KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY, KUMASI

Green Procurement and Logistics in Mining Firms in Ghana"

by

Bright Yao Agodzo

A thesis submitted to the Institute of Distance Learning, Kwame Nkrumah University of Science and Technology, in partial fulfilment of the requirements for the award of the degree of

MASTER OF SCIENCE IN PROCUREMENT AND SUPPLY CHAIN MANAGEMENT

I

INSTITUTE OF DISTANCE LEARNING, KNUST

Supervised by:

Dr. Listowell Appiah

July, 2023

DECLARATION

I hereby declare that this submission is the result of our work towards MSC Procurement and supply chain management degree, and to the best of my knowledge, it contains no material previously published by another person, nor material which has been accepted for the award of any other degree of the University, except where due acknowledgement has been made in the text

Bright Yao Agodzo	……..	**…….**
PG9445421	Signature	Date

Certified by:

Dr. Listowell Appiah	……	**…….**
(Supervisor)	Signature	Date

Certified by:

……	……..	……
HOD	Signature	Date

DEDICATION

To:

This thesis is dedicated to the Almighty for His infinite mercies and to my late dad.

I also dedicate this piece to my family.

ACKOWLEDGEMENT

Foremost acknowledgement to the Almighty for the strength and wisdom to pursue this nice piece. My sincerest acknowledgment goes to my able supervisor, DR. LISTOWELL APPIAH, for his constant and continuous support throughout the course of this dissertation. I also owe plenty of thanks to his devoted time and diverse help in making this research a reality. My special gratitude goes to all lecturers in making this program a success.

ABSTRACT

Sustainable procurement and logistics in the mining sector has not received much attention in developing countries. Slow progress has been made in implementing sustainable logistics and procurement in the mining industry. Studies indicated that sustainable procurement and logistics are not being well implemented to the much-expected level in either the private or public sectors, which is causing countries to fall behind in their efforts to achieve the sustainable development goals. It is based on this that this study explored the drivers of Green Procurement and Logistics in the Mining Sector. Among other things, the study explored the implementation challenges and strategic mechanisms to efficiently implement sustainable logistics practices into mining operations in Ghana. This qualitative investigation followed a logical chain of reasoning. To understand green procurement drivers and implementation strategies, primary data was sourced from the top hierarchy. The interview results indicated that some key drivers influence green procurement adoption in the mining sector. The drivers have been thermalized into three; climate commitment drivers, cost savings and top management support. The results further indicated that the cost implication of green procurement adoption was a key hurdle to its implementation. Although these costs are associated at the early stages, the cost of adoption is normally expected to drop significantly in the long run. The identified strategies to green procurement adoption maybe categorized in three dimensions; regulation, skills and competence development and incentives. A law on Green Procurement should be passed – and implemented. It is recommended that the long-term financial prospects of green procurement be critically evaluated. This will give management, clients and all actors the confidence and motivation to pursue green procurement. Without these financial gain evidence, green procurement becomes merely a concept.

Table of Contents

LIST OF TABLES

LIST OF FIGURES

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Sustainable procurement and logistics practices are becoming more important as the world becomes more global and industrialized. Sustainable procurement & logistics is the integrating of environmental considerations into inter-organizational procurement chain management activities. Due to the obvious increasing importance of sustainable development on a global scale, the concept of sustainable procurement and logistics has swiftly gained traction as a viable option (Björklund & Forslund, 2018). According to Kiwili & Ismail (2016), when businesses take into consideration the impact that sustainability has on efficiency and brand image, they not only contribute to social benefits that may lead to brand image, but they also realize various advantages in terms of revenue growth. Ghosh (2018) averred that it is indeed the responsibility of a company's procurement and logistics department to guarantee that procurement choices are made on the basis of ethical standards that maximize the benefits to society, fulfil the requirements of the community, and safeguard the company from reputational concerns (Kiwili & Ismail, 2016).

In the last decade, research on sustainable logistics and procurement methods has covered a wide spectrum, including procurement chain management (Helo & Ala-Harja, 2018; Fang et al., 2020) and manufacturing. Real-world applications may provide a wealth of relevant expertise and guidance. For instance, the inability to maintain a sustainable procurement is generally attributable to inefficient logistics practices in the downstream (Graham et al., 2018). This specifically refers to transport operation delays (Sanchez-Rodrigues et al., 2010), a lack of effective management of carbon footprints (Ghadge et al., 2019) and poor communication (Saberi, 2018). A

sustainable logistics management is an effective approach that may enhance the competitiveness, financial performance, and environmental performance of logistics businesses.

Ankrah et al. (2017) stated that Ghana began mining more than a decade ago. Our contemporaries in developed nations constructed their economy on the strength of mining revenues. Per the studies of Kansake et al. (2019) and Carvalho (2017), mining significantly leads to the preservation and expansion of developed and developing economies around the world by supplying raw materials, employment, revenue, and foreign currency. According to the International Council on Mining and Metals (ICMM, 2014), there are roughly 2.5 million individuals working in formal (licenced large-scale) mining across the world. Again, per McMahon and Moreira (2014), a large number of nations that are wealthy in resources, particularly those that are still developing, have seen significant socioeconomic progress as a result of the discovery and mining of important minerals. Peprah et al. (2016) expatiated that Ghana's mining sector is important to the country's growth. Mining has made a significant contribution to Ghana's GDP over the years. Oshokoya and Tetteh (2018) further elucidated that the mining industry contributed approximately ten percent of Ghana's GDP and thirty-seven percent of its export income. The mining sector contributed around 2% of Ghana's GDP in 2016 (WBG, 2018). According to the WBG (2018), Ghana's GDP increased by 9.3 percent in September 2017. This increase was due to the industry's continued robust growth rates, that were fueled through mining and petroleum. In Ghana, more than ten global mining enterprises are presently functioning. These companies are highly automated and use a wide range of technologies to improve operational effectiveness, safety, and production (Kansake et al., 2019).

1.2 Research Gaps

According to Abbasi and Nilsso (2016), sustainable development has been the driving force behind many green and sustainable logistics initiatives. These efforts aim to decrease the negative

consequences of freight transportation while simultaneously improving positive environmental and social feedbacks. There are various adverse consequences associated with road freight (Lindholm and Blinge, 2014). Pollution, traffic, accidents, noise, visual interference, infrastructure failure, and resource waste are some of these negative externalities. Road-based freight transportation systems include intra-city distribution and long-distance heavy-duty operations (Kaur and Singh, 2018; 2019). The performance of the corporate and regional procurement chains is further hampered by these negative effects and the limitations of the logistics system (Ren et al., 2020; Gholizadeh et al., 2020). Because of the explosive development in the demand for logistical services, the amount of damage is increasing at an exponential rate, which will ultimately have an irreparable effect on both the economy and the whole environment (Sayed et al., 2021). The growing concern for sustainability on the global market, as well as the loss of natural resources, has prompted CEOs to examine environmental procurement and logistics methods (Ghadimi et al., 2016; Muchaendepi et al., 2019). The environment has emerged as a major issue at all levels of the economy in recent years (Roman, 2017). Although sustainability concerns are viewed as a priority on a global scale for socioeconomic and environmental considerations, they are not fully incorporated into the procurement networks of developing countries.

According to Lysons and Farrington (2016), key beneficial variables to consider in the mining firms with regards to sustainable procurement include reducing pollution, energy consumption, waste, and making effective use of resources. Social repercussions include improved civil rights, ethical and transparent commerce, better workplace conditions, and strengthening local areas. Economic advantages include cost savings and reputation enhancement (UNEP, 2016). Due to rising costs associated with waste disposal, ecological deterioration, quality of life issues, global warming, depletion of natural resources, and pervasive world poverty, procurement chain

professionals are increasingly expected to participate to broader organizational sustainable growth objectives by incorporating social and environmental criteria into processes (Islam et al., 2017; Yu et al., 2020). Sustainable procurement and logistics management is founded on the pollution prevention concept, which aims to reduce threats to human health and the environment (Rane & Thakker, 2020).

In underdeveloped nations, the mining industry has not gotten much attention when it comes to sustainable procurement and logistics. Implementing sustainable logistics and procurement in the mining sector has progressed slowly (Muchaendepi et al., 2019). In developing countries such as Ghana, there exist a theoretical, evidential and knowledge gap with regards to green/sustainable logistics and procurement. Kiwili and Ismail (2016), for example, stated that sustainable procurement and logistics are not being implemented to the desired degree in either the private or governmental sectors, causing countries to fall behind in their attempts to meet the SDGs. According to studies, sustainable procurement and logistics are not being implemented to the desired degree in either the commercial or public sectors, causing countries to fall behind in their attempts to achieve the SDGs. Further, due to the fact that sustainable logistics and procurement is often conceived of as being beneficial to society and the environment, the advantages it offers to mining firms have not been thoroughly investigated (Ghosh, 2018). To implement green procurement practices in the mining sectors, the drivers are key considerations. A study by Rane and Thakker (2020) indicated that identifying areas to focus is a key way to successful implementation of Green Procurement practices. It is based on this that this new direction intends to explore the drivers of Green Procurement and Logistics in the Mining Sector. Among other things, the study would explore the implementation challenges and strategic mechanisms to efficiently implement sustainable logistics practices into mining operations in Ghana.

1.3 Research Objectives

The overarching goal of this research is to assess the drivers of sustainable logistics and procurement in mining firms in Ghana. However, the following goals have been established in order to achieve the aforementioned goal:

1. To appraise the state of green procurement implementation among mining firms in Ghana
2. To explore the drivers of green/sustainable procurement in Ghanaian mining firms
3. To assess the barriers to the implementation of green procurement and logistics in Ghanaian mining firms

1.4 Research Questions

1. What are the drivers of green procurement and logistics in Ghanaian mining firms
2. What are the implementation challenges towards the adoption of green logistics and procurement?
3. What strategies would aid the smooth implementation of green procurement in Ghanaian mining firms?

1.5 Contribution to Theory and Practice

The acquisition of raw materials, employment opportunities, revenue, and foreign currency are some of the key contributions that mining helps to sustain the growth and stability of both domestic and international industries. Sustainable procurement and logistics have economic, social and environmental impact mining firms (UNEP, 2016) such as cost, energy savings, CSR and eco-friendliness. Integrating sustainable practices would therefore go a long way to improve the performance of mining firms in Ghana. Implementing sustainable practices are usually met with

challenges such as corporate structure hence, strategic mechanisms need to be put in place to ensure their smooth integration. This study would provide cogent recommendations and strategies to implement these practices. Further, the study would contribute to the pool of knowledge on the discourse of sustainability at the mining sector.

1.6 Supporting Theory

This study would be underpinned by the stakeholder theory. According to Freeman et al. (2020), the stakeholder theory's main idea was not just a narrow scientific effort to discover the underlying causes of why one firm outperformed another. Rather, it was the explicitly normative concept of assisting decision makers in making better decisions. Despite the fact that the stakeholder theory has been used to guide both public policy and business decisions, there is no agreement on its general applicability. Some argue that stakeholder theory has addressed the majority of its critical issues and that it can, is, and should be used to inform business decisions (Barney and Harrison, 2020). The real issue is not shareholder versus stakeholder, but a narrow/reductionist versus broad/holistic perspective on business (Freeman et al., 2020). It is on this basis that this study adopts the stakeholder theory to assess the impact of management decisions on sustainable and logistics practices on the performance of mining firms in Ghana.

1.7 Proposed Research Model/Conceptual Framework

This section explains the study's proposed conceptual framework. Each variable, concept and theory are interconnected in this section to make sense of the study. A variety of possible relationships between dependent variables and independent variables are explored (Simon & Senaji, 2016). As identified in literature, sustainable procurement and logistics have economic, social and environmental impact mining firms (UNEP, 2016) such as cost, energy savings, CSR

and eco-friendliness. Again, not adopting sustainable procurement together with the logistics system's shortcomings (Ren et al., 2020), further contribute to a reduction in corporate and regional procurement chain performance. Based on these premises, a framework is designed below. The framework therefore depicts the relation between sustainable procurement and logistics practices on the performance of mining firms in Ghana. The relationships between the variables are presented below information is presented below.

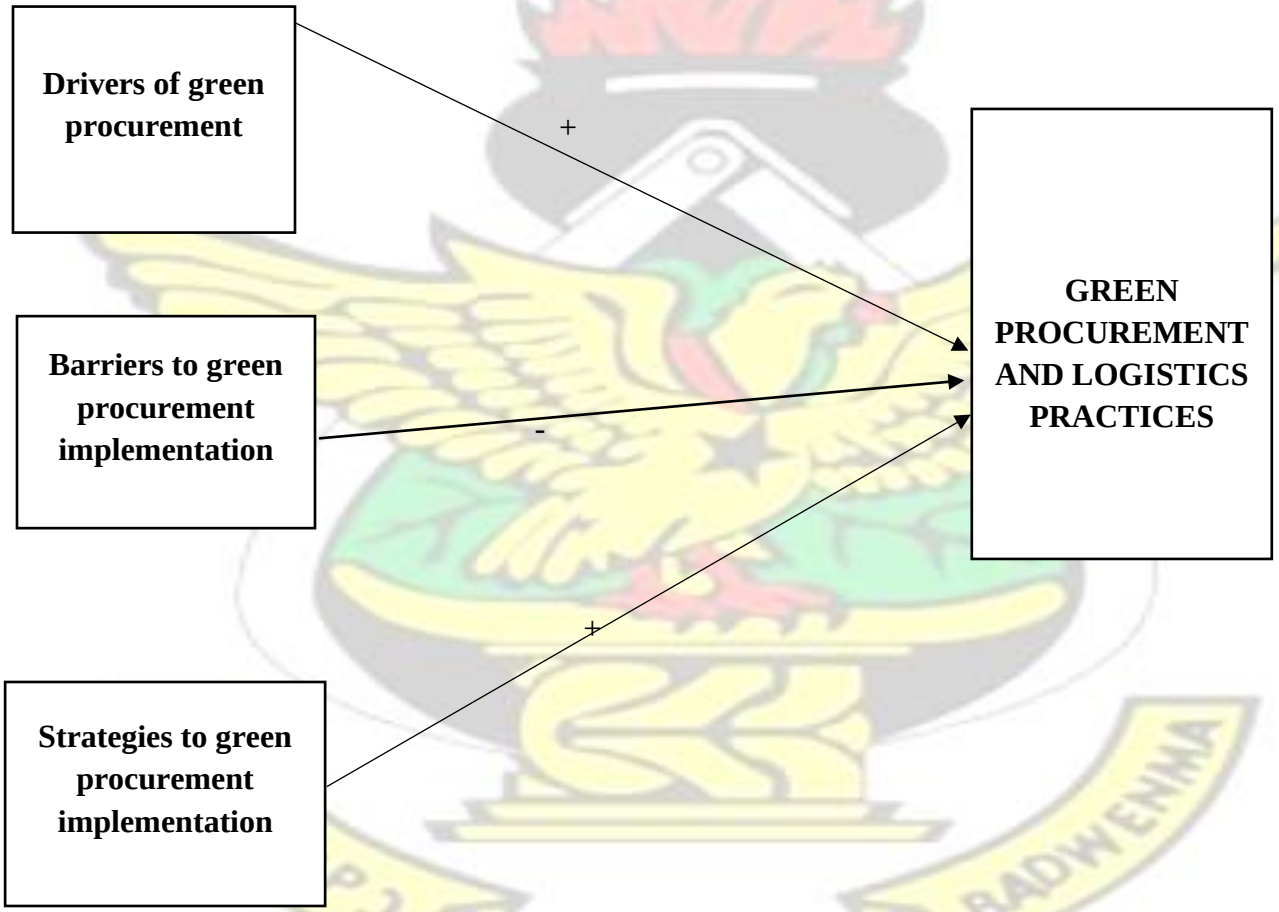

Figure 1: Conceptual framework (Authors Construct, 2022)

1.8 Proposed Research Methodology

The process by which an investigator selects a system of analysis is known as research design (Creswell and Plano, 2011). This study employs a survey design and a quantitative research strategy. To test existing theories with regards to sustainable procurement practices, the deductive research approach could be adopted. The population, according to Saunders et al. (2007), refers to the entire set of cases from which a sample is drawn. The population of the study will comprise respondents from the 16 listed major mining firms by the Minerals Commission (2022). Close-ended questionnaires would be used to source data from top and middle level management. Managers, procurement officers and financial accountants shall form the unit of analysis. The formulae method would be employed to calculate a suitable sample for the study due to the fact that there is not much information on the total population in the frame. The responses would be converted into quantitative data using a 5-point Likert scale. Data gathered would be analyzed using Statistical Package for Social Sciences (SPSS) version 26 software. Inferential tools such as confirmatory factor analyses, inter-item correlation and one sample t test would be employed in analyzing the specific objectives of the study. To determine the effect of sustainable procurement and logistics practices on mining firms' performance, a linear regression analysis would be conducted.

1.9 Organization of Study

The thesis is divided into the following five (5) separate yet related chapters. The first chapter will include a brief overview of the whole study, including its background, problem statement, research question, purpose and objectives, and relevance. The literature review is given in Chapter 2. The section presents literature that was based on information from other reputable researchers, identified the gaps in the literature that the research attempted to address, and also arrived at

conclusions regarding what had been learned with regard to the study's subject. The study methodologies are also thoroughly summarized in Chapter 3. The research design for the study is also described. Chapter 4 presents a thorough analysis, presentation, and interpretation of the results of all the data acquired for the study in relation to the research. The fifth chapter would cover the conclusion and recommendations.

CHAPTER TWO

LITERATURE REVIEW

2.0 INTRODUCTION

This chapter provides a comprehensive overview of relevant research on green procurement and logistic drivers in Ghanaian mining firms. A review of concepts, a review of hypotheses, and empirical data make up the four sections of this chapter. The conceptual review gives an overview of key terms in the study. Sustainability, Green procurement, mining overview are the key concepts reviewed under this section. The theoretical review presents literature of key theories supporting this study. The empirical review perused findings from related studies. In order to get an in-depth comprehension of sustainable procurement, a number of books, papers, and other publications were read and examined. In addition, the websites of a variety of businesses that engage in sustainable procurement, as well as the websites of a variety of international organizations, were visited in order to get knowledge regarding the most current advancements that have been made in this area.

2.1 CONCEPTUAL REVIEW

2.1 1. The Sustainability Concept

According to Bengtsson et al. (2018), sustainable development is defined as a development operation that improves the well-being of current generations in a way that can be sustained or maintained over time while not jeopardizing the conditions and resources needed for continued future development. In other words, sustainable development is development that improves the well-being of current generations in a way that can be sustained or maintained over time. Following a number of discussions, the United Nations came to the conclusion that economic expansion and

the protection of the environment could not be split apart, and that the two had the capacity to mutually reinforce one another. It is anticipated that increased economic growth would lead to improvements in both living and working circumstances, as well as an increase in investments in environmentally friendly and economically viable technology (Gratzer and Keeton, 2017). At the same time, any attempt to improve human well-being that endangered the environment was doomed to fail in the long run. This is due to the fact that resource depletion, environmental degradation, and pollution of air and water, for example, would have an influence on the well-being and growth potential of future generations (Dolter and Victor, 2017). When people talk about "sustainability," they frequently mean satisfying the needs of the present generation without sacrificing the capacity of future generations to do the same. This is a critical understanding (Linton et al., 2007; Giminez and Tachizawa, 2012). This concept was first suggested by the World Commission on Environment and Development in 1987 (WCED, 1987). The maximisation of earnings is no longer the driving force behind the continued functioning of the vast majority of businesses.

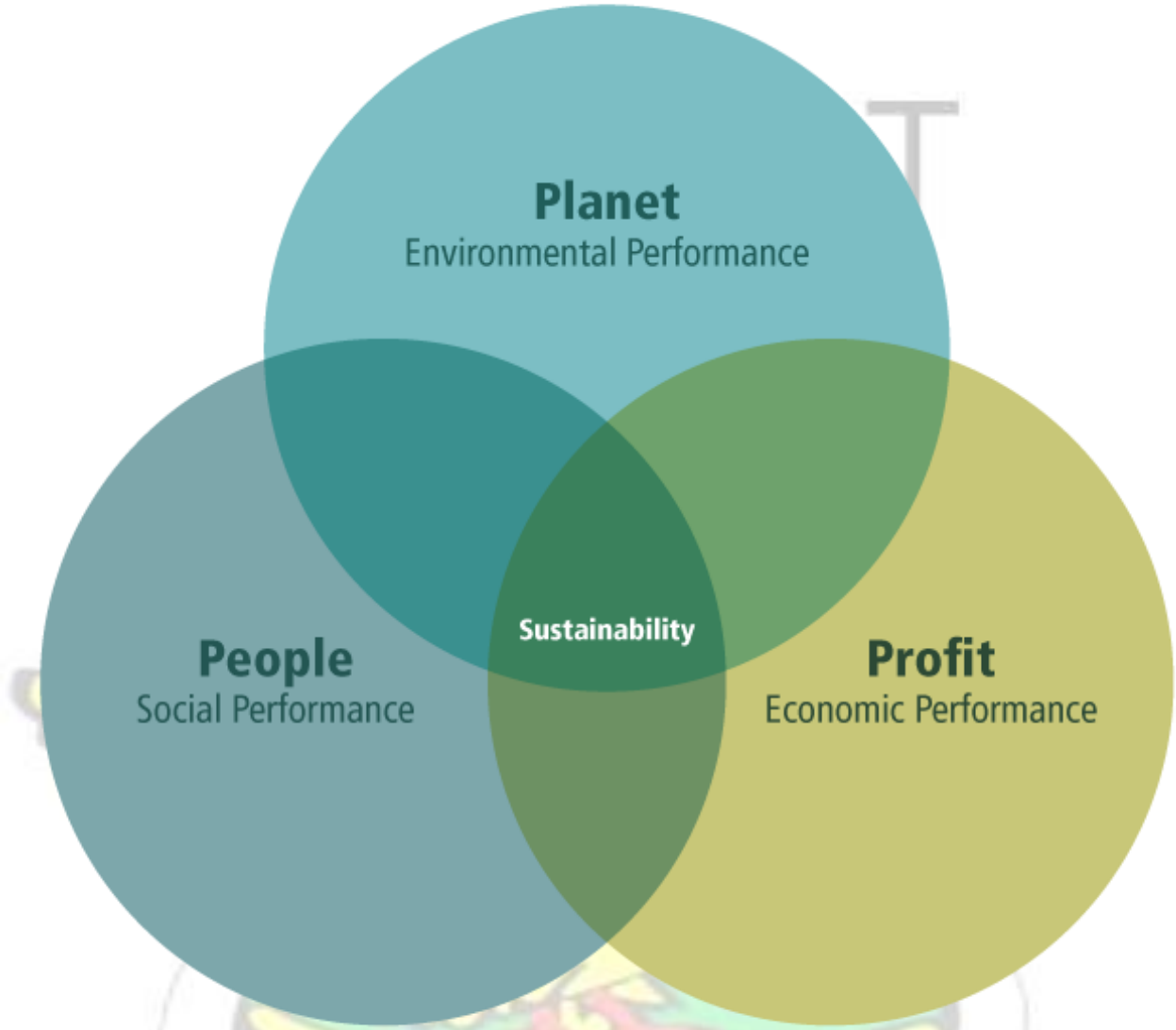

Figure 2: Sustainability dimensions (American University of Sharjah, 2022)

On the other hand, the vast majority of them are highly worried about the effect that their actions will have on the so-called "triple bottom line," which is made up of three components: people, planet, and profit. When applied to the notion of sustainability, the term People refers to the impact of a company's daily activities on the level of life enjoyed by the general population. The term

profit refers to the financial return that a business experiences as a direct result of the investments that it makes in order to carry out its operations (Heizer et al., 2017).

2.1.2 Green/Sustainable Procurement and Logistics

Organizations buy raw materials, components, commodities, services, and other resources through purchasing, also known as procurement (Chopra et al., 2021). Price, quality, and delivery time are given the utmost importance in conventional procurement. In addition to the three conventional criteria, green procurement (GP), also known as environmentally responsible purchasing, takes into account environmental factors (Yook et al., 2017) that may have an impact on the choices that are made regarding supply management. Min and Galle (2001) describe green procurement as an environmentally conscious buying practise that decreases waste sources and encourages recycling and reuse of acquired resources without losing performance standards of such things.

Green procurement (GP) is an ecologically conscious purchasing strategy that fosters recycling and resource reclamation without sacrificing the performance criteria of such products (Min and Galle, 2001). Recently, GP has attracted more scholarly and commercial interest. This is mostly done to combat climate change and global warming while also preserving our quickly depleting natural resources. To halt environmental harm, green procurement begins with ecologically friendly sourcing (Chin et al., 2015). Green procurement is a series of activities taken to ensure that the items or raw materials purchased do not harm the environment. They include recycling, substituting raw materials, and reducing resource waste. Furthermore, according to Min and Galle (2001), "green procurement" refers to a number of actions taken to guarantee that the goods or raw materials purchased have no adverse environmental effects. In the same vain, green procurement has the potential to improve the efficiency of resource consumption and operation, hence improving firm financial performance. This would be accomplished by lowering the cost of energy

input, reducing pollutants, and removing the need for clean-up. Green procurement promotes efficiency while lowering pollution levels by addressing issues such as waste management, carbon footprints, energy management, packaging and transportation, and so forth. The majority of industries involved in assembly or comparable processes will hold suppliers accountable for the majority of the environmental impact (Sinha Neena and Garg, 2016). In an effort to address the rising demands of sustainability, many businesses are creating policies and practises that transcend their own boundaries (Meehan and Bryde 2011). According to Ghadimi et al. (2016), recent years have seen an increase in the procurement sector's emphasis on sustainability alongside more traditional metrics like price, lead time, adaptability, and risk. Supplier selection plays a crucial role in ensuring that a company's strategic goals are met, especially in light of the current emphasis on outsourcing and environmental responsibility. Genovese et al. (2014) proffered that academics and professionals alike have only recently prioritised sustainable procurement. Growing public concern for environmental and social concerns has prompted many businesses to adopt more eco-friendly policies. To identify products and services that are both economical and ecologically sustainable, procurement specialists are tasked (Sarkis and Zhu 2018). Shaik and Abdul-Kader (2011) further stated that the procurement process must adhere to all relevant laws and standards as well as all applicable regulations. During procurement, buyer-supplier interactions and supplier selection procedures are seen as crucial to maintaining a competitive edge (Ghadge et al. 2017).

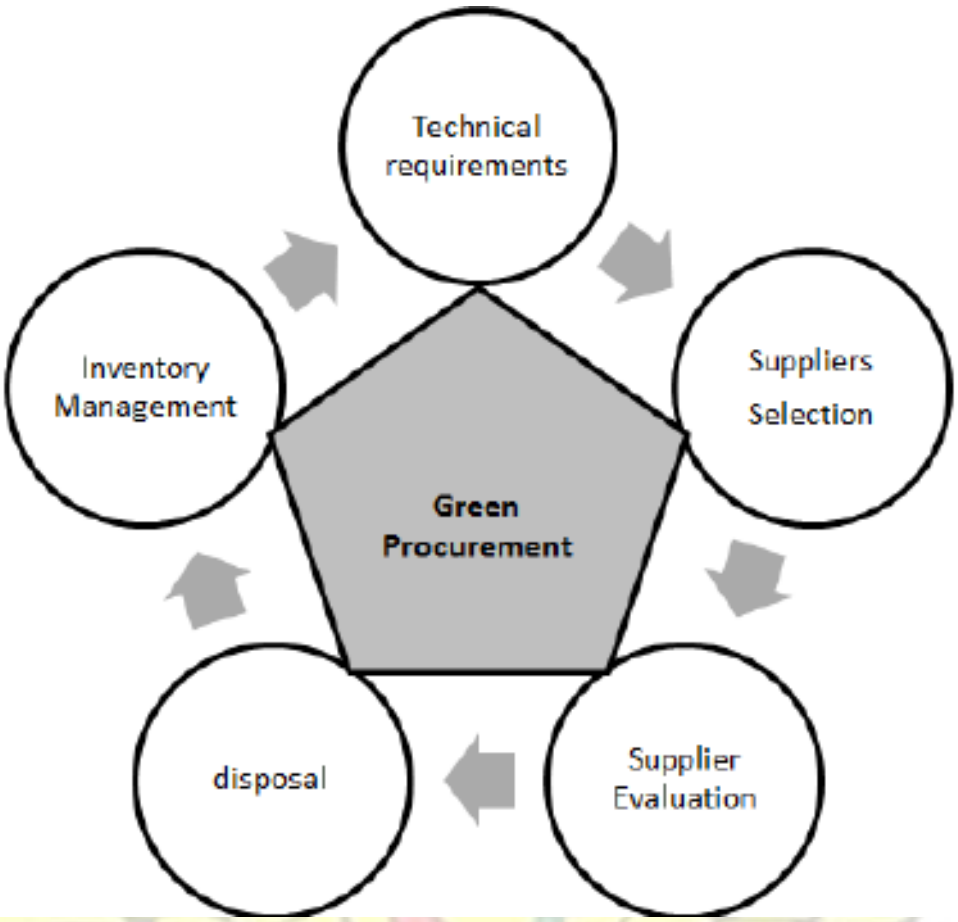

Figure 3: Green procurement process (Authors construct)

Companies have been compelled to integrate environmentally responsible business practises into their supply chain networks as a result of the ever-increasing pressure put on finite resources as well as the significant environmental concerns (Ghadge et al., 2018). Various stakeholders, such as regulators, end customers, and non-governmental organisations (NGOs), put additional pressure on sustainable business practises (Foerstl et al. 2015). Businesses have been forced to develop procurement-related rules and procedures in response to the increasing pressure. The most important internal element that motivates companies to participate in sustainable procurement efforts is the potential for cost savings via the implementation of environmentally friendly procedures (Walker et al. 2012).

By reusing existing assets, environmentally responsible purchasing results in decreased operating costs (Erkul et al., 2015). Per Giunipero et al. (2012), the highest level of management's endorsement of cutting-edge technology and environmentally conscious innovation is the single most important factor in sustainable purchasing. Environmental management and pollution control systems require strong executive support (Walker et al., 2012). Concerns with environmental procurement include climate change, waste management, and resource depletion (Walker et al., 2008). Investment costs are a barrier to adopting environmentally responsible and sustainable purchases (Giunipero et al., 2012).Upgrades to equipment that use less energy and better remanufacturing procedures both require significant investments, which are difficult for smaller businesses to handle (Vachon and Klassen 2006). A further barrier that has been brought to people's attention is the regulatory authorities' failure to establish clear standards and adequate legislation (Sarkis and Dhavale, 2015). The effective implementation of sustainable procurement methods could not be accomplished by a single organisation, but rather by the entire supply chain network (Zhu et al., 2008).

2.1.3 Mining in Ghana

With more than 90% of the sector's revenue coming from gold production, the mining industry has long been an important part of Ghana's economy. According to Peprah et al. (2016), Ghana produces the second-most gold in Africa and the ninth-most gold globally. According to Amponsah-Tawiah and Dartey-Baah (2011), the mining sector in Ghana continues to play an important role in the country's overall economic growth. Mining has, during the course of Ghana's history, made a considerable contribution to the country's GDP. The mining industry was responsible for 9.8% of Ghana's GDP and 37% of the country's total export revenues (Oshokoya and Tetteh, 2018).

In 2016, the mining industry was responsible for around 2% of Ghana's GDP (World Bank Group, 2018). The World Bank Group (2018) estimated that the GDP of Ghana increased by 9.3% in September of 2017, which was the most recent month for which data is available. This development was due to the sector as a whole continuing to see strong levels of growth, which was driven by the mining and petroleum industries. Ghana is home to more than 10 large-scale mining operations that are run by multinational corporations at the present time. These businesses are highly mechanised and employ a variety of technologies to improve the efficacy, safety, and productivity of their operations. The mining sector provides a wide range of necessary raw materials, including aluminium cans and the electronic chips found in computers and mobile devices (Carvalho, 2017). Over the centuries, there was a steady expansion in metal mining, punctuated by periodic rushes for a number of minerals (silver, gold, radium) that coincided with spikes in demand. Till recently, mining operations typically consisted of the following steps: securing a permit, digging a pit, extracting the metal, and leaving after the deposit was depleted to begin operations elsewhere (Jain et al. 2016). As may be expected, mining is one human activity that has far-reaching effects on the environment and society. According to Kusi-Sarpong et al. (2014), the mining sector has made an effort to go outside of its organisational borders in order to make the operations and supply chain designs more environmentally and socially responsible. This project was started with the goal of making things more sustainable. Green purchasing has become more popular recently because it is thought that it could help reduce the negative effects of mining while also giving mining businesses a competitive edge (Rozar et al., 2013). This idea comes from the idea that "green procurement" might help to lessen the bad effects of mining. Green procurement will try to do what no single organisation can do: cut down on waste and environmental damage, improve customer satisfaction, and keep making money in a healthy way.

2.2 THEORITICAL REVIEW

2.2.1 Stakeholder theory

This study follows the stakeholder theory. Stakeholder theory is a popular sustainability theory, according to Carter and Easton (2011). Stakeholders are organisations and individuals who may effect corporate value and commerce (Freeman et al. 2010). The academic literature that addresses the topic of stakeholder relationship management makes reference to a number of different versions of stakeholder theory (Verbeke and Tung 2013). According to Horisch et al. (2014), there are a few different forms of stakeholder theory. These include the instrumental stakeholder theory, the descriptive stakeholder theory, the normative stakeholder theory, and the integrative stakeholder theory. Many people make the mistake of incorrectly criticizing Freeman's stakeholder theory (1994) on the grounds that it does not treat all of the stakeholders equally. This, on the other hand, is acceptable given that not all stakeholders are interested in the company to the same extent. Rather than making simple compromises in the sake of business and short-term benefits, the philosophy is centered on the concept of cultivating mutual interests while simultaneously producing value for all parties concerned.

Implementing green procurement in the mining sector requires several stakeholders' involvement. This is the premise for underpinning the work to it. Dealing with trade-offs and making concessions is an unavoidable aspect of running a company, and this is especially true when considering sustainability. This is important to keep in mind while determining how much weight to give to sustainable issues and making sacrifices in order to reduce carbon emissions and increase profits. Stakeholder theory postulates that social and environmental factors should not take precedence over immediate financial gains (Freeman et al., 2010). Considerations of business ethics, the environment, and society are vital to the interests of corporate stakeholders and should

not be separated (Loorbach and Wijsman 2013). Extensive academic literature reaffirms that profits are not in conflict with environmental and social considerations, but rather that they collaborate to create viable long-term solutions that take into account all stakeholders, thereby satisfying the requirements for sustainability (Ghadge et al., 2018).

Stakeholder theory is based on the premise that the most essential contribution it can make is to ensure that stakeholders' expectations are satisfied while simultaneously attempting to generate value for all parties concerned. The level of engagement of stakeholders, according to stakeholder theory, would vary depending on the complexity of the supply chain network. The stakeholder idea would serve as the foundation for this investigation. According to Freeman et al. (2020), the primary concept behind the stakeholder theory was not merely a limited scientific attempt to find the underlying causes of why one company outperformed another. Rather, the core idea of the stakeholder theory was more expansive than that. It was rather the clearly normative concept of supporting decision makers in the process of making better decisions that was at issue here. In spite of the fact that the stakeholder theory has been utilised to influence decisions about both public policy and business, there is no consensus regarding the theory's viability in a broader sense.

One school of thought maintains that the majority of the theory's fundamental problems have been satisfactorily resolved, and that the stakeholder theory can, should, and already is being used to guide operational decisions (Barney and Harrison, 2020). The true conflict in this context is not between shareholders and other stakeholders, but rather between a reductionist and a more holistic or expansive view of business (Freeman et al., 2020). As a result of this, the study uses the stakeholder theory as its foundation in order to evaluate the effect that management choices have on the performance of mining companies in Ghana, specifically with regard to sustainability and logistics practises. Numerous researchers have examined the impact of stakeholders on

environmentally conscious buying (Elijido-Ten and Louise, 2010). They believe that stakeholders may have a significant influence on green procurement, which may increase the firm's performance; nevertheless, very little research has been conducted on the contingent role played by stakeholders in recent years (Khor et al., 2016).

2.2.2 Resource-Based Theory

Resource availability is often argued by some academics as a driver of green/sustainable procurement. RBV defines resources as tangible and intangible assets within the firm that generate core competencies and competitive advantage for specific business activities (Ferreira et a., 2016). The resource-based view (RBV) examines numerous different aspects while accounting for internal strengths and weaknesses. Firms typically define specific assets, which they continually review in order to respond to shifts in the dynamic business environment. As a result, firms must develop dynamic capabilities that are able to adapt to climatic factors (Pettus, 2001). Capability is the key role of strategic management to ably adapt, integrate and reconfigure internal and external organizational skills, resources and functional capabilities to match the requirements of a changing environment such as green procurement; combined capability, skills and right resources are necessary ingredients used by service providers to make quality products. The theory maintains that in order to generate sustainable competitive advantage, a resource must provide economic value and must be presently scarce, difficult to imitate, non-substitutable and not readily obtainable from markets (Demil et al., 2015). The theory furthermore rests on two crucial assumptions: first, that assets are determinants of firm performance, and second, that resources must be scarce, useful, difficult to imitate, and non-substitutable by other scarce resources (Demil et al., 2015).

2.2.3 Institutional Theory

The institutional theory may help to explain the drivers of green procurement in the mining context. Selznick (1948) proposed institutional theory, asserting that a firm's behaviour can be influenced by its institutional context. Tina Dacin et al. (2002) cite institutional theory as a popular and strong explanation for both individual and organisational activity. According to Selznick (2011), understanding the organisation should go beyond efficiency and the organisation itself because an organisation is a social organism rather than a machine of efficiency matching technical needs. According to Greenwood et al. (2008), institutional theory has become a popular and useful tool for describing the activities of both individuals and collective actors. It underlines both the actor's dependency on institutions and the role of human agency in institutional transformation. According to John et al. (2001), the core notion of institutional theory is that organisations must follow the rules and norms established by leading institutions in order to obtain acceptance and legitimacy. Institutional theory is not a cohesive set of laws, but rather a collection of concepts that together form a consistent view of the systems that support and constrain social behaviour (Scott, 2001). Chen (2015) classified institutional theory into formal institutional context and informal institutional context. The formal institutional context includes regulations, laws, and industry self-regulation. It is identified in the informal institutional setting as religious beliefs, ethics, traditions, norms, culture, and value.

2.3 EMPIRICAL REVIEW

2.3.1 Drivers of Green/Sustainable Logistics and Procurement

Drivers may inspire businesses to embrace GP practises (ElTayeb et al., 2010). Internal and external driving factors have been studied. The firm's owners, founders, and top and middle management support initiative are internal drivers. This assistance extends to programmes that try

to halt environmental damage (Ghosh, 2019). In addition, a GP's concerns are not limited to the company's upper or middle management; rather, they flow down through the various organisational levels to the lowest levels. Thus, employee understanding and concern about product environmental impact drives them to cut costs by reducing waste, improving efficiency and quality, and maximising resource utilisation. External factors include regulatory compliance, customer demand for environmentally friendly procurement, competitor competitiveness to acquire a market edge, pressure from environmental advocacy groups, as well as supplier cooperation and supply integration (Walker et al., 2008).

Bag (2017) conducted a study on identification of green procurement drivers and their interrelationship using total interpretive structural modelling. The findings highlighted that green procurement is gaining popularity due to its positive association with the triple bottom line, that is, sustainability. Firms implement green procurement to achieve sustainability in this dynamic business environment.

According to a literature review undertaken by Walker et al. (2008) on the drivers of GP practises in public and private sector organisations, external variables influence environmental supply chain management strategies more so than internal ones. In research done on UK companies by Holt and According to Ghobadian (2009), the most significant factors that influence GP practises are internal pressures and the law. According to research conducted by ElTayeb et al. (2010), 132 ISO 14001-accredited manufacturing companies in Malaysia embraced GP as a result of norms and legislation, customer demand, social responsibility, and financial benefit. According to Chan et al. (2012), who carried out an empirical study of the relationships between environmental orientation, GP practises, and corporate performance across 194 Chinese businesses, both internal and external orientations have a significant effect on the adoption of green practises, and the effect is a positive

one. Sustainable logistics was shown to be driven by top-level management's vision, regulatory requirements, the nature of the organisation, consumer expectations, competition activities, NGO pressure, and supplier green efforts in a study conducted by Ageron et al. (2012) between January and March of 2009. (SSM). The trust of employees and the backing of upper management were shown to be critical components of GP by Hoejmose et al. (2012). According to a survey by Yen and Yen (2012) on 863 Taiwanese electronics companies, the top three drivers of green procurement were supplier cooperation, sponsorship from upper management, and consumer pressure (GP).

In Malaysia, ISO 14001-certified companies were more likely to adopt green supply chain activities including GP, design for environment, and reverse logistics owing to regulatory, customer, competitive, and social/cultural pressure (Hsu et al., 2013). Recently, significant study on MSMEs in India revealed that both external and internal causes were boosting the adoption of GP initiatives within the nation's business sector (Mohanty and Prakash, 2014). Recently, researchers (Ramakrishnan et al., 2015) examined small and medium-sized manufacturing companies in Malaysia with 150 or less employees and discovered that government regulations, customer demands, and perceived benefits all had a role in the adoption of general ledgers.

In order to have the least possible impact on the environment, a corporation in the United Kingdom formed a joint venture with its suppliers and adopted green procurement practises, according to Blome et al. (2014). According to Kalubanga (2012), underprivileged nations stand to profit the most by tying sustainability more closely to the purchasing process. According to Tate et al. (2012), when a business outsources the majority of its materials and components, the environmental impact of the company is determined by the suppliers it chooses and the standards it applies to those suppliers. This is true even if the firm manufactures all of its own components.

Giving the suppliers ideas is not enough in this kind of situation; they must also be actively involved in the process. The criteria for environmentally conscious private-sector procurement were evaluated by Appolloni et al. (2014) through a literature review.

According to Babbar and Amin (2018) and Lo et al. (2018), research on green supplier development has kept up with that of green procurement. Parts of the green supply chain's green procurement have been studied, but more research is needed on the whole range of challenges and solutions. This study looks towards mining GP drivers to cover this knowledge gap.

2.3.2 Inherent Barriers to the Implementation of Green Procurement and Logistics

However, green procurement and green purchasing are still uncommon in businesses (Liobikien et al., 2017; Rane & Thakker, 2020). It's important to note that environmentally conscious purchasing is still in its infancy and faces several obstacles. The general lack of awareness and familiarity among persons working for public client organisations and stakeholder organisations hinders the adoption of environmentally responsible purchasing practises.

Abbasi and Nilsson (2016) examined logistics service providers' perspectives on ecologically friendly logistics. Current and future initiatives in establishing ecologically friendly logistics operations demonstrate the main elements. The government's regulation of green procurement is still insufficient, leading consumers and developers are unwilling to adopt green practises. This is a concern since green procurement is important to the economy (Parikka-Alhola, 2008). According to the findings of their study, Wong et al. (2020) concluded that in order to lessen the negative impact of building projects on the environment, the Chinese government does not require firms to use environmentally friendly methods of purchasing materials. Furthermore, there are gaps in the rules and regulations that should exist to promote green procurement. Additional mandatory

measures that assure higher sustainability are necessary to minimise the severity of this issue (Kirkire et al., 2018).Kansake et al. (2019) conducted research on mining companies and their capacity to be sustainable in the future. According to the findings, there are no available paths to acquire the skill sets that will be necessary for future mining operations. In 1994, a case study of an Indian mining company showed that the country's constantly changing rules make it hard to make long-term environmental plans and use greener management practises (Belfit et al., 2011). Government laws are a big motivator, but they can also be one of the things that gets in the way of sustainable procurement management (Muchaendepia et al., 2019). Also, some research shows that government rules may act as a barrier because they don't create the right environment for the green supply chain method to work (Hosseini, 2007). This is backed up by Dashore and Sohani (2013), who wrote: Lack of a government initiatives system for green practitioners: this shows that the government is not making industry-friendly policies for GP and is not giving firms that use green management special incentives (Dashore and Sohani, 2013).

Isaksson and Bjorklund (2010) found that the most important internal barriers to green logistics were the cost of investments and the uncertainty of when they would pay off. Bouwer (2006) says that rules can be a driver or a barrier, depending on how an organisation handles regulatory trade-offs. Because sustainable procurement depends on a single-administration method, there isn't a way to make sure the law is followed. Regulations from the government and other parties could put pressure on businesses to be more environmentally friendly (Orsato and Wells, 2007). This showed that there aren't many laws that require governments and businesses to act in a green way (Chelanga et al., 2015).Multiple considerations make it challenging for an organisation to adopt environmentally friendly practises. Studies show several key obstacles to sustainable procurement strategy creation, approval, and implementation. Country, organisation, and sector obstacles differ

(Islam et al., 2017). High expenses or financial constraints are the most significant barrier in the United Kingdom, Eastern and Western Europe, the United States, and Canada (Brammer & Walker 2011; Blair & Wrigh 2012). Malaysia's most significant barrier is lack of awareness (Islam et al., 2017), but the UN's is a lack of sustainable procurement policies and practises (Hasselbalch et al., 2012). According to Dolva (2008), the greatest barrier in Norway is a lack of knowledge on sustainable practises. Misalignment between short-term and long-term strategic goals is an additional important impediment (Giunipero et al. 2012). A lack of effective leadership, a lack of management support, a lack of training, and a lack of knowledge and competency among procurement professionals are all significant impediments to sustainable procurement. All of these things lead to incompetence. Inadequate political support and government legislation governing commercial company contract processes, contract management, the competitive environment, and social concerns (Islam et al. 2017).According to existing data (Muchaendepi et al., 2019), the great majority of barriers to GP is internal to an organization rather than external. There has been no comprehensive research on the subject of sustainable procurement limits in the Gulf countries, particularly in Saudi Arabia. Sustainable procurement practises are likely to have a substantial impact on Middle Eastern sustainable development because Saudi Arabia has the region's largest economy and the world's nineteenth-largest. Saudi Arabia's tremendous economic and demographic growth, vast construction and development, and cultural conservatism necessitate a thorough evaluation of its sustainable procurement practises. Similarly, Mensah (2012) identifies a lack of internal management systems as a hindrance to sustainability. Businesses will struggle to become green if they do not have the necessary infrastructure in place, since sustainability needs complicated and rethought supply chain systems, such as quality control (Chelanga et al., 2015). This is emphasized by the fact that top management is not really committed to their environmental

responsibilities. They are seen as being concerned about environmental issues as a group (Min and Galle, 2001). A lack of commitment from high management is one reason preventing them from adopting green practises. As a consequence, the mining industry lacks strategic insight. Management at the top levels is preoccupied with the immediacy, at the cost of more essential long-term goals (Lin and Ho, 2008). A well-structured organisation is more likely to utilise environmentally friendly practises, according to study (Gatari, 2014) on barriers to green procurement in Kenya's manufacturing sector. This provides a barrier to entry for the mining sector in adopting environmentally friendly supply chain management. To break through this barrier, the company's services and infrastructure must be reorganised so that new forms of information sharing and cooperation among workers may emerge (Chelanga et al., 2015). According to Belfit et al. (2012), a company's organisational structure may have a major influence on its ability and motivation to adopt sustainable practises.

2.3.3 Strategies for Implementation of Green Procurement and Logistics

The introduction of green procurement in the mining industry has occurred slowly (Muchaendepi et al., 2019). Sustainable procurement is a solution that integrates environmental and social concerns throughout the buying process. This is done in order to reduce the negative effects of procurement on human health, the environment, and human rights (Mello et al., 2017). Ghosh (2018) investigated the impact of green procurement on firm performance, as well as the factors that drive its adoption. The results indicated that internal environmental worry, supplier cooperation, customer pressure, rival pressure, and management support all had a positive role in GP. Yu et al. (2019) conducted a literature review and inquiry on how to best promote electronic procurement and sustainable procurement in the construction sector. A total of 22 and 16, respectively, of different promotion techniques were found for e-Procurement and Sustainable

Procurement, and these were then synthesised in order to establish an integrative framework for promoting eP and SP.

*Table 2. 1**: Summary of Literature review***

Authors	**Article Title**	**Key Results/Findings**
Bag (2017)	Identification of green procurement drivers and their interrelationship using total interpretive structural modelling	Green procurement is gaining popularity due to its positive association with the triple bottom line, that is, sustainability. Firms implement green procurement to achieve sustainability in this dynamic business environment
Bidin et al. (2020)	Challenges and drivers of green procurement among construction practitioners in Malaysia	The use of green procurement is one of the strategies that assists in addressing environmental challenges in the execution of construction projects in the Malaysian construction sector.
S. Koirala (2019)	SMEs: Green and inclusive growth engines.	Small and medium-sized enterprises ("SMEs") have an essential role in both environmental and economic policymaking.
Nilsson and Abbasi (2016)	Developing green logistics: Examining themes and issues from the perspective of logistics service providers	The findings illustrate the major themes by analysing current and future activities in developing environmentally sustainable logistical activities.
James et al. 2016	Factors influencing green supply chain in the mining sector in Ghana	According to the report, the most significant barriers to a green supply chain in Ghana's mining industry are a lack of knowledge and competence in this area and a lack of understanding of the possible financial benefits.
Ghosh, 2018.	Green procurement and company performance.	Enhanced GP was the result of internal environmental concern, supplier collaboration, customer pressure, customer pressure from competitors, and management backing.

Carvalho, 2017	Mining industry and sustainable development: time for change	In order to be environmentally acceptable and comply with sustainable development objectives, current mining practises must reform and contribute to more equitable community development, as well as safeguard better natural resources and ecosystems.
Forslund and Björklund (2018)	Investigating the innovation process for sustainable logistics	The Sustainable Logistics Innovation process consists of five phases which are linked to achieved targeted objectives
Helo and Ala-Harja, 2018	Food distribution green logistics—a case study	The findings demonstrate that numerous activities along the supply chain have the ability to save energy by providing examples of distribution logistic online temperature-controlling options.
Kansake et al., 2019	Are stakeholders in Ghana prepared for the implementation of autonomous mining systems?	Respondents usually knew about AMS, but they were afraid it would increase unemployment in Ghanaian mines.
Kaur and Singh, 2019	Sustainable supply chain management is crucial if you want your system to be resilient to natural disasters.	A dynamic non-linear mixed integer model with cap-and-trade carbon emission can be utilized to create disaster-resilient procurement logistics.
Kiwili and Ismail, 2016	Role of sustainable procurement practices on supply chain performance of manufacturing sector in Kenya: a case study of East African Portland cement company	Procurement Preferences and Reservations, Green Procurement Practices, Supplier Involvement, and Electronic Procurement accounted for 76.3% of EAPCC's increase in Supply Chain Performance.
Rane and Thakker,2020	Green procurement process model based on blockchain–IoT integrated architecture for a sustainable business	Industry surveys rate green procurement issues. Blockchain and IoT perform green procurement duties in the architecture.

Muchaendepi et al. 2019	Challenges faced by the mining sector in implementing sustainable supply chain management in Zimbabwe	Sustainable supply chain management requires structural and organisational transformation, which is lacking.
Ghadge et al. 2019	Sustainable procurement performance of large enterprises across supply chain tiers and geographic regions	Major companies' sustainable procurement performance improves as they approach the end customer.
Oshokoya and Tetteh (2018)	Mine-of-the-future: In terms of mineral and mining engineering education, how is Africa prepared?	The websites of the North, East, and West Arica mining engineering schools do not address future-mine thinking, notably with experimental mine units/projects or research facilities.
Ren et al., 2020	A comprehensive survey of the literature on green and sustainable logistics, including bibliometric analysis, research trends, and knowledge taxonomy	G&SL chronological publication is booming. 2018 released 15 times more books than 2010. Sustainability, Journal of Cleaner Production, Transportation Research Part D: Transport Environment, and International Journal of Production Economy are the top four journals, accounting for 25% of G&SL articles since 1999.
Saberi (2018)	Model of a multiperiod supply chain network with products transporter through pollution stock reduction	This model shows how mitigation efforts and natural decay rate might reduce pollutant stock for each polluter over a multiperiod planning horizon.
Maysara Sayed et al. 2021	Sustainable procurement: comparing in-house and outsourcing implementation modes	As SP maturity increases, well-designed contractual arrangements can boost long-term performance, according to Principal Agency Theory.
Islam et al. 2017	Aspects of sustainable procurement practices by public and private organisations in Saudi Arabia: an empirical study	According to the research findings, regardless of ownership or kind of organisation, sustainable procurement procedures appear to be too negative, and top management attitudes and organisational culture are the primary hurdles to implementing sustainable procurement practises at the organisational level.

Yu et al. 2019	A systematic literature analysis towards an integrative framework for boosting electronic procurement and sustainable procurement in the construction industry	By synthesising 22 and 16 promotion techniques for each, an integrative framework for promoting eP and SP was developed.
Kaur and Singh (2017)	Big data heuristic modelling for sustainable procurement and logistics in a supply chain	MINLP and MILP models need real-time customer and supplier characteristics including prices, capacities, lead-times, and emissions.
Roman, 2019	Institutionalizing sustainability: US public agency sustainable procurement structural equation model	The empirical investigation shows that a company's senior executive's leadership style increases the likelihood of sustainable procurement.
Fang, 2020	Analyzing the interrelationships among barriers to green procurement in photovoltaic industry: An integrated method	According to the study, internal constraints (such as corporate unawareness) are more important than external obstructions (such as a lack of legislation).
Ghadimi, 2016	Sustainable procurement buyer–supplier dyads: history, present, and future	This review analyses 2008–2014 studies utilising these seven dimensions.
Gholizadeh, 2020	Big data-based resilient fuzzy stochastic programming for sustainable procurement and logistics under hybrid uncertainty	An efficient hybrid robust fuzzy stochastic technique is also used to control parameter uncertainty and risk in outbound decisions.
Gupta, 2018	Multi-objective AHP-DEA optimization for environmentally friendly mining transportation.	Integrated multi-objective optimisation model for sustainable mining industry transportation developed.

2.4 LITERATURE REVIEW SUMMARY

This chapter covered the relevant literature works on green procurement and logistics implementation. The chapter perused key concepts such as sustainability, green procurement and the mining industry overview in Ghana. Upon reviewing several works, this work is underpinned by the stakeholder theory. The empirical findings were reviewed on each objective which gave a broader insight on the study direction. Drivers for green procurement in mining firms are hampered by some inherent challenges which necessitate the development of certain strategies to ensure smooth implementation. It is on this premises that this study intends to appraise, explore and examine the key drivers of sustainable procurement in the mines as little is known in this regard.

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 INTRODUCTION

This chapter provides a summary of the overall strategy or framework for the investigation. Some of the topics covered in this chapter are the research strategy, research methodology, study design, sample, sampling techniques, analytical instruments, and validity measurements. The study design serves as an all-encompassing framework or direction for the investigation. According to Kothari (2004), a research design is a preset method for obtaining and analysing data in such a way that it strives to achieve the study goal while reducing the amount of time and effort spent on the activity. In other words, the plan aims to maximise efficiency while decreasing the amount of time and effort spent on the process.

3.1 RESEARCH METHODOLOGY

This study's methodology was quantitative research. In quantitative research, the process of making estimates of numbers serves as the essential connecting mechanism between empirical observation and the mathematical representation of quantitative relationships. This is because quantitative research is predicated on the hypothesis that there is a relationship between the variables being studied. The data are frequently selected at random, and then some type of numerical format is utilised in order to analyse them (Goertz & Mahoney, 2012). Quantitative research often involves the methodical and empirical investigation of phenomena via the application of statistics, mathematics, and the processing of numerical data (Basias & Pollalis, 2018). The application of statistics in quantitative research makes it an essential subfield of applied mathematics. It is frequently used in situations where: (a) a large amount of quantitative data must be analysed and processed in order to test a theory and verify hypotheses; (b) there is uncertainty

surrounding the theories being considered; (c) research may be successfully conducted with questionnaires that contain straightforward questions and succinct answers; and (d) the data collected can be quantified and compared. Statistical software designed for quantitative research is commonly used to process data (Martin & Bridgmon, 2012; Singh, 2006).

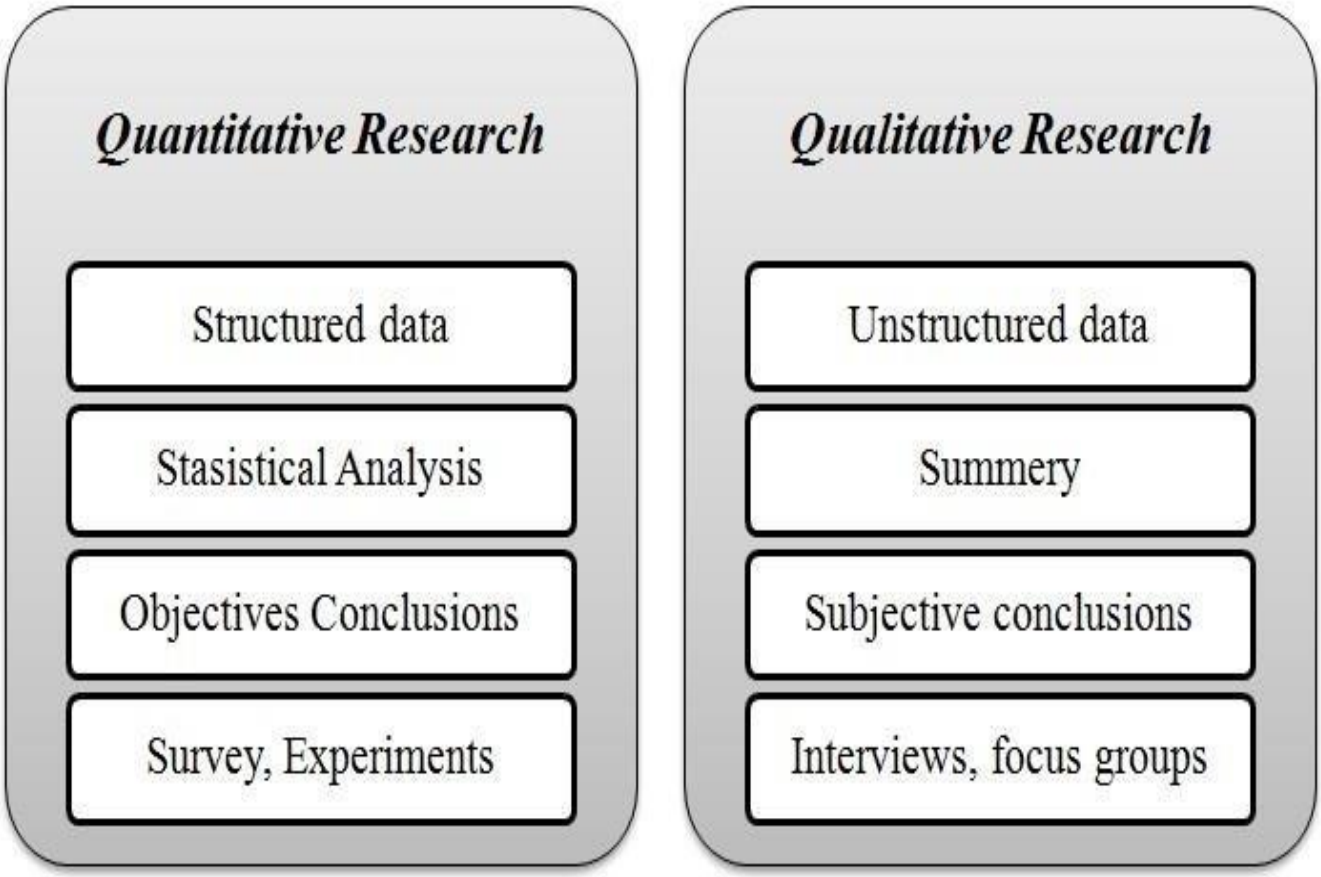

*Figure 4: **Quantitative vs Qualitative research***

Because it builds on previously established theories, quantitative research has its own unique way of conducting observations and experiments. A quantitative research methodology is founded on the empiricist paradigm's hypothesis as its foundation (Creswell, 2003). Researchers who use quantitative methods typically centre their attention on behaviours that are measured using metrics or observation scales (or both), as well as the occurrence relationship between two variables

(Krathwohl, 2004). The term quantitative research strategy is used to describe research that is based on positivist and neo-positivist conceptions of how research should be conducted. The quantitative approach is a methodology for conducting research that places a significant emphasis on the quantitative evaluation of the data collected (Kumar et al., 2014). According to Walsh et al. (2019), quantitative research is used for the collection of statistical data that is evaluated using techniques that are numerically based. This definition suggests that the primary focus of quantitative research is on the acquisition of numerical data in order to provide an explanation for a phenomenon.

According to Gall et al. (2003), a testing process is required for quantitative research because it lays the foundation for linking quantitative interactions between empirical observation and mathematical function. As a result, the testing procedure is a crucial component of quantitative research. According to Babbie (2016), quantitative research methods emphasise objective measurements and the statistical, mathematical, or numerical analysis of data collected through polls, questionnaires, and surveys, or by manipulating previously collected statistical data with the help of computational techniques. It is based on these reasons that the study adopts a quantitative strategy to empirically test the drivers of green procurement in mining firms in Ghana.

3.2 RESEARCH APPROACH

A research project's step-by-step procedures and action plans, beginning with the general assumptions and ending with the data interpretation, are collectively referred to as approach to research (Creswell, 2013). This study adopted a deductive approach. According to Rahi (2017), a deductive approach is one in which you do not get theory from observation and theory already exists and has been proven by researchers, and you can explain research that is based on empirical observation and theory generated on conceptual and theoretical structure. The method of deductive

reasoning is used by the researcher of quantitative data because deduction is most commonly applied to quantitative data. In addition, because previous research has been done on the green procurement domain, using a deductive approach would make it possible for the researcher to test variables that are already in place. According to Wilson (2010)'s postulation, the deductive method entails formulating a supposition based on existing theories and devising a research strategy to test the assumption in order to validate the supposition.

The two most common types of research reasoning are known as deductive and inductive approaches (Hyde, 2000; Sutrisna, 2009). In a similar vein, the most common research methodologies include deductive, abductive, and inductive approaches. In the deductive method of conducting research, the researcher comes up with a theory and a hypothesis, in addition to a plan for putting the hypothesis to the test (Saunders et al., 2019). According to Zalaghi and Khazaei (2016), valid reasoning is considered to be deductive reasoning when it is impossible to accept the premises while rejecting the conclusion. Developing accounting theory using a deductive approach begins with identifying the end goal of the process. As soon as the goal is specified, definitions and assumptions ought to be elucidated in greater detail. According to Beiske (2007), the deductive research approach explores a certain theory and puts that theory to the test to discover whether or not it is applicable to the circumstances that are being studied. According to Hyde (2000), the purpose of deductive reasoning is to ascertain whether or not a given theory can be applied to a particular instance or circumstance. According to Trochim (2006), it is constrained and limited in scope, with a stronger emphasis placed on putting hypotheses, ideas, and laws to the test. As a result, this made it very simple for the research to test the previously defined theory by drawing conclusions based on statistical units.

3.3 RESEARCH DESIGN

This study follows a descriptive survey design method. According to Cohen et al. (2011), a descriptive survey uses many approaches to examine a variety of themes, demographics, and programmes to analyse, pick, and explain any generalisations. In addition to this, it involves the collection of data from the study in order to provide appropriate responses to the research questions that direct the investigation (Apuke, 2017). The descriptive survey design would lead to the benefit of providing valid responses that can be generalised when dealing with a large number of respondents, as well as precise measurements that deal with numerical representations to explain data analysis. This is an advantage over other research design, which does not provide these benefits (Apuke, 2017). The descriptive survey approach will be utilised in this study, together with questionnaires, in order to acquire quantitative data from respondents. Survey research, according to Sukamolson (2007), uses a scientific sampling method in conjunction with a specified approach to evaluate the characteristics of a specific population through the application of statistical methods. In order to collect data from the population being studied, a survey is a type of research that calls for sampling, questionnaire design, and administration. To fully comprehend the behavioural patterns that individuals display, this data is subsequently evaluated (Sukamolson, 2007). In addition, Fellows and Liu (2015) noted that surveys or interviews are utilized to gather information from sample groups. Closed-ended questionnaires will be used in this study, among other things, to gather quantitative data in accordance with a descriptive survey research methodology. A research design is a rationale that connects data collection and analysis to produce results and translate the best approach to take, as stated by Fellows and Liu (2015). According to Urquhat and Vaast (2012), the research design provides an outline of the particular procedures that were adhered to throughout the entirety of the research project. Because of the way the research

was designed, the researcher can retrieve pertinent evidence or data with significantly less effort, time, and money (Kothari and Garg, 2018). The most important aspect is that the experimental research design is carried out in a predetermined location (Babbie, 2016). The researcher focuses on action, charges, and respondents' participation in identifying, evaluating, and implementing various activities in action research, where both the scientist and the participants are involved in developing solutions to actual problems within an institution (Saunders et al., 2009).

3.4 DATA COLLECTION TECHNIQUE

Data is an important component in addressing the study topic or inquiry. There are two basic forms of data for measurement and analysis, according to Wang et al. (2017). The primary data would be gained through fieldwork, which would be employed in this study, and it implies a certain amount of expectation in that data must be taken from the field using questionnaires. Many researchers consider the questionnaire to be the most reliable and popular tool for collecting data (Everitt & Hothorn, 2010). The purpose of a questionnaire, as defined by Park and Park (2016), is to collect data by having several respondents answer the same questions in a standard format. Questions are asked, and answers are written down in a questionnaire. Participants were requested to complete questionnaires in order for the researcher to collect data (Bacon-shone, 2015). According to Walliman (2017) and Saunders et al. (2009), the questionnaire is the best tool or strategy for gathering quantitative data. Structured questionnaires were used to obtain primary data for this inquiry. The questionnaire tool has 4 components. In order to rate the discovered variables, a Likert scale will be utilised. The first part of the survey focused on the respondents' demographics. The other parts of the instrument questioned respondents' perspectives on the particular aims of the study. The second part sought information on the drivers of green procurement and logistics in mining firms in Ghana. The next section targeted information on the

barriers to green procurement implementation. Finally, Respondents would be asked to give their opinions on strategies to integrate green procurement in mining firms in Ghana.

3.5 DATA ANALYSIS

According to Strydom et al. (2005), data analysis is the act of making meaning of information in order to answer questions. The word unit of analysis can be simply defined as the entity that is being analysed in scientific research, and it is essential for every research endeavour to either determine or be aware of the research's unit of analysis (Dolma, 2010). In order to summarise the fundamental aspects of the data that was obtained, descriptive statistics will be utilised. The acquired data will next be examined using descriptive statistics such as the mean score, standard deviations, frequencies, and percentages. The research findings will be presented to the audience in the form of graphs, charts, and tables. The most important analytical programmes to utilise are Excel and SPSS version 26. The demographic information would be provided with percentages and frequency distributions. Inferential statistics are going to be used in the analysis of the ordinal data. During the course of the data analysis, the most relevant inferential statistical tools would be utilised. The Relative Importance Index (RII), along with one sample test, would be utilised in order to carry out in-depth analyses. According to Kaur et al. (2018), the total or average quantity of observations in a collection of data produces the sum of the mean score ranking. This information may be found in the mean score ranking. The standard deviation is a statistical metric that is used to quantify the amount of variation in a set of numbers relative to its mean by calculating the average distance between each quantity and its mean (Kothari, 2004). The one-sample t-test is used to evaluate the significance of a mean and establishes a relationship between a population's mean and a given value. When performing interval estimations, either a sample standard deviation or a population standard deviation that is already known is used (z-test). A p-

value that is lower than a significant level of 5%, as stated by Ross and Willson (2017), constitutes evidence for rejecting the null hypothesis.

3.6 RELIABILITY AND VALIDITY TESTING

Both reliability and validity are ways to illustrate and convey the rigour of research processes and the credibility of research findings. Reliability and validity are methods. If research is to be useful, it must not mislead those who use it (Roberts and Priest, 2006). The consistency of a measure is referred to as its reliability (Price et al., 2015). Reliability and validity are the two most crucial and fundamental aspects to consider when assessing any measurement tool (Mohajan, 2017). The reliability of the variables would be examined using the Cronbach's alpha coefficient. According to Taber (2018), a Cronbach Alpha coefficient of more than 0.7 is recommended. Validity on the other hand would be ascertained through a careful piloting process using expert to make sure the research instrument is valid and accurately measure the samples

CHAPTER FOUR

ANALYSIS AND DISCUSSIONS

4.1 Introduction

This chapter presents the data analysis for the study. In order to get an in-depth comprehension of sustainable procurement, a number of books, papers, and other publications were read and examined. In addition, the websites of a variety of businesses that engage in sustainable procurement, as well as the websites of a variety of international organizations, were visited in order to get knowledge regarding the most current advancements that have been made in this area. The chapter presents data on three key objectives; drivers, barriers and strategies of sustainable procurement. The chapter is divided into several sections below.

4.2 Respondent's Profile and Sample Justification

Table 4. 1: Background data

Participant S/N	Gender	Level of Experience	Level of education	Position/role
A	Male	12years	PhD	Regional Sustainability Manager, Technical
B	Female	6years	BSc	Procurement officer
C	Female	6years	MSc	Procurement officer
D	Female	5years	MSc	Procurement and Contracts Superintendent

E	Female	5years	MSc	Procurement and Contracts Superintendent

Author's Construct, 2023

4.3 The Concept of Sustainable Procurement

The researcher began by asking the respondents to define green procurement. It is expedient to understand the definition of green/sustainable from the respondent's perspective. Respondent A explained that;

- *"In Gold Fields, the three terms are used synonymously. It entails making sure that the products and services procured have the lowest environmental impact and most positive social results".*
    - *"Green Purchasing/Procurement: A process whereby organizations meet their needs for goods, services, works and utilities in a way that achieves value for money on a whole life basis in terms of generating benefits not only to the organization, but also to society and the economy, whilst minimizing damage to the environment. Green purchasing means basing all purchasing decisions and allocation of contracts on environmental criteria along with other criteria such as price and quality".*
    - *"Circular procurement encourages procurement professionals to consider not just the Take: Make: Dispose, linear economy, it enables us to consider how we can maximize the lifespan of the product through repair and reuse, and how we re-use or recycle products once they reach their end-of-life stage, so ensuring we don't always look to consume finite resources. Thus, Circular procurement is the consideration of a product from design stage through to disposal. By understanding*

how we are going to dispose of the product at the start of the product cycle, we can be better positioned to structure the specification, by considering the products total life cycle costing".

- *"Sustainable procurement: procurement that has the most positive environmental, social and economic impacts possible over the entire life cycle"*

Similarly, another respondent added that;

The green procurement is the prioritized procurement of parts, materials, and services in consideration of reduction in environmental load and without using the prohibited substances we have specified, from suppliers who (1) comply with regulations and standards regarding the environmental laws, (2) strive to reduce environmental load, and (3) have an established environmental management system.

The above definitions are consistent with past definitions. For instance, Min and Galle (2001) described green procurement as "an environmentally aware purchasing practise that decreases waste sources and encourages recycling and reclamation of acquired resources without compromising the performance requirements of such products." Additionally, green procurement was defined as "recycling and reclamation of acquired materials without compromising their performance requirements. Similarly, green procurement refers to a series of activities done to ensure that the commodities or raw materials obtained have no negative influence on the environment (Carter and Carter, 1998; Min and Galle, 2001; Zsidisin and Siferd, 2001).

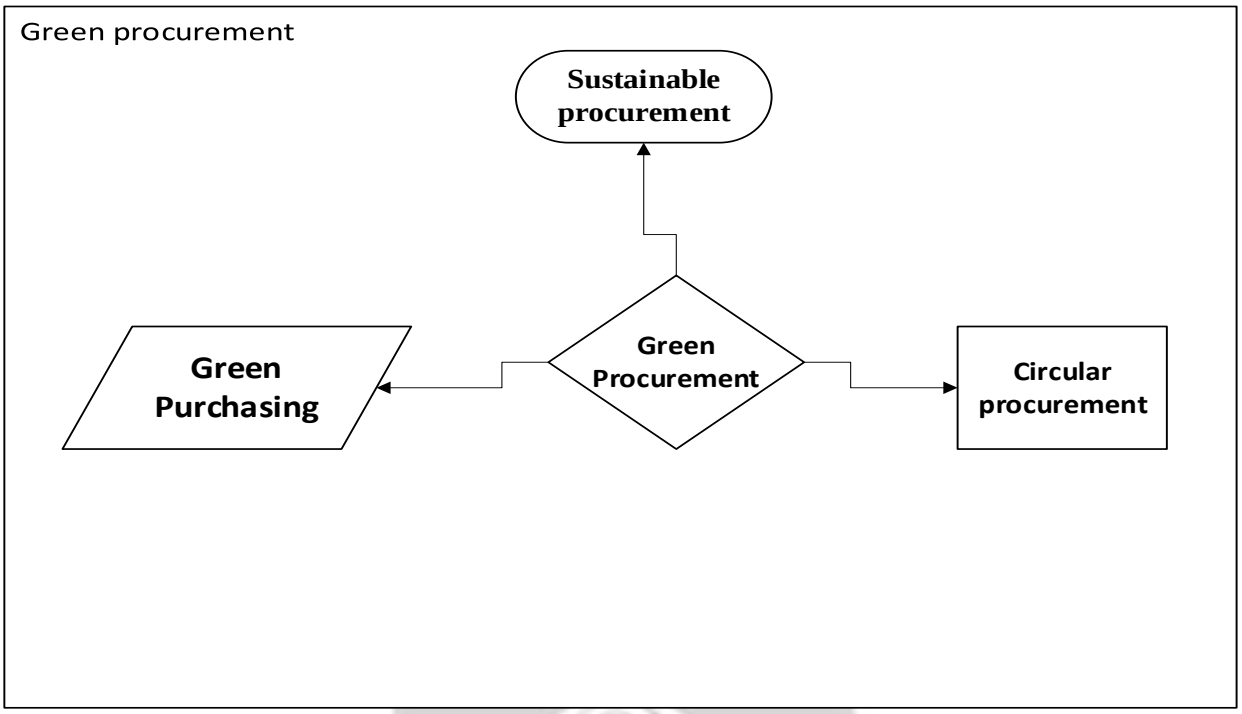

Figure 5: Green Procurement terminologies (Author's construct, 2023)

4.4 Drivers of sustainable logistics and procurement in Ghanaian mining firms

The primary objective of the study is to understand the drivers of green procurement in mining companies. It is necessary that drivers are seen as motivating business organizations to adopt GP practises (ElTayeb et al., 2010). Previous research has divided its affecting variables into two categories: internal and external.

According to the findings of the interviews, some significant determinants impact green procurement adoption in the mining sector. According to one of the responses, investor expectations and investment requirements drive green procurement. Some investors include particular green requirements in their contracts, which influence the procurement possibilities in certain mining operations.

Respondent two added that expected cost savings and financial motives, Top Management Support and Commitment, Image and Reputation, Government Regulations and Climate Commitment drive green procurement. In a bid to save cost and uplift mining firm reputation, green procurement is often adopted. The results also indicated that emission reductions, Production Drive, Best Management Practices, Industry and Best business Codes (e.g., ICMM) drive green procurement. Finally, Social License for Operation, Accident Prevention/Safety Concerns, Waste Reduction – Circular Economy and Gender and Diversity were also identified as key drivers. The analysis grouped the drivers into three themes as elucidated in the figure below.

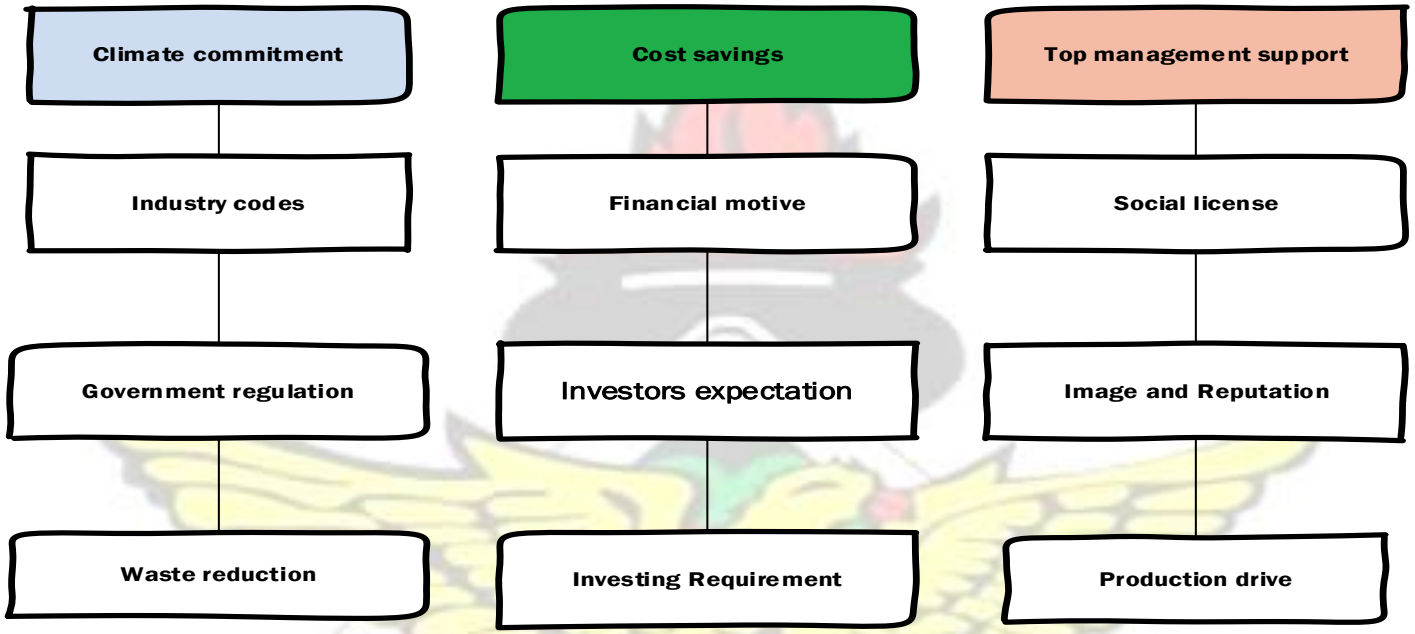

Figure 6: Drivers of green procurement (Interview results, 2023)

4.4.1. Discussion of Drivers of Green Procurement

From the figure 4.2 above, the drivers have been thematized into three; climate commitment drivers, cost savings and top management support. Compliance with regulatory issues, pressure from investors and customers to adopt green procurement were considered key drivers of green procurement in mining firms. This is consistent with a study conducted by (Walker et al., 2008). The influence of top-level management in driving green procurement is one that has received attention across the globe. The results revealed that top management played a predominant role in implementing green procurement. For instance, Ageron et al. (2012) studied 178 French companies between January and March of 2009 and discovered that the primary reasons for sustainable logistics were top-level management's vision, regulatory requirements, the nature of the business, customer expectations, competitor actions, pressure from non-governmental organisations, and suppliers' green initiatives (SSM). Hoejmose et al. (2012) discovered that managerial support from high management and staff trust were crucial elements in GP. The highest level of management's endorsement of cutting-edge technology and environmentally conscious innovation is the single most important factor in sustainable purchasing (Giunipero et al.,2012). The top management of a corporation must provide consistent and steadfast support for infrastructures like an environmental management system and a pollution control system (Walker et al. 2012).Climate commitment efforts was also identified in this study as a key driver of green procurement in mining firms. In recent years, GP has attracted considerable attention from both the commercial and academic communities. This is mostly due to the urgent need to reverse the trend of global warming and climate change, as well as to protect our rapidly decreasing natural resources. Environmental procurement concerns are being driven by critical environmental difficulties such as climate change, waste management, and natural resource depletion (Walker, Di Sisto, and McBain 2008). Growing public concern for environmental and social concerns has

prompted many businesses to adopt more eco-friendly policies. Environmentally responsible procurement is vital to the management of green supply chains since it is the first step in reducing environmental deterioration. This is consistent with previous studies (Chin et al., 2015). Companies have been compelled to integrate environmentally responsible business practises into their supply chain networks as a result of the ever-increasing pressure put on finite resources as well as the significant environmental concerns (Ghadge et al., 2018). In order to satisfy the increasing demands of sustainability, several companies are establishing policies and practises that extend outside their own borders (Meehan and Bryde 2011). Various stakeholders, such as regulators, end customers, and non-governmental organisations (NGOs), put additional pressure on sustainable business practises (Foerstl et al. 2015). Because of the growing pressure, businesses have been compelled to formulate procurement-related policies and procedures in response to the situation.

Cost savings and financial gains were other drivers of green procurement identified in this study. Green procurement has the ability to increase the efficacy of resource use and operation, hence enhancing the financial performance of enterprises. This would be achieved through decreasing the cost of energy input, reducing pollution, and eliminating clean-up. The most important internal element that motivates companies to participate in sustainable procurement efforts is the potential for cost savings via the implementation of environmentally friendly procedures (Walker et al. 2012). By reusing existing assets, environmentally responsible purchasing results in decreased operating costs (Erkul, Kaynak, and Montiel 2015).

4.5 Inherent barriers to the implementation of green procurement and logistics

A key objective of this study was to assess the barriers to green procurement implementation. The respondents gave their inputs and opinions on green procurement implementation barriers in mining firms. In the opinion of respondent C,

> *There is the potential for barriers in trade in green purchasing. For example, Eco labels have, in the past, been seen as a "barrier of trade" issue since requesting only products that have an Eco label during the procurement may be seen as limiting the number of suppliers who can respond to the tender and would thus be viewed as a closed.*

Similarly, Respondent A added that *Scarcity of Financial Resources/Cost Implications, Lack of Know-How and Complexity of Adopting Sustainable Procurement, Lack of Alternatives/Options, Weak Government Regulations in Ghana, Low ESG commitments of suppliers/Business Partners, High Cost of Procurement (Sustainable items), Scarcity of Sustainable Raw Materials, Challenges in securing Sustainable/Green Procurement Partners and Return Policies and Associated challenges were critical barriers to green procurement adoption.*

Another respondent concomitantly averred that,

> *Government regulations which discourage some companies in becoming environmentally and socially responsible since they did not like obtaining strict rules. Regulatory requirement for Local Content Procurement prohibits certain products and services to be purchased out of the country. However, there is lack of capacity for some products categories locally*

These barriers are all linked to each other therefore creating a hurdle for the integration of green procurement in mining firms.

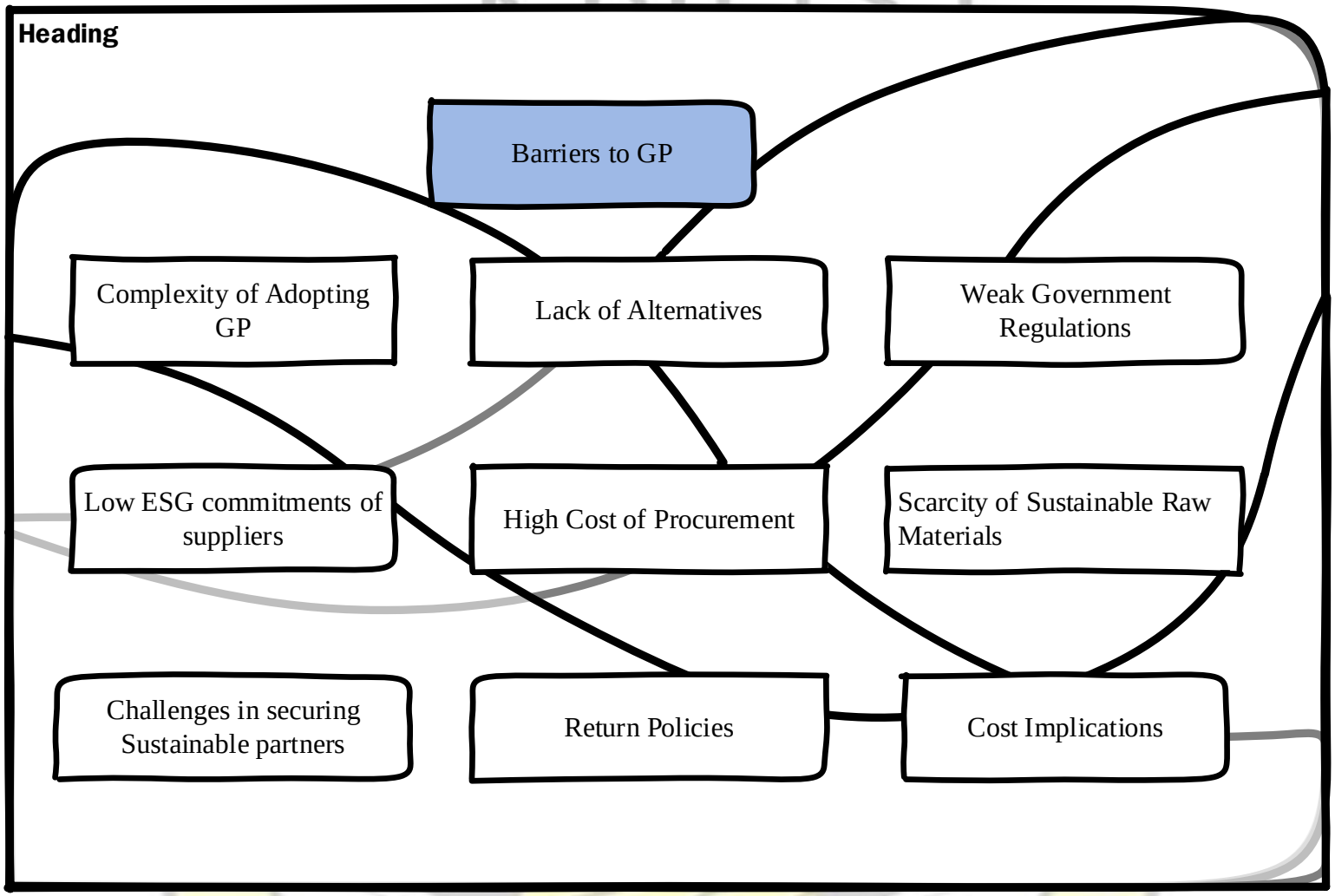

Figure 7: Barriers to Green procurement implementation

4.5.1 Discussion of Findings (Barriers to GP implementation)

The results indicated that the cost implication of green procurement adoption was a key hurdle to its implementation. Although these costs are associated at the early stages, the cost of adoption is normally expected to drop significantly in the long run. Investment cost is one of the biggest obstacles standing in the way of the widespread adoption of sustainable and environmentally friendly buying methods as agreed by (Giunipero et al., 2012). Similarly, Isaksson and Bjorklund (2010) found in their study that the most important internal barriers to green logistics were the cost of investments and the uncertainty of when they would pay off. The idea of high costs or financial restraints is the most major barrier in the United Kingdom, Eastern and Western Europe, the United States of America, and Canada (Brammer & Walker 2011; Blair & Wrigh 2012).Upgrades to equipment that use less energy and better remanufacturing procedures both require significant investments, which are difficult for smaller businesses to handle (Vachon and Klassen 2006).Lack of knowledge and guidelines were also identified as barriers to green procurement adoption in mining firms. The knowledge on green procurement processes, approaches and methods are scarce hence impeding the implementation. Recent studies made similar discoveries. Kansake et al. (2019) conducted research on mining companies and their capacity to be sustainable in the future. According to the findings, there are no available paths to acquire the skill sets that will be necessary for future mining operations. Next to the expertise dilemma is a poor regulatory framework from both government and companies. A barrier that has been brought to people's attention is the regulatory authorities' failure to establish clear standards and adequate legislation (Sarkis and Dhavale 2015). The government's regulation of green procurement is still insufficient, leading consumers and developers to be unwilling to adopt green practises. This is a concern since green procurement is important to the economy (Parikka-Alhola, 2008). Furthermore, there are gaps in

the rules and regulations that should exist to promote ecologically responsible procurement. Some research shows that government rules may act as a barrier because they do not create the right environment for the green supply chain method to work (Hosseini, 2007). This is backed up by Dashore and Sohani (2013), who wrote: Lack of a government initiatives system for green practitioners: this shows that the government is not making industry-friendly policies for GP and is not giving firms that use green management special incentives (Dashore and Sohani, 2013).

4.6 Strategies for the smooth implementation of green procurement and logistics

An objective of the study is to determine what strategies will aid in the smooth implementation of green procurement and logistics in mining firms. After identifying the drivers of green procurement and implementation barriers, it was necessary to ask respondents what strategies will improve green procurement adoption. The respondents expressed their opinions regarding implementation strategies of green procurement.

The respondent A stressed on,

Adjusting procurement KPIs to place greater weight on sustainability and increasing the weight put behind sustainability criteria in supplier selection decisions.

Similarly, another respondent added that,

> *A law on Green Procurement should be passed – and implemented. Once it becomes a compliance obligation, it become easy to implement. Further, green procurement must be used as a criterion for rewarding Top Management Executives, right up to the Board Level*

Other identified strategies discussed by the respondents include;

Green Procurement Primer must be established and implemented by Businesses. Further, training, resources and structures for implementation must be instituted, monitored and evaluated. Finally, green procurement principles must be embedded in business plans and implemented.

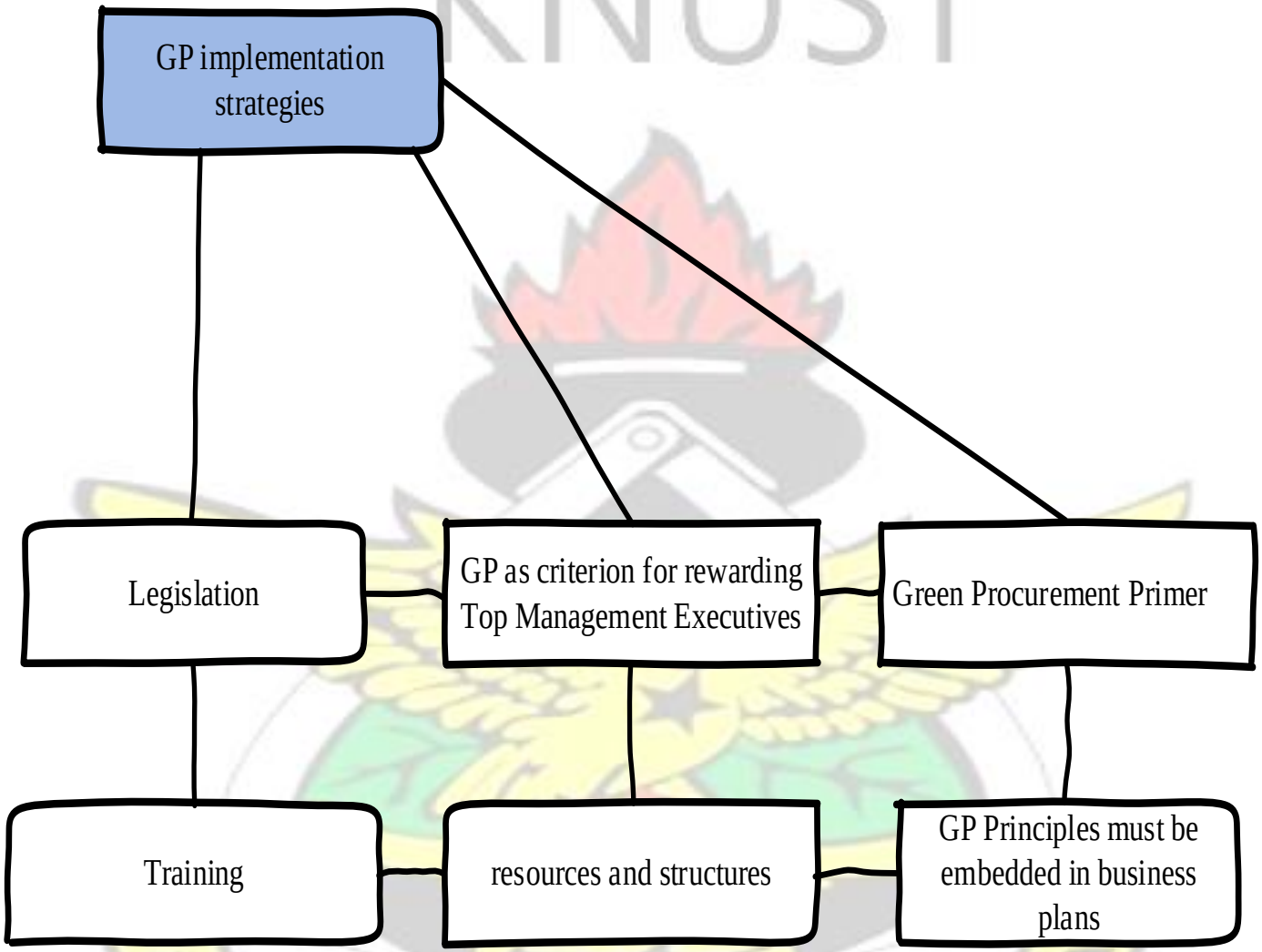

Figure 8: GP implementation strategies (interview results, 2023)

4.6.1 Discussion of Findings

The identified strategies to green procurement adoption maybe discussed in three dimensions; regulation, skills and competence development and incentives. A law on Green Procurement should be passed – and implemented. Once it becomes a compliance obligation, it become easy to implement. This will ensure that all mining procurement operations are conducted under the law of green procurement. This regulation will be justified since green procurement plays a crucial role in an economy's environmental, social, and economic sustainability. Sustainable procurement is a solution that integrates environmental and social concerns throughout the buying process. This is done to mitigate the detrimental consequences of procurement on human health, the environment, and human rights (Mello et al., 2017). It must be used as a criterion for rewarding Top Management Executives, right up to the Board Level, Green Procurement Primer must be established and implemented by Businesses and Green Procurement Principles must be embedded in business plans and implemented were other vital strategies that will aid the implementation of green procurement in mining companies in Ghana.

Create a code of conduct for your supplier chain that addresses green and ongoing involvement as well as stakeholder education. Stakeholders are collaborators and participants of all affairs in our company, communication between the organization and stakeholders are of high standard and priority has a tendency to improve green procurement implementation as released from the interviews

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

5.1 INTRODUCTION

5.2 SUMMARY OF FINDINGS

5.2.1 The drivers of green/sustainable logistics and procurement in Ghanaian mining firms

5.2.2 Barriers to the implementation of GP and logistics in Ghanaian mining firms

A key objective of this study was to assess the barriers to green procurement implementation. The respondents gave their inputs and opinions on green procurement implementation barriers in mining firms. The results indicated that the cost implication of green procurement adoption was a key hurdle to its implementation. Although these costs are associated at the early stages, the cost of adoption is normally expected to drop significantly in the long run. Investment cost is one of the biggest obstacles standing in the way of the widespread adoption of sustainable and environmentally friendly buying methods. Lack of knowledge and guidelines were also identified as barriers to green procurement adoption in mining firms. The knowledge on green procurement processes, approaches and methods are scarce hence impeding the implementation.

5.2.3 Strategies for the smooth implementation of green procurement

Having identified the drivers of green procurement and implementation barriers, it was necessary to inquire from the respondents, what strategies will improve green procurement adoption. The respondents expressed their opinions regarding implementation strategies of green procurement. The identified strategies to green procurement adoption maybe categorized in three dimensions; regulation, skills and competence development and incentives. A law on Green Procurement

should be passed – and implemented. Once it becomes a compliance obligation, it become easy to implement. This will ensure that all mining procurement operations are conducted under the law of green procurement. This regulation will be justified since green procurement plays a crucial role in an economy's environmental, social, and economic sustainability. Sustainable procurement is a solution that integrates environmental and social concerns throughout the buying process.5.3

5.3 CONCLUSION

From the numerous discussions and analysis of the results, the following conclusions have been drawn;

The green procurement is the prioritized procurement of parts, materials, and services in consideration of reduction in environmental load and without using the prohibited substances we have specified, from suppliers who (1) comply with regulations and standards regarding the environmental laws, (2) strive to reduce environmental load, and (3) have an established environmental management system.

The drivers can be thermalized into three; climate commitment drivers, cost savings and top management support.

The influence of top-level management in driving green procurement is one that has received attention across the globe. The results revealed that top management played a predominant role in implementing green procurement.

GP has attracted considerable attention from both the commercial and academic communities. This is mostly due to the need to halt the trend of global warming and climate change, as well as to safeguard our quickly depleting natural resources.

The results indicated that the cost implication of green procurement adoption was a key hurdle to its implementation. Although these costs are associated at the early stages, the cost of adoption is normally expected to drop significantly in the long run

Lack of knowledge and guidelines were also identified as barriers to green procurement adoption in mining firms. The knowledge on green procurement processes, approaches and methods are scarce hence impeding the implementation.

There is a need to adjust procurement KPIs to place greater weight on sustainability and increasing the weight put behind sustainability criteria in supplier selection decisions.

Green/Sustainable procurement is a solution that combines environmental and social considerations across the whole procurement process

5.4 RECOMMENDATIONS

The researcher would like to emphasis that there is a major need for introspection on the best ways to address this hazard given the present rise in national concerns about the detrimental effects of mining activities on the environment. The preposition of this study is Green Procurement and Logistics in Mining Firms in Ghana. Therefore, the following must be prioritized:

Firstly, mining companies and their supporters should hold combined seminars and workshops to educate suppliers and employees on the benefits of green procurement and logistics, as well as the need of implementing them. When suppliers and employees understand the benefits of green procurement and logistics, the green supply chain flow becomes easier to implement.

Secondly, the mining industry and the EPA should work together to train their suppliers, logistics professionals, and procurement staff on the issue of green logistics and procurement.

Practitioners participating in operational ordering will most likely be aware of the environmental impact of the green procurement and logistics when education and training are closely related to environmental rules and policy. They may even assume to use it. The mining businesses' practitioners and personnel will become more knowledgeable about green procurement and logistics procedures as a result.

Thirdly, mining companies should be aware of the value or importance of environmental issues that have an impact on the local populations and create this culture in their employees so that they may carry out the company's green strategy. Finally, early supplier involvement is necessary to understand the value of going green, and suppliers should think about lowering the cost of green product supply to entice consumers (miners) to buy green goods. People will purchase environmentally friendly products as a result, assisting in the reduction of the greenhouse effect (global warming).5.5 SUGGESTION FOR FUTURE RESEARCH

This study's conception and implementation were meticulous. The design is one of the restrictions. A mixed sequential methodology will have provided more statistical foundation for the study. It is therefore recommended that future studies adopt a mixed approach to statistically draw inference. The study is further limited to the case of Ghana; hence, generalization should be done with caution.