.

5.4 Recommendations

Based on the findings of the study, several recommendations can be prescribed for the Government, Ministry of Mines, and mining sector management and practitioners:

1. Government Policies and Regulations

- The Government should enact policies and regulations that incentivize and promote the adoption of green packaging, green supplier selection, and reverse

logistics practices within the mining sector. This can include tax breaks, subsidies, or preferential treatment for companies implementing environmentally conscious practices.

- Establish stringent environmental standards and regulations for mining operations, mandating the adoption of sustainable practices throughout the supply chain.

2. Ministry of Mines Initiatives

- The Ministry of Mines should collaborate with industry stakeholders to develop guidelines and best practices for implementing green packaging, green supplier selection, and reverse logistics in mining operations.
- Provide training and capacity-building programs for mining professionals on the importance and implementation of sustainable practices.

3. Management and Practice in Mining Sector

- Mining companies should integrate green procurement principles into their procurement policies and practices, giving preference to suppliers with strong environmental credentials and sustainability initiatives.
- Invest in infrastructure and technology to support the implementation of reverse logistics practices, such as recycling facilities and waste management systems.
- Conduct regular audits and assessments of environmental performance to monitor and improve sustainability practices.
- Encourage a culture of sustainability within mining companies by promoting awareness, education, and employee engagement initiatives.
- Collaborate with local communities and stakeholders to mitigate environmental impacts and promote sustainable development practices.

5.5 Suggested Areas of further Study

- Conduct a longitudinal study to assess the long-term effects of implementing green packaging, green supplier selection, and reverse logistics practices in the mining sector.
- Compare the sustainability performance of mining operations that have adopted green practices with those that have not. This comparative study could explore the differences in environmental impact, resource utilisation, and financial performance between green and non-green mining operations to provide insights into the effectiveness of sustainable practices.
- Conduct a comprehensive survey or interviews with various stakeholders in the mining sector, including government officials, mining company executives, local communities, and environmental activists, to understand their perceptions and attitudes towards green initiatives. This study could provide valuable insights into the barriers, motivators, and challenges associated with implementing sustainability practices in the mining industry.

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APPENDIX I: QUESTIONNAIRE

My name is Leenah and I am a postgraduate student at Bindura University of Science Education carrying out a survey entitled “*The Influence Of Green Procurement On The Sustainability Performance Of The Mining Sector In Zimbabwe: A Case Of Rio Zim*” in partial fulfilment of the Master of Science Degree in Purchasing and Supply Chain Management. May you please answer the following questions voluntarily. Please note that your responses will be used solely for academic purposes and will be kept confidential. All data collected will be kept anonymous.

Please answer the following questions honestly and to the best of your ability.

The survey will take a few minutes

SECTION A: DEMOGRAPHIC INFORMATION (PLEASE TICK THE APPROPRIATE BOX)

1. Ownership		2: Years in Mining		3. Operations	
Government	☐	1-5 years	☐	Extraction& Exploration	☐
Private	☐	6-10 years	☐		☐
Conglomerate	☐	11-15 years	☐	Beneficiation& Value Addition	☐
	☐	16+ years	☐	Transport &Logistics	☐
	☐		☐	Waste Management	☐
	☐		☐		☐

SECTION B

Kindly indicate the extent to which you agree with the following statements, by ticking the appropriate box.

1=Strongly Disagree (SD), 2=Disagree (D), 3=Neutral (N), 4=Agree (A) and 5=Strongly Agree (SA).

No.	Construct	Rating				
A	The impact of green packaging on the sustainability performance of the mining industry in Zimbabwe	1	2	3	4	5
1	Green packaging practices contribute significantly to reducing environmental impact in the mining sector.					
2	The implementation of green packaging initiatives positively affects the overall sustainability performance of mining operations.					
3	Stakeholders perceive green packaging as essential for promoting environmental responsibility within the mining industry.					
4	Green packaging solutions enhance the reputation and credibility of mining companies in terms of sustainability practices.					
5	The adoption of green packaging strategies leads to measurable improvements in resource conservation and waste reduction within the mining sector.					

B	The influence of green distribution on the sustainability performance of the mining industry in Zimbabwe.	1	2	3	4	5
6	Green distribution methods contribute to minimizing carbon emissions and environmental footprint in mining operations.					
7	The implementation of green distribution practices enhances the efficiency and effectiveness of logistics operations in the mining sector.					
8	Stakeholders recognize the importance of green distribution in promoting environmental sustainability within the mining industry.					
9	Green distribution initiatives positively impact the reputation and brand image of mining companies in terms of sustainability efforts.					
10	Adopting green distribution strategies leads to tangible improvements in resource efficiency and environmental conservation within the mining sector.					
C	The effects of green supplier selection on the sustainability performance of the mining industry in Zimbabwe.	1	2	3	4	5
11	Green supplier selection criteria contribute significantly to enhancing environmental sustainability practices within the mining industry.					
12	Companies that prioritize green supplier selection demonstrate improved sustainability performance in their operations.					
13	Stakeholders acknowledge the crucial role of green supplier selection in promoting sustainable practices within the mining sector.					
14	Green supplier selection initiatives positively influence the reputation and trustworthiness of mining companies in terms of sustainability.					
15	Adopting green supplier selection strategies leads to measurable improvements in environmental impact and resource management within the mining sector.					
D	The impact of reverse logistics on the sustainability performance of the mining industry in Zimbabwe	1	2	3	4	5
16	Reverse logistics practices contribute significantly to reducing waste and promoting recycling initiatives within the mining sector.					
17	Companies that prioritize reverse logistics demonstrate improved sustainability performance and resource efficiency in their operations.					
18	Stakeholders recognize the importance of reverse logistics in promoting environmental sustainability within the mining industry.					
19	Reverse logistics initiatives positively influence the reputation and credibility of mining companies in terms of sustainability efforts.					

20	Adopting reverse logistics strategies leads to tangible improvements in waste management and environmental conservation within the mining sector.					
E	Sustainability Performance	1	2	3	4	5
21	Sustainability initiatives positively impact the overall performance of our organisation					
22	Our organization manages its environmental impact and resource usage					
23	Our organization improved its sustainability practices over the past year					
24	Sustainability is in shaping the reputation and image of our organization					
25	Our organization is meeting its social and environmental responsibilities					

Thank you for your time