

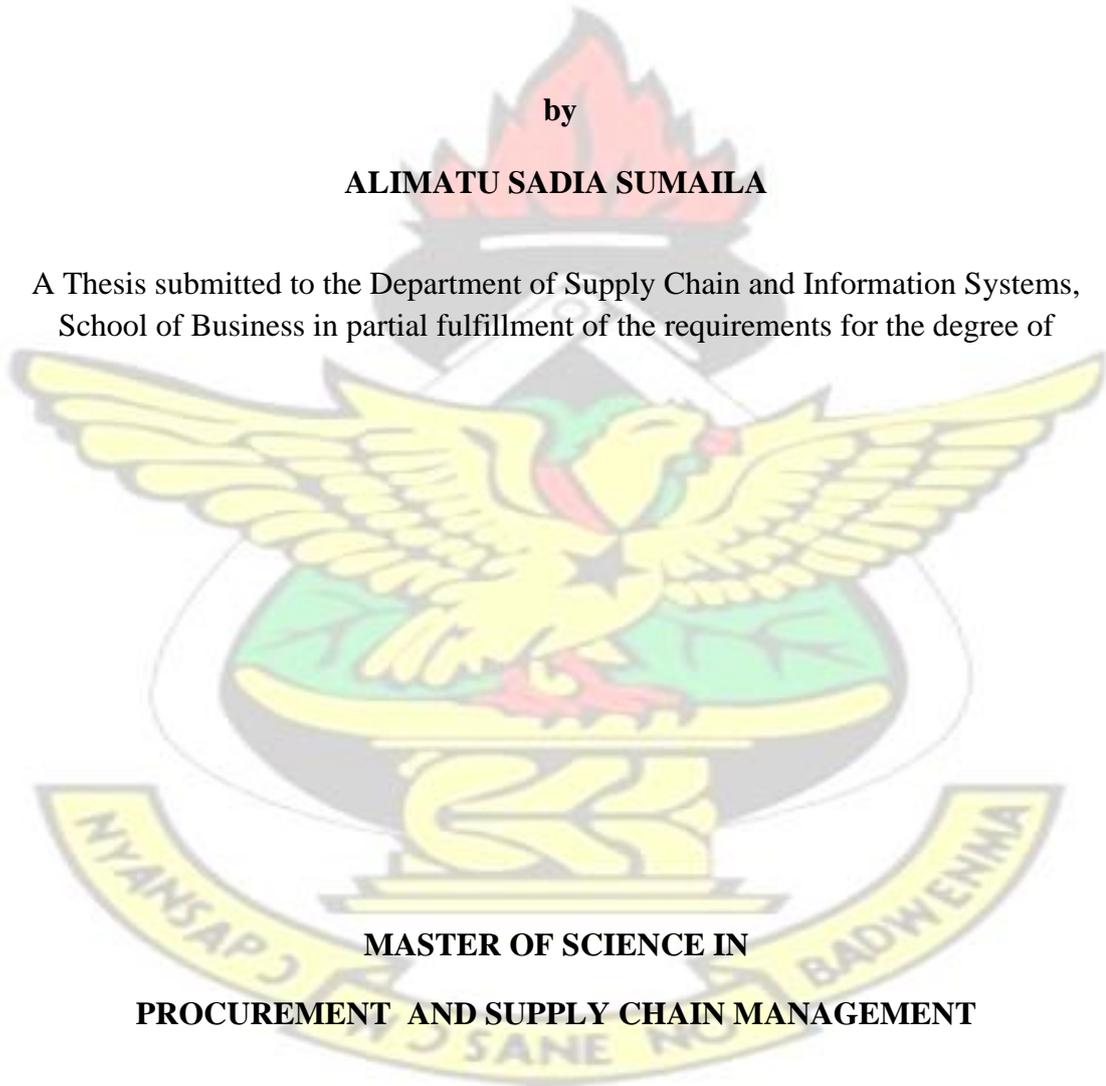
KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY, KUMASI

**Examining the mediating role of green purchasing practices in the relationship
between environmental knowledge and procurement sustainability.**

by

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A Thesis submitted to the Department of Supply Chain and Information Systems,
School of Business in partial fulfillment of the requirements for the degree of



**MASTER OF SCIENCE IN
PROCUREMENT AND SUPPLY CHAIN MANAGEMENT**

NOVEMBER, 2023

DECLARATION

I hereby declare that this submission is my work towards the Masters of Science in Procurement and Supply Chain Management and that, to the best of my knowledge, it contains no material previously published by another person nor material which has been accepted for the award of any other degree of the University, except where due acknowledgment has been made in the text.

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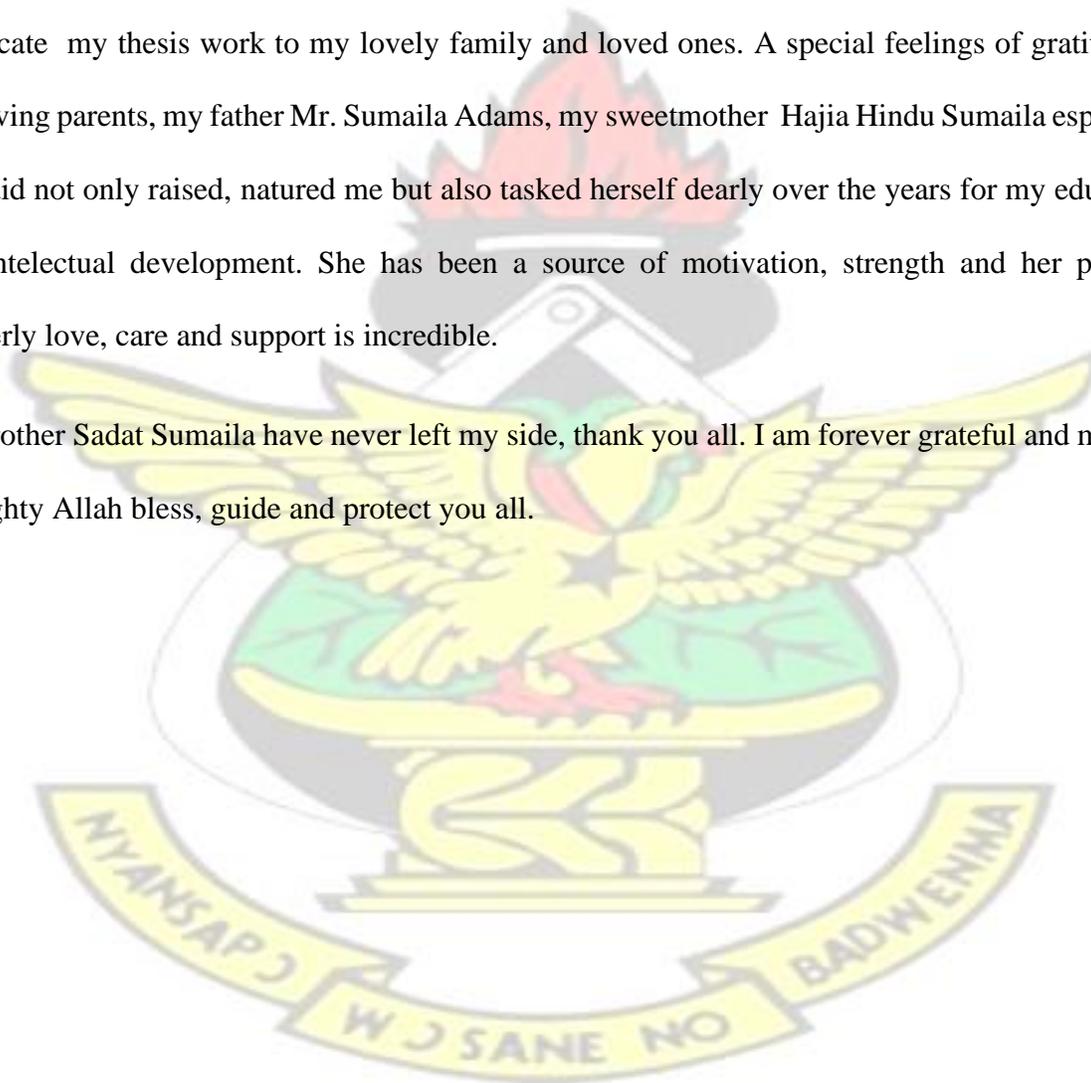
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DEDICATION

I am most grateful to the Almighty Allah, all praises and thanks are to Him for life, guidance, protection, strength and power of mind throughout this study.

I dedicate my thesis work to my lovely family and loved ones. A special feelings of gratitude to my loving parents, my father Mr. Sumaila Adams, my sweetmother Hajia Hindu Sumaila especially who did not only raised, natured me but also tasked herself dearly over the years for my education and intelectual development. She has been a source of motivation, strength and her prayers, motherly love, care and support is incredible.

My brother Sadat Sumaila have never left my side, thank you all. I am forever grateful and may the Almighty Allah bless, guide and protect you all.



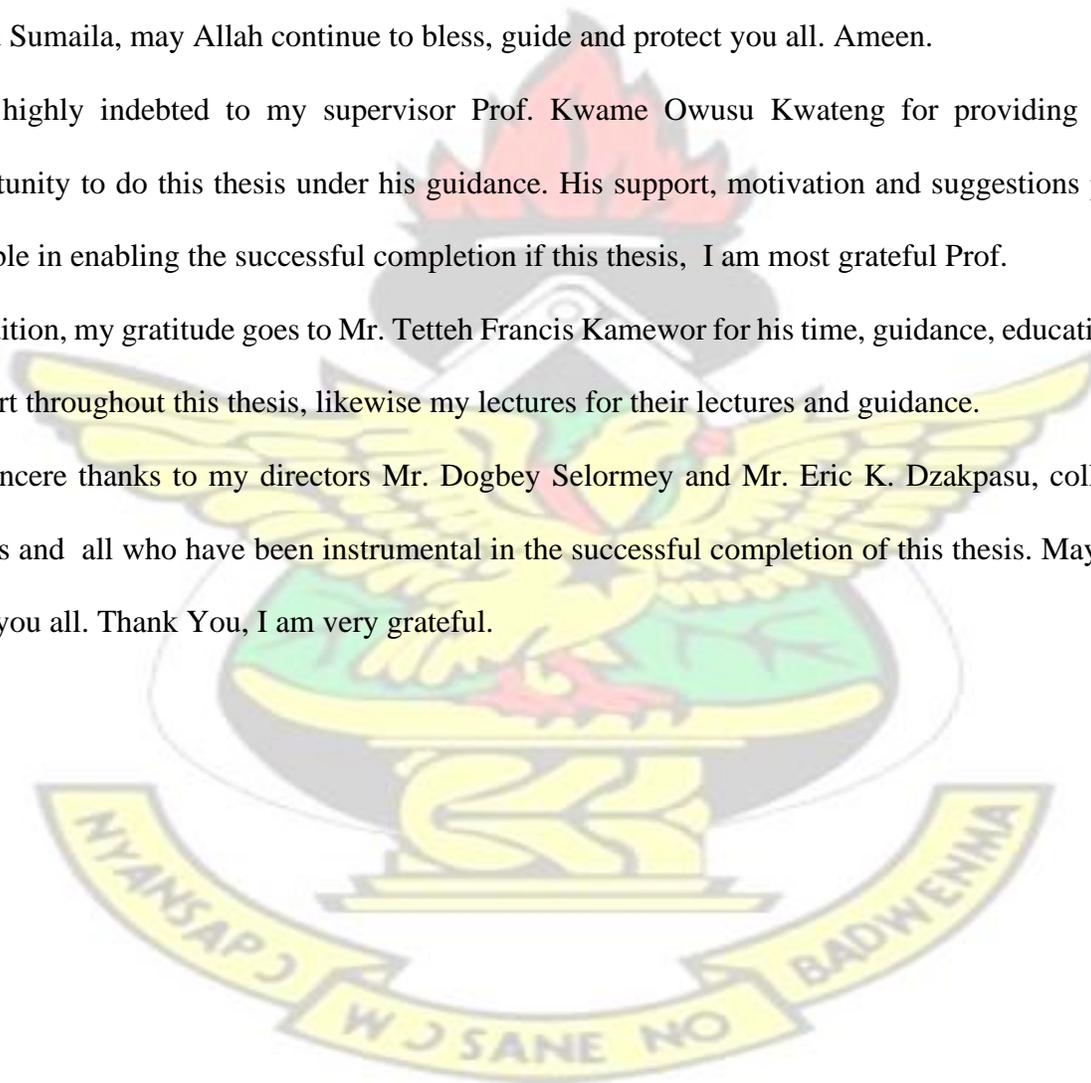
ACKNOWLEDGMENT

No creation in this world is a sole effort, neither this thesis. I would like to express my profound gratitude to Almighty Allah for the blessings, protection, mercy, guidance and grace throughout my life. I would also like to extend special gratitude to my amazing parents, Mr. and Mrs. Sumaila and my brother Sadat Sumaila. I am most grateful for all you do for me especially my mother Hajia Hindu Sumaila, may Allah continue to bless, guide and protect you all. Ameen.

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ABSTRACT

Incorporating green thinking in procurement has been flaunted as a vital area of concern among many business sectors across the globe. This study was conducted to examine the mediating role of green purchasing practice in the relationship between environmental knowledge and procurement sustainability. A cross-sectional survey design was employed to select 90 procurement officers from 45 public sector institutions in Ghana. PSS and PLS-SEM (Smart PLS-3) were used for the analyses and the result discussed. The findings of the study indicate that environmental knowledge has an insignificant positive effect on procurement sustainability. The study however showed that environmental knowledge significantly affects green purchasing practice. Additionally, the result showed that while green purchasing practice directly influences procurement sustainability, it also plays an indirect role in the EK-PS link. The result revealed showed that the relationship between environmental knowledge and procurement sustainability is not a direct relationship but mediated through green purchasing practice. This study, therefore, offers a contemporary view of RBV theory by examining the nexus between EK – PS. The study extends existing knowledge by exploring how green purchasing practice strengthens the direct EK – PS link. Again, this study found that Green Procurement fully mediates the EK – PS link which is also missing in extant literature. Thus, this, therefore, offers empirical support to the validation of the RBV theory as it has not been sufficiently validated in procurement sustainability management literature.

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LIST OF ABBREVIATIONS



GDP	Gross Domestic Product
OECD	Organization for Economic Co-Operation and Development
SPP	Sustainable Public Procurement
PS	Procurement Sustainability
GP	Green Procurement
EK	Environmental Knowledge
RBVT	Resources Base View Theory
UN	United Nations
RBT	Resource Based View Theory
GSCM	Green Supply Chain Management
SEM	Structural Equation Modelling
PLS	Partial Least Squares
HTMT	Hetero Trait-Mono Trait
PPA	Public Procurement Authority
PUFMARP	Public Financial Management Reform Program
SPSS	Statistical Package for Social Sciences
CMB	Common Method Bias
EFA	Exploratory Factor Analysis
CMV	Common Method Variance
KMO	Kaiser-Meyer-Olkin Measure of Sampling Adequacy.
CFA	Confirmatory Factor Analysis
CA	Cronbach Alpha
CR	Composite Reliability
AVE	Average Variance Extracted

CHAPTER ONE

INTRODUCTION

1.1 Background of Study

The role of government procurement constitutes a stimulus for environmental sustainability has been an issue of particular interest over the past decade (McCrudden, 2004; Walker and Brammer, 2009; Weiss and Thurbon, 2006). Procurement sustainability remains an interesting that is increasingly receiving both practitioners' and scholars' attention in the last decade (Boer et al., 2019; Voora et al., 2019). Procurement in the past decade has been at the centre of global sustainability discourse as a strategy for ensuring the protection of the environment in the attainment of sustainability. In the past few years, sustainability strategies were focused on the supply chain without giving necessary attention to procurement which is a major aspect of the supply chain. Procurement has over the years evolved or keeps changing, which implies that the way organizations engage with their suppliers, manage the supplier relationship and their purchase decisions are changing in recent times. Among many drivers of the changes in procurement, the need to minimize cost or to buy at the least price without compromising on environmental consequences remains a major motive. While existing studies have largely focused on supply chain sustainability, sustainability remains a key part of the evolution of procurement and hence requires careful understanding in the quest to implement successful sustainable procurement initiatives.

Governments in both developed and developing countries exist to provide a variety of services and goods to their citizens and for economic growth. The government in the process of fulfilling its mandate procures materials, goods, works, and services from various suppliers both locally and internationally. Governments spend more on procurement. Available statistics show that even before Covid-19, public procurement accounted for 12% of the GDP in OECD countries and

approximately 30% in developing countries, which is higher than 30% of total government spending (OECD, 2019). Between the last six (6) years, procurement expenditure in Africa reached \$16 billion (African Development Bank Group, 2021). Additionally, between 10-30% of public procurement expenditure is lost to corruption and mismanagement practices in OECD countries, with just procurement contracts accounting for 57% of a bribery cases in the region (OECD, 2019). There is, therefore, doubt that the SDG indicator 12.7.1 cities sustainable public procurement as a necessity to achieve the SGD. 12% will not be achieved in many developing countries by 2030 if measures are not put in place.

Globally, sustainable public procurement (SPP) emphasizes the world's effect to achieve SDG 12.7. Sustainable public procurement (SPP) deals with the government spending on products services, works, and projects to enhance sustainability. According to the UK sustainable procurement task forces in 2006, sustainable procurement deals with organizations meeting their present needs in a way that achieves the best value for money on a whole life basis in terms of not just generating benefit but also to society and the economy at large without causing harm to the environment.

Even though the concept of procurement sustainability continues to revive global attention, little is known about what drives procurement sustainability. It is therefore imperative to comprehensively appreciate the driving forces of procurement sustainability in the effort to achieve SDG 12.7 by 2030. Though several strategies have been advanced in different countries, ranging from technology to human resource development and education. While these strategies contribute to actively some level of sustainability in public procurement, environmental knowledge remains an irreplaceable strategy for achieving sustainability.

While extant literature (Mohiuddin et al., 2018; Liobilkiene et al., 2019; Li et al., 2019; Fryxell and Lo, 2003; Vincente-Molina et al., 2013; Awan and Abbasi, 2013; Zelenika et al., 2018; Haron et al., 2005; Marthinez-Marthinez et al., 2019; Hamzah and Tanmr, 2021; Liu et al., 2020) have demonstrated the relevance of environmental knowledge in sustainability, there appears to be vague knowledge on how environmental knowledge drives procurement sustainability, especially in the context of developing nations where a high percentage of expenditure is made through procurement. To date, government across many developing economies doubt their possibility of reaching the SDG 12.7 by 2030, it has therefore become imperative that a study of this nature is conducted to guide policy decisions toward procurement sustainability in Sub-Sahara Africa. Hence this study examines the influence of environmental knowledge on procurement sustainability through green procurement.

1.2 Problem Statement

In the public sector, procurement decision is influenced by procurement officials right from the tender preparation through supplier selection to receiving goods at the stores, all these processes in the acquisition of goods, work service and project require some level of environmental consideration, in the effort to achieve sustainability. Hence the level of environmental knowledge of procurement professionals in the processes of procurement cannot be underestimated and will help deal with the level of sustainability challenges facing the globe. Environmental knowledge represents the level of information individuals (procurement professionals) has regarding environmental issues and their capacity to understand and assess its consequences on society and the environment (Genovaitė et al., 2019; Geiger et al., 2019). Meanwhile, existing studies have largely centered on the drivers (McMurray et al., 2014; Ranta et al., 2018; Luthra et al., 2018; Epstein and Roy, 2018; Giunipero et al., 2012; Renukappa et al., 2013; Stoughton and Ludema,

2012; Aray et al.,2020; Fairfield et al.,2011) and barriers (Aleixo et al.,2018; Al Zaabi et al.,2013; Brandli et al.,2015) to the implementation of sustainability initiatives.

Most of the studies on sustainability were largely done in the private sector (Tansuhaj, and Pomirleanu, 2016; Large and Gimenez Thomsen, 2011; V Mani et al., 2016; Couto, Tiago, Gil, Tiago, and Faria, 2016; Oruezabala and Rico, 2012; Poulsen, Ponte, and Lister, 2016; Huq, Pawar, Rogers, West, and Manchester, 2016), quite a number in the public sector which focused on sustainability reporting (Hall and Purchase, 2006; Adams et al.,2014; Domingues et al.,2017; Greiling et al.,2015; Figueira et al.,2018; Adams et al.,2014; Greiling et al.,2015; Figueira et al.,2018; Montecalvo et al.,2018). Little work has been done on the public sector procurement sustainability and developing countries such as Ghana. Today, procurement sustainability is an important issue in the public sector (Walker, 2015; Gelderman et al.,2017). The potential contribution of procurement sustainability in the public sector cannot be underestimated owing to its size and impact on the GDP of any economy in percentage terms (Preuss, 2009). It remains unclear whether the focus on the private sector implies insufficient or lack of sustainability initiatives in the public sector, or whether the public sector is just being under researched (Gelderman et al.,2017). Existing literature revealed very interesting opportunities that need to be examined or investigated in the domain of public procurement sustainability in developing countries. Existing studies have not adequately dealt with procurement sustainability problems (Preuss, 2007; Fayezi et al., 2018; Gelderman et al., 2017; Gelderman et al.,2015; Lehtinen, 2012; Roman, 2007; Leal Filho et al.,2019; Lăzăroiu et al., 2020), hence the silent remedy. Managers in public agencies are faced with procedural, legal and political constraints. This study intends to fill the gap by exploring how environmental knowledge could shape procurement sustainability in the public sector. Prior studies (Ruparathna and Hewage, 2015; Molin et al., 2021; Sönnichsen et al.,

2020; Yu et al., 2020; Lăzăroiu et al., 2020; Adjei-Bamfo et al., 2019; Qazi, A.A. and Appolloni, 2022) on procurement sustainability have highlighted numerous gaps especially regarding the role of contemporary strategies including environmental knowledge as a driver of procurement sustainability in the public sector.

Apart from the lack of clear understanding of regarding, environmental knowledge may influence procurement sustainability, earlier studies are largely reviewing and lack empirical and theoretical support (Xenophon et al., 2012). Though firms may have some level of environmental knowledge, it remains essential that they actually practice green purchasing in addition to the environmental knowledge, without which these environmental knowledge may not produce fruitful outcomes in achieving the desired sustainability in procurement. This study seeks to fill the theoretical gap by examining how environmental knowledge and green purchasing practices may directly influence procurement sustainability through the natural resource-based view perspective. Additionally, Syed et al. (2022) indicated that while green purchasing practice has gained global recognition, its applications as a strategic resource particularly in the manufacturing space is dominantly in developed economies (Ivanova, 2020), and that poses interesting avenues for more empirical studies (Yee et al., 2021). It is imperative to understand the role of green purchasing practices in driving sustainability particularly in emerging economies where the concept is newer (Yee et al., 2021; Syed et al., 2022). Thus, drawing from the contingency perspective, procurement sustainability may not just be enhanced through environmental knowledge but also the role of green purchasing practice, even though the implementations of green purchasing practice are not easy as firms' limited capabilities and resources (Fang et al., 2020; Zailani et al., 2012) hinder it. This study therefore envisages that the ability of organizations to implement green purchasing practices may play essential role in delivering superior procurement sustainability through environmental knowledge. This study closed the aforementioned gaps by examining how environmental knowledge and green

purchasing practice individually affected procurement sustainability and the indirect role of green purchasing practice in the direct link between environmental knowledge and procurement sustainability. Being among few attempts to examine the phenomena, this study made a twofold contribution to procurement sustainability literature. The direct relationship between environmental knowledge, green purchasing practice and procurement sustainability which has not yet been empirically validated was explored in this study and further expand the theoretical lens of procurement literature on how procurement officers might take decisions to enhance procurement sustainability in emerging economies. Secondly, this study introduced green purchasing practice as a mediating variable, which expands the context of research on sustainability discourse and facilitates the understanding of the indirect routes that promote procurement sustainability.

1.3 Objectives of the study

The main objective of this study was to investigate the indirect role of green purchasing practice in the direct link between environmental knowledge and procurement sustainability with evidence from the Ghanaian Public sector. Based on the gaps identified and discussed in the problem statement, three specific objectives were put forward. These objectives included:

- i. To examine the effect of environmental knowledge on procurement sustainability.
- ii. To evaluate the relationship between green purchasing practice and procurement sustainability.
- iii. To investigate the mediating role of green purchasing practice in the relationship between environmental knowledge and procurement sustainability.

1.4 Research Questions

- i. What is the effect of environmental knowledge on procurement sustainability?

- ii. What is the relationship between green purchasing practice and procurement sustainability?
- iii. What is the mediating role of green purchasing practice in the relationship between environmental knowledge and procurement sustainability?

1.5 Significance of the Study

The study was conducted basically on the effect of environmental knowledge and green purchasing practice on procurement sustainability with evidence from Ghanaian public sector. The outcome of this study made significant practical and theoretical contributions. The nature of the study was such that it was categorized into two folds with regards to its benefit to public procurement sustainability and its conceptuality. First and foremost, the nature of the study benefited these organisations by contributing immensely towards how these organisations would come out with policies that would ensure that sustainability issues that confronted them are addressed with respect to the recommendations that would be made available in the studies. Again, this study would also contribute to firms with institutional frameworks that by far ensured that relational issues relating to procurement sustainability could be resolved in these frameworks.

Theoretically the study added to literature in academia especially in Sub Sahara Africa by providing direction on procurement sustainability among procurement professionals of diverse cultural orientation.

The literature again revealed that, most research in procurement or green purchasing studies has predominantly been done in developed economies. However, there is very little empirical research of this nature in developing counties in Africa. This study saw this gap as one worth investigating especially in Ghana.

1.6 Research Methodology

The study employed a positivist research approach that made use of a quantitative methodology. Again, the study also adopted an explanatory research design. The research design enabled the researcher to how green purchasing practice can be strengthened to enhance procurement sustainability among public organizations in Ghana. The population of interest of this study includes all public procurement departments in the various public sector organizations, a sample of hundred (100) public organizations were included in the study. After selecting the organizations, the researcher used the purposive sampling method to select individuals that are directly involved in the subject under investigation. The researcher adopted the purposive sampling method to get individuals who have an in-depth understanding of the subject under investigation. The study commenced with an extensive literature review to help to discover the academic writings supporting the relevance of the topic and the research objectives. Again, the study used a primary source of data to validate the results produced in literature through field surveys using questionnaires. After the data collection, the primary data that has been gathered from the field were vetted for accuracy and reliability. The questionnaires that have been adequately filled were coded into excel for analysis. This study employed two data analysis approaches i.e. descriptive and inferential analysis using multivariate data analyses such as Structural Equation Modelling (SEM) and factor analyses to fulfill set objectives in chapter one. Descriptive analysis was based on information provided by respondents concerning their organization (demographical data), which includes a profile of the organization and the respondents. The essence of the descriptive analysis was to test for normality and this included frequencies, percentages, means, skewness and kurtosis statistics. The motive of this analysis is to ensure that the data gathered are suitable for

covariance-based-SEM analysis. It is done to check for missing data, outliers, and data distribution (Hair et al., 2017). Inferential analysis was used to test the hypothesis in the study.

1.7 Organization of the study

The study is structured into five chapters. The first chapter is made up of the introduction of the study which contains the background of the study that reveals the motivation behind this research work. The chapter also captures the problem statements, research questions, the scope of the study and an explanation of the significance of the study and the last part of this chapter captures the definitions of the terms used. Chapter two discusses the literature review from the existing knowledge of research. In this chapter, the researcher would attempt to look further into the resource-based theory by looking at the social exchange theory that underpins the entire model and examining the mediating role of green purchasing behaviour in the relationship between environmental knowledge and procurement sustainability. Furthermore, chapter two attempts to explain the theoretical concepts of the research as well as develop a model based on the previous research works of academic scholars. Chapter three focuses on the proposed method that the research would use. It comprises the research design, the target population and sample, the data collection method and lastly, the proposed tools that would be used in analyzing the data. All these are well explained. Chapter four presents the empirical results of the study and the discussion of the findings from the field. This section contains the results of the pilot study and an analysis of the main study. The study employed both SPSS and Smart-PLS software to analyze the data and validate the measurement model and the structural model employed. The chapter also discusses and interprets the results of this research work. This section presents a discussion of the results of the study.

Chapter five discusses the conclusion of the study and summarizes the findings in connection with the objectives of the study. The chapter also explains the contributions and the limitations of the research and also provides suggestions for future research directions.

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CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter reviewed some of the literature regarding the main concepts explored in this study. The first chapter took a detailed look at issues about Procurement Sustainability, Green Purchasing and Environmental Knowledge, followed by a theoretical review. The theoretical principle underlying the study is the Natural Resources Base View Theory. The theoretical review is preceded by hypotheses development and finally a conceptual framework guiding the study.

2.2 Definition of Concepts

This section presents a conceptual review of major concepts used in this study. These concepts include Procurement Sustainability, Green Procurement and Environmental Knowledge.

2.2.1 Procurement Sustainability

According to Bals and Tate (2018), a complete investigation of sustainability requires the consideration of environmental, economic and social dimensions. With that said, it becomes important to understand the idea behind sustainability. The concept of procurement sustainability is to produce, improve and protect a lifetime economic, social and environmental value for all who have an interest in bringing services and products to the consumer. However, this can mostly be achieved with the triple bottom line of economic, environmental and social influence (Khan, Hussain, and Ajmal, 2016). Previous research has shown that a lot of studies on sustainability in the context of business are directed toward the supply chain (Aboelmaged, 2018; Carter, Rogers, Carter, and Rogers, 2008a; Gast, Gundolf, and Cesinger, 2017) Therefore, the sustainable product can only be delivered by sustainable supply chain (Bals and Tate, 2018; Esfahbodi et al., 2017).

The idea of sustainability initially turned into an issue of worry in 1972, at United Nations (UN) Conference on the Human and Environment. During this period the environment started to drain because of toxins exuding from the enterprises and illicit practices (unlawful mining). At the conference, delegates were conflicted between these two issues; financial headway and watchman to the environment, one was additionally intriguing. After an extensive elaboration, the conference understood that both the financial progression and gatekeeper to the environment were commonly removed (Blackburn, 2009). The essential illustrated was that improving the living and working states of an individual and controlling the contamination of air and water, draining the environment and assets will both fulfill the prosperity of humans both now and later on. The UN Conference at that point embraced the idea of sustainability which establishes the individuals (social), planet (environment) and benefit (financial) contemplations, Blackburn (2009) added.

The economic viewpoints of sustainability manage the inflow of income. Contingent upon the circumstance, it might think about investigating benefits and the pace of expenditure, firm culture, key management and the firm's competitive edge the industry. In the territory of procurement, this thought might be best taken care of through economic due steadiness, inventory management and viable observing (Abedin, 2015).

Shielding the natural resources and environment from disintegrating and making the world a protected spot to live both now and what's to come forms the environmental perspectives of sustainability (Egbadzor et al., 2014). As a component of protecting the environment, the accompanying territories should be thought of; natural resources quality, energy consumption, waste management and land use. Environmental effect evaluation should be performed before any choice is made on the procurement cycle. The effect appraisal may incorporate energy age and

consumption (power, fuel), contamination exuding from its formative exercises and untamed life and public insurance (Egbadzor et al., 2014).

As indicated by Warner and Ryall (2001) larger part of the indigenous partners installed environmental thought into their procurement techniques. Likewise, they understood that starting such methodology had prompted greater expense on the practical item which was an impediment; notwithstanding, they were monstrously effective in receiving environmental maintainability. Non-presence of strategy on environmental related issues, unimportant preparing and information and hint to oversee related danger; such mishaps could be experienced. Handfield et al., (2002) are likewise of the view that preceding execution of supportable activity, there is the need to direct an appraisal on all overarching danger and effect of the providers and impart to all gatherings. It is additionally essential to receive a checking plan to decide if or wanted point is achieved.

Social aspect of sustainability tries to furnish communities with facilities like education (great infrastructure and accessibility of instructors), openness to social backings, clinics and wellbeing, lodging and available roads. The manufacturing industry could handle this perspective by presenting corporate social approaches which try to annihilate poverty, human right fundamentals for example, schools and emergency clinics and sponsorship and sponsorships (Egbadzor et al., 2014).

2.2.1.1 Economic Consideration of Procurement Sustainability

Often, economic sustainability is described as a development activity that offers enormous benefits to the economies of communities by making use of the natural resource available to them and their surrounding environment (Mahbubi and Uchiyama, 2020). Some studies also explained that economic sustainability is the preservation and improvement of yield and productivity of livestock and crops (Lovarelli, Bacenetti, and Guarino, 2020; Zhen et al., 2020). Economic sustainability

helps improve market share, for example Nike concentrated on sustainable innovation of its products and became popular hence it continue to improve its brand image and market share in the long term (Niu, Mu, Chen, and Lee, 2019). Economic sustainability also involves minimum quality base rejection and making maximum use of your assets (Valentina Carbone, 2011), both tangible and intangible. Many organizations do adopt sustainability practices due to the numerous benefits that come with it (Vachon and Klassen, 2008; Zhu, Dou, and Sarkis, 2010) while others also adopt sustainability practices due to external pressure (Nakano and Hirao, 2011). The pressure applied on organizations normally comes in the form of penalties, of business losing and of reputation (D. Kumar and Rahman, 2015). Environmental and social sound practices through the supply chain lead to economic benefits (Sudusinghe and Seuring, 2020). However, research works that focus on dimensions of sustainability have given little attention to economic sustainability (Sudusinghe and Seuring, 2020).

2.2.1.2 Social Consideration of Procurement Sustainability

Some studies' view of social sustainability is as explained as a focus on personal needs such as employment, education, income and skills (Spangenberg, Omann, and Hinterberger, 2002). Similarly, Whooley (2004) described social sustainability as the worker's satisfaction in the supply chains with respect to areas such as education, health and safety, compensation, benefits, retirement funds, training and development (V Mani, Agrawal, and Sharma, 2015).

Many scholars have used social sustainability pointers to explain social sustainability for instance, (Cramer, 2008; Sudusinghe and Seuring, 2020) came up with a model where corporate social responsibility indicators were used to measure social sustainability. Some of the dimensions considered under social sustainability includes; fair trade and transparency (Ni, Li, and Tang, 2010; Pullman and Dillard, 2010; Venkatesh, Kang, Wang, Zhong, and Zhang, 2020), safety (Ni

et al., 2010; Pullman and Dillard, 2010; Munny et al., 2019), health (Eltayeb, Zailani, and Ramayah, 2011; Pullman and Dillard, 2010; Abid, Ahmed, Elahi, and Ilyas, 2020), poverty reduction (Ni et al., 2010), education (Babu John Mariadoss, Ting Chi, Patriya Tansuhaj, 2016; Closs, Speier, and Meacham, 2011), fair earnings (Venkatesh, Kang, Wang, Zhong, and Zhang, 2020; Ashby et al., 2012; Rocha, Searcy, and Karapetrovic, 2007). In similar vein, Kusi-sarpong, Gupta, and Sarkis (2018) believe that, work safety, labour health, education, openness in working together, social responsibility towards society and good working conditions influence social sustainability implementation. However, some number of organizations who shelved the idea to deliver on social sustainability ended up in serious problems which negatively affected the organizations (F. . Huq, Stevenson, and Zorzini, 2014). With that said, most of the sustainability challenges have been hanging mostly on social sustainability for fear that an attempt in that regard will negatively affect the organization in question.

2.2.1.3 Environmental Consideration of Procurement Sustainability

It comprises of activities or events that influence the environment (Alan, Kuzey, Acar, and Açıkgöz, 2016; Suhi et al., 2019). Previous literature has discussed some of these activities or events including, pollution and emission minimization (Bai, Dhavale, and Sarkis, 2016; Vachon and Klassen, 2008), and waste minimization (Carter et al., 2008a; Z. Wu and Pagell, 2011; Pulido-fernández, Cárdenas-garcía, and Espinosa-pulido, 2018). Significant evidence indicated that, sustainability in supply chain, has helped firms to obtain better performance (Luthra, Garg, and Haleem, 2015; Yusuf et al., 2013), in addition, environmental supply chain sustainability is progressively seen as a quality attribute that will enable organizations to reap premium price from the market (Crowder and Reganold, 2015b).

2.2.1.4 Sustainable Procurement in Ghana

The need for sustainability in the practices of procurement has caught the attention of professional, researchers and other decision-making bodies. The main concern has to do with the fact that, the cost element of goods and services affect the margin of organizations. Most organizations that are into manufacturing will have to rely upon the raw materials procured from a reliable supplier. These raw materials have to meet the specification given in the purchasing order which guides what the supplier ought to supply with the quantity and time of delivery. The ability of products manufactured to meet the quality as it may satisfy the final consumers and to have a sustainable supply is highly depended on the supplier of such raw materials. When raw materials failed to meet specification, its component may not meet the expected final product as may be desired by the final consumers especially when the organization producing it has previously produced to serve the final consumers and as such there must be improvement of supply chain and to reduce cost (Humphreys 2003). Procurement practices has become a sensitive practice within most organizations especially at the public sector organizations where procurement of goods and services form the highest percentage in the expense category of the national budget. The continuous record of corrupt practices and the inability of getting the quality of goods and services as expected to be used at the public sector to meet the expected desires for a specified period is lacking as a result of some officials not following the due processes to ensure transparency, accountability and efficiency as well as the economy as expected to assess performance, we at the public sector.

Since the mid-1990s, there has been a rise in procurement and its impacts have been felt within environments, economies and other social institutions through which it has become necessary for

organizations to ensure the green procurement or green purchasing (Van Calster 2007), which is considered part of the broader sustainable procurement notion. This has led to the adoption of procurement practices in all sectors of which the modern procurement practices have introduced the e-procurement processes to enhance operations and to ensure a reduction in cost and other unethical practices by officials to gain advantage through procurement rather than seeking the interest of organizations which they represent and also to meet the high resource consumption by human being especially in this 21st century Stuart Williams (2007). In Ghana, policies have been put in place by the government as well as other institutional and legislative to govern the operations of organizations in ensuring better environmental and social protection and also awareness of economic issues to a large extent (Thomson and Jackson 2007). More so, an improved sustainable procurement practice despite the challenges is the driving force behind the benefits and impacts in realizing value for money within public and private procurement and sustainable purchasing practices. The role of procurement professionals in appreciating challenges and benefits of sustainable procurement helps in ensuring procurement are executed devoid of causing harm to the environment and increasing the cost of supply. The Public Procurement Act 2014 (Act 914 as amended) has introduced new standards for public procurement in Ghana. However, as Ross (2013). Ghana as one of the emerging nations that has been slow in the implementation of its policy driven approach to enhancing effective implementation of sustainable procurement the benefits accruing notwithstanding. Sustainable procurement is intensifying on the policy programme for many countries especially Africa but awareness remains inadequate (Muraguri, 2013). Policies have been formulated as well as legislative and other institutional concerns by government in Ghana to govern all procurement activities in a move towards sustainable procurement. The establishment of the Environmental protection agency, Public procurement Act 2003 (Act 663 as

amended), National Sustainable Development Coordination Body, Environmental Impact Assessment Law is an indication of government commitment towards sustainable procurement. Despite the establishment of the acts and legislations, adoption and implementation of sustainable procurement has been slow resulting in lower diffusion rate in Ghana (Dza 2017).

The sensitive nature of procure procurement especially when it comes to the supply of drugs and other medical equipment has contributed to various researches which were mostly conducted in developed nations on the need for sustainability including Green supply chain management practices (Ross 2013) and also on the need for companies to undertake their responsibilities within societies (McWilliams and Siegel, 2000) and also on the fact that they must exercise purchasing social responsibility' (Ho et al. 2010). However, only few of these studies were undertaken in Ghana (Thomson and Jackson, 2007; Sasaka, 2014).

There is however, a need for sustainable procurement as indicated by scholars, to enable organizations in curbing various social vices including global warming as well as climate changes (Lund-Thomsen and Costa 2011). Meanwhile the constraints relating to procurement especially relating to the private sector through rules and regulations do not strictly to private purchasing (Harland et al. 2019). The regulatory framework relating to procurement including the plurilateral Agreement on Government Procurement (GPA) of the World Trade Organisation, primary and secondary legislation of the European Union and specific titles in the United States code (Harland et al., 2019) recognised the need for enforcement of rules and regulation to ensure that the procurement practices is carried out in a more transparent manner with integrity. Harland et al., (2019) identified that the regulations relating to procurement practices within the public sector contributed to the complexity within the public sector unlike the private sector which has some

liberty regarding how the raw materials and other services are procured. Public procurement is different and more complex than private purchasing.

2.2.2 Green Purchasing behaviour

As a starting point for reducing environmental pollution, the supply of raw materials is an important step in controlling the supply of raw materials (Chin et al., 2015). Global warming has become an issue of environmental concern, and firms now view environmental protection as their social responsibility (Chang, et al., 2022) and are ready to use green opportunities (Zaidi, et al., 2019). Therefore, green strategies have become a significant issue that could strengthen the sustainability of businesses in the world. However, not all companies have the foresight and competency to establish and implement green strategies thus, if firms wish to successfully embrace green opportunities, they should integrate the notion of green initiatives into all phases of their activities (Shukla S., 2019). According to (Ivanova T., 2020) green purchasing mostly deals with controlling the environmental performance of suppliers. Joshi and Rahman., (2015) define green purchasing behavior as procuring sustainable products that possess social, economic, and environmentally friendly attributes. This study conceptualises green purchase behavior as environmentally friendly products or sustainable products that are 'recyclable and 'beneficial' to the environment and avoids harm to the environment and society (Jaiswal and Kant., 2018). Consumer behavior for green purchasing is generally evaluated in terms of their consumers' willingness or intention to purchase green products and that conscious behaviour or intention eventually transformed into their purchase decision for such products in order to benign for environmental sustainability. Through purchase of green products, environmental degradation can be reduced or prevented by consumers (Joshi and Rahman. 2019).

Sustainable purchasing practices is important and many studies have pointed out the need to foster and examine sustainable purchase behaviour (Joshi and 2019). Nowadays, production of sustainable goods such as biodegradable products, energy efficient appliances, etc. has increased, but associated benefits have improved faster with the increase in consumption. Available literature indicates that the number of eco-friendly consumers is growing swiftly, but the degree of acceptance of sustainable products among them differs (Joshi, and Rahman, 2019). However, more people have shown the willingness to take up sustainability but their consumption habits have not been reflected in their purchasing behaviour.

2.2.3 Environmental Knowledge

Environmental knowledge refers to an individual's understanding and knowledge of the environment and related issues (Guomin et al., 2019). Individuals with certain environmental knowledge have a positive attitude toward environmental behavior and are strongly willing to take action. Flamm (2019) found that households with higher levels of environmental knowledge have a higher tendency to purchase energy-efficient cars. Some scholars demonstrated that environmental knowledge has a positive impact on consumers' attitudes toward green products (Mostafa, 2009). Latif et al. showed that environmental knowledge affects residents' attitudes toward green product purchase behavior, which in turn affects residents' willingness to purchase green products (Sang and Bekhet, 2015).

2.3 Theoretical Literature Review

2.3.1 Resource based view theory (RBT)

According to the RBT, that which is rare, valuable and difficult to imitate resources and capabilities can make available important sources of sustainable competitive advantage (Barney, 1991). Grant (1991), describes resources to include tangibles (e.g. equipment) and intangibles (e.g.

process knowledge) that enhance the production and supply of services and goods. According to Grant (1996) and Barney (1991), resources can also be recognized as organization's capabilities, assets, knowledge, competencies and processes which an organization control to enable them implement strategies and enhance competitiveness. For (Wernerfelt (1984), a resource is that which could be recognized as either a strength or a weakness of an organization and the resources among other things include knowledge, skilled personnel, efficient procedure, machinery, reward system, capital etc.

Barney (1991) and Peteraf (1993) in more specific terms have deliberated on the five features of resources that may permit an organization to obtain a true sustainable competitive advantage. To start with, the resource must be treasured and should enhance organization's efficiency and effectiveness. Secondly, the resource must be uncommon hence the organization can exploit it to the detriment of its competitors when one exercises control over it. Thirdly, the resource should be that which competitors cannot imitate. Fourthly, the resource must be that which cannot be easily moved that is to say, an attempt in moving it, must cause a damage to it, so that only the organization will have control over it. Finally, the resource should not have a close substitute so that competitors may not have alternative to it.

Also, environmental knowledge of procurement officers represents the mind and the approaches of environmental issues and this should be irreplaceable and valuable. However it can be the basis for competitive advantage (Barney, and unique resources that differ across firms (Xu, Huo, and Sun, 2014) and this justifies the inclusion of environmental knowledge in the propose model. According to RBT, the skill and capability to manage relationships among organizations and partners along the supply chain must be classified as capabilities (Dyer and Singh, 1998). For instance, Antony Paulra, Augustine A. Lado (2008) associated communications among partners to

relational capabilities while Rungtusanatham, Salvador, Forza, and Choi (2003) also associated relationships to capabilities and resources. According to Boonstra (2013), environmental knowledge is recognized as a resource that is rare, and it plays a key role in managing the procurement function of organization (Ward, Leong, and Boyer, 1994). Resources (such as training on environmental issues) permit organizations to consider and establish plans that enhance the firm's effectiveness and efficiency (1989). Meanwhile, Hart, (1995) found that, green challenges may cause the development of intangible resources to handle those challenges. These intangible resources can be the bases for improvements in sustainable performance which can also lead to competitive advantage. Carter and Rogers (2008) found that intangible resources such as the information shared or knowledge acquired in managing the buyer and supplier relationship in collaboratively working to improve sustainable procurement can be viewed as a resource that is rare, valuable and difficult to imitate (Barney, 1991), and these resources can lead to improved sustainability. For Pagell et al. (2010), the capability of management to establish collaborative relationship to increase sustainability is an important asset that leads to sustainable competitive advantage in building result oriented or profitable procurement. Therefore, having procurement sustainability as a variable in the proposed model is justifiable. According to Mohsen Varsei, Claudine Soosay, Behnam Fahimnia (2014), RBT offers a very good point of assessing sustainability resources. For some time past, there have been some initiatives to understand the relationship between sustainability and RBT (Pagell and Wasserman, 2010; Rao and Holt, 2005). It is important to know that the knowledge, processes and the capabilities that help a supply chain to achieve economic, social and environmental sustainability can be considered as the resources of the organization from the point of view of RBT (Sarkis, Zhu, and Lai, 2011). One of the things that improve a firm's reputation and image is sustainable practice. It is an important resource in

the supply chain (Sarkis et al., 2011; Shang, Lu, and Li, 2010). This hence examine the mediating role of green purchasing behavior in the relationship between environmental knowledge and procurement sustainability through the lens of the RBT.

2.4 Conceptual Framework

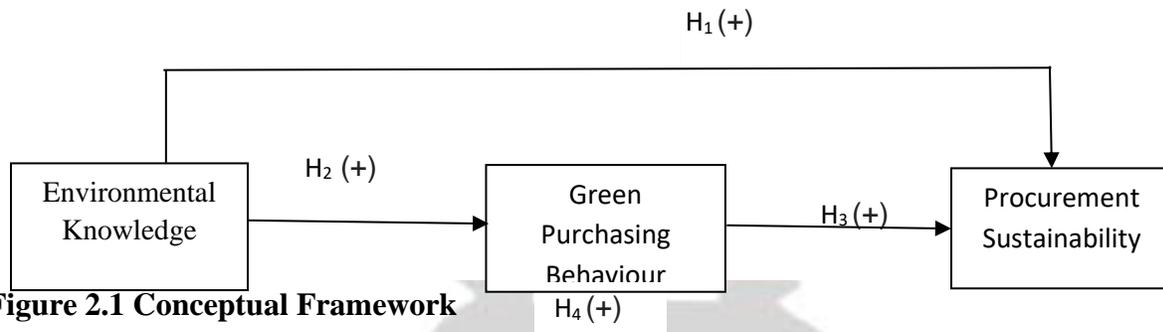


Figure 2.1 Conceptual Framework

2.5 Hypotheses Development

This section is a discussion on the hypotheses stated in introduction of the study. The study is made of up four main hypotheses which includes the examine the relationship between environmental knowledge and procurement sustainability, the relationship between green purchasing behavior and procurement sustainability and to mediating role of green purchasing behavior in the relationship between environmental knowledge and procurement sustainability. The various hypotheses are discussed below;

2.5.1 Effect of Environmental Knowledge and Procurement Sustainability

Environmental knowledge represents individual orientation understanding and knowledge of issues regarding the environment (Gvomin et al., 2019). Individuals' high environmental knowledge react positively to sustainability initiatives (Mostafa, 2009). Again, existing studies have demonstrated that environmental knowledge positively relate to sustainability (Zelenika et al., 2018; Marthinez-Marthinez et al., 2019). By extension the study expects that procurement

officials with high environmental knowledge will not just be conscious of procuring at minimum or best value for money but will also be conscious of not damaging the environment relationship with other stakeholders, which in return makes procurement sustainable. Thus, the above discussion leads to the first hypothesis

H1: Environmental knowledge positively influence procurement sustainability.

2.5.2 Environmental Knowledge (EK) - Green Purchasing Behavior

Earlier studies have confirmed that education remain a key strategy for preparing people to appreciate environmental issues and ultimately to be environmentally conscious (Trumper, 2010; Harring and Jagers, 2017; Asunta, 2003). It is well established that people with high environmental knowledge are more likely to accept green products (Noor et al., 2012; Sun et al., 2018; Mohiuddin et al., 2018; Mostafa, 2007; Wang et al., 2020; Tong et al., 2020; Ahmad and Thyagaraj, 2015; Lee, 2010). Theoretically, environmental knowledge (EK) appears to play essential role in helping individuals to know and appreciate more appropriate way of moving toward environmental goal. The role could move beyond just habit formation and influence actual purchase decisions. It is therefore expected procurement officials with high environmental knowledge (EK) will procure environmentally friendly products and service or embark on eco-friendly projects. Hence the second hypothesis of the study

H2: Environmental knowledge (EK) has positive significant impact on green purchasing behavior

2.5.3 Effect of Green Purchasing Behavior on Sustainability

The link between GSCM practices and business stability is one of the most well-known research topics in SCM continuing studies (Pullman et al., 2009; Hoejmosse and Adrien-Kirby, 2012; Min and Kim, 2012) and in the field of knowledge management (Cerchione and Esposito, 2017, 2016; Handfield et al., 2015; Hernandez-Espallardo et al., 2010; Hult et al., 2006, 2004). In such studies,

various aspects of organizational performance have been evaluated, including environmental and economic performance (Ken et al., 1998; Zhu and Sarkis, 2004; Zhu et al., 2005). Nearly all previous studies have shown a positive relationship between raw material supply improvements and higher environmental performance (Hart, 1995; Zhu et al., 2017; Chiou et al., 2011). However, only a few studies have clearly considered the links between green price and environmental performance. It is necessary to assess whether the ability to purchase green products directly affects procurement sustainability. Previous study conducted by Lăzăroiu et al (2020) argued that green procurement plays essential role in ensuring sustainable procurement among SMEs. Therefore, the study posits that:

H₃: Green Purchasing Behavior positively and significantly influence procurement sustainability

2.5.4 Mediating Effect of Green Purchasing Behavior

As mentioned above, ineffective behavior affects hiring green. However, since the sale of raw materials is closely linked to the needs of the target company, when it comes to operational measures, such as environmental support, it can be safe to assume that the marketing measures are in place of raw products will be good for the company. A company that is more focused than a supply company. However, as previous theories (H1 and H2) have suggested, the study predicted that purchasing raw materials could have a major impact on environmental protection. According to the theory, this mediator is produced by a vision based on its resources and educational supplements (Hart 1995; Dyer and Singh 1998; Lavie 2006). In line with this view, the development of co-operatives will help firms acquire tools and relationships that can help advance their environmental interests (Hart 1995; Lorenzoni and Lipparini 1999; Paulraj 2011). In particular, sustainability will not only help by combining resources and capabilities between supply partners, but it can also help companies use such company resources / capabilities to create

more corporate rewards important, unusual and difficult to imitate (Dyer and Singh 1998). The knowledge of environment impact on procurement sustainability can be significantly altered by the cost of raw materials, as it may help to establish mechanisms of exchange between organizations and additional resources that can improve efficiency (1), the creation of companies related to (2) long-term performance of both partners (Dyer and Singh 1998; Lavie 2006; Sarkis, Gonzalez-Torre and Adenso-Diaz 2010). Based on the above, the study hypothesized that:

H₄: Green Purchasing Behavior significantly mediate the relationship between Environmental knowledge and procurement sustainability



CHAPTER THREE

RESEARCH METHODOLOGY AND PROFILE OF ORGANIZATION

3.0 Introduction

This section presents and justifies the research design and the methodology used in testing the hypothesis stated in the preceding chapter. The tools, methods, techniques and strategies employed to help achieve the stated objectives of this study are presented in this chapter. It encapsulates the Research Design, Population, Sampling Techniques, Sample Size, Respondents of the study, Analytic Method, Research Instruments, Validity and Organizational Profile. The entire chapter describes the methods and techniques implemented to obtain the right data from the right respondents for quality analysis.

3.1 Research Design

The research design also referred to as study design is a component of the research method. This often incorporates surveys, interviews, observations, and/or experiments. McCombes and van den Eertwegh (2019) define it as a framework that includes the methods and procedures to collect, analyze, and interpret data. Generally, a research endeavor may fall within the categories of descriptive, correlational, explanatory, or exploratory in terms of the research design (Kumar, 2018). This study adopts both descriptive and explanatory research designs. According to Akhtar (2017), a descriptive research study aims to comprehensively explain a scenario, phenomenon, problem, service, or programme, or gives information on attitudes towards an issue, for example, the living circumstances of a community. Sileyew (2019) further added that a descriptive study seeks to correctly depict the features of a given group or circumstance as is the case of the study to explain the effect of environmental knowledge on procurement sustainability. Tobi and Kampen

(2018) noted that the primary objective of such investigations is to identify what is widespread in relation to the issue or problem being investigated.

An explanatory study on the other hand seeks to explain why and how a link exists between two dimensions of a phenomenon or situation (Akhtar, 2018). The above reasons, therefore, influenced the choice of the descriptive and explanatory designs for this study. These designs are most appropriate since the research objective seeks to establish a relationship between the variables involved using primary data. The study therefore further employed an explanatory research design to understand how green purchasing practice can be strengthened to enhance the relationship between environmental knowledge and procurement sustainability within the Ghanaian Public Sector.

3.2 Population of the Study

A research population is a well-defined group of people who, depending on the researcher's interests, possess comparable features and hence qualify for inclusion in the study (Babbie, 2015). This population which is termed as study population serves as the source of the study sample. In the context of this study, the general population constitutes members of the tender committee, procurement Officers and selected public institutions in Ghana.

3.3 Sampling Technique and Sample Size

Sampling is mainly about choosing individuals as a subset of a defined population to evaluate the characteristics of the entire population (Collis and Hussey, 2009). It can also be used to designate the process of selecting a section from the entire population (Bryman, 2012). It is very suitable in situations where the researcher cannot reach the whole sample or population due to challenges such as time constraints and cost (Saunders et al., 2007). There are two (2) main techniques used in sampling, they are; probability (random) and non-probability sampling. With probability or

random sampling, every participant in the population has an equal chance of selection. However, in the instance of non-probability sampling not all the subjects in the population have the chance of being selected (Bhattacharjee, 2012; Kothari, 2004). The subject of sample size in research remains a dilemma. Different views have been said by different authors. Some authors argue that smaller sample size is well suited for larger populations while others also believe that it should be representative (Krejcie and Morgan, 1970), relatively homogeneous, or heterogeneous in the population. In the view of Gorsuch (1990) and Kline (1979), the sample size should be at least 100. Others also advise that researchers should get the maximum sample size possible (Rummell, 1970; Humphreys, Ilgen, McGrath, and Montanelli, 1969; Guertin and Bailey, 1970; Press, 1972). Thus, if the sample size is unsuitable or insufficient it may harm the outcome or findings of the research (Bartlett, Kotrlik, Higgins, 2001). To achieve an appreciable statistical test power and avoid the tendency of using few sample cases, which will affect the results, (Habib, Magruder-Habib, Kupper, 1987) the study targeted procurement officers in the public sector organizations in Ghana. The study, therefore, sampled two (2) respondents from each of the 100 sampled organizations, making a total sample of 200. The study further employed the purposive and convenience sampling techniques to select the participants in the study.

3.4 Data Collection Instrument

Primary data refers to the data originated by the research for the first time. Primary data is real-time data and is collected by addressing the problem at hand and it also involves a process. Primary data sources include surveys, observations, experiments, questionnaires, and personal interviews (Saunders et al., 2007). Primary data for this study were through a questionnaire. The questionnaire was well-structured and was designed in line with the posited objectives of the study. The questionnaire will be designed based on existing measures in the literature. To ensure the quality

of its design, the researcher employed Saunders et al. (2009), an indication that underscores instrument design. According to Saunders et al. (2009), data obtained from respondents through the use of a questionnaire can be considered stable, constant, and has a uniform measure of variation. It also reduces the researcher's preconceived notion or idea concerning the presentation of study variables. The questionnaire was sourced from studies. Environmental knowledge was measured using four (4) items adapted from (Hill et al, 2008). Green purchasing practice was measured by five (5) items adopted from Carter (2005) and Carter and Jennings (2004). Procurement sustainability was measured with fourteen (14) items adopted from (Islam, Siwar and Fien, (2014; Yu, Chavez, Feng and Wiengarten, 2014; Zhu, Sarkis and Lai, 2012).

The questionnaire was presented to respondents at their offices considering their position in the organization. Respondents utilized not less than 30 minutes the filling out the questionnaire. The researcher adopted one-on-one data collection administration to make clarifications and explanations when the need arose. The researcher personally collected the questionnaire after it has been filled by the respondents.

3.4.1 Pilot Testing

The purpose of pilot testing is to identify the flaws in the questionnaires and instruments to be used for the study to do the necessary corrections before using them for the actual research. The pilot study gives a clear picture of the estimation of cost and logistics needed for data gathering and analysis. According to Hertzog (2008), the ideal sample size for pilot testing is 35-40, Lackey and Wingate (1998) propose 10 percent of the population for the study whereas Nieswiadomy (1998) suggests 10 respondents. Others, like Israel (1992) and Krejcie and Morgan, (1970), are of the view that the sample size provided should be the same or near value. This research has resorted

to Hertzog (2008) where a sample size of 35 respondents will be enough to perform the pilot testing.

3.4.2 Data Collection method

There are several methods from which a researcher can adopt to collect data depending on the type of research being conducted (qualitative, quantitative and mixed methods). Saunders et al. (2016) posit that the two main questionnaires are the self-completed and interview completed. Face-to-face and telephone questionnaires, according to Saunders et al. (2016), form part of the interviewer questionnaire. Zikmund (2013) has given questionnaires, interviews and observation as the main instruments for the methods survey. Data for this research was collected through face-to-face interaction using a questionnaire. The Face-face approach enabled the researcher to obtain timely responses, especially during data collection. Face-to-face data collection helped the researcher build rapport and seek clarification of ambiguous responses, enhancing the data collected (Szolnoki and Hoffmann, 2013).

Studies have shown that face-to-face administered questionnaires work better than posted and phone surveys (Szolnoki and Hoffmann, 2013). However, it can be expensive and requires a lot of time. With an introductory letter obtained from the school, the researcher visited firms selected for the study with a questionnaire. This assisted the researcher to obtain the needed responses for the study. A self-administered questionnaire technique has been adopted because the number of sampling frame are considered high and they are located in different parts of the region.

3.6 Data Analysis

The adoption of the data analysis technique largely relies on the aim and objectives of the study (Hair *et al.* 2010). As previously discussed, the design of this study is explanatory, seeking to investigate the effects of relationships to understand the impacts on supply chain performance. Per

this study, multiple relationships will exist among variables that need to be tested. In light of this and the explanatory purpose of the study, the applicable data analysis techniques for this study is based on Hair *et al.* (2010) structural equation modelling (SEM), which is the main method of analysis in the multivariate analysis with SPSS IBM version 20 and SmartPLS version 3 due to the enormous and model complexity. The multivariate analysis technique of SEM is broadly used when a study is dealing with more than one variable, analysing more than one statistical outcome variable at a time (Field 2009; Schumacker and Lomax 2010; Kline 2011). The SEM technique is able to examine multiple relationships between dependent and independent variables while considering interaction effects among the variables (Kaplan 2000). Kline (2011) revealed that SEM describes all of the relationships between independent and dependent variables and expresses them in a series of equations. Additionally, SEM tries to analyse all the relationships between variables in one sitting, producing less biased results (Kaplan 2000). The structural equation modelling (SEM) technique is a widely used data analysis approach in analysing structural models that encompass independent and dependent variables (Bagozzi and Yi 2012). The ability of SEM is highly germane to this research as it allowed simultaneous estimation of all the posited hypotheses. It is in this regard, that Bagozzi and Yi (2012) maintained that the use of SEM offers an integrative function as a single umbrella of methods that covers testing measurements and causal hypotheses.

All of the factors that will be included in the model's statistical correlations will be covered in detail by the study (Akter, Fosso Wamba and Dewan 2017; Hair, Ringle and Sarstedt 2011). The study's data was processed in two different ways: descriptively using SPSS and inferentially using partial least squares modeling of structural equations (PLS-SEM). This study is explanatory research backed by PLS-SEM, an increasingly used tool in empirical studies (Cepeda-Carrion,

Cegarra-Navarro and Cillo 2018, Henseler 2018). PLS-SEM research has accelerated over the past decade, and there are many opportunities for analysis on topics including mediation, moderation, and multi-group analysis (Hair *et al.*, 2014).

3.7.1 Partial Least Square-Structural Equation Modelling (PLS-SEM)

PLS-SEM will be used in analysing data that will be collected. SEM as defined by AmirAlavifar, (2012), is a statistical technique that uses statistical data to test and analyse the causal relationship. In comparison to multiple regression, SEM has been well acclaimed as a better statistical method for establishing the relationship between variables. SEM can evaluate the relationship of model constructs simultaneously, whereas the variables are analysed differently in the first generation method (AmirAlavifar, 2012). As a result, this research study will adopt the use of PLS-SEM.

The need for using PLS-SEM

PLS as a method is a known-established technique that has widely been used and discussed in a lot of research (Šeric *et al.*, 2016). Two forms of SEM techniques exist: these are covariance-based SEM (CB-SEM) and Partial Least Square-Structured Modelling (PLS-SEM). The variation in these 2 models is based on objectives or purpose of research work. When the objective of research is a confirmation or testing of a theory prevailing, then CB-SEM is the right technique. Contrarily, if the objective of research work is theory development or prediction, PLS-SEM is the preferred technique to use. PLS can be used as a foundation in theory confirmation, however, its use is mostly to determine if relationships exist or non-existence (Šeric *et al.*, 2016). Since there is not much evidence on the relationship between Brand awareness and service innovation, and service innovation

and competitive advantage, this study will use PLS-SEM since the emphasis will be directed at giving explanation and prediction of the constructs.

Henseler et al., (2009), identified some advantages linked with the use of PLS-SEM, which includes, its ability of analysing models that are complex in nature with several variables simultaneously, the study will investigate sophisticated model when constructs as service innovation and competitive advantage contain more dimensions, then using PLS-SEM is appropriate for this study. Also, the application of PLS-SEM possesses a unique method that is suitable to analyse data whose sample contain either small or medium size (Henseler et al., 2009; Wolf et al., 2013; Tsou and Cheng, 2015)

Model Evaluation in using PLS-SEM

According to Hair et al., (2011) having select the tool, subsequently the next option is to assess the model development. In assessing PLS-SEM model, two vary process exist, either using structural or measurement model(Hair et al., 2011). The model validation for this study will be based on well-known two established types for assessing. Measurement model demonstrate how constructs used are measured and the structural model explains how constructs hidden are connecting with each one other.

Measurement model Assessment

Assessing the measurement model is very crucial to positivism study, it affirms validation and outcome of the study. It is on the other hand significant for researchers to focus on improvement in research work quality(Heale and Twycross, 2015). Also, there exist two

characteristics that are crucial dealing with evaluating measurement model, this are reliability and validity of instruments used in research (Saunders et al., 2016).

Reliability measurement is very critical in any research activity and it is defined as the level where measurement use is not associated with random error in delivery of consistent results(Khalid et al., 2012). Hence, can be expressed by way of stability, equivalence, and internal consistency(Cooper et al., 2003). Further, in testing for the reliability of an instrument, Hair, Sarstedt, Pieper, et al, (2012), emerged with 2 reliability test; internal consistency and reliability indicator. In internal consistency reliability, researcher uses Cronbach Alpha. Hence scholars like Hair, Sarstedt, Ringle, & Mena (2012),asserted reliability indicator normally uses the absolute standardized loading of each indicator, which must be greater than 0.7, to calculate the variance of the indicator used to explain the latent construct (Hair et al., 2011). According to researchers, the indication loading, which ranges from 0.4 to 0.7, should be eliminated from the scale if doing so will raise the composite reliability above the acceptable threshold number. But if the indicator loading is 0.7 or less, it will always be eliminated from the reflective scale. Table 3.20 will show the reliability test.

Table 0.7 Reliability Test

Assessment	Attribute	Evaluation Criteria	Description	Reference
Reliability	Internal consistency	Composite reliability	To determine whether the construct indicators are closely related. In this case, the value should	Hair et al., (2011)

			be greater than 0.7.	
	Reliability indicator	Indicator loading	To measure the indicator variance that underpins similar constructs. The value must be greater than 0.7.	Hair et al., (2011)

Validity

According to Zikmund et al., (2000), the ability of a scale to measure what is intended to be measured is referred to as validity. Thus, according to Saunders et al, (2009), validity is expressed in two forms External and Internal(AmirAlavifar, 2012). In positivism research, researcher must certify that the three traditional forms of validity exist within measurement device which are face validity, content validity and construct validity(AmirAlavifar, 2012; Heale and Twycross, 2015; Tsou and Cheng, 2015)

Content Validity
 Content validity is the familiar method among others that need to be conducted. It determines whether the items will measure all of the content developed for the study (Creswell, 2009; Heale & Twycross, 2015). In content validity is frequently determined by reviewing related literature; in this study, the instruments used were validated by previous studies. However, according to Richard G. Netemeyer, William O. Bearden, (2003). in order to determine whether all of the research content has been captured, the researcher should investigate face validity by bringing in experts to assess whether the instruments are viable in terms of relevance, appearance, and accurately representing identified items.

Construct Validity

According to Hair et al., (2010). “Construct validity is the extent to which a set of measured variables represent the latent constructs which are designed to measure theoretically”(Pratihari, 2018). In furtherance, it measures items hypothesised in constructs(Creswell, 2009). However, to show that the research model has construct validity, the researcher should show that the construct being measured has discriminant and convergent validity(Khalid et al., 2012; Tsou and Cheng, 2015).

Convergent validity is the measure of constructs that must, in theory, be related to one another. Straub et al., (2004) is of the opinion that convergent validity occurs frequently when two or more items are correlated and measure the same construct.

Discriminant validity is the extent to which the measurement of one construct is different from another construct measurement. Therefore, an item will be identified to have a discriminant validity, according to Cooper et al., (2003), when value of correlation between the indicators vary from another construct is very low.

3.7 Ethical Consideration

A consent form was presented to the authorities of all respondents to inform them of all benefits and risks involved in the participation and further sought their consent for their inclusion in the study. Selected farmers had the right to decline their participation in the study. The researcher indicated in the consent form that all forms of anonymity and confidentiality would be observed. Privacy of farmers in terms of freedom to define the time, extent and the conditions of sharing information was also observed. The researcher avoided any form of action in their relation with participants that amounts to deception. All forms of plagiarism and falsification of data were also avoided by the researcher.

3.8 Organizational Profile

Public Procurement (PP) is regulated through procedures, rules, methods and processes which lawfully protect the acquisition of goods, services and works with state funds. In a different context, public procurement could be defined as the acquisition of public necessities that are financed with public resources within the nation's budget. Before the introduction of the Procurement Act 2003, most state institutions procure goods, works and services out of their discretion. This has however resulted in several irregularities and anomalies within the public sector. The procurement was always characterized by fraudulent practices which leads to the misappropriation of public funds.

There was no guiding procedure that directed how institutions could undertake procurement activities. The absence of a legal procedure for procurement created a ground for misuse of state funds and increased cases of corruption. Again, due to a lack of competition in public procurement, contracts were awarded to unqualified individuals; procurements were usually not open to competitive tendering which made procurement within the public sector inefficient. Given the above discussion, the 2003 Procurement Law of Ghana was promulgated and passed by parliament. The mandate of the Act was to minimize the fraudulent practices associated with procurement in the public sector through the promotion of transparency, fairness and value for public resources (Ghana Public Procurement Authority, 2010, Osei-Tutu et al, 2012). As stated earlier, the Public Procurement Authority (PPA) seeks to regulate procurement activities and also ensure efficient utilization of state funds/resources. This is to ensure competition, transparency, and greater proficiency, minimize corruption and improve expert procurement within public entities. In the case of Ghana just like other African countries such as Uganda, Kenya etc. were mandated to come out with Procurement laws due to the above anomalies within the public sector.

In Ghana, all government agencies have procurement departments managed by procurement Officers who undertake procurement activities of the hospital (Gafarua, 2017). The Unit/Department ensures adherence to the requisite laws to achieve procurement objectives. As part of a government effort to improve public financial management across the country the Public Financial Management Reform Program (PUFMARP) 1996, was even introduced before the Procurement Act, Act 663, 2003. However, the PUFMARP revealed some shortcomings with the procurement structure as it lacks a complete strategy and legal framework to safeguard public procurement and also lacks an independent auditing function coupled with no central body with technical expertise to manage procurement activities.

However, the public sector procurement continues to be challenged and the resultant wastages of public resources through procurement activities. The study had been conducted at selected non-tax revenue-generating institutions in the country. Ghana has several agencies and institutions that are responsible for mobilizing revenue for the state aside from the Ghana revenue authority. The revenues from these state agencies and institutions are referred to as non-tax revenue. Most of the revenues from these institutions are obtained through our natural resources and other public institutions providing special services to the citizens. These include the Ministry of Interior, Ghana Health Services, Ministry of Trade and Industry, Ministry of Foreign Affairs and Regional Integration, Ministry of Energy, Judicial Service, Ministry of Lands and Natural Resources, Ministry of Transport, Roads and Highways Authority, Local Government and Ministry of Education. The source includes the Ministry of Interior, Ghana Health Service, Ministry of Trade and Industry, Ministry of Foreign Affairs and Regional Integration, Ministry of Energy, Judicial Service, Ministry of Lands and Natural Resources, Ministry of Transport, Roads and Highways Authority, Ministry of Education.

CHAPTER FOUR

DATA ANALYSIS, RESULTS, AND DISCUSSION

4.0 Introduction

This section of the study elaborates on the empirical results of the study and the discussion of the findings from the result. The questionnaire used in this study comprised four major sections. The first section solicits the demographic characteristics of respondents who were included in the study. The second section contains questions on environmental knowledge, the third section also contains questions on green procurement and the last part dealt with procurement sustainability. All items of the second section of the questionnaire were measured on a five-point Likert scale. The chapter proceeds with a summary of the results of the pilot study and then, with a description of data using descriptive statistics. The descriptive of the demographic were individual level while those on the main variables were processed on an aggregate level since the theoretical and conceptual model was hypothesized at the organizational level. How data was processed at the aggregate level is discussed in the preceding chapter. This section of the analysis was done using SPSS version 23 and Smart PLS version 3.

4.1 Exploratory Data Analysis

SPSS and Partial Least Squares (PLS) were used to analyze the data. While SPSS was utilized for preliminary tests such as descriptive, normality, CMB, none response bias, and EFA. The Smart PLS (i.e., first generation multivariate path analysis approach) was used for Confirmatory Factor Analysis and the Structural Model Evaluation (Hypothesis testing).

4.1.1 Response Rate

The data gathering period was more than three months, from August 20th to November 4th, 2021. Between the 20th of August and the 4th of November 2021, 134 questionnaires were issued, and 90 were judged to be acceptable after evaluating the individual questionnaires for acceptability, resulting in a response rate of 67%, as shown in Table 4.1 below.

Table 4.1 Data Response Rate

Distributed	Collected	Percentage of Usable
Response	90	67%
Non-Response	44	33%
Total	134	100.0%

Source: Field Data (2021)

4.1.2 Common Method Bias

This study used Harman's single factor test to analyze common method bias and the adequacy of the constructs in the measurement model, as proposed by Shashi et al (2019). According to Podsakoff et al. (2003), the one-factor test, also known as the Harman test, examines all observable variables in exploratory factor analysis (EFA) to see if a single factor accounts for more than 50% of the computed variance. The biggest variation explained by a single factor is 26.96 percent, which is less than the 50 percent requirement when employing the principal component analysis extraction method, as shown in Table 4.2. This confirms that CMB is not present in the dataset.

Additionally, the correlation matrix was used to further validate the absence of CMB following the limitations of Harman's one-factor approach. As per the recommendation of Tahseen et al. (2007), the correlations among the main constructs should not exceed a recommended threshold to confirm the absences of CMB. The result of our study revealed that the correlations among the principal constructs are less than ($r < 0.9$). This further confirms Harman's one-factor test result, hence there is no issue of CMB in this research model.

Table 4.2: Test for Common Method Variance (CMV)

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	7.490	29.961	29.961	7.490	29.961	29.961
2	4.464	17.855	47.817	4.464	17.855	47.817
3	3.637	14.546	62.363	3.637	14.546	62.363
4	2.929	11.717	74.080	2.929	11.717	74.080
5	2.344	9.377	83.457	2.344	9.377	83.457
6	1.611	6.443	89.900	1.611	6.443	89.900
7	1.314	5.255	95.155	1.314	5.255	95.155
8	.927	3.707	98.862			
9	.284	1.138	100.000			
10	1.653E-15	6.613E-15	100.000			
11	1.314E-15	5.254E-15	100.000			
12	1.137E-15	4.546E-15	100.000			
13	5.918E-16	2.367E-15	100.000			
14	4.122E-16	1.649E-15	100.000			
15	3.155E-16	1.262E-15	100.000			
16	2.040E-16	8.160E-16	100.000			
17	-8.853E-17	-3.541E-16	100.000			
18	-2.458E-16	-9.833E-16	100.000			
19	-3.316E-16	-1.327E-15	100.000			
20	-5.749E-16	-2.299E-15	100.000			
21	-6.945E-16	-2.778E-15	100.000			
22	-9.473E-16	-3.789E-15	100.000			
23	-1.074E-15	-4.296E-15	100.000			
24	-1.670E-15	-6.679E-15	100.000			
25	-1.921E-15	-7.683E-15	100.000			

Extraction Method: Principal Component Analysis.

The Kaiser-Meyer-Olkin Measure of Sampling Adequacy was 95.2% while Bartlett's test also showed significantly ($\chi^2 = 10665.878$, df.: 903, $p < 0.000$) as presented in Table 4.3 below.

Table 4.3: Bartlett's Test of Sphericity and KMO Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.952
Bartlett's Test of Sphericity	Approx. Chi-Square	10665.878
	df	903
	Sig.	.000

Source: Field Survey (2021)

4.1.3 Non-Response Bias

The greatest way to avoid nonresponse bias in a survey is to have a high response rate (Oppenheim, 2001; Armstrong and Overton, 1977). As a result, the researchers in this study worked hard to improve the response rate. The researchers initially requested authorization from the human resource departments of the institutions that would be participating in the study. After the researchers were introduced by the HR managers, the respondents were contacted.

The researchers individually administered the questionnaires. To assist responders in providing accurate answers to the questions, guidelines and explanations were offered. The respondents were assured of their privacy, and the researchers promised not to share the data with anyone else. They were told that the information they supply will be utilized just for research purposes and will not be shared with anyone else. The data was collected between August 20, 2021, and November 4, 2021.

All ninety (90) responses out of hundred and thirty-four (134) distributed were usable and used for the analysis. This represents a response rate of 67%. In addition, to assess non-response bias in the survey sample, the approach described by Oppenheim (2001, p.106) was adopted. The first 45 responses and the last 45 responses were classified as early and late responses, respectively, according to the protocol. Following that, a T-test analysis was used to look for non-response bias.

The t-test analysis revealed no statistically significant differences. The socio-demographic traits and constructs were subjected to a second t-test analysis (Oppenheim, 2001, p.106; Armstrong and Overton, 1977, p.397). The findings revealed no significant differences in demographics or the constructs investigated in this study (see Table 4.4 below).

Table 4.4 Results of Independent-Samples t-Test for Non-Response Bias

Variables	Group	Mean	Levene's Test for Equality of Variances		
			F	Sig.	T
MO	1.00	15.6476	1.904	.016	-.721
	2.00	15.8714			
MDC	1.00	15.0810	.176	.675	-.755
	2.00	15.3095			
FP	1.00	19.6143	.765	.382	1.096
	2.00	19.2048			
Gender	1.00	15.1238	.230	.632	1.096
	2.00	14.4190			
Age	1.00	16.1524	1.792	.213	1.628
	2.00	15.3857			

Source: Field Data, 2021

4.1.4 Test for Normality and Missing Values

Because normality of the data is an important underlying assumption in parametric studies, determining data normality is a need for many statistical analyses. Normality was investigated in this work, even though it is not required to use PLS-SEM. This is critical because a dataset with an atypical distribution can hurt the bootstrapping standard error. The distribution in Appendix 1 demonstrates that none of the values for skewness or kurtosis surpassed the threshold. The rule of thumb posits that skewness within ± 2.00 standard error of skewness and kurtosis within ± 3.00 standard error of kurtosis is acceptable (Garson, 2012; Hair et al., 2010). The data also show the absence of missing values in the dataset.

4.2 Demographic Characteristics of the Respondents

The study found it necessary in determining the gender of respondents. Out of the ninety (90) respondents that were involved in the study, Table 4.5 below shows that 36 (40.0%) of the respondents were females while 54 (60.0%) were males. The results indicate that majority of respondents were males. The results as presented below revealed that 45 (50.0%) of respondents were between 25-34 years, and the remaining 45 (50.0%) of respondents were between 35-44 years. The results indicate that all the respondents included in the study were between 25-34 years and 35-44 years respectively. The results also indicated that 18 (20.0%) of the respondents were Diploma/HND holders, while the remaining 72 (80.0%) of the respondents were Bachelor's degree holders. The study however suggested that the majority of the respondents involved in the study were Bachelor's degree holders. The results therefore finally revealed that 54 (60.0%) of the respondent's working experience falls between 1-5 years, and the remaining 36 (40.0%) respondents' working experience falls between 6-10 years. The results obtained from the study implied that the majority of the respondent's working experience falls between 1-5 years.

Table 4.5: Demographic Characteristics

Variables	Categories	Frequency	Percent
Gender			
	Female	36	40.0
	Male	54	60.0
Age			
	25-34	45	50.0
	35-44	45	50.0
Highest educational level			
	Diploma/HND	18	20.0
	Bachelor's Degree	72	80.0
Work experience in the organization (years)			
	1-5 years	54	60.0
	6-10 years	36	40.0
	Total	90	100.0

Source: Field Work, 2023

4.3 Descriptive Statistics and Correlation Analysis

4.3.1 Procurement Sustainability

The researcher considered ten (10) items under procurement sustainability (PS). The results as presented in Table 4.6 indicates that the average score for PS1 was (Mean=4.90; Std=0.302) indicating they strongly agreed with PS1. PS2 scored (Mean=4.60; Std=0.667) indicating they strongly agreed with PS2. PS3 scored (Mean=3.90; Std=0.704) indicating they strongly disagree with PS3. PS4 scored (Mean=4.00; Std=1.006) indicating they strongly disagree with PS4. PS5 scored (Mean=3.90; Std=0.949) indicating they strongly disagreed with PS5. PS6 scored (Mean=4.00; Std=0.636) indicating they strongly disagreed with PS6. PS7 scored (Mean=4.20; Std=0.603) indicating they strongly agreed with PS7. PS8 scored (Mean=4.00; Std=1.19) indicating they strongly disagreed with PS8. PS9 scored (Mean=3.40; Std=1.288) indicating they strongly disagreed with PS9. PS10 scored (Mean=4.70; Std=0.461) indicating they strongly agreed with PS10. The overall mean or grand mean of the ten (10) items measuring procurement sustainability (PS) is [M = 4.16]. Remarkably, any mean score that is pegged as [= or >] the overall mean is hung as an approved or satisfactory indicator and those [<] are considered as a disallowed indicator. From the table, the result shows that out of the ten (10) items, four (4) items were considered with a mean score [= or >] the overall mean and six (6) items were not considered with a mean score [<] the overall mean.

Table 4.6: Procurement Sustainability

Items	N	Mean	Std. Deviation
PS1: Product availability is considered in procurement process	90	4.90	0.302
PS2: Our firm considers quality in procurement process	90	4.60	0.667

PS3: Our firm source for sustainable or recycled materials/products	90	3.9 0	0.704
PS4: Our firm ensures that suppliers' locations are operated in a safe manner.	90	4.0 0	1.006
PS5: Our firms ensures reduction of Greenhouse effect	90	3.9 0	0.949
PS6: Our firm uses a life-cycle analysis to evaluate the environmental friendliness of products and packaging	90	4.0 0	0.636
PS7: Our firm purchases from suppliers who are committed to waste reduction goals	90	4.2 0	0.603
PS8: Our firm ensures that suppliers comply with child labour laws	90	4.0 0	1.19
PS9: Our firm donates to philanthropic organizations.	90	3.4 0	1.288
PS10: Our firm holds interest in economic benefit of the project to community	90	4.7 0	0.461
	Over all	4.1 6	

Source: Field Work, 2023

4.3.2 Environmental Knowledge

The researcher considered five (5) items under environmental knowledge (EK). The results as presented in Table 4.7 indicates that the average score for EK1 was (Mean=3.90; Std=1.227) indicating they strongly disagreed with EK1. EK2 scored (Mean=4.10; Std=0.835) indicating they strongly agreed with EK2. EK3 scored (Mean=4.20; Std=0.753) indicating they strongly agree with EK3. EK4 scored (Mean=4.50; Std=0.675) indicating they strongly agree with EK4. EK5 scored (Mean=4.00; Std=0.899) indicating they strongly disagreed with EK5. The overall mean or grand mean of the five (5) items measuring environmental knowledge (EK) is [M = 4.14]. Remarkably, any mean score that is pegged as [= or >] the overall mean is hung as an approved or satisfactory indicator and those [<] are considered as disallowed indicators. From the table, the result shows that out of the five (5) items, three (3) items were considered with a mean score [= or >] the overall mean and two (2) items were not considered with a mean score [<] the overall mean.

Table 4.7: Environmental Knowledge

Items	N	Mean	Std. Deviation
EK1: My organization pays more attention to recycling than the average organization does	90	3.90	1.227
EK2: My organization understand the environmental phrases and symbols on product packaging	90	4.10	0.835
EK3: We know how to select products and packages that reduce the amount of waste ending up in landfills	90	4.20	0.753
EK4: We are knowledgeable about environmental issues	90	4.50	0.675
EK5: My organization ensures using environmentally sustainable products is a primary means to reduce pollution	90	4.00	0.899
	Overall	4.14	

Source: Field Work, 2023

4.3.4 Green Purchasing Practice

The researcher considered ten (10) items under green purchasing practice. The results as presented in Table 4.8 indicates that the average score for GP1 was (Mean=3.70; Std=0.785) indicating they strongly disagreed with GP1. GP2 scored (Mean=4.10; Std=0.835) indicating they strongly agreed with GP2. GP3 scored (Mean=3.00; Std=0.899) indicating they strongly disagree with GP3. GP4 scored (Mean=4.10; Std=0.835) indicating they strongly agree with GP4. GP5 scored (Mean=3.60; Std=0.804) indicating they strongly agreed with GP5. GP6 scored (Mean=4.20; Std=0.877) indicating they strongly agreed with GP6. GP7 scored (Mean=3.10; Std=1.05) indicating they strongly disagreed with GP7. GP8 scored (Mean=3.10; Std=1.05) indicating they strongly disagreed with GP8. GP9 scored (Mean=2.40; Std=1.026) indicating they strongly disagreed with

GP9. GP10 scored (Mean=3.50; Std=0.927) indicating they strongly agreed with GP10. The overall mean or grand mean of the ten (10) items measuring green procurement (GP) is [M = 3.48]. Remarkably, any mean score that is pegged as [= or >] the overall mean is hung as an approved or satisfactory indicator and those [<] are considered as a disallowed indicator. From the table, the result shows that, out of the ten (10) items, six (6) items were considered with a mean score [= or >] the overall mean and four (4) items were not considered with a mean score [<] the overall mean.

Table 4.8: Green Purchasing Practice

Items	N	Mean	Std. Deviation
My organization implements water-saving practices	90	3.70	0.785
My organization inhibits pouring harmful materials into the port's water	90	4.10	0.835
My organisation endeavours to make our workplaces as green as possible.	90	3.00	0.899
My organisation regularly promotes and conducts training related to ecology and environmental protection	90	4.10	0.835
My organisation requests that employees reduce consumption to avoid unnecessary waste and pollution generation	90	3.60	0.804
My organisation prefers to use more environmentally friendly technologies and equipment.	90	4.20	0.877
My organisation has a set of waste dumping management rules during port operations (e.g., ISO 14001 series).	90	3.10	1.05
My organisation prefers to use reusable tools in transport activities	90	3.10	1.05
My organisation avoids pollutants during port maintenance and cargo handling.	90	2.40	1.026
My organisation prefers to select less polluting operational tools for air pollution avoidance (e.g., using electrification equipment of cargo handling tools to replace diesel ones).	90	3.50	0.927
	Overall	3.48	

Source: Field Work, 2023

4.3.4 Correlation Analysis

The correlations among the constructs in the model were examined. The result in Table 4.9 below shows the correlation among the constructs in the model was generally moderate. The result showed a statistically significant positive association between green purchasing practice and Environmental Knowledge ($r=0.626$). Additionally, Procurement Sustainability shows a moderate association with Environmental Knowledge ($r=.551$). The result however showed a significantly high correlation between Environmental Knowledge and Procurement Sustainability ($r=.822$). Though the correlation coefficient was moderately high, it does not pose a serious threat to multicollinearity, however, this will be further explored subsequently.

Table 4.9: Correlation Analysis

Constructs	1	2	3
Environmental Knowledge	1.000		
Green purchasing practice	0.626**	1.000	
Procurement Sustainability	0.551**	0.822**	1.000

***. Correlation is significant at the 0.01 level (2-tailed).*

4.4 Confirmatory Factor Analysis

Confirmatory factor analysis (CFA) is a statistical approach for confirming a collection of observed variables' factor structure. The researcher can use CFA to assess whether there is a link between observable variables and their underlying latent components. For measurement of model validity and reliability, Confirmatory Factor Analysis was conducted using Smart PLS version 3. The process employed the maximum likelihood estimation method for testing the validity and reliability of the constructs. The model measurement evaluation was conducted, as a pre requisite for the structural model analysis. The model measurement evaluation comprised reliability and validity using Cronbach Alpha (CA), Composite Reliability (CR) and Average Variance Extracted (AVE).

Examining the reflective model measurement is the first step in the model measurement evaluation, the use of indicator loading was employed, and the result as presented in Table 4.8 below shows that the indicator loading ranges between 0.756 and 0.943, which shows the 0.708 thresholds recommended by Hair et al (2019). The result shows that the construct accounts for more than 50% of the indicator variance, hence offering evidence of acceptable item reliability. Again, all the items were statistically significant as shown in Table 4.10 below.

Additionally, two internal consistency measures (Cronbach Alpha and Composite reliability) were employed to examine the reliability of the constructs in this study. Here, high values of Cronbach Alpha and Composite reliability indicate high reliability (Hair et al., 2019). The result of this study shows that Cronbach Alpha values range from 0.821 and 0.908. Hair et al (2019) opined that CA values between .70 and .90 are classified as satisfactory to good, however, Cronbach Alpha values above 0.95 possesses a serious threat as they represent or indicate items redundancy and hence reduce construct validity (Diamantopoulos et al.,2012; Hair et al., 2019). Another measure of

reliability is the use of composite reliability. The results again showed that Composite reliability ranges between 0.891 and 0.933. In summary, all the constructs had good scale reliability (ie. Cronbach Alpha and Composite reliability) were high than 0.7 (Fornell and Larcker, 1981; Henseler et al., 2015; Hair et al., 2019), hence all the constructs had acceptable internal consistency and reliability.

The convergent validity of each construct measure is addressed in the third step of the reflective measurement model assessment. The extent to which a construct converges to explain the variance of its elements is known as convergent validity. The average variance extracted (AVE) for all items on each construct is the metric used to assess convergent validity. The AVE is computed by squaring the loading of each indicator on a construct and computing the mean value. A value of 0.50 or higher indicates that the construct explains at least 50% of the variance among its elements (Hair et al., 2019). The result of this study as presented in Table 4.10 below indicates that AVE which was also used to assess the convergent validity of the constructs was found above the 0.5 thresholds.

Table 4.10: Reliability and Validity

Construct	Items	Loading	CA	rho_A	CR	AVE
Environmental Knowledge	EK2	0.882	0.908	0.943	0.933	0.777
	EK3	0.839				
	EK4	0.891				
	EK5	0.913				
Green purchasing practice	GP1	0.847	0.873	0.885	0.914	0.727
	GP10	0.756				
	GP3	0.943				
	GP5	0.855				
Procurement Sustainability	PS2	0.838	0.821	0.879	0.891	0.732
	PS4	0.906				
	PS5	0.820				

Source: Field Data, 2023

4.4.2 Discriminant Validity

The fourth phase is to determine discriminant validity, or how distinct a construct is experimentally from other constructs in the structural model. The standard metric was proposed by Fornell and Larcker (1981), who advised that each construct's AVE be compared to the squared inter-construct correlation (as a measure of shared variance) of that construct and all other reflectively assessed constructs in the structural model. All model constructs' shared variance should not be greater than their AVEs. However, recent research suggests that this metric is ineffective for assessing discriminant validity. Henseler et al. (2015), for example, show that the Fornell-Larcker criterion fails miserably, especially when the indicator loadings on a construct differ only marginally (e.g. all the indicator loadings are between 0.756 and 0.892). Henseler et al. (2015) proposed the heterotrait-monotrait (HTMT) correlation ratio as a replacement (Voorhees et al., 2016). The HTMT is defined as the difference between the (geometric) mean of the average correlations for items measuring the same construct and the mean value of item correlations across constructs. When HTMT readings are high, discriminant validity issues arise. For structural models containing constructs that are conceptually quite comparable, such as cognitive satisfaction, affective satisfaction, and loyalty, Henseler et al. (2015) propose a threshold value of 0.90. In this case, an HTMT score greater than 0.90 indicates that discriminant validity is not present. When constructs are more conceptually diverse, however, a lower, more conservative threshold value, such as 0.85, is recommended (Henseler et al., 2015). In addition to these criteria, bootstrapping can be used to see if the HTMT value differs considerably from 1.00 (Henseler et al., 2015) or a lower threshold value of 0.85 or 0.90, which should be determined based on the study setting (Franke and Sarstedt, 2019). The result as shown in Table 4.9 shows all the HTMT values are less than 0.90 or 0.85, hence discriminant validity is established.

Table 4.11: Discriminant Validity using HTMT

Constructs	1	2	3
Environmental Knowledge			
Green purchasing practice	0.661		
Procurement Sustainability	0.571	0.716	

4.4.3 Predictive Relevance

The structural model assessment and hypothesis testing via the variances of dependent variables, as well as the model's predictive relevance using Stone-Q2, Geisser's path coefficients, and significance levels, is the next phase of the analysis once the measurement model evaluation meets all of the reliability and validity thresholds (t-values). To estimate the Q2, the study employed the blindfolding process. The result showed the effect of environmental knowledge on green procurement and procurement sustainability recorded Q2 values of 0.277 and 0.463 respectively which are above the threshold (>0).

Again, the coefficient of determination (R^2) was a moderate value (0.392 and 0.677). The implication is that while environmental knowledge accounts for approximately 39%, environmental knowledge and green procurement account for 68% of procurement sustainability variation among the institutions included in this study. The result is presented in Table 4.12 below and further in Figure 4.1 below.

Table 4.12 Predictive Relevance

Construct	R Square	Q² (=1-SSE/SSO)
Green purchasing practice	0.392	0.277
Procurement Sustainability	0.677	0.463

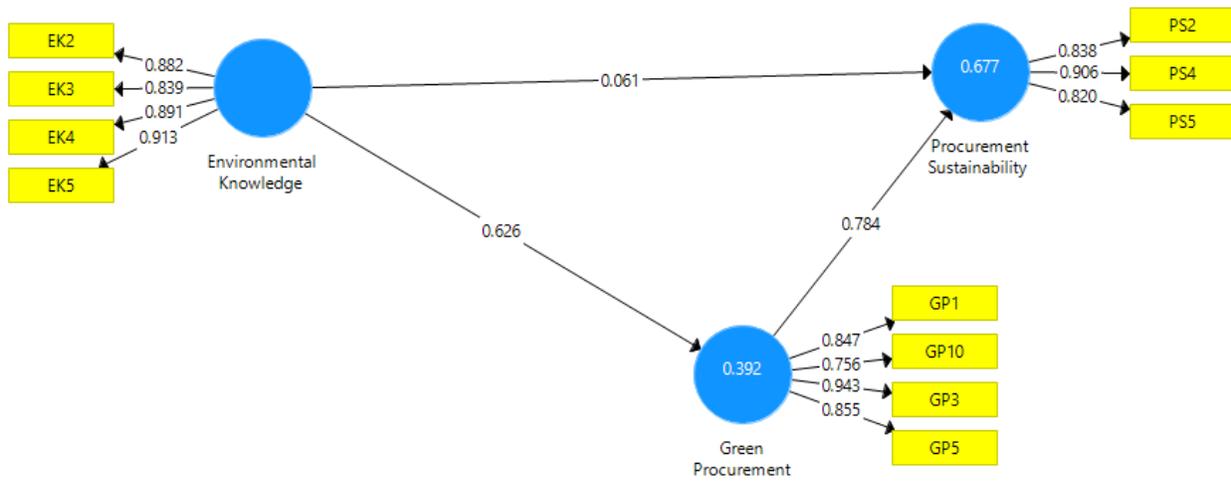


Figure 4.1 Measurement Model Evaluation

4.5 Hypotheses Testing for Hypothesis

Because of the importance of green procurement, several studies have been undertaken to determine the internal and external factors that may inspire businesses to use green procurement techniques (Appolloni et al., 2014). However, little research has been done to see if green procurement can increase the link between environmental awareness and procurement sustainability. This study is motivated by the paucity of empirical research on the long-term viability of public procurement in Africa's developing countries, which amounts to between 30 and 70 percent of government spending. This study is an attempt to fill this research gap since inadequate literature exists on exploring the mediating role of green purchasing practice in the relationship between environmental knowledge and procurement sustainability. The hypothesis and construct relationship were tested using the standardized path coefficients. The path's significance level was calculated using the bootstrap resampling procedure (Henseler et al., 2009),

with 500 iterations of resampling (Chin, 1998). The framework in this study hypothesizes mediating role of green purchasing practice in the relationship between environmental knowledge and procurement sustainability among public sector institutions in Ghana.

4.5.1 Hypotheses Testing for Hypothesis

The outcome of the analysis showed that the first (H1) hypothesis of the study which investigated the effect of Environmental Knowledge on Procurement Sustainability among Ghanaian Public sector institutions was rejected ($B=0.061$, $t=1.296$, $P=0.196$, $Sig>0.005$). The result shows that though environmental knowledge has a positive effect on procurement sustainability, it is statistically insignificant as a unit change in environmental knowledge translates to just a 6% improvement in procurement sustainability. Hence, the results imply that just having environmental knowledge is insufficient to ensure sustainability.

The result, however, showed a statistically significant effect of Environmental Knowledge on green purchasing practice among Ghanaian public sector institutions ($B=0.626$, $t=9.932$, $P=0.000$, $Sig<0.005$). Hence H2 is supported and concludes that Environmental Knowledge significantly impacts green purchasing practice among Ghanaian public sector institutions. The result also showed that holding all other things constant, a unit improvement in environmental knowledge increases green purchasing practice approximately by 63%.

Interestingly, green purchasing practice was found to significantly influence Procurement Sustainability ($B=0.784$, $t=26.590$, $P=0.000$, $Sig<0.005$). Hence, H3 was supported, and a unit increase in Green Procurement enhances Procurement Sustainability by approximately 78%. Hence, evidence from this study demonstrates that green purchasing practice significantly influences Procurement Sustainability.

Additionally, the study examined the mediating role of green purchasing practice in the relationship between environmental knowledge and procurement sustainability among public sector institutions in Ghana. This study examined the mediating effect using the bootstrapping indirect effect as recommended by Preacher and Hayes (2004; 2008). The result in Table 4.10 shows that green purchasing practice significantly mediates the relationship between environmental knowledge and procurement sustainability among public sector institutions in Ghana (B=0.491; t=8.992; p=0.000). The implication is that when green purchasing practice is present, the relationship between environmental knowledge and procurement sustainability is much stronger. The result further indicates that green purchasing practice plays a full mediation in the relationship between environmental knowledge and procurement sustainability, this conclusion was drawn by the fact that the total effect was insignificant, however, the introduction of the mediator made the relationship significant.

Table 4.13: Hypotheses Testing for Direct Hypothesis

Hypothesis	Path Coefficients	StD	T Statistics	P Values	Results
H1: Environmental Knowledge -> Procurement Sustainability	0.061	0.047	1.296	0.196	Not Supported
H2: Environmental Knowledge -> Green purchasing practice	0.626	0.063	9.932	0.000	Supported
H3: Green purchasing practice -> Procurement Sustainability	0.784	0.029	26.590	0.000	Supported
H4: EK -> GPP -> PS	0.491	0.055	8.992	0.000	Supported

Source: Field Data, 2023

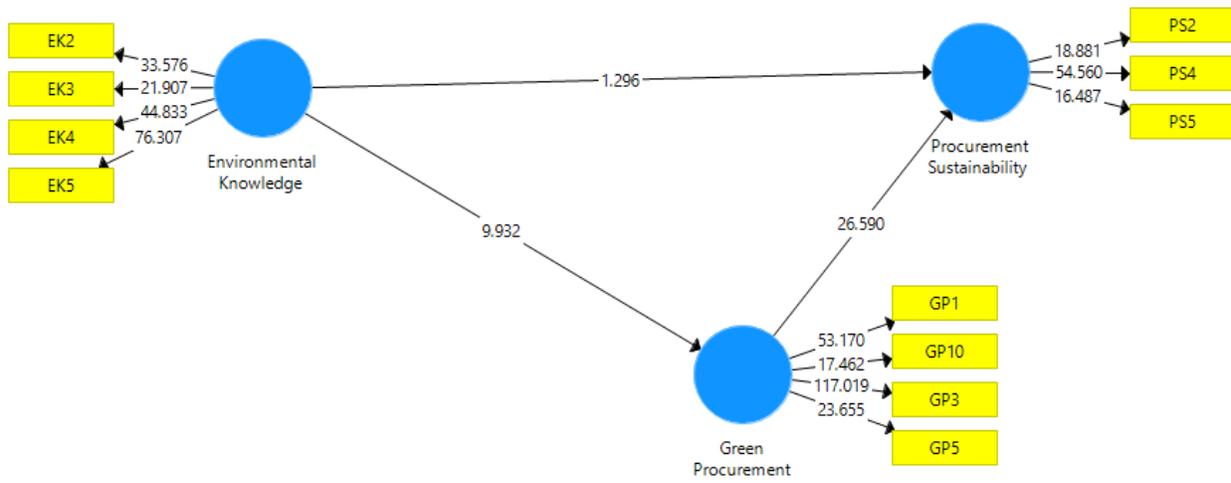


Figure 4.2 Structural Model Evaluation



4.6 Discussion of Results

Little research has been done to see if green purchasing practice can increase the link between environmental awareness and procurement sustainability. This study is motivated by the paucity of empirical research on the long-term viability of public procurement in Africa's developing countries. This study is an attempt to fill this research gap since inadequate literature exists on exploring the mediating role of green purchasing practice in the relationship between environmental knowledge and procurement sustainability. In the attempt to achieve the objective of the study, four (4) hypotheses were put forward for empirical validation. Data was gathered from 90 staff of 45 public sector institutions in Ghana. SPSS and PLS-SEM (Smart PLS-3) were used for the analyses and the result discussed below.

4.6.1 Relationship Between Environmental Knowledge and Procurement Sustainability

The outcome of the analysis showed that the first (H1) hypothesis of the study which investigated the effect of Environmental Knowledge on Procurement Sustainability among Ghanaian Public sector institutions was rejected. The result shows that though environmental knowledge has a positive effect on procurement sustainability, it is statistically insignificant as a unit change in environmental knowledge translates to just a 6% improvement in procurement sustainability. Hence, the results imply that just having environmental knowledge is insufficient to ensure sustainability. The finding in this study is different from prior studies that argue that individuals with high environmental knowledge react positively to sustainability initiatives (Mostafa, 2009). Extant studies demonstrated that environmental knowledge positively relates to sustainability (Zelenika et al., 2018; Marthinez-Marthinez et al., 2019). The outcome of this study suggests that procurement officials with high environmental knowledge though may be conscious of procuring at minimum or the best value for money as well as ensuring they do not damage the environment

relationship with other stakeholders, which in return makes procurement sustainable is not always the case, thus the sustainability of procurement goes beyond just have environmental knowledge.

4.6.2 Relationship Between Environmental Knowledge and Green Purchasing Practice

The result, however, showed a statistically significant effect of Environmental Knowledge on green purchasing practice among Ghanaian public sector institutions. Hence H2 is supported and concludes that Environmental Knowledge significantly impacts green purchasing practice among Ghanaian public sector institutions. The result also showed that holding all other things constant, a unit improvement in environmental knowledge increases green purchasing practice approximately by 63%. The result confirms earlier studies that education remains a key strategy for preparing people to appreciate environmental issues and ultimately be environmentally conscious (Trumper, 2010; Harring and Jagers, 2018; Asunta, 2003). This study confirms that people with high environmental knowledge are more likely to procure green products (Noor et al., 2012; Sun et al., 2018; Mohiuddin et al., 2018; Mostafa, 2007; Wang et al., 2020; Tong et al., 2020; Ahmad and Thyagaraj, 2015; Lee, 2010). The outcome of this study suggests that environmental knowledge plays an essential role in helping individuals to know and appreciate the more appropriate way of moving toward an environmental goal. The role moves beyond just habit formation and influences actual purchase decisions. It is therefore expected procurement officials with high environmental knowledge (EK) will procure environmentally friendly products and services or embark on eco-friendly projects.

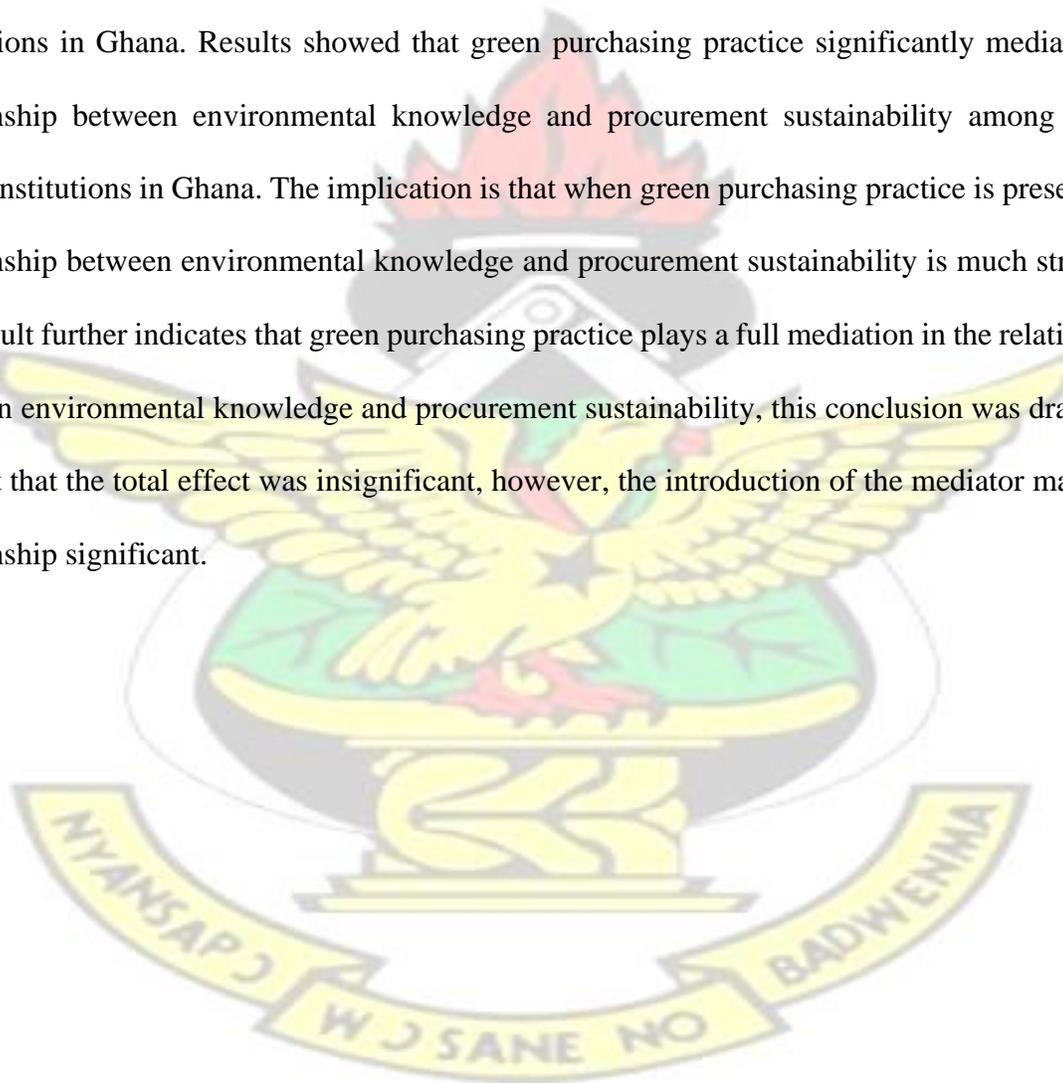
4.6.3 Relationship Between Green Purchasing Practice and Procurement Sustainability

Moreover, green purchasing practice was found to significantly influence Procurement Sustainability. Hence, H3 was supported, and a unit increase in green purchasing practice enhances Procurement Sustainability by approximately 78%. Hence, evidence from this study

demonstrates that green purchasing practice significantly influences Procurement Sustainability. The result is indifferent to a recent study by Lăzăroiu et al (2020) which argued that green procurement plays an essential role in ensuring sustainable procurement.

4.6.4 Mediating Role of Green Purchasing Practice

Finally, the study examined the mediating role of green purchasing practice in the relationship between environmental knowledge and procurement sustainability among public sector institutions in Ghana. Results showed that green purchasing practice significantly mediates the relationship between environmental knowledge and procurement sustainability among public sector institutions in Ghana. The implication is that when green purchasing practice is present, the relationship between environmental knowledge and procurement sustainability is much stronger. The result further indicates that green purchasing practice plays a full mediation in the relationship between environmental knowledge and procurement sustainability, this conclusion was drawn by the fact that the total effect was insignificant, however, the introduction of the mediator made the relationship significant.



CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSION, AND RECOMMENDATIONS

5.1 Introduction

The current chapter gives a summary and discussion of all the findings of this study. The chapter starts with the provision of a summary of the objectives of the study and the major findings which are consequently deliberated on past research findings. Conclusion and recommendations for further study are also presented.

5.2 Summary of findings

Drawing on the little research that has been done to see if green purchasing practice can increase the link between environmental awareness and procurement sustainability. This study is motivated by the paucity of empirical research on the long-term viability of public procurement in developing countries. This study is an attempt to fill this research gap since inadequate literature exists on exploring the mediating role of green purchasing practice in the relationship between environmental knowledge and procurement sustainability. In the attempt to achieve the objective of the study, four (4) hypotheses were put forward for empirical validation. Data was gathered from 90 staff of 45 public sector institutions in Ghana. SPSS and PLS-SEM (Smart PLS-3) were used for the analyses and the result discussed below.

The outcome of the analysis showed that the first (H1) hypothesis of the study which investigated the effect of Environmental Knowledge on Procurement Sustainability among Ghanaian Public sector institutions was rejected. The result shows that though environmental knowledge has a positive effect on procurement sustainability, it is statistically insignificant as a unit change in environmental knowledge translates to just a 6% improvement in procurement sustainability. Hence, the results imply that just having environmental knowledge is insufficient to ensure

sustainability. The outcome of this study suggests that procurement officials with high environmental knowledge though may be conscious of procuring at minimum or the best value for money as well as ensuring they do not damage the environment relationship with other stakeholders, which in return makes procurement sustainable is not always the case, thus the sustainability of procurement goes beyond just have environmental knowledge.

The result, however, showed a statistically significant effect of Environmental Knowledge on green purchasing practice among Ghanaian public sector institutions. Hence H2 is supported and concludes that Environmental Knowledge significantly impacts green purchasing practice among Ghanaian public sector institutions. The result also showed that holding all other things constant, a unit improvement in environmental knowledge increases green purchasing practice approximately by 63%. The result confirms earlier studies that education remains a key strategy for preparing people to appreciate environmental issues and ultimately be environmentally conscious (Trumper, 2010; Harring and Jagers, 2017; Asunta, 2003).

5.2.3 Relationship between Green Purchasing Practice and Procurement Sustainability

Moreover, green purchasing practice was found to significantly influence Procurement Sustainability. Hence, H3 was supported, and a unit increase in green purchasing practice enhances Procurement Sustainability by approximately 78%. Hence, evidence from this study demonstrates that green purchasing practice significantly influences Procurement Sustainability. The result is indifferent to a recent study by Lăzăroiu et al (2020) which argued that green purchasing practice plays an essential role in ensuring sustainable procurement.

5.2.4 Mediating Role of Green Purchasing Practice

Finally, the study examined the mediating role of green purchasing practice in the relationship between environmental knowledge and procurement sustainability among public sector

institutions in Ghana. Result showed that green purchasing practice significantly mediates the relationship between environmental knowledge and procurement sustainability among public sector institutions in Ghana. The implication is that when the green purchasing practice is present, the relationship between environmental knowledge and procurement sustainability is much stronger. The result further indicates that green purchasing practice plays a full mediation in the relationship between environmental knowledge and procurement sustainability, this conclusion was drawn by the fact that the total effect was insignificant, however the introduction of the mediator made the relationship significant.

5.3 Conclusion

Incorporating green thinking in procurement has been flaunted as a vital area of concern among many business sectors across the globe. This study was conducted to examine the mediating role of green purchasing practice in the relationship between environmental knowledge and procurement sustainability. A cross sectional survey design was employed to select 90 procurement officers from 45 public sector institutions in Ghana. PSS and PLS-SEM (Smart PLS-3) were used for the analyses and the result discussed. The findings of the study indicate that environmental knowledge has insignificant positive effect on procurement sustainability. The study however showed that environmental knowledge significantly affects green procurement. Additionally, the result showed that while green purchasing practice directly influences procurement sustainability, it also plays an indirect role in the EK-PS link. The result revealed showed that the relationship between environmental knowledge and procurement sustainability is not a direct relationship but mediated through green purchasing practice.

5.4 Theoretical Implications

This study makes three key theoretical contributions. The first theoretical contribution of this study lies in the relationship between EK, green purchasing practice and PS, the study is among the few attempts to examine the role of environmental knowledge and green purchasing practice in shaping procurement sustainability, especially in the SSA setting. This study, therefore, offers a contemporary view of RBV theory by examining the nexus between EK – PS. The study extends existing knowledge by exploring how green purchasing practice strengthens the direct EK – PS link. Again, this study found that green purchasing practice fully mediates the EK – PS link which is also missing in extant literature. Thus, this, therefore, offers empirical support to the validation of the RBV theory as it has not been sufficiently validated in procurement sustainability management literature. Though prior studies have sufficiently discussed the importance of green purchasing practice and the ability of firms to leverage it to enhance the sustainability of large industrial firms (Dangelico et al., 2017; Gong et al., 2019; Fernando et al., 2019), how EK shapes Procurement sustainability has earned limited research attention in the context of public sector organizations. Meanwhile, more research has concentrated in developed economies, and the inclusion of organizational factors in EK – PS link in the public sector context presents a unique contribution to existing knowledge in the area. The discoveries made can be linked to decisions of public procurement management. This makes the decision-making aspect of government procurement very important, especially in emerging countries like Ghana. The institutional theory provides an explanation and clear understanding of pressures that come to institutions with regards to green procurement of which government institutions are of no exception considering the relevance of public procurement to national development. This discovery offers another approach in which green purchasing practice and procurement sustainability can be viewed.

5.5 Practical Implications

This study provides relevant managerial implications. Procurement sustainability is new in Ghana, particularly in the public sector. To the best of the researcher's knowledge, the study is new research done on the role of green procurement between environmental knowledge and procurement sustainability in Ghana's public sector. Hence, this research will provide very useful information to managers and regulators of the public procurement and policy makers in the public sector to take into consideration the factors that would support green procurement and sustainability in public procurement.

By implication, the result clearly shows that procurement is a vital component of operations of public sector organizations making it an important area of government business that cannot be overlooked. Strengthening environmental knowledge and green procurement remain essentially important in the quest to enhance procurement sustainability. Importantly, this study showed that merely having environmental knowledge is not enough, it must however be supported through green procurement to yield improved sustainability in public procurement. This also provides a learning area for these firms in the sense that it would aid government institutions in paying a great level of attention to green in procurement to adhere to such practices and standards so that sustainability can be improved. This would also aid these firms to give the required attention to green education to achieve the very purpose of environmental knowledge to improve green procurement and procurement sustainability at large.

5.6 Limitations and future research

The outcome of the study shows that the model of the research truly predicts the role of green procurement between environmental knowledge and procurement sustainability in Ghana. This research was done among procurement officers of public sector organizations in Ghana. Since the result cannot be generalized as it may be different for different industries in different countries, the researcher recommends that the scope of the study can be extended to include other private sector organizations

Again, a comparative study can be conducted across different countries/ industries to determine whether the outcome in Ghana can be similar for other countries.

Also, the research was conducted using quantitative methods to examine the role of green procurement between environmental knowledge and procurement sustainability in Ghana. A qualitative approach can be used to conduct this same research and to examine the same relationship. In using the qualitative method, detailed information could be obtained.

Future research can also consider suppliers in addition to the procurement officers. This is an important dimension that will add a fresh viewpoint to the entire research. This research made use of quantitative techniques in data collection and analysis. The use of questionnaires offered very valuable information on the subject matter. However, using qualitative data such as interviews could also offer more detailed information on the topic.

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