UNIVERSITY OF CAPE COAST

EFFECT OF PROCUREMENT MANAGEMENT PRACTICES ON SUSTAINABILITY AND INNOVATION OUTCOME AMONG MINING FIRMS IN GHANA

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EFFECT OF PROCUREMENT MANAGEMENT PRACTICES ON SUSTAINABILITY AND INNOVATION OUTCOME AMONG MINING FIRMS IN GHANA

BY

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Thesis submitted to the Department of Marketing and Supply Chain Management of the School of Business, College of Humanities and Legal Studies, University of Cape Coast, in partial fulfilment of the requirements for the award of Master of Commerce (M.Com.) degree in Procurement and Supply Chain Management

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DECLARATION

Candidate's Declaration

I hereby declare that, this submission is my own work towards Master of Commerce degree and that, to the best of my knowledge, it has not been presented by anyone for any academic award in this or any other University.

Candidate's Signature…….. Date…….....

Name: Ruth Abakah-Pobee

Supervisors' Declaration

I hereby declare that the preparation and presentation of the thesis were supervised in accordance with the guidelines on supervision of thesis laid down by the University of Cape Coast.

Principal Supervisor's Signature…….....Date…….....

Name: Dr. Dominic Owusu

ABSTRACT

Despite the importance of mining to job creation and its positive impact on economies and Gross Domestic Product (GDP), procurement management practices on sustainability and innovation outcome seems to be a major problem faced by most mining firms in Ghana (Barenblitz et al., 2021). Nevertheless, there is the need for studies to investigate the procurement practices and its effect on sustainability and innovation outcome (Adjei-Bamfo et al., 2021). In this regard, the current study sought to examine the effect of Procurement Management Practices on Sustainability and Innovation Outcome among Mining Firms in Ghana. The study was underpinned by the theory of constraint and the network theory. The study employed the positivism philosophy, quantitative approach and explanatory design of which respondents from the mining firms in Ghana were targeted. A structured questionnaire was used for data collection. Out of a population of 266, the number recorded as reliable and used for the analysis and processed with the IBM SPSS Statistics version 26 was 232. Following data processing, descriptive tools, including frequencies, percentages, means, standard deviations, and inferential tools, were used to analyse the data. Findings of the study indicates that, Tender and Technical Specification, Innovation Risk, Competitive Innovation Conundrum and Supplier Relationship Management were found to significantly predict Sustainability and Innovation outcomes. However, Political Regime was found not to significantly influence Sustainability and Innovation outcomes. The study therefore recommended that, management of mining firms must pay attention to Procurement Management Practices as it contributes highly to improving sustainability and innovation outcomes.

KEY WORDS

Procurement Management

Sustainability

Supply Chain Management

Innovation

Technical and Tender Specification

Innovation Risk

Competitive- Innovation Conundrum

Political Regime

Supplier-Relationship Management

Sustainable Innovation Outcome

Gross Domestic Product

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DEDICATION

To my family and friends

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LIST OF ABBREVIATIONS

AGI	Association of Ghana Industries
ANOVA	Analysis of Variance
CIC	Competitive Innovation Conundrum
GDP	Gross Domestic Product
GNCCI	Ghana National Chamber of Commerce and Industry
IR	Innovation Risk
PM	Procurement Management
PR	Political Regime
PLS-SEM	Partial Least Squares Structural Equation Modelling
SCM	Supply Chain Management
SDG	Sustainable Development Goal
SEM	Structural equation modelling
SIO	Sustainable and Innovation Outcome
SPSS	Statistical Package for Social Sciences
SRM	Supplier Relationship Management
TTS	Tender and Technical Specification
UCC	University of Cape Coast
SDG	Sustainable Development Goal

CHAPTER ONE

INTRODUCTION

Over the past few years, sustainable innovation among supply chain actors in both public and private sector organisations have gained much attention (Adjei-Bamfo *et al.,* 2021). Due to the challenges faced by most mining firms as part of their procurement processes has brought about the realization of procurement management on sustainability and innovations outcome among mining firms. Sustainability and innovation practices has become the heart of most mining firms since failure to practice it increases the operational cost of production despite its challenges and risk involved in its adoption. The sustainability and improved innovation have helped most mining firms to maximise revenue and profitability.

The mining sectors in Ghana has for some time now contributed immensely in diverse ways to the country's Gross Domestic Product (GDP) by employing between 28,000 and 1,000,000 people in large- and small-scale mining respectively (Barenblitt *et al.,* 2021). The mining sector of Ghana contribute to a greater percentage in the GDP of the country despite its high environmental impact (Jaskoski, 2014; Bland, 2019). Poor procurement management on sustainability and innovation practices happens to be a very big problem faced by the mining firms in Ghana since failure of its adoption leads to an increase in operational cost, endangering of the environment among others despite the immerse positive contributions to the economy (Kumi *et al.,* 2020). These can be significantly reduced by implementing sustainability and innovation.

The idea of sustainability and innovation places a strong emphasis on enhancing quality continuously through sound business practices. This is only possible if the management of these mining companies pays little to no attention to their conventional methods of extraction and administrative procedures as parts of their production processes, focusing instead on sustainability and innovation. The administration of Ghana's mining industries, which improves operational performance, heavily relies on sustainable and innovative procurement management. Due to these factors, this study will evaluate how procurement management practices that affects sustainability and innovation outcomes in Ghanaian mining enterprises.

The background of the study, the problem statement, the goal of the investigation, the research objectives, the research questions, the significance of the study, the constraints, the delimitations, and the definition of important terminology were all specifically provided in this chapter.

Background to the Study

Recent attention from both academics and practitioners has been focused on the impact of organizations and their suppliers on the environment, society, and the economy through their procurement practices (Barenblitt et al., 2021). This attention is driven by increasing environmental regulations, heightened public awareness, and fluctuating commodity prices, all of which have created substantial pressure on the global mining industry (Olvera, 2021). The mining sector has experienced a notable decline in productivity across various countries since the early 2000s (Tilton, 2014; Olvera, 2022).

One avenue to enhance procurement management for sustainability and innovation is the integration of procurement with upstream supply chain

management, fostering the development of sustainable and innovative products (Edquist et al., 2015). Interestingly, while demand-side innovation strategies to address sustainability issues have gained popularity, the supply-side has received comparatively less attention (Edquist et al., 2015). It's crucial to recognize that the actions of suppliers can exert direct positive or negative effects on procurement innovation (Adjei Bamfo et al., 2021). Moreover, mandatory rules, including procurement policies, have been proven to promote supplier operations that are not only efficient but also socially, environmentally responsible, and economically sound (Kusi-Sarpong et al., 2019).

Procurement management has recently emerged as a "demand-side" innovation policy tool, typically involving procurement orders issued by institutions to request new or improved technologies, products, or services, with limited attention to sustainability considerations (Uyarra et al., 2014, 2020; Edquist et al., 2015). However, procurement should not merely focus on reducing costs and achieving value for money, as traditionally emphasized by many procurement agencies in the mining sector. Instead, it should encompass a broader policy objective, including social and environmental considerations (Yeow et al., 2015; McCrudden, 2004). For instance, the tendering process can influence supplier behaviour towards environmentally friendly and socially responsible practices while promoting economic performance. Procurement policies, among other mandatory policies, have been categorized accordingly (Kusi-Sarpong et al., 2019).

Despite these advancements in procurement practices, there remains a lack of comprehensive understanding regarding how external factors, such as

the circumstances under which suppliers participate in procurement processes designed to promote innovation, influence sustainable innovation outcomes (Uyarra et al., 2014; Kundu et al., 2020). Mining activities have been major contributors to economic development in many countries, with operations, whether small or large-scale, often posing environmental challenges and generating long-lasting waste impacts.

In Ghana, the mining industry's supply chain operations have had detrimental environmental impacts on the socioeconomic conditions of communities residing in mining-affected areas. Water pollution and land degradation caused by mining firms in southwestern Ghana have increased municipal water treatment costs and diminished arable land (Bansah, Dumakor-Dupey, Kansake, Assan, & Bekui, 2018). Furthermore, mining operations, involving the extraction, transportation, and utilization of non-renewable natural resources, have resulted in various ecological consequences. These include toxic reagent emissions, acid drainage, air quality degradation, habitat alteration, pollution, non-renewable resource depletion, landscape disruption, health and safety risks, heavy metal contamination, vegetation removal, farmland destruction, stream sedimentation, improper waste treatment, abandoned pits, and insufficient reclamation (Dong et al., 2019; Owusu, Bansah, & Mensah, 2019; Zolnikov, 2020; Roychowdhury, Roy, Zaman, & Mitra, 2019).

Environmental degradation linked to mining activities in Ghana primarily stems from inefficient operational practices, insufficient rehabilitation measures, physical degradation, and pollution-related issues (Bansah, Dumakor-Dupey, Stemn, & Galecki, 2018). The use of toxic

chemicals in mineral concentration processes further complicates the ecological challenges faced by many mines (Farjana, Huda, Mahmud, & Saidur, 2019). These environmental concerns, coupled with a lack of effective control over mining activities, prompted the Ghanaian government to impose a ban on mining in March 2017. Despite numerous policies and initiatives aimed at addressing the environmental impact of mining, limited attention has been given to identifying best practices in environmental policy across the mining sector. Environmental concerns have increasingly led individuals, companies, communities, and governments to adopt precautionary measures (Bansah, Dumakor-Dupey, Kansake, Assan, & Bekui, 2018).

The study is anchored in two theoretical frameworks: the Theory of Constraints and Network Theory. The Theory of Constraints posits that every organization faces at least one bottleneck or limiting factor that affects its daily operations (Simsit et al., 2014). It asserts that the identification of the primary limiting factor(s) is crucial for an organization to achieve its objectives (Goldratt, 1992). To this end, organizations deploy systems and resources to address constraints that impact their performance (Goldratt, 2017). Network Theory provides a broader perspective on partner-partner connections and interactions within the environmental network of organizations (Salancik, 1995). It aids in understanding the interactions among employees and employers, both within and outside organizations (Katz, Ward & Heere, 2018). This theory focuses on enhancing cooperative relationships to help supply chain managers routinely assess individual node resources and their implications for sustainability and innovation outcomes, particularly in the mining sector.

Network Theory emphasizes the importance of building strong bonds among organizations and their members, promoting healthier buyer-supplier relationships, and fostering effective networks (Adjei -Bamfo et al., 2023). This study seeks to investigate how procurement management practices impact sustainability and innovation outcomes among mining firms in Ghana, drawing upon these theoretical frameworks

Statement of the Problem

Global mining has been facing significant challenges, including lower commodity prices and stricter environmental regulations (Olvera, 2021). This has led to a substantial decrease in the output of mining firms worldwide since the early 2000s (Tilton, 2014; Humphreys, 2020). Research indicates that global mining productivity declined by approximately 3.5 percent annually between 2004 and 2013, resulting in an overall reduction of nearly 30 percent during that period (Tilton, 2015). In response, mining companies emphasize the importance of innovation to enhance profitability and ensure the sustainability of their operations (Olvera, 2021). The mining industry holds a significant position in Ghana's economy, contributing significantly to revenue generation and economic expansion (Ministry of Lands and Natural Resources, 2010).

With over 90 percent of its revenue derived from gold production, the mining sector plays a vital role in Ghana's economic landscape. Ghana ranks as the second-largest gold producer in Africa and ninth globally. In 2011, the mining sector directly contributed 6 percent to Ghana's GDP, 27.6 percent to government revenue, and 38.3 percent to all corporation tax receipts (Aryee, 2012). Furthermore, from 2000 to 2008, the mining industry in Ghana

accounted for an average of 5.5 percent of GDP and 42 percent of all export goods (Peprah et al., 2016). Large- and small-scale mining activities in Ghana also employ a significant number of people, ranging from 28,000 to 1,000,000 employees (Barenblitt et al., 2021).

However, despite the substantial economic benefits derived from the mining sector, the Ghana Revenue Authority reported a decline in mining revenue in 2017–2018 and 2019 (Antwi et al., 2022). This decline could be attributed to various sustainability and innovation factors, such as inadequacies in technical and tender specifications during procurement, poor supplier relationship management practices, and political regime influences (Barenblitt et al., 2021). These factors pose significant threats to sustainability within the mining industry and the continued existence of mining firms (Antwi-Boateng & Akudugu, 2020). Furthermore, the lack of effective procurement management on sustainability and innovation issues could potentially impact the long-term profitability of mining firms (Abdulai, 2017; Bansah et al., 2018).

This underscores the necessity for mining firms to acquire knowledge and attach substantial importance to sustainability concerns (Osei et al., 2021). Additionally, mining firms in Ghana must contend with pressure from both the government and the local communities in which they operate, which may affect the sustainability and innovation of their production processes. Consequently, it is imperative for these firms to conduct regular surveys of their production processes (Kusi-Sarpong et al., 2016; Heinemann et al., 2022). In Ghana, several common factors influence procurement management regarding sustainability and innovation outcomes, including issues related to

technical and tender specifications, innovation risks, political regime influences, the competitive innovation conundrum, and supplier-relationship management, among others (Adjie-Bamfo et al., 2021).

Nevertheless, while some studies have been conducted on sustainability and innovation (Kundu et al., 2020; Adjei-Bamfo et al., 2021), none have thoroughly examined the extent to which procurement and sustainability impact the performance of Ghana's mining companies. Mining firms in Ghana are grappling with the challenge of achieving sustainability and innovation in their operations (Olvera, 2021). These firms source a wide range of equipment, technologies, and services from suppliers, both domestic and international. However, they have observed significant disparities in sustainability and innovation outcomes across their operations. The challenge lies in providing precise technical and tender specifications to their suppliers, which in turn affects their sustainability and innovation outcomes (Tilton, 2014; Humphreys, 2020).

Moreover, the dynamic nature of the mining industry, with its technological advancements, safety requirements, and evolving environmental regulations, exposes these firms to innovation risks that impact their sustainability and innovation outcomes (Peprah et al., 2016). The mining sector in Ghana is intensely competitive, and firms often grapple with the trade-off between cost competitiveness and innovation (Barenblitt et al., 2021). This competitive-innovation conundrum poses a significant challenge to their sustainability efforts and innovation outcomes. Additionally, Ghana's political landscape is characterized by variations that affect policies, regulations, and governance structures within the mining industry. The

influence of different political regimes on sustainability practices and innovation capabilities within these operations cannot be overlooked.

Interestingly, mining firms in Ghana have not thoroughly assessed the effectiveness of their supplier-relationship management practices in fostering sustainability and innovation outcomes (Barenblitt et al., 2021). Therefore, this study aimed to bridge the existing knowledge gap by examining the impact of procurement management on sustainability and innovation outcomes across Ghanaian mining enterprises.

Purpose of the Study

The study aimed to determine how procurement management affected innovation and sustainability among Ghanaian mining companies.

Research Objectives

The following objectives were developed to:

1. examine the effect of technical and tender specification on sustainability and innovations outcome,
2. assess the effect of innovation risk on sustainability and innovations outcome,
3. analyse the effect of a competitive-innovation conundrum on sustainability and innovations outcome,
4. assess how political regimes influence sustainability and innovations outcome and
5. analyse the effect of supplier-relationship management on sustainability and innovations outcome.

Research Hypothesis

To achieve the stated objectives, the following hypotheses were formulated:

H_1: technical and tender specifications significantly influence sustainable innovations outcome,

H_2: innovation risk significantly influences sustainability and innovations outcome,

H_3: competitive-innovation conundrum significantly influences sustainable innovations outcome,

H_4: political regime significantly influences sustainability and innovations outcome and

H_5: supplier-relationship management significantly influences sustainability and innovations outcome

Significance of the Study

This study will help to identify the specific procurement management on sustainability and innovation practices appropriate to be used by the mining firms in Ghana. As a result, this study will inform policy makers as it will provide a new and a better understanding of procurement management on sustainability and innovation practices and their effect in firm performance of the mining firms in Ghana. This will help the management of these organisations to make informed and constructive decisions to implement efficiently the procurement on sustainability and innovation practices in the aspect of technical and tender specifications, innovation risk, supplier-relationship management, competitive-innovation conundrum and political influence on the operations of the firms.

Additionally, businesses would learn a lot about procurement management, sustainability, and innovation outcomes to help them enhance their operational performance. The result of this study would contribute to

current literature since the study will extend existing knowledge within the area of procurement management on sustainability and innovation. Finally, this will provide as a resource or guide for future researchers as they seek out more suitable theories to apply to their research on the effects of procurement management on innovation and sustainability results.

Delimitations of the study

The goal of this study was to determine how procurement management affected sustainability and innovation outcomes among Ghanaian mining companies registered with the Ghana National Chamber of Commerce and Industry (GNCCI) (2016) and the Association of Ghana Industries (AGI) in 2019. Both commercial and artisanal gold mining companies in Ghana were the focus of this investigation. Due to the huge concentration of these businesses in Ghana, this occurred. As a result, all other types of mining companies were not included in this study, including unlicensed and illegal small and medium-scale gold mining companies as well as the mining of manganese, bauxite, and diamonds, among other minerals.

Limitations of the study

Only commercial and artisanal gold mining companies in Ghana were included in this analysis. As a result, this study only considers these types of mining enterprises in Ghana when drawing conclusions and making suggestions. The work did not disaggregate the mining firms from the local Once more, the study's use of closed-ended questionnaire items limited the information that respondents provided. Non-responses, incomplete questionnaires, and lack of information preparedness all had an impact on the study. It is important to highlight that due to these restrictions, data cleansing

assisted in identifying and eliminating all erroneous and irrelevant data, making the study's conclusions credible.

Definition of Key Terms

Procurement Management: The practice of managing a company's processes for acquiring the commodities, services, and labour it needs to function is known as procurement management.

Sustainability: The triple bottom line, or sustainability, refers to a balance between economic support, environmental improvement, and social responsibility (Walker *et al.*, 2012).

Innovation: The introduction of new goods or services or improvements in organizational technology all fall under the umbrella of innovation (Adjie-Bamfo *et al.*, 2021).

Technical and Tender Specification: The technical and tender specification is done by the buying organization which gives suppliers with a description of the goods or services requested to allow them present the most suitable and appropriate solution or products at the best feasible price all other things being equal.

Innovation Risk: Innovation risk refers to the probability of any event or occurrence happening, that may affect an innovation process at a given rate or time.

***Competitive- Innovation Conundrum*:** This is the situation whereby there is competition in the procurement process of the buying firms when potential suppliers are being offered an equal chance of selection (Adjei-Bamfo *et al.*, 2021)

***Political Regime*:** Political regime is where most of the activities and decisions on sustainability and innovation are influenced by the Government in power based on the political characteristics of the political party (Dalpé, 1994; Dolfsma & Seo, 2013).

***Supplier-Relationship Management*:** This is the process whereby buyers and suppliers and other key procurement actors in the supply chain have a close relationship and interact with each other. (Adjei-Bamfo *et al.*,2021).

CHAPTER TWO

LITERATURE REVIEW

Introduction

The literature in regard to the study's research goals was covered in-depth in this chapter. The chapter does, however, presented the study's guiding theories and detailed the study's conceptual framework and empirical review which are analysed to explain these problems and variables. This study aims to investigate the impact of procurement management practices on innovation and sustainability among Ghanaian mining companies. The topics covered in this chapter include: theoretical review, conceptual review, empirical review, conceptual framework and finally ends with the chapter summary.

Theoretical Review

Due to the importance of fulfilling the study's goals, the theory of constraints and the network theory served as its foundations. In order to show how the two hypotheses linked to the study's research goals, they were discussed in this section.

Theory of Constraints

Eliyahu Goldratt's book "The Goal," which is focused on assisting organizations in identifying problems and solving them, served as the inspiration for the development of the Theory of Constraint. This theory operates under the presumption that every organization has at least one bottleneck or limiting factor that affects its day-to-day operations (Simsit et al., 2014). It was also underpinned by the theory that the key to determining the success of an organization is to identify the main limiting factor(s) faced by the organisation (Goldratt, 1992). The primary aim of every organisation is

to achieve its objectives (Simsit et al., 2014). They deploy systems and resources that are intended for the execution of organizational activities in response to at least one constraint that has an impact on an organization's performance (Goldratt, 2017).

Being the weakest component of any system, a limitation will ultimately have a detrimental impact on the sustainability and innovative results or output of every firm. Therefore, according to the theory of constraints, limitations can be divided into four basic categories: physical, policy, paradigm, and market (Goldratt, 2017). The physical aspect of constraint includes all the tangible items which affect the performance of an organisation which includes a breakdown of machines and poor procurement practices among others in the organization (Grandzol & Grandzol 2018). Poor maintenance culture however leads to the breakdown of the machines (Wang, Shou, Wang & Wu, 2018). The shortages of raw materials on the other hand are caused by poor procurement practices caused by the procurement professionals and poor buyer-supplier relationship which causes delays in the supply of the raw materials (Liu, Shang, Lirn, Lai & Lun, 2018).

On the other hand, choices or directions made about a firm's operational activities without consulting the main specialists involved fall under the category of policy constraints (Jin, Hyder, Elkassabgi, Zhou & Herrera, 2009). Political factors like government rules, which concentrate on the procedures, and union agreements, which are the main focus, have an impact on innovation when not addressed (Atnafu & Balda, 2018). Poor procurement performance may also result from unfavourable policies, regulations, and directives that interfere with corporate operations or activities

(Abd Karim, Nawawi & Salin, 2018). The paradigm constraint focuses on the rooted habits and beliefs which affect sustainability and innovation among firms. These include organisational culture, political influence and buyer-supplier relationship management among others (Moktadir, Ali, Mangla, Sharmy, Luthra, Mishra & Garza-Reyes, 2018).

Last but not least, the market limitation comprises subpar procurement procedures and unfavourable market circumstances, including but not limited to high inflation and other factors (Benton & Kim, 2020). The theory of constraints further assumes that it necessitates the implementation of appropriate decisions, strategies, or policies in order to continuously enhance organizational systems (Goldratt, 2017; Onursal, Birgün & Mzrak, 2018). Therefore, the theory of constraints laid the groundwork for methodical, clear-cut, and long-lasting structures to address the many limitations that face organizations. (Bhowmik & Ray, 2015; Orouji, 2016; Goldratt, 2017; Benton & Kim, 2020). It is presumptive that the main methods of overcoming constraint are through individuals, groups, or businesses adopting and putting into practice well established rules and procedures (Goldratt, 2017; Benton & Kim, 2020).

In this case, sustainability and innovations outcome can be achieved by eradicating all the constrain and rather increase the value created in the process of creating detailed tender and technical specification and establishing a healthier buyer-supplier relationship among others through the supply chain. When improperly addressed, procurement management on sustainability and innovation outcomes restrictions have the potential to negatively impact the entire performance of the businesses under study and result in exorbitantly

unneeded expenses (Bogers et al., 2017; Adjei-Bamfo *et al.,* 2023). The mining industry has contributed significantly to Ghana's economy over the past few decades, with gold accounting for over 90% of the sector's output and making up an average of 5.5 per cent of the country's Gross Domestic Product (Aryee *et al.*, 2012).

Hence, failure to manage its procurement management on sustainability and innovation will adversely affect these firms and the economy at large. The theory of constraints hereby suggests that the mining firms in Ghana can overcome the sustainability and innovation constraints by implementing appropriate managerial policies and procedures such as effective technical and tender specification and developing healthier buyer-supplier relationship management among others.

Network Theory

The network theory assists in providing a broader partner-partner connections and interactions among the various environmental network of organisations (Salancik, 1995). This theory also helps players of various organizational settings to understand the personal interactions of its employee and employer's interactions within and outside the organisations (Katz, Ward & Heere, 2018). The relationship between or among people, groups, and organizations is frequently studied using the network theory. This theory is concentrated on providing appropriate understanding in supply chain cooperation or interorganizational relationships. This promotes strong ties among supply chain participants, including suppliers and purchasing organizations, among others (Shipilov & Gawer, 2020).

The theory places a strong emphasis on developing cooperative relationships to help supply chain managers carefully and routinely assess the individual node resources and their implications on sustainability and innovation outcome in order to establish an effective network among organizations, particularly in the mining sector. Again, the network theory further emphasizes on providing improved understanding in aiding organisations or members and also, ensures that, there is a strong bond among them through building a healthier buyer-supplier relationship among other factors (Adjei -Bamfo *et al.*, 2023). Since the pool of resources may result in waste and redundancy, which will prevent the development of a resilient supply chain, this helps to forge long-term partnerships among members (Nyamah, Jiang, Feng & Enchill, 2017; Zaid, Jaaron & Bon, 2018).

Since an organization's performance depends on cooperation with relevant partners in a supply chain rather than just its resources (O'Connor, Lowry & Treiblmaier, 2020; Opoku *et al.*, 2020), the relevance of network theory for this study is to provide foundations for the mining firms in Ghana to understand the need to build a cooperative relationship with key partners relevant to improving their performance. Therefore, it is crucial that mining companies in Ghana properly manage procurement in terms of sustainability and innovation, including technical and tender specifications, the competitive-innovation conundrum, and good supplier relationship management, among other things, in order to foster strong bonds between the major players in the supply chain, as stressed by network theory.

Procurement Management

In this section, the study went into great detail about the procurement management concept and related literature. The majority of fields now regard procurement management as a science as it is on the increase. There isn't a single, universal definition of procurement management, and it typically varies depending on the researcher. Procurement management is the process of acquiring goods, services, or works from an external source, often through a bidding process (Russell & Thukral, 2003). It involves identifying procurement needs, developing procurement strategies, selecting suppliers, negotiating contracts, and managing supplier relationships. Effective procurement management help organizations to reduce costs, improve quality, and increase efficiency (Mello et al., 2017). It is an important aspect of project management, particularly for large-scale projects that require significant resources and involve multiple stakeholders.

Procurement management is a critical component of supply chain management that involves the planning, sourcing, purchasing, and controlling of goods and services needed by an organization to achieve its goals and deliver value to its stakeholders (Baker et al.,2016). Effective procurement management plays a crucial role in an organization's success, as it directly impacts cost control, quality assurance, supplier relationships, and ultimately, the ability to meet customer demands and achieve strategic objectives (Bodnar & Hopwood, 2004). Organizations identify the right suppliers and negotiate favorable terms and conditions to ensure a reliable supply of goods and services. Strategic sourcing involves evaluating supplier capabilities, assessing

market conditions, and optimizing supplier relationships to achieve cost savings and quality improvements (Carter & Narasimhan, 1996; Weele, 2010).

Procurement management entails defining the procurement strategy, establishing procurement objectives, and developing a detailed plan that outlines the procurement process, timelines, and resource requirements (Mello et al.,2017). It also involves risk assessment and mitigation strategies. Procurement managers carefully select suppliers based on criteria such as cost, quality, reliability, and compliance with ethical and sustainability standards (Xie, 2016). Supplier evaluation and performance monitoring are ongoing processes to ensure suppliers meet contractual obligations (Walker & Philips, 2009). Contracts are essential for outlining the terms, conditions, and expectations of both the buyer and the supplier (Olvera, 2021). Effective contract management involves drafting, negotiating, executing, and monitoring contracts to ensure compliance and manage risks.

Procurement managers are responsible for managing procurement costs, which includes not only the purchase price but also various associated costs such as transportation, inventory carrying costs, and procurement process expenses (Edquist et al., 2015). Ensuring the quality of procured goods and services is crucial to meet customer expectations and avoid defects or product recalls. Quality standards and inspection procedures are established and adhered to. Procurement managers identify, assess, and mitigate risks associated with the supply chain, such as supplier disruptions, geopolitical factors, and market volatility (Adjei Bamfo et al., 2021). Developing risk mitigation plans is essential to maintain continuity. Organizations increasingly focus on ethical and sustainable procurement practices. This involves ensuring

suppliers adhere to ethical standards, labour practices, and environmental regulations to minimize negative social and environmental impacts.

Building and maintaining strong relationships with suppliers is vital for long-term success. SRM involves collaboration, communication, and continuous improvement efforts to enhance supplier performance and innovation. Procurement management benefits from the use of technology such as procurement software, e-procurement platforms, and data analytics (Adjei Bamfo et al., 2021). These tools help streamline processes, improve decision-making, and enhance visibility into procurement operations. Effective procurement management contributes to cost reduction, risk mitigation, improved supplier relationships, and overall supply chain resilience (Uyarra et al., 2014; Kundu et al., 2020). It also aligns procurement practices with an organization's strategic objectives, including sustainability and innovation goals. As such, it is a critical function for organizations seeking to thrive in today's competitive business environment.

Procurement Management Practices

Procurement Management practices refer to the set of processes and procedures that organizations follow to acquire goods, services, or works from external sources (Abdulai, 2017). Procurement management practices encompass a range of activities and strategies aimed at efficiently acquiring goods and services while maximizing value, minimizing risks, and ensuring compliance with regulations and ethical standards (Bansah et al., 2018). These practices are crucial for organizations to achieve their goals and maintain a competitive advantage. These practices include procurement planning, supplier selection, contract negotiation, contract management, supplier

relationship management, strategic sourcing, cost control, quality assurance, risk management and ethical procurement (Osei et al., 2021). Procurement planning involves identifying procurement needs and developing a procurement strategy that aligns with organizational goals and objectives (Adjie-Bamfo et al., 2021).

Supplier selection involves identifying potential suppliers, evaluating their capabilities, and selecting the most suitable supplier based on criteria such as price, quality, and delivery time (Kundu et al., 2020). Contract negotiation involves negotiating the terms and conditions of the contract with the selected supplier, including price, payment terms, delivery schedule, and quality standards (Adjei-Bamfo et al., 2021). Contract management involves monitoring supplier performance, ensuring compliance with contract terms, and managing any disputes or issues that may arise (Osei et al., 2021). Supplier relationship management involves developing and maintaining positive relationships with suppliers, including regular communication, feedback, and collaboration to improve performance and achieve mutual benefits (Olvera, 2021).

Strategic sourcing is the process of identifying, evaluating, and selecting suppliers for goods and services (Edquist et al., 2015). It is a critical function for any organization, as it has a significant impact on costs, quality, and efficiency. Strategic sourcing is a long-term approach to procurement that focuses on building relationships with suppliers and developing mutually beneficial partnerships (Adjei Bamfo et al., 2021). It involves identifying the organization's needs, developing a sourcing strategy, and executing that strategy. Cost control is the process of identifying and managing costs in order

to achieve organizational goals (Kumi et al., 2020). It is a critical function for any organization, as it has a significant impact on profitability and sustainability. Quality assurance (QA) is a process for ensuring that products or services meet customer expectations and requirements (Humphreys, 2020). It is a systematic approach to identifying and preventing defects in products or services.

QA are applied to any type of product or service, from manufactured goods to software to healthcare services. Risk management is the process of identifying, assessing, and controlling risks (Tilton, 2014). It is a critical function for any organization, as it helps to protect the organization from financial losses, reputational damage, and other negative consequences. Ethical procurement is the process of acquiring goods and services in a way that is fair, responsible, and sustainable (Tilton, 2015). It is a critical function for any organization, as it has a significant impact on the environment, society, and the economy. Effective procurement management practices help organizations to reduce costs, improve quality, increase efficiency, and enhance stakeholder satisfaction. It is an essential function of supply chain management and project management, particularly for organizations that rely heavily on external resources to meet their business needs.

Technical and Tender Specification

A technical specification is a document that describes the technical requirements for a product or service (Uyarra et al., 2014, 2020). It is used by buyers to evaluate suppliers and to ensure that the products or services they purchase meet their needs. A tender specification is a document that describes the requirements for a tender, or bid, for a product or service (Edquist et al.,

2015). It is used by buyers to solicit bids from suppliers and to evaluate those bids. Both technical specifications and tender specifications are important documents that can have a significant impact on the success of a procurement process (Yeow et al., 2015). By carefully drafting these documents, buyers can ensure that they get the best possible products or services at the best possible price.

Innovation Risk

Innovation risk is the risk of failure associated with the introduction of new products, services, or processes (McCrudden, 2004). It is a complex risk that can be difficult to assess and manage. Innovation risk refers to the potential negative consequences and uncertainties associated with efforts to develop and implement new products, services, processes, or technologies (Kusi-Sarpong et al., 2019). Innovation offers significant benefits, including increased competitiveness, growth, and profitability, it also comes with inherent risks that organizations must navigate (Kundu et al., 2020).

Competitive-Innovation Conundrum

The competitive-innovation conundrum refers to the challenge that companies face when trying to balance the need for competitiveness in the market with the need for innovation (Mello et al., 2017). On one hand, companies must strive to stay ahead of their competitors and maintain a strong market position (Baker et al.,2016). This often involves focusing on efficiency, cost reduction, and incremental improvements to existing products or services. Innovation is crucial for long-term success and growth (Russell & Thukral, 2003). It involves taking risks, exploring new ideas, and developing breakthrough products or services that can disrupt the market. However,

innovation can be costly, time-consuming, and uncertain in terms of outcomes. Finding the right balance between competitiveness and innovation is a complex task.

Companies need to allocate resources effectively, foster a culture that encourages creativity and risk-taking, and continuously adapt to changing market dynamics (Adjei-Bamfo et al., 2021). It requires careful planning, strategic decision-making, and a willingness to embrace both short-term gains and long-term vision. Ultimately, companies that successfully navigate the competitive-innovation conundrum can achieve sustainable growth, differentiate themselves from competitors, and create value for their customers (Uyarra et al., 2014).

Political Regimes

Political regimes refer to the types of government systems that exist in different countries (Weele, 2010). There are several types of political regimes, including democracy, authoritarianism, totalitarianism, monarchy, and others. Democracy is a system of government in which power is held by the people, typically through elected representatives (Bodnar & Hopwood, 2004). It is characterized by free and fair elections, the rule of law, protection of individual rights and freedoms, and a separation of powers between different branches of government. Authoritarianism is a system of government in which power is concentrated in the hands of a small group or an individual (Baker et al.,2016). It is characterized by limited political freedoms, lack of transparency and accountability, and a disregard for human rights.

Totalitarianism is an extreme form of authoritarianism in which the government seeks to control all aspects of society and individuals' lives (Mello

et al., 2017). It is characterized by a single-party system, a cult of personality around the leader, and the use of propaganda and violence to maintain control. Monarchy is a system of government in which a monarch, typically a king or queen, holds absolute power. It is characterized by hereditary rule and a lack of democratic institutions (Russell & Thukral, 2003). The type of political regime in a country can have significant implications for its citizens' lives, including their access to basic rights and freedoms, economic opportunities, and overall well-being.

Supplier-Relationship Management

Supplier-relationship management (SRM) is the process of managing interactions and relationships with external suppliers to achieve business objectives (Bodnar & Hopwood, 2004). It involves developing a collaborative and mutually beneficial relationship with suppliers to ensure that they meet the organization's needs effectively and efficiently. Effective SRM is crucial for organizations that rely on external suppliers to provide goods or services (Mello et al.,2017). By building strong relationships with suppliers, organizations can reduce costs, improve quality, and increase innovation. SRM also helps to improve supply chain visibility, mitigate risks, and enhance supplier performance. The SRM process typically involves several stages, including supplier selection, contract negotiation, performance monitoring, and continuous improvement.

It requires effective communication, trust, and transparency between the organization and its suppliers. To implement an effective SRM program, organizations should have a clear understanding of their suppliers' capabilities, strengths, and weaknesses (Xie, 2016). They establish clear performance

metrics and goals and regularly assess supplier performance against these metrics. Overall, effective SRM helps organizations to build a competitive advantage by leveraging the strengths of their suppliers and developing strong partnerships that drive innovation and growth (Carter & Narasimhan, 1996; Weele, 2010).

Sustainability

The term sustainability is regularly well-thought-out to be ambiguous with different meanings given to it (Adjie-Bamfo *et al.,* 2023). The term is used interchangeably depending on the purpose and the interest at a time. The different views and interest vary from academic, government, suppliers and buyers (Vermeulen, 2018). There has been a notion that experiment and conclude on a sequence modification towards ecology, reasonably since it suggests businesses as an avenue to trade-off economic expansions with ecological fundamentals and essentials (Braulio-Gonzalo & Bovea, 2020; Cerin & Dobers 2006). According to the Sustainable Development Goals (SDGs) of the United Nations, sustainable development entails safeguarding the environment from negative human impact, preserving community livelihoods, and fostering fair and reasonable economic and societal development over the long term.

In addition, it entails preserving the wealth of the present generation without jeopardizing that of future generations (Adjie Bamfo *et al.,* 2023). The triple bottom line, or sustainability, refers to a balance between economic support, environmental improvement, and social responsibility (Walker *et al.,* 2012). In addition, a recent study on sustainable supply management by Léon-Bravo *et al.* (2021) supports a broad understanding of sustainability that

covers topics like the ancestors' cultural values of local suppliers and producers. From the foregoing, it is clear that there are various perspectives on sustainability, which together form the basis of the demand for innovative goods. These various perspectives on sustainability have also formed the basis of the innovative product demands that advance modern business strategy, as advanced by the buyer-user rationale. (Sharma *et al.,* 2020).

Depending on current organizational expectations and pressures, sustainability may also be required in opposition to the various supply chain phases, that is from downstream to upstream (Léon-Bravo *et al.,* 2021). Therefore, conflicts between an organization's social, economic, and environmental aims are caused by the different ways that innovation and sustainable development are understood and applied (Zartha Sossa *et al.,* 2020).

Innovation

The term innovation encompasses of the introduction of new product or services or advancement in an organizational technology (Adjei Bamfo *et al.,* 2023). Several strategic decisions are incorporated in its outcome that are basically implemented by management of organisations which enhances the achievement of the improved goals and objectives of the firm, irrespective of the increase in operational processes and success in a product market that comes along with it. (Goodale *et al.,* 2011). Product innovation and process innovation are the two main broad approaches of innovation outcomes that this study will focus on (Prajogo, 2016). Product innovation refers the process whereby completely new products or services are made to reproduce which results in changes in the final products of an organization (Prajogo, 2016).

In the same study, it was discovered that process innovation, on the other hand, includes adjustments to the organizational setup or structure that produce their final goods or services as a result of using new technology, adjusting to changes in their business environment, or creating new internal practices, among other things (Prajogo, 2016). Product innovation focuses on how many new items a company introduces to the market, when it does so, how quickly it produces these new products, how fresh they are, and what cutting-edge technology advancements were used in the production of the new products (Goodale *et al.*, 2011).

On the other hand, process innovation places a greater emphasis on a company's technological attractiveness, responsiveness to adopt the most recent technology to improve its operational procedures, and the types of technology employed in its production processes (Adjei Bamfo *et al.*, 2023). The same study made note of the fact that both product and process innovation may be radical, which entails the use of new technology to target brand-new markets, or incremental, which involves building on current technological knowledge for continual development.

Sustainable Innovation

According to Boons and Lüdeke-Freund (2013) and Penate-Valentin *et al.* 2021) sustainable innovation is the result of intra- or inter-organizational relations connecting business models and ideas with new or improved product ideas and technologies to achieve sustainable goals. The phrase has a broader application in the domain of new product development by individual businesses, which includes achievements in raising industrial-level environmental and operational requirements for businesses to support

increased social and environmental sustainability in the business context (Bohnsack *et al.,* 2020; Zartha Sossa *et al.,* 2020).

Zartha Sossa *et al.,* (2020) further suggested through their study that improving environmental sustainability involves life-cycle assessments of production processes, adopting efficient and effective waste disposal methods, reducing material usage and cost, reducing energy resource consumption, and also adopting strategies as part of the production process to be environmentally responsible throughout the different stages of a product's lifecycle. Businesses must use their purchasing power to pressure suppliers they do business with to provide environmentally sustainable goods and services and to adhere to socially responsible behaviour standards in order to comply with Sustainable Development Goal 12, which places a strong emphasis on sustainable production and consumption patterns (Adjei-Bamfo *et al.*, 2023; Adjei-Bamfo *et al.,* 2019).

Despite its benefits and favourable effects on organizational production as well as overall total performance, new technologies aiming at sustainable innovation are not always adopted by enterprises, according to the most recent literature from an inter-organizational point of view (Smink *et al.,* 2015; Bohnsack *et al.,* 2022).

Empirical Review

Technical Innovation Capacity and Tender Specification

Studies have shown and demonstrated that most purchasing organizations frequently have low technical competence, and the mining industry is no exception. As a result, the quality of tender specifications may be influenced, which may hinder suppliers' ability to respond sustainably

(Iossa *et al.*, 2018; Milios, 2018). Due to this circumstance, the majority of chosen empirical research incorporates a multi-stakeholder level into their study (Adjei-Bamfo *et al.*,2021). In contrast to the usage of outcome-based specifications, Uyarra *et al.* (2014) highlighted instances and examples in which purchasers of organizations either limit or over-specify tenders. Due to the technical nature of the required products and services, buyers are often unable to establish appropriate procurement methods and criteria to elicit a certain response from suppliers, which has an impact on the outcome (Whyles *et al.*, 2015; Askfors & Fornstedt, 2018).

Additionally, most purchasing organizations frequently limit their procurement processes to conventional procedures, criteria, and standards, among others, which may have little bearing on the technical and tender specifications and interfere with the production of the necessary results in achieving the desired innovation outcomes (Adjei Bamfo *et al.*, 2021). The study also found that when suppliers are unable to react to tenders and actively participate in the procurement process, the mention of uncertainty is counterproductive to innovation. Contrarily, tender specifications impede numerous suppliers and numerous purchasing organizations that are experiencing financial difficulty (Aschhoff & Sofka, 2009).

Tender specifications can be prepared based on inputs, ideas, and conclusions from the suppliers in relation to the respective industry, therefore taking into consideration a potential innovative outcome, in order for these obstacles to be removed from the procurement procedures (Adei-Bamfo *et al.*, 2021). From the foregoing, it can be inferred that there is a need for early and close communication with industry suppliers as technology title holders,

which will increase the buyers' technical understanding (Uyarra *et al.,* 2014; Zelenbabic, 2015). As an illustration, Hekkert *et al.,* (2021) used the Dutch Ministry of Defence's purchase of textiles with post-consumer recycled content to highlight the significance of pre-procurement consultations that set tender specifications. Therefore, the following hypothesis was developed to be tested:

H_1: technical and tender specifications significantly influence sustainable and innovations outcome.

Innovation Risk

Innovation-related risks in the corporate environment can have an influence on both organizations and their customers (Uyarra *et al.,* 2014). Unsuccessful bids, being unable to satisfy client tastes and preferences, not reaching production standards, failing to fulfil deadlines, and failing to recoup money invested are some of these hazards (Adjei-Bamfo *et al.,* 2021). Therefore, it may be claimed that the majority of purchasing organizations frequently shift these risk factors to their suppliers (Uyarra *et al.,* 2014; Davis & Brady, 2015; Bao *et al.,* 2019). These incidents have been happening in most buying institutions, with the exception of those that have adopted, implemented, and used a risk management framework, such as the Forward Commitment Procurement program in the UK's health sector, where both buyers and suppliers used this idea to manage and share risks through a collaborative process (Georghiou *et al.,* 2014; Whyles *et al.,* 2015).

In cases where these buying organizations have a risk-averse culture, the impact of procurement on sustainability and innovations is low (Adjei-Bamfo *et al.,* 2021). Measures like seeking bid-security and pre-funding of

projects from suppliers are suggested in situations where suppliers desire to control and reduce potential agency difficulties (Penate-Valentin *et al.*, 2021). The efficiency of risk control procedures that ensure that cutting-edge products from supplier companies are fulfilled allows for the attainment and calculation of sustainability standards such as carbon emission rates and energy usage (Selviaridis, 2020; Penate-Valentin *et al.*, 2021).

When the measures put in place discourage resource-strapped small firms that lack established niche markets, guaranteed prices, and commitments to participation in the procurement process, procurement on sustainability and innovations practices may not produce as much innovation as intended by firms (Agerstrand *et al*., 2015). Furthermore, according to Dalpé (1994), "innovation risks are lowered if the firm is assured an initial market and if its invention may gain an edge in follow-up contracts. In their study, Uyarra *et al.*, (2014) found that "suppliers in the construction industry and research and development (R&D) organizations viewed management of risk to be a serious concern.

This is due to the fact that the majority of suppliers devote a significant amount of time, energy, and money to research and development, but may not be able to afford or finance the majority of one-off contracts if the contract's worth is not as enticing (Davis & Brady, 2015). However, in order to effectively and efficiently manage alleged risks in procurement related to sustainability and innovation, suppliers must be encouraged by the purchasing organization to invest in the development of sustainable, innovative products. Additionally, procurement agencies must adopt and implement procurement methods like forward commitment procurement, which undoubtedly

articulates both their current and future needs and may even guarantee suppliers a share of future niche markets through (Whyles *et al.*, 2015).

Studies on Procurement and sustainability and innovation outcomes appears to be scanty especially in developing countries like Ghana. Therefore, the following hypothesis was developed to be tested:

H_2: *innovation risk significantly influences sustainability and innovations outcome.*

Competition-Innovation Conundrum

Encouragement of competition among suppliers submitting bids for the same project is one of the key principles in procurement (Adjei-Bamfo *et al.*, 2021). The same literature also argued that competitive supplier selection was necessary to increase value among buying organizations. When competitive procurement also aims to serve the interests of the buying firms by giving each possible supplier an equal opportunity of selection, this is typically the situation (Adjei-Bamfo *et al.*, 2021). In addition to these benefits, it has been discovered that supplier engagement in procurement for sustainability and innovation is discouraged by the competitiveness in enterprises' procurement processes (Ding & Wolfstetter, 2011; Agerstrand *et al.*, 2015).

Additionally, in order to achieve innovation or new product development, investment in technology and operational process optimization, which is aided by non-competitive elements like commitments from buyers and cohesion among a small number of members within the supply base, are part of the fundamental requirement (Choi & Krause, 2006; Adjei-Bamfo *et al.*, 2021). Through their research, Agerstrand *et al.*, (2015) found that when supplier companies compete for contracts without any assurance that they

would win, they are less motivated and inspired to develop. In order to determine how the European Organisation for Nuclear Research's procurement practices affect innovation, more than 100 interviews were performed. Due to the significant cost and risk associated with sustainable innovation, small and emerging businesses have found it less appealing (Smink *et al.* 2015).

On the other hand, in order to encourage innovation, the uncertainty of locating a niche market and the forfeiture of resources and capital must be addressed through nurturing, encouraging interaction and idea sharing, and establishing new supply networks of few members with a wide range of experiences and expertise (Adjei-Bamfo *et al.*, 2021). For instance, in the Spanish context, a framework known as the competitive dialogue process is intended to improve the exchange of information and interactions among key players in the supply chain, such as technical consultants, firm buyers, and potential suppliers, in order to negotiate the innovation design (Ntsondé & Aggeri, 2021). However, the development of linkages and cohesion with the mining sector procurement plays a more substantial role in their capacity for innovation, especially in the case of small regional enterprises under economic hardship (Aschhoff & Sofka 2009).

The study, therefore addresses this gap by hypothesising that Competitive -Innovation Conundrum significantly influence sustainable innovations outcome among mining firms in Ghana. Therefore, the following hypothesis was developed to be tested:

H_3: *competitive-innovation conundrum significantly influences sustainable innovations outcome.*

Supplier Relationship Management

Since it denotes a tight connection and relationship between buyers and suppliers as well as other important procurement actors throughout the supply chain as a whole, supplier relationship management is a crucial area to concentrate on in terms of sustainability and innovation practice (Adjei-Bamfo *et al.,* 2021). Other research supported the idea that successful sustainability and innovation depend on close communication and collaboration among the procurement actors (Rothwell, 1994; Schiele, 2020). This topic has been covered both upstream (at the level of the supply network) and downstream (at the level of buyers and suppliers) (Adjei-Bamfo *et al.,* 2021). The same studies also revealed that the connection between supply and demand has a substantial impact on the dynamics of innovation.

Inadequate purchaser and supplier chain connection is one of the main obstacles preventing the circular economy and innovation impact of procurement sustainability and innovation among mining enterprises (Uyarra *et al.*, 2014; Alhola *et al.*, 2019). There is insufficient capacity for engagement with potential suppliers regarding desired novel products and services due to the structure of current procurement processes in supply chain industries, such as the mining sector (Adjei-Bamfo *et al.*,2021). The same study also found that, in the mining industry, a partnership connection between buyers and suppliers facilitates clear communication about expectations for new goods and services as well as adjustments to buyer requirements, among other things.

Before a contract is awarded, effective buyer supplier selection procedures, all other pertinent selection criteria, and mutual agreement on all interests must be agreed upon and must be in the best interests of both sides.

Suppliers that want to work with buying organizations like the mining industry must take into account their relational orientation as a deciding element (Schiele, 2020). Therefore, it follows that ineffective procurement management undermines sustainability and innovation outcomes and exposes suppliers to market risk in the mining industry (Adjei-Bamfo *et al.*, 2021). The current business climate is highly uncertain, which exposes a number of risk concerns, including an increasingly competitive market, advances in technology, and changes in customer sustainability demand preferences (Aschhoff & Sofka, 2009; Askfors & Fornstedt, 2018; Bag *et al.*, 2018).

Because of the aforementioned risk, it is exceedingly difficult for supply chain actors to independently operate sustainably and profitably at the same time (Adjei-Bamfo *et al.*, 2021). The report also stated that supplier firms must establish networks to communicate with one another and their suppliers in order to fulfil new social and environmental criteria and to increase sustainability capabilities. Additionally, the connection between specific target suppliers and their tiers of suppliers affects how procurement management affects sustainability and innovation outcomes (Bag *et al.*, 2018). In a nutshell, the benefits produced by new product knowledge and new sustainability standards attained by important suppliers, which are subsequently carried to other supply networks, can be used to improve the innovation performance of the buyer's whole supply base (Florio *et al.*, 2018). Therefore, the following hypothesis was developed to be tested:

H_4: supplier-relationship management significantly influences sustainability and innovations outcome.

Political Regime

Since the majority of the activities and decisions made by the mining industry, among other industries, are being influenced by the government in power, the political context of a country must be taken into consideration, especially in developing countries like Ghana (Dalpé, 1994; Dolfsma & Seo, 2013). The political ideologies of the ruling political party have an impact on this (Adjei-Bamfo *et al.,* 2021). For instance, the government in power in Ghana has instructed the Gold Fields Company and other mining firms to first consider hiring locals from the area where the mining firm is located before opening it to the general public whenever there is a need for employment, even though the firms are not owned by the government.

The mining industry buyers aim to diversify their interest and so push alternative political agendas given the majority of multi-party governance systems have a limited term, as discussed above in the competition-innovation dilemma section (Adjei-Bamfo *et al.*, 2019; Adjei-Bamfo *et al.*, 2021). As a result, another government may not necessarily provide the same assistance, services, and expertise to mining enterprises committed to sustainability and innovation results to help with the transformation inspired by sustainability (Gee & Uyarra, 2013). The aforementioned characteristics then reveal two crucial consequences for sustainability and creativity (Adjei-Bamfo *et al.*, 2021). Mining companies suffer as a result of political parties' tendency to adopt broad and divergent political agendas at odds with one another (Ignatieve *et al.*, 2015).

Second, these dynamic dynamics influence innovation and sustainability by influencing the mining organizations' buying practices. The

risk management strategy used, the level of supplier interaction currently in place, and the procurement methods used, such as single sourcing, restricted or competitive tendering, will all ultimately encourage formal communications and interactive learning opportunities for suppliers and other supply chain actors to improve their capacities for sustainable innovation (Warland & Mayer, 2017; Bag *et al.*, 2021; Schiele, 2020). Therefore, the following hypothesis was developed to be tested:

H_5: political regime significantly influences sustainability and innovations outcome

Conceptual framework

A conceptual framework is a visual representation of numerous concepts combined to show the link between or among study's dependent and independent variables (Bandyopadhyay & Srivastava, 2020). This framework was created to specifically describe how the independent variables relate to one another (Technical and tender specification, innovation risk, competitive innovation conundrum, political regime and supplier-relationship management) and the dependent variable (sustainability and innovations outcome).

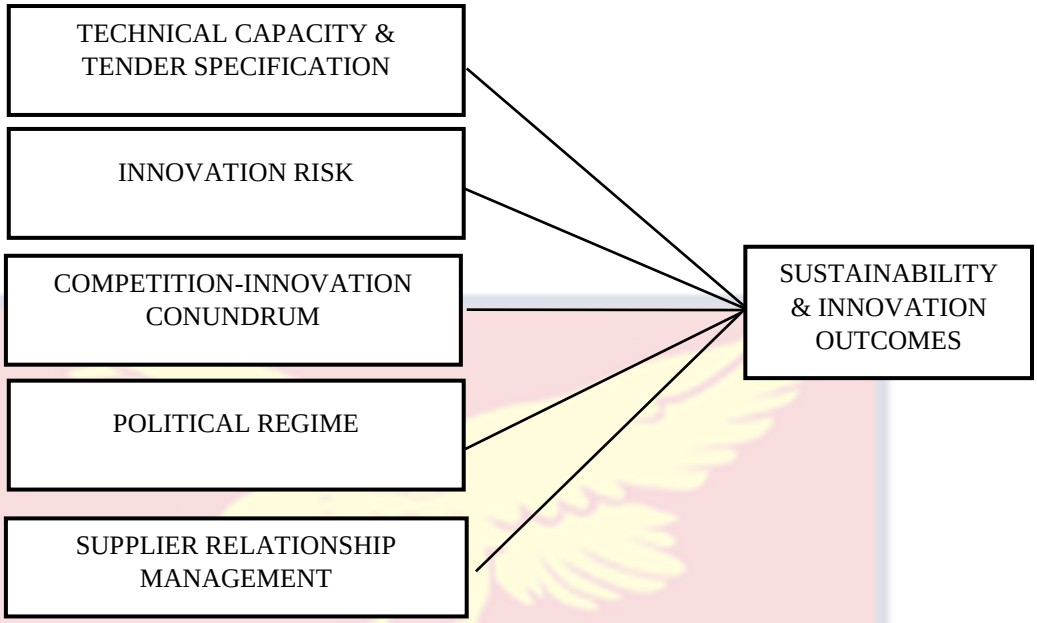

Figure 1: Conceptual Framework on Procurement Management Practices on Sustainability and Innovation Outcomes
Source: Adapted from Adjei-Bamfo *et al.* (2021)

Figure 1 shows how the independent variable (procurement management) predicts how much the dependent variable (outcomes for sustainability and innovation) will vary (Saunders & Lewis, 2007; Zikmund, Carr & Griffin, 2013; & Adjei-Bamfo *et al.*, 2021). This implies that the sustainability and innovation outcomes of mining firms studied is dependent on any variation caused by the procurement management practices which include technical and tender specification, innovation risk, competition-innovation conundrum, political regime and supplier-relationship management. Further, these procurement variables have an effect on the sustainability and innovation outcomes among mining firms in Ghana.

Additionally, using the non-linearity and interdependency of the systems of innovation approach, it can be seen that the relationship between competitiveness and innovation and suppliers' sustainability capacity and willingness to innovate through procurement management may be mediated (Adjei-Bamfo *et al.*,2021). This suggests that the sustainability and

innovation outcomes across the mining enterprises under study can alter as a result of a unit in procurement management. Reviewing relevant literature by authors such as Aryee *et al.* (2012); Kusi-Sarpong *et al.* (2016); Peprah *et al.* (2016); Mello *et al.* (2017); Famiyeh *et al.*, (2017); Olvera and Moore (2021); Oliveira *et al.* (2021); Adjei-Bamfo et al (2022).

The framework, however, was created to offer a visual representation of the relationship between procurement management and sustainability and innovation among Ghanaian mining companies.

Chapter Summary

The chapter examined relevant literature to provide a stronger explanation for generalization and to corroborate the study's conclusions. The theory of constraints and network theory served as the study's foundation. Additionally, discussions of concepts, an empirical review, and a conceptual framework for the study were offered in this chapter. The study's research methodology is the chapter that comes after this one.

CHAPTER THREE

RESEARCH METHODS

Introduction

The impact of procurement management practices on sustainability and innovation among Ghanaian mining companies is investigated in this study. On the other hand, this chapter described the research techniques used to carry out the fieldwork in accordance with the study's goals (that is, the field of study and the methodological procedures). Bell, Bryman and Harley (2018) claim that conducting research enables decision-makers to gather knowledge about organizations, economies, or other ambiguous areas. The research philosophy, research approach, research design, study area, population, sampling procedure, data source and type, data collection instrument, data collection procedure, data processing and analysis, validity and reliability, and ethical considerations were all specifically covered in this chapter.

The chapter concludes with a discussion of pre-testing, data collection techniques, validity and reliability, data analysis techniques, and field problems.

Research Philosophy

The fundamental presumptions that support the researcher's study approach and methods make up the theory of science. A research philosophy, also known as a research paradigm, is a set of assumptions, viewpoints, or perceptions that support an investigation (Sapkota, 2019). Therefore, it is essential to take careful measures while selecting the research philosophy that is thought to be better suitable for a particular research approach (Kumar, 2019). Saunders, Lewis and Thornhill (2020) and Kivunja and Kuyini (2017)

both assert that research theory has something to do with how knowledge is produced and what knowledge really is. The social constructivist and positivist or objectivist paradigms were suggested as research paradigms in the same study.

Positivism is the research paradigm used for this investigation. Positivism is a philosophical perspective that puts an emphasis on experience and scientific understanding of natural events. The positivist paradigm also presupposes that objectivity is devoid of people's perceptions and less prone to yield false results (Irshaidat, 2019). This means that science is about testing hypotheses through deductive reasoning and research findings, regardless of whether the hypothesis supports or refutes the evidence. Therefore, the positivism paradigm develops a theory to support the data gathered through science (Creswell & Clark, 2017). Due to its assumptions, which help quantitative research methods provide reliable results, the study concludes that positivism is a more acceptable paradigm to embrace (Opoku, Ahmed & Akotia, 2016).

Research Approach

Given that the quantitative approach allows for the use of quantitative techniques for data analysis, which aids in the generalization of results or conclusions, it was chosen for this study (Saunders *et al.*, 2020). This method is used to gather data on research that aim to look at cause-and-effect correlations (Creswell & Creswell, 2014). The scientific process used to derive logical and useful conclusions from numerical information characterizes the quantitative approach (Creswell & Creswell, 2014). It was reasonable to utilize a quantitative technique in this study to help establish or

investigate the causal linkages between the specified procurement management and innovation outcomes among Ghanaian mining companies.

Despite the criticisms levelled at the quantitative approach for failing to take into account people's perspectives, behaviours, views, and beliefs and for being rigid and creating numerical numbers to represent information and data hoarding artificially (Traverso *et al., 2018*). It incorporates the principles and standards of positivism in particular as well as the natural scientific model, and it embodies the idea that social reality is an objective external reality (Brannen, 2017). As a result, the research goals of this study allow for the use or adoption of this strategy to examine how procurement management practices (technical and tender specifications, innovation risk, competition-innovation conundrum, political regime influence, and supplier relationship management) affects sustainability and innovation outcomes among Ghanaian mining firms.

Research Design

According to Creswell and Creswell (2017), selecting the right research design depends on the research approach that is used for the study. The broad strategy and tenets that direct a researcher to respond to study questions are described by Saunders, Lewis and Thornhill (2009) as the research design. De Vaus (2001) defines research design as a coherent grouping of techniques used by researchers to gather, analyse, and present their results. For this study, an explanatory research design was used. This is because the explanatory design offers a better grasp of a certain topic to aid in drawing conclusions that are intended to be objective (Ghauri *et al.*, 2020). According to Saunders *et al.* (2020), the explanatory design may gather and

analyse a significant amount of data using both descriptive and inferential statistical tools.

In order to conduct this study, the researcher goes beyond merely outlining the specifics of the problem or circumstance in order to investigate and explain why or how the event under study actually occurs. Therefore, explanatory research aims to explain events by identifying and quantifying their causal relationships. In some contexts, this is known as a causal study design (Saunders *et al.,* 2007). In addition to explaining and discussing the underlying causes and the nature of the interactions between dependent and independent variables, explanatory analysis also includes descriptive aspects. It is therefore suitable to investigate how procurement management affects innovation and sustainability results in Ghanaian mining companies. Despite its flaws, critiques regarding its failure to include respondents' perspectives and objections regarding how much time it takes to collect data, this design is preferable to alternative research approaches (Monllor & Murphy 2017).

Study Area

This study was carried out in the mining sector of the Ghanaian economy. The mining sector is basically owned by private companies with the government having a little share in it (Kusi-Sarpong *et al.,* 2016). The sector is responsible for the extraction of resources mainly by mining taking into consideration measures that will aid in preserving the environment, making it safe for human and animal inhabitants (Peprah *et al.,* 2016). This sector is made up of six main minerals extraction in Ghana namely: gold, diamond, manganese, oil, natural gas and bauxite. Each of these sectors play a vital role in the Ghanaian economy as gold alone employs between 28,000 and

1,000,000 people in large and medium-scale mining respectively (Barenblitt et al.,2021).

The sector also helps in proving the industrial performance and contributes a greater percentage to Ghana's tax earnings, Gross Domestic Product and job creation (Emmanuel et al., 2018; Akyea, S.A. 2022). In contrast, Ghana's gold mining companies have made significant contributions to knowledge creation, skill development, tax revenue generation, and employment creation (Peprah *et al.*, 2016). The study also proposed that Ghana is the ninth-largest producer of gold worldwide and the second-largest producer in Africa. Over 90% of the mining industry is devoted to the production of gold (Peprah *et al.*, 2016). Additionally, the industry directly generated an average of 38.3% of Ghana's total corporation tax revenue, 27.6% of the government's revenue, and 6% of the country's GDP in 2011. (Mantey et al., 2012).

Minerals Commission (2021) report shows that the majority of the gold mining firms are located in the Western, Ashanti, Bono and Ahafo Regions of Ghana. For the purpose of this study, the registered and licenced gold mining firms (both the commercial and the artisanal (Galamsy) were chosen. The number of firms selected is enough for generalization on the findings of the study. The political regime in Ghana plays a significant role in shaping the mining industry. The government's policies, regulations, and stability impact the operating environment for mining firms. It is important to analyze the political landscape, including the legal framework, government support, and potential risks or challenges that may arise from changes in the political regime.

Mining firms in Ghana face the challenge of balancing competitiveness and innovation. They need to find ways to stay competitive in the market while also fostering innovation to drive sustainable growth. This may involve optimizing operational efficiency, cost reduction strategies, and incremental improvements, while also investing in research and development for technological advancements and sustainable practices. Effective supplier relationship management is crucial for mining firms in Ghana. They rely on suppliers for various inputs, equipment, and services necessary for mining operations. Managing relationships with suppliers involves selecting reliable partners, negotiating contracts, monitoring performance, and fostering collaboration. It is important to establish clear communication channels, address any issues promptly, and ensure compliance with ethical and sustainability standards.

Mining firms in Ghana need to carefully define technical and tender specifications to ensure efficient procurement processes and successful project execution. This includes specifying the technical requirements for equipment, machinery, and services needed in mining operations. Tender specifications should be well-defined, transparent, and aligned with industry standards to attract qualified suppliers and promote fair competition.

Population

A collection of people having the same or comparable characteristics over time is referred to as the study's population. Burns and Grove (2010) define a population as the complete group of people who satisfy the criteria for a research sample. It also includes any people or objects that often share a common, unifying quality or aspect (Bhattacherjee, 2012). The study focused

on Ghana's registered and licensed commercial and artisanal gold mining companies. Procurement Managers, Operation Managers, Stores and Warehousing Managers, Logistics Managers, Safety Managers, and Inventory Supervisors of the Ghanaian gold mining companies make up the study's population.

Table 1: Total Population

Mining Firms	Total number
Commercial mining firms	14
Artisanal miners	1418
Total Sample Size	1432

Source: (Minerals Commission, 2021)

From Minerals Commission (2021) report, the total number of Commercial mining firms are 14 whereas the total number of Artisanal firms are 1,418. In terms of percentage, Commercial mining firms in Ghana amounts to only 1 percent whereas the remaining 99 percent are Artisanal mining firms.

Sample Size

The study used Krejcie and Morgan's (1970) sample size determination table to select the sample. All fourteen (14) commercial mining firms were selected for the study. Out of the total population of artisanal firms considered, a total two hundred and nine (209) were sampled. Data were collected from these two hundred and nine (209) and fourteen (14) mining firms.

Sampling Procedure

Sampling is described by Babbie (2010) as the process of choosing a portion of the population to represent the entire population. Similarly, Anthony-Krueger and Sokpe (2006) viewed sample as a representative portion

of a population. Thus, sampling helps the researcher to sample a relatively small number of population units and collect data that could be representative of the study's entire population or population. Based on the purpose of this study, a probability sampling design was deemed appropriate and was employed for the current study. Furthermore, a sampling technique used in the sampling design is the stratified sampling technique. A stratified random sampling technique was used to select the number of respondents from the sampling frame.

Stratified sampling is a probability sampling procedure in which the target population is first separated into mutually exclusive, homogeneous segments (strata), and then a simple random sample is selected from each segment (stratum) (Sekaran & Bougie, 2016). The samples selected from the various strata are then combined into a single sample. This sampling procedure is sometimes referred to as "quota random sampling (Saunders et al., 2016). For all elements of the population, the target population was defined to start the stratified sampling procedure, the stratification variables were identified to determine the number of strata to be used for the study. The stratification variables were related to the purposes of the study. The study made subgroup estimates based on the stratification variables which were related to the subgroups.

The availability of auxiliary information often determines the stratification variables that are used. More than one stratification variable was used for the study. However, in order for the study to provide expected benefits, the was related to the variables of interest and be independent of each other. The existing sampling frame was identified and developed which

included information on the stratification variable(s) for each element in the target population. The sampling frame included all information on the stratification variables. The sampling frame was evaluated for under coverage, over coverage, multiple coverage, and clustering to make adjustments where necessary. The sampling frame was divided into strata, categories of the stratification variable(s), to create a sampling frame for each stratum. Within-stratum differences were minimized, and between-strata differences were maximized.

The strata constituted the entire population. The strata were independent and mutually exclusive subsets of the population. Every element of the population was in one and only one stratum. A unique number was assigned to each element in the strata. A sample size was determined for each stratum. The numerical distribution of the sampled elements across the various strata determined the type of stratified sampling that is implemented. The study used proportionate stratified sampling to select the sample size. In proportionate stratified sampling, the number of elements allocated to the various strata is proportional to the representation of the strata in the target population (Saunders et al., 2016). That is, the size of the sample drawn from each stratum is proportional to the relative size of that stratum in the target population.

As such, it is a self-weighting and EPSEM sampling procedure (Sekaran & Bougie, 2016). The same sampling fraction is applied to each stratum, giving every element in the population an equal chance to be selected (Saunders et al., 2016). The resulting sample is a self-weighting sample. This sampling procedure is used when the purpose of the research is to estimate a

population's parameters (Saunders et al., 2016). The study randomly selected the targeted number of elements from each stratum. At least one element was selected from each stratum for representation in the sample, and at least two elements were chosen from each stratum for the calculation of the margin of error of estimates computed from the data collected. This is also a necessary condition for predictive research (Creswell, 2014). Table 2 presents the proportional stratified sampling.

Table 2: Sample distribution

Mining Firms	Total number	Percentage	Sample Size
Commercial mining firms	14	0	14
Artisanal miners	1418	99	209
Total Sample Size	1432	100	223

Source: Author's Sample (2021)

Data Source and Type

Primary data was used for this study's objectives. The rationale behind this was to give readers enough of debate space so they could learn more about the issue at hand and the several contributing factors. Primary data was the responses the researcher received from respondents on the ground by distributing the questionnaire in order to request the anticipated data for the analysis. The key data for the analysis were the survey results that were obtained from the respondents through the distribution of interviews. For the current study, the researcher used primary data, and a questionnaire was chosen as the survey method.

Data Collection Instrument

Instruments for gathering data include techniques and methods for fact-finding. Additionally, it describes how the researcher(s) measured the

study's variables while gathering the data (Creswell & Creswell, 2017). For this investigation, a structured questionnaire was used. A structured questionnaire is a set of questions with predetermined answers that a respondent must answer in order to offer the precise information desired rather than an individual's opinion (Creswell & Creswell, 2017). A systematic questionnaire had to be used because statistical methods were being used. Saunders *et al.* (2020) added that the use of a structured questionnaire can enable the collection of a sizable amount of information or its accumulation over time.

Portions A, B, C, and D make up the four sections of the data gathering instrument. Questions about the history of the mining enterprises taken into consideration for the study were included in Section A. Section B provided 26 question items, including 7 on technical and tender specifications, 6 on innovation risk, 4 on the competitive innovation conundrum, 5 on supplier relationship management, and 4 on political regime as procurement management practices, in order to address the research questions posed in the introductory chapter. In addition, Section C included a list of seven questions that might be used to gauge how well the mining corporations under study were doing in terms of sustainability and innovation.

Finally, the questionnaire's Section D comprised six question items that provided information on the genders, ages, educational backgrounds, positions held within the company, and other demographic details of the important responders. The question items in Sections B and C were organized on a 5-point Likert scale, with 1 denoting the least agreement and 5 the maximum. According to Korkut-Altuna and Arslan (2016), a Likert scale enables

respondents to supply information that the researcher or researchers can strongly rely on to reach conclusions and make recommendations.

Data Collection Procedure

Before the data was gathered, an authority letter was received from the head of the Department of Procurement and Supply Chain Management at the University of Cape Coast, and copies of it were given to all the mining companies under investigation. All residents were asked for their consent in the letters that were sent. The heads of the various institutions gave their approval before the data collection tool (structured questionnaires) was provided to these companies. The data collection period was 30 days, from Monday, November 1, 2022, to Wednesday, December 7, 2022. Despite the difficulties encountered throughout the data collection exercise (some respondents' busy schedules, reluctance to submit information, organizational policies and procedures, etc.), the exercise was completed within the allotted time.

Since it was difficult to find the locations of the other 6 businesses, only 226 out of the 232 questionnaires that were sent out were ultimately successful. However, 3 of the 226 administered surveys were disregarded since the data these respondents gave was insufficient. In conclusion, the statistics were accurate given that 226 made up 97.5% of the total sample size of 232. An appropriate response rate, according to Stedman, Connelly, Heberlein, Decker, and Allred (2019), shouldn't be lower than 50%. A response rate for a study shouldn't be less than 60%, according to Rubin and Babbie (2016). Furthermore, Halbherr (2017) suggested that a study's response rate should only be above 80% and 70%, respectively. Since it exceeded the

appropriate response rates suggested in the literature, the response rate for this study was sufficiently acceptable.

Operationalisation of Key Variables

This section shows how the researcher measured the study's variables to aid in achieving the study's goals. The measuring items for each of the study's variables were determined by the researcher after a thorough and lengthy investigation of the literature. The study's dependent variable was Sustainability and Innovation outcomes with Technical and Tender Specification, Innovation Risk, Competitive-Innovation Conundrum, Political Regime and Supplier Relationship Management served as the independent variables. Table 3 shows the items used to measure each of the study's variables including relevant sources.

The measurement items shown in Table 3 were chosen based on a thorough analysis of the relevant literature. Uncertainty exists on how accurately the measurement items represent the study's variables. Pretesting was done on the majority of the mining companies in Ghana in order to determine whether or not these indicators are relatively adequate to measure the variables.

Table 3: Measurement Items

Variables	Measurement items	Sources
Technical and Tender Specification	Tender Document Requirement, Terms of a Contract, Quality Requirement Specification, Clear and Precise Specification, Competitive Bidding Process and Reasonable Deadlines for Submission of Tender	Iossa *et al.* (2018); Milios (2018); Askfors and Fornstedt (2018)
Innovative Risk	Risk Sustainability Standard Control Measures, Risk Management Framework, Risk averse Cultural Procedure, Research and Innovation Procedure and Risk Mitigation Measures.	Georghiou *et al.* (2014); Whyles *et al.* (2015) and Iossa *et al.* (2018)
Competitive-Innovation Conundrum	Competitive Supplier Selection, Competitive Procurement Process and Information Flow	Åberg and Bengtson (2015); Adjei Bamfo *et al.* (2023); and Ntsondé and Aggeri (2021)
Supplier Relationship Management	Firm Structure, Relationship Management, Communication Management, Mutual Understanding and Agreement to the terms of a Contract	Uyarra *et al.* (2014); Alhola *et al.* (2019); Tessaro *et al.* (2020) and Adjei Bamfo *et al.* (2023)
Political Regime	Change of government in Power, Government influence on Sustainability, Dynamic forces of Political Parties, Government support on Sustainability and Innovation	Dolfsma & Seo (2013); Gee & Uyarra, (2013); Åberg and Bengtson (2015) and Adjei Bamfo *et al.* (2023);
Sustainability and innovation	Environmental Protection, Eco friendly Procurement Culture, ISO Certification Standard Procurement Process, New Product, Service and Technological Development.	Adjei Bamfo *et al.* (2023); Léon-Bravo *et al.* (2021); Braulio Gonzalo and Bovea, (2020); Kundu *et al.* (2020); Zartha Sossa *et al.* (2021) Prajogo (2016) and Maloreh-Nyamekye (2019)

Source: Field Survey (2022)

Validity

The consistency with which an instrument measures the traits and attributes that are intended to be measured is referred to as reliability (Fraenkel

& Wallen, 2001). The level of a measurement that is free from bias, consistent, and stable over time, as well as the use of the instrument being consistent when employed in different research, are all examples of measurement reliability (Ab Talib et al., 2013). Pre-testing of the study tools was done among Ghanaian mining companies to make sure that high-quality data gathering tools were used during the fieldwork phase. In light of this, 52 responders were chosen. Any questions, issues, or discrepancies the respondents may have with any part of the draft questionnaire have been discussed by the researcher and the respondents in detail. After that, respondents were given time to complete and return the questionnaire to the researcher.

The researcher and supervisor compiled the responses and carefully examined them. Uncertain statements were removed thanks to the pre-test, especially from the Likert items. Because they were repeated elsewhere, certain statements were completely eliminated. Cronbach Alpha was used to conduct a reliability test, and the results (a= 0.821) show that the instrument was incredibly accurate and consistent. The Cronbach coefficient alpha must be at least 0.7 even if the value of 0.6 is still deemed adequate (Hair *et al.*, 2010). Reliability is a metric that shows if a measurement tool is appropriate for the task at hand. All essential alterations and fixes were made prior to the data collection. The questions that the respondents answered during the actual data collection showed a consistency in their answers.

According to Crawford & Henry (2004), an instrument is legitimate if it accurately serves the intended function and measures the variables it was designed to measure. Validity demands that the conclusions drawn by the

researcher from the facts gathered be suitable, understandable, and valuable. The researcher seeks some type of evidence that the chosen procedure has produced false results. A thorough investigation of the instruments was done to look for inconsistencies. Before going on the field, the researcher gave the supervisor the tools so they could check them for consistency and dependability.

Reliability Analysis

The degree to which a scale is free from random error or how consistently it yields the same findings after repeated measurements is known as its reliability (Kent et al., 2009; Phylad et al., 2013). The degree to which each item on a scale measures an underlying construct was determined using the internal consistency metric Cronbach Alpha (Phylad et al., 2013). Individual consistency reliability needs to be at least 0.7. From the Table 4, the Cronbach alpha for the variables; Technical and Tender Specification (TTS), Innovation Risk (IR), Competition Innovation Conundrum (CIC), Supplier Relationship Management (SRM), Political Regime (PR) and Sustainability and Innovation Outcomes (SIO) ranged from 0.688 to 0.870. This suggests that all measurement scales and constructs employed in the study were accurate.

However, for the construct CIC, not all indicators fully represented the variable with the exception of three indicators. Thus, indicators that reliably measured CIC were CIC1, CIC2, CIC4. But for all the other variables all the indicators reliably measured the construct.

Table 4: Reliability Analysis

Variable	Cronbach Alpha
Technical and Tender Specification	.870
Innovation Risk	.843
Competition Innovation Conundrum	.688
Supplier Relationship Management	.753
Political Regime	.809
Sustainability and Innovation Outcomes	.834

Source: Field Data (2022).

Data Processing and Analysis

Survey data must be processed, sorted, coded, error-checked, and mathematically computed (Sekaran, 1985; Zikmund et al., 2013). Before undertaking statistical analysis, Blumberg *et al.* (2008) argued that editing, sorting, and coding are necessary to check and validate flaws in raw data. Before data is coded and transported to data storage procedures, for example, data editing and sorting operations are important for assessing and correcting data for accuracy, omissions, and consistency (Blumberg *et al.*, 2008). Additionally, data editing is done to verify each questionnaire's accuracy and each respondent's eligibility. On the other side, the coding procedure is utilized to recognize and classify each response with its corresponding numerical symbols and scores (Zikmund *et al.*, 2013).

Additionally, data screening and cleaning are done to make sure the data that needs to be coded is complete and consistent (Tabachnick & Fidell, 2001). These procedures, in line with Tabachnick and Fidell (2001) and Hair, Ringle, and Sarstedt (2011), improve the precision of data analysis while guaranteeing that the underlying presumptions of data analysis methods are upheld. They continued by saying that ensuring data accuracy is crucial for

validating out-of-the-ordinary responses, means, standard deviations, and values for believability. In order to code the data, which is necessary in quantitative research, each statement from the questionnaire was given a number. To make sure there were no errors, the data was edited and cleansed. This was accomplished by determining whether or not entries had been doubled by using basic descriptive statistics like minimum and maximum.

Then, the IBM SPSS Statistics version 26 software tools were used to process the coded data. Following data processing, descriptive tools, including frequencies, percentages, means, standard deviations, and inferential tools, were used to analyse the data. Prior to responding to the research questions, the study's demographic features of the respondents were more carefully analysed utilizing frequencies and percentages. After satisfying basic assumptions related to multicollinearity, reliability, and validity, the study's research objectives were addressed utilizing the linear regression method. The following chapter addressed and met these basic hypotheses.

Ethical Consideration

Ethics entails adhering to negotiated moral conduct rules as well as accepted norms (Strydom, De Vos, Fouche & Del port, 2005). The Department of Marketing and Supply Chain Management at the University of Cape Coast asked for permission to visit the gold mining locations in an introduction letter. By providing the respondents with background information so they could decide if they were interested, the study also ensured their full confidentiality and consent. The right to withhold any information that the respondents deemed private was extended to them. Some of the respondents were very busy at the time of visit and also, some were not willing to answer

the questionnaire because of some earlier experiences they have previously had.

The researchers made sure the respondents weren't negatively harmed physically or mentally before and after the trial and gave them the assurance that, their privacy was protected by utilizing the information just for the analysis. The researcher also made sure that those whose work was important for the analysis were appropriately remembered.

Chapter Summary

The research methodology for the study, including the research philosophy, research approach, research design, study area, population, sampling procedure, data collection instrument, data collection procedure, and study analysis, was provided and discussed in the chapter. However, the study used a quantitative methodology. Once more, the study used an explanatory research design to aid in achieving its research goals.

CHAPTER FOUR

RESULTS AND DISCUSSIONS

Introduction

This chapter focuses on the findings, interpretations and discussions of the results in relations to the study objectives and the relevant literature. The study focused on the effect of procurement management on sustainability and innovations outcome among mining firms in Ghana. The presentation entails descriptive statistics, reliability analysis, followed by regression analysis for each of the objectives. Two hundred and Twenty-Six (226) Questionnaires were administered but only 223 were fully filled and used for the study analysis. This represented 98.67% response rate.

Socio-Demographics of Respondents

The respondents' socio-demographics were evaluated in this section. Utilizing descriptive statistical methods like frequency and percentage, the results were measured in a descriptive manner. The results of the survey's demographic questions are shown in Table 5, which reveals that men made up the majority of respondents (61 percent), while women made up the remaining 39 percent. This demonstrates that men predominate in the procurement industry. The respondents' ages were also determined. According to Table 5, the majority (87.9%) of the respondents were between the ages of 25 and 40. The group of people between the ages of 41 and 49 came in second with a percentage of 9.9 percent. The age group of 50 to 59 years had the lowest percentage of participants. The findings showed that the majority of respondents were between the ages of 25 and 45, which is the active age range.

The educational qualification of the respondents was also assessed. Those with post graduate degree were in the majority with a percentage of 38.6%; those with HND had a percentage of 35.4%- and First-degree graduates were 26%. This shows that all the respondents had some sort of formal education in the field of procurement and therefore understand basic concepts used in the study. The professional membership of the respondents was further assessed the results in Table 5 indicated that out of the two hundred and twenty-three (223) respondents, majority (188) had professional qualifications. Out of this 188, 40.4% had CIPS professional membership, 24.5% had GIPS, 15.4% had ISM and 19.7% had other professional membership that was not listed in the questionnaire.

The positions the respondents occupy in their various companies was assessed. Production managers were in the majority with 32.3%, stores/warehouse managers were 55 (24.7%), operations managers were 34 (15.2%) and other managers that were not listed were 62 (27.8%). Number of years the respondents have worked in their respective fields were assessed. Majority (49.1%) of the respondents stated that they had worked in the field of procurement for 5 – 10 years. Eighty-four (38.5%) of the respondents had worked less than 5 years in the field of procurement. Also, 17 (7.8%) had worked for 11 – 15 years and 10 (4.6%) had worked for more than 15 years. The results show that majority are in the early years of their profession and may not have acquired a rich experience in the field of procurement but have all the same, some experience to be able to handle the research questionnaire.

Table 5: Socio-demographics of Respondents

Variable	Frequency	Percentage
Sex		
Male	136	61.0
Female	87	39.0
Total	223	100.0
Age		
18-40 years	196	87.9
41-49 years	22	9.9
50-59 years	5	2.2
Total	223	100.0
Education		
SSCE/WASSCE	9	4.0
HND/Equivalent	79	35.4
First Degree	49	22.0
Graduate Degree	86	38.6
Total	223	100.0
Professional Membership		
Ghana Institute of Procurement and Supply (GIPS)	46	24.5
Chartered Institute of Purchasing Supply (CIPS)	76	40.4
Institute of Supply Management (ISM)	29	15.4
Others	37	19.7
Total	188	100.0
Current Position		
Procurement Manager	72	32.3
Operations Manager	34	15.2
Stores/Warehouse Manager	55	24.7
Other managers	62	27.8
Total	223	100.0
Number of years worked		
Less than 5 years	84	38.5
5-10 years	107	49.1
11-15years	17	7.8
Above 15 years	10	4.6
Total	218	100.0

Source: Field Data (2022)

Demographics of Firms

This section assessed the demographics of the mining firms that were researched on. The results of these are shown in Table 6. The type of business ownership of the companies was assessed. The results showed that the majority 37.2% of the firms were state-owned, 36.3% were private-owned, 19.7% were partnerships and the remaining 6.7% were joint ventures. This implied that one-third of the mining firms were owned by the government. The age of the firms was assessed. Firms above 20 years were in the majority with a percentage of 43.5%. Those that were less than 5 years followed with a percentage of 32.3%. Other firms that were 5 – 10 years were 14.3%, firms that were 11 – 15 years old were 8.5% and those in that were 16 – 20 years were 1.3%. this showed that majority of the firms had been in existence for more than 20 years.

Finally, the number of employees these firms had were assessed. From Table 6, it shows that firms with employees less than 100 were in the majority with a percentage of 43.9%. this was followed by those with 100 – 300 employees. These were 26.5% and those with employees above 900 were 15.7%. lastly, firms with 601 – 900 employees and 301 – 600 employees were 9.4% and 4.5% respectively. This implied that though majority of mining firm have been in existence for over 20 years, they are classified as small firm according to the Ghana Enterprise Agency.

Table 6: Demographics of Mining Firms

Variable	Frequency	Percentage
Business Ownership		
Private-owned	81	36.3
State-owned	83	37.2
Partnership	44	19.7
Joint Venture	15	6.7
Total	223	100.0
Firm Age		
Less than 5 years	72	32.3
5-10 years	32	14.3
11-15 years	19	8.5
16-20 years	3	1.3
Above 20 years	97	43.5
Total	223	100.0
No. of employees		
Less than 100	98	43.9
100 – 300	59	26.5
301-600	10	4.5
601-900	21	9.4
Above 900	35	15.7
Total	223	100.0

Source: Field Data (2022)

Effect of Technical and Tender Specification on Sustainability and Innovations Outcome

This goal examined the impact of technical and tender specification on sustainability and innovation outcomes. In order to do this, a regression analysis was conducted, and the results were shown and described in the paragraphs that followed. Table 7 summarizes the results of the model with technical and tender specification as the independent variable and Sustainability and Innovations Outcome as the dependent variable. R, R squared, corrected R squared, and the standard error are shown in this table. The intensity and direction of the linear relationship between the dependent variable (Sustainability and Technical and Tender Specification) and the independent variable are shown by the Pearson product moment correlation

coefficient, or R. (Technical and Tender Specification). Table 7 shows that technical and tender specification, sustainability and outcome are all positively connected, with a moderately strong correlation (r = 0.503) between them.

Technical and tender specification has a weakly positive and significant link with Sustainability and Innovations Outcome in this relationship between technical and tender specification and Sustainability and Innovations Outcome. The amount of variation in the dependent variables brought on by the independent variable is described by the R Square. As a result, the study also shows that the independent variable (Technical and tender specification) accounts for 25.3% of the variation in the Sustainability and Innovations Outcome (as dependent variables). The residual accounts for the remaining 74.7 percent.

Table 7: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.503[a]	.253	.250	.51697

a. Predictors: (Constant), TTS

Source: Field Data (2022)

The test significance for R and R^2 using the F-statistic is provided in Table 8 (ANOVA table). Regression mean square (MSR) divided by residual mean square yields the F statistic (MSE). The independent factors are effective at explaining the variance in the dependent variable if the significance value of the F statistic is minimal (less than, say, 0.05). The -value in this analysis is significantly below.05 (0.001). The R and R^2 between the dependent and independent are therefore statistically significant, it can be said.

Table 8: ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	20.010	1	20.010	74.873	.000[b]
	Residual	59.063	221	.267		
	Total	79.073	222			

a. Dependent Variable: SIO
b. Predictors: (Constant), TTS
Source: Field Data (2022)

Understanding the regression equation is aided by the information in the table labelled coefficients in the SPSS output (Table 9). The researcher can provide the regression equation for sustainability and innovation based on these findings. Based on Technical and tender specification. Y (Sustainability and Innovations Outcome) = 1.948 + 0.471TTS. The researcher can add the following information by using the slope and intercept values in the generated regression equation: According to the intercept, sustainable innovative results are at 19% when procurement professionals are aware of technical and tender specification, and according to the slope, every improvement in technical and tender specification would result in an increase in sustainable innovative outcomes by 47.1 percent.

Table 9: Coefficients[a]

Model		Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	1.948	.233		8.343	.000
	TTS	.471	.054	.503	8.653	.000

a. Dependent Variable: SIO
Source: Field Data (2022)

Effect of Innovation Risk on Sustainability and Innovations Outcome

This goal examined the impact of innovation risk on sustainability and innovation outcomes. In order to do this, a regression analysis was conducted, and the results were shown and described in the paragraphs that followed. Table 10 summarizes the results of the model with Innovation Risk as the independent variable and Sustainability and Innovations Outcome as the dependent variable. R, R squared, corrected R squared, and the standard error are shown in this table. The intensity and direction of the linear relationship between the dependent variable (Sustainability and Innovations Outcome) and the independent variable are shown by the Pearson product moment correlation coefficient, or R. (Innovation Risk). Table 10 shows that innovation risk, sustainability, and outcome are all positively connected, with a moderately strong correlation (r = 0.508) between them.

There exists a statistically significant, if slightly positive, association between Innovation Risk and both Sustainability and Innovations Outcome within the context of their connection. The amount of variation in the dependent variables brought on by the independent variable is described by the R Square. As a result, the study also shows that the independent variable accounts for 25.8% of the variation in the Sustainability and Innovations Outcome (as dependent variables) (Innovation Risk). The residual accounts for the remaining 74.2 percent.

Table 10: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.508[a]	.258	.255	.51520

a. Predictors: (Constant), IR
Source: Field Data (2022)

The test significance for R and R^2 using the F-statistic is provided in Table 11 (ANOVA table). Regression mean square (MSR) divided by residual mean square yields the F statistic (MSE). The independent factors are effective at explaining the variance in the dependent variable if the significance value of the F statistic is minimal (less than, say, 0.05). The -value in this analysis is significantly below.05 (0.001). The R and R^2 between the dependent and independent are therefore statistically significant, it can be said.

Table 11: ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	20.414	1	20.414	76.911	.000[b]
	Residual	58.659	221	.265		
	Total	79.073	222			

a. Dependent Variable: SIO
b. Predictors: (Constant), IR
Source: Field Data (2022)

Understanding the regression equation is aided by the information in the table labelled coefficients in the SPSS output (Table 12). The researcher can provide the regression equation for sustainability and innovation based on these findings. Based on Innovation Risk outcome. Y (Sustainability and Innovations Outcome) = 2.519 + 0.404IR. The researcher can add the

following information by using the slope and intercept values in the generated regression equation: According to the intercept, sustainable innovative results are at 25% when procurement professionals are aware of innovative risk, and according to the slope, every improvement in innovative risk would result in an increase in sustainable innovative outcomes by 40.4 percent.

Uyarra *et al.* (2014), Bao *et al.* (2019), and Selviaridis (2020) all provided support for this. They were of the view that sustainability standards such as carbon emission rates and energy used can be attained and calculated as a result of the effectiveness of risk control measures that ensure that innovative products from supplier firms are met.

Table 12: Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	**Std. Error**	**Beta**	**T**	**Sig.**
1	(Constant)	2.519	.166		15.150	.000
	IR	.404	.046	.508	8.770	.000

a. Dependent Variable: SIO
Source: Field Data (2022).

Competitive-Innovation Conundrum on Sustainability and Innovation Outcome

Regressive analysis was used to determine how far the dependent variable (Sustainable Innovations Outcome) can be predicated or explained by the independent variable (Competitive-Innovation Conundrum). This objective was evaluated by linear regression. First, the results of Table 13 revealed that the predictor (Competitive-Innovation Conundrum) and Sustainable Innovations Outcome (r=0.426) were moderately positive. In addition, the predictor in the model accounts for 18.2% variation in Sustainable Innovations

Outcome. The determination coefficient (r-square=0.182) justified this. This results in the higher level of sustainable innovative outcomes. It also implies that the variance of sustainable innovative outcomes of 81.8% percent is explained by other factors not included in this model.

Table 13: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.426[a]	.182	.178	.54115

a. Predictors: (Constant), CIC
Source: Field Data (2022).

As stated in Table 14, the ANOVA results were computed to determine whether the model was statistically significant. It was determined that the model was statistically significant (p=0.000: p0.05). Since this prediction is a result of the scientific interaction between the model's components and not by chance, the model can be used to make accurate predictions about the influence of the Competitive-Innovation Conundrum on sustainable inventive results. Additionally, the Competitive-Innovation Conundrum's effects on long-term innovative outcomes were to be assessed. Measurements were made of the significance level and standardised beta coefficients (p-value).

Table 14: ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	14.356	1	14.356	49.024	.000[b]
	Residual	64.717	221	.293		
	Total	79.073	222			

a. Dependent Variable: SIO
b. Predictors: (Constant), CIC
Source: Field Data (2022).

The findings (in Table 15) demonstrate that the Competitive-Innovation Conundrum made a statistically significant contribution to the prediction of a favourable 40.5 percent difference (Beta=0.426; p=0.000; p < 0.05). The contribution of this variable is therefore an important predictor of sustainable innovative outcomes. In previous studies, such as Aschhoff and Sofka (2009); Smink *et al.* (2015) and Ntsondé and Aggeri (2021), they found positive links between competition innovation and innovative abilities that are sustainable. The positive impact of Competitive-Innovation Conundrum was confirmed. The Competitive-Innovation Conundrum serves as the good basis for the whole procurement process.

Table 15: Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	**Std. Error**	**Beta**	**T**	**Sig.**
1	(Constant)	2.314	.236		9.812	.000
	CIC	.405	.058	.426	7.002	.000

a. Dependent Variable: SIO
Source: Field Data (2022).

Political Regime Influence Sustainability and Innovation Outcome

This section looked at the effect of Political Regime on Sustainability and Innovations Outcome. A regression analysis was done and results presented below. To measure the relationship between Political Regime and Sustainability and Innovations Outcome, the coefficient of determination (R^2) was used, explaining the proportion of variations in dependent variable (Sustainability and Innovations Outcome) as explained in the independent variable. In this study, the determination coefficient (R^2), which shows the

projected model to be 6 percent, is supported by political regime of a country, is demonstrated by Table 16.

Table 16: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.076[a]	.006	.001	.59645

a. Predictors: (Constant), PR
Source: Field Data (2022).

The Variance Analysis (ANOVA) was used to test the meaning of the link between the study variables. The findings of the ANOVA, are presented in Table 17, where the findings show that F-statistic had a value of 1.267 and P-value was 0.261. The obtained value of P (0.261) revealed that this value is above the 0.05 level, hence, the overall regression model is statistically not significant, or the variable (Political Regime) does not have a significant effect on the dependent variable (Sustainability and Innovations Outcome).

Table 17: ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	.451	1	.451	1.267	.261[b]
	Residual	78.623	221	.356		
	Total	79.073	222			

a. Dependent Variable: SIO
b. Predictors: (Constant), PR
Source: Field Data (2022).

Table 18 displays the political regime variable's regression coefficients. The results indicate that the constant (3.774) was statistically significant (p=0.000.05), which suggests that the Sustainability and Innovations Outcome would be 3.774 if one set the value of the independent variable to zero. It was also noted that the Political Regime of a country

investigated in the study does not significantly influence the Sustainability and Innovations Outcome. (t = 1.126, p= 0.261>0.05) The regression coefficient for the political regime (0.050) was not statistically significant. This demonstrates that an increase in a country's political system on a unit level will not lead to an increase in sustainability and innovation outcomes.

This finding is unpredictable with past examinations in which analysts have stated that political regime of a country has a negative effect on sustainable innovations (Gee & Uyarra, 2013; Warland & Mayer, 2017).

Table 18: Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	**Std. Error**	**Beta**	**T**	**Sig.**
1	(Constant)	3.774	.158		23.961	.000
	PR	.050	.045	.076	1.126	.261

a. Dependent Variable: SIO
Source: Field Data (2022).

Supplier - Relationship Management on Sustainability and Innovation Outcome

Regressive analysis was used to determine how far the dependent variable (Sustainability and Innovations Outcome) can be predicated or explained by the independent variable (Supplier - Relationship Management). This objective was evaluated by linear regression. According to Table 19, the correlation strength between the independent and dependent variables is shown by the value R. The correlation is very strong at 0.608. The R Square displays how much of the dependent variable can be accounted for and explained by the independent variable. In this instance, 37.0 percent of the

variance in the dependent variable may be accounted for by the independent variable. The better the relationship between supplier and buyer, the better innovative and sustainable outcomes are gotten from the procurement process.

Table 19: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.608[a]	.370	.367	.47480

a. Predictors: (Constant), SRM
Source: Field Data (2022).

The ANOVA table F ratio checks if the overall regression model fits the tested data. The independent variable (Supplier - Relationship Management) F (1, 221) = 129.755, p<0,0005 is statistically significant, and is a predictor of dependent variable (Sustainability and Innovations Outcome). The regression model therefore fits well with the data. These findings are shown in Table 20.

Table 20: ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	29.252	1	29.252	129.755	.000[b]
	Residual	49.822	221	.225		
	Total	79.073	222			

a. Dependent Variable: SIO
b. Predictors: (Constant), SRM
Source: Field Data (2022).

Unstandardized coefficient (B) shows how the dependent variable (Sustainability and Innovations Outcome), when all other factors are held in constant order, varies by the independent variable. Table 21 shows that the unstandardized coefficient is 0.726 with a mean $\mu < 0.05$. This suggests that an increase in Supplier - Relationship Management will increase Sustainability

and Innovations Outcome by 0.726 units. This result is statistically significant because the P value is less than 0.01. The study has shown that Supplier - Relationship Management has positive effects on Sustainability and Innovations Outcome. Schiele (2020), who observed that close cooperation and relationships among the procurement actors are essential for the achievement of sustainability and innovation, supports this.

This result is also consistent with Alhola *et al.* (2019), who contend that insufficient buyer and supplier chain contact is one of the main obstacles preventing mining enterprises from implementing the circular economy and innovation impact of procurement sustainability and innovation.

Table 21: Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	**Std. Error**	**Beta**	**T**	**Sig.**
1	(Constant)	.981	.262		3.742	.000
	SRM	.726	.064	.608	11.391	.000

a. Dependent Variable: SIO
Source: Field Data (2022).

Chapter Summary

The chapter assessed the findings of the study. The results were presented under various sub headings such as the socio-demographics of the respondents and the mining firms studied. The other sub headings were based on the research objectives. Regression was used to analyse the five objectives and it was found out that in objective one, technical and tender specification in the procurement process results in sustainable innovative outcomes. Objective two showed that when risk is been considered in the procurement process, it

improves sustainable innovations. Competition and innovation in the process also improves sustainable innovative outcomes. This was found in the objective three.

The objective four revealed that buyers having a close relationship with their suppliers help improve sustainable innovations. However, the last objective indicated that the political climate of a country does not have any effect in sustainable innovations in the procurement process. All these were back by previous literature.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Introduction

The goal of the study was to determine how procurement management practices affected innovation and sustainability among Ghanaian mining companies. The information in this chapter is related to the conclusions. Thus, the main research findings that served as the foundation for the conclusions drawn from this chapter are outlined. Finally, suggestions based on the findings were made. This study aims to evaluate how procurement management practices affects innovation and sustainability among Ghanaian mining companies.

Summary of Findings

Due to its objective, the study used a quantitative methodology and an explanatory research design. Data from 226 professionals in procurement in the mining industry were gathered using a standardized questionnaire, which served as the main collection tool. The collected data were coded, processed, and analysed using SPSS V.26 and descriptive statistics like frequencies and percentages as well as inferential statistics like regression. While inferential tools like regression were used to analyse the research objectives, the descriptive statistical tool was utilized to analyse the socio-demographics of the respondents and their companies. The outcomes were then displayed in tables in Chapter 4, but the key conclusions were outlined below.

In objective one, which assessed the effect of technical and tender specification on sustainable innovative outcomes, it was discovered that the technical and tender specification given in details in the procurement of goods,

services and works helps in more sustainable innovations in the procurement process. The study found out that when specifications are stated precisely and in details, more innovative and sustainable outcomes are birthed in the procurement process. Regarding the effect of innovative risk on sustainable innovative outcome for objective two, it was discovered that when risk management process is inculcated into the procurement process, yields better sustainable innovative outcomes. This is because, when risk identification and management is involved in the procurement process, professionals come out with innovative and sustainable ways of managing these risks.

The third research objective zeroed in on analysing the effect of competitive-innovation conundrum on sustainable innovation outcomes. The study made similar findings as the previous objectives. It was found that a procurement process that is competitive births sustainable and innovative outcomes at the end of the procurement process. It stated that the more competition is allowed in the procurement process, the more innovative and sustainable ideas are birthed.

The fourth research objective assessed the how the political regime of a country affects sustainable innovative outcomes. The study found out that the political climate of a country does not have any significant effect on sustainable outcomes in the procurement process. Thus, one political regime or another does not affect innovation and sustainability in the procurement process, though it might affect other variables in the procurement process.

The fifth objective sought to analyse the effect of supplier relationship management and sustainable innovation outcome. The study found out that when buyers manage their relationship with their suppliers, this helps develop

more sustainable innovative outcomes. This is because a good relationship with one's suppliers helps foster creative and sustainable ideas throughout the procurement process.

Conclusions of the Study

The study's goal was to determine how procurement management affected the results of sustainable innovation. The research findings led to the following deductions.

For the first research objective, the study's result practically implies that details for goods or services should be provided to aid in product development. That is to say that during product development, to aid parties in the process come out with sustainable innovative ideas, the concise and detailed specifications should be provided. Previous empirical studies have largely supported the outcome by stating that a proper specification provided influences the creation of sustainable and innovative ideas. The study concluded that to aid in coming out with goods or services that are innovative and sustainable, proper technical specification is needed.

The outcome has practical consequences for the administration of mining businesses, which was the second research purpose. This result indicates that the risks occurring during the innovation process have an effect on sustainable innovative outcomes. The study proved that risks help parties in the innovation process come up with innovative and sustainable outcomes. The study provided empirical evidence that trying to identify and manage risks in the process positively affects the creation of more sustainable innovative outcomes. The study, therefore, concluded that risk is important for the outcomes of the development process to be sustainable and innovative.

The study showed that competitive innovation has a significant positive effect on sustainable innovative outcomes with regard to the third research objective. The practical implication of this finding is that management should inculcate competition into the innovation process for outcomes to be sustainable and innovative. This is because competition in the innovative process helps breeds sustainable and innovative outcomes. Existing related literature has indicated that firms that incorporate competition in their innovation and procurement of innovation processes have supported this finding.

The fourth objective looked at how the political regime of a country affects sustainable innovative outcomes. The study found out that no matter what political regime is ruling the country, it has no effect on the sustainable innovative outcomes of the innovation process. The study implies that the political climate of a country does not prevent the creation of sustainable and innovative outcomes. Thus, the management of mining firms can create the environment for the creation of sustainable and innovative outcomes despite unfavourable political climates.

For the last objective, the study found that supplier relationship management influenced sustainable innovative outcomes positively. This result also had practical implications for the management of mining firms. The study practically implies that management should foster a good relationship with their suppliers. This is because firms' relationships with their suppliers foster a good environment for the creation of sustainable outcomes during new product development. Thus, management should consider involving their suppliers in their product development process. On this note, the study

concluded that a good supplier relationship is a breeding place for sustainable outcomes.

Recommendations

On the basis of the results of the study and conclusions, the following recommendations were taken. The study found that the technical and tender specification positively affects sustainable innovation outcomes. The management of mining firms is to provide precise and detailed technical and tender specifications should therefore be given to improve sustainable and innovative outcomes. The management should also make sure these specifications should provide information functionality as well as quality.

In objective two, the study found that risk in the innovative process of product development helps breed sustainable innovative outcomes. Thus, the management of mining firms is to ensure a risk management process is included in the product development process. This is because, as risks are identified, parties come up with innovative ideas to manage them. This results in sustainable innovative outcomes.

The study in its third objective found that the competitive-innovation conundrum has a positive effect on sustainable innovative outcomes. The management of mining firms should create an environment that fosters competition for innovation in the product development process. This is because competition imbibed in the process helps foster the creation of sustainable and innovative outcomes. Thus, firms are to encourage competition in the procurement process during product development.

The fourth objective found that political regime has no significant effect on sustainable innovative outcomes. This implies that the management

of mining companies should not be too concerned about the political regime of the country during procurement for new product development. Though the management should constantly monitor it to see if there are any changes that affect the creation of sustainable innovation outcomes.

The last objective found that supplier relationship management has a significant positive effect on sustainable innovative outcomes. The management of mining firms should foster proper relationships with their suppliers. This is because this good relationship helps create an environment that fosters the growth of sustainable and innovative outcomes.

Suggestions for Future Research

The study suggests that future research should consider this research in the manufacturing sector. This is because product development takes place more in this sector. Also, moderation or mediation with other variables in the relationships established can be determined. This will see if any of these relationships will change.

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APPENDIX

QUESTIONNAIRE

UNIVERSITY OF CAPE COAST

DEPARTMENT OF MARKETING AND SUPPY CHAIN MANGEMENT

Dear Sir/Madam,

I am an MCOM student of the above-mentioned school and department. I am conducting my research on the topic **"Effect of Procurement Management on Sustainability and Innovation Outcome among Mining Firms in Ghana"**. I request for your professional knowledge on the subject which is very relevant to this study. All information provided by you would be held with high level of confidentiality and will be used for the exact purpose for which it was collected.

Thank you for your acceptance.

Please tick where appropriate

SECTION A: BACKGROUND OF MINING FIRM

1. What type of business ownership is your firm?

   Private-owned [ ] State-owned [ ] Partnership [ ] Joint Venture [ ]

2. How old is your firm?

   Less than 5 years [ ] 5-10 years [ ] 11-15 years [ ] 16-20 years [ ]

   Above 20 years

3. How many employees does your firm have?

Less than 100 [ ] 100 – 300 [ ] 301-600 [ ] 601-900 [ ]

Above 900 [ ]

SECTION B: PROCUREMENT MANAGEMENT PRACTICES

On a scale of 1 – 5, please indicate your level of agreement to each of the following statements. **With 1 – Least Agreement and 5 – Highest Agreement**

Technical And Tender Specification	**1**	**2**	**3**	**4**	**5**
My firm ensures that, the tender document describes precisely what is required					
My firm ensures that, the title of the stated requirement is clearly indicated in the tender document					
The firm ensures that, the terms of the contract are also spelt out in the tender document					
The firm frequently ensures that, the suppliers meet up to the quality requirement					
The firm also tries to ensure that, the technical and tender specifications are in plain languages that can be understood by their suppliers					
The firm ensures that, their bidding process is very competitive					
My firm gives reasonable deadlines for submission of tender					
Innovation Risk					
My firm has a high level of innovation risk					
My have has a sustainability standard to control measures risk possibilities					
The firm has a risk management framework					
The firm has a risk averse cultural procedure					
There is a research and innovation procedure to control innovation risk					
There is risk mitigation measure that are used to control possible risk					

Please rate your views using the scale 1-5 by properly ticking (√)

Scale: SD= Strongly Disagree D=Disagree U=Undecided A=Agree SA=Strongly Agree

Competition Innovation Conundrum	SD	D	U	A	SA
Competitive supplier selection helps enhance value for the firm					
Potential suppliers of the firm are given equal chance of selection					
The procurement process of the firm deters supplier participation in procurement for sustainability and innovation					
There is a constant flow of information and interactions between potential suppliers, firm buyers and technical consultants					
Supplier Relationship Management					
The structure of the firm creates adequate room for the buyers to interact with potential suppliers					
The is a good and close relationship between the firms and its key suppliers					
The firm has a strong communication network with its suppliers					
The firm has a design network to interact with its suppliers					
There is always a mutual agreement between the firm and the suppliers before a contract is awarded					
Political Regime					
Most of the sustainability and innovation policies of the firm is highly influenced by the government in power					
The different political agendas by the different political parties imposes negative consequences to the procurement process of the firm					
The dynamic forces of the political parties tend to contradict with each other and poses negative consequences to the firm					
The management of the firm's commitment to sustainability and innovation outcomes may not necessarily receive the same support from another government					

SECTION C: SUSTAINABILITY AND INNOVATION OUTCOMES

Please rate your views using the scale 1-5 by properly ticking (√)

Scale: SD= Strongly Disagree D=Disagree U=Undecided A=Agree SA=Strongly Agree

Sustainability and Innovation Outcomes	SD	D		U	A	SA
The firm's operation protects the environment against harmful human impact						
The firm practices ecofriendly procurement culture						
The firm adhere to ISO certification standards						
There is constant introduction of new product, services and advanced technology by the firm						
The procurement management decisions of the firm enhance the achievement of improved goals and objectives of the firm						
The firm demand environmentally sustainable standard products and services from suppliers.						
The firm has a system that deals with information irregularities through their sustainable supply chain management						

SECTION D: DEMOGRAPHIC INFORMATION OF RESPONDENTS

1. Sex: Male [ ] Female [ ]
2. Age: 18-40 years [ ] 41-49 years [ ] 50-59 years [ ]
   Above 59 years [ ]
3. Indicate your highest educational qualification in Procurement and Supply Chain Management.

SSCE/WASSCE [ ] HND/Equivalent [ ] First Degree [ ] Post Graduate Degree [ ]

1. Indicate which of these professional bodies you belong to.
   Ghana Institute of Procurement and Supply (GIPS) [ ]
   Chartered Institute of Purchasing Supply [ ]
   Institute of Supply Management (ISM [ ]
   Other (Please specify) ……
2. Indicate your current position in the firm.
   Procurement Manager [ ] Operations Manager [ ]
   Stores/Warehouse Manager [ ] Other managers [ ]
3. Indicate the number of years you have worked in your current position in the firm.
   Less than 5 years [ ] 5-10 years [ ] 11-15years [ ]
   Above 15 years [ ]

Thank you!