

UNIVERSITY OF CAPE COAST

**SUSTAINABLE PROCUREMENT PRACTICES AND OPERATIONAL  
PERFORMANCE OF MANUFACTURING FIRMS IN GHANA**

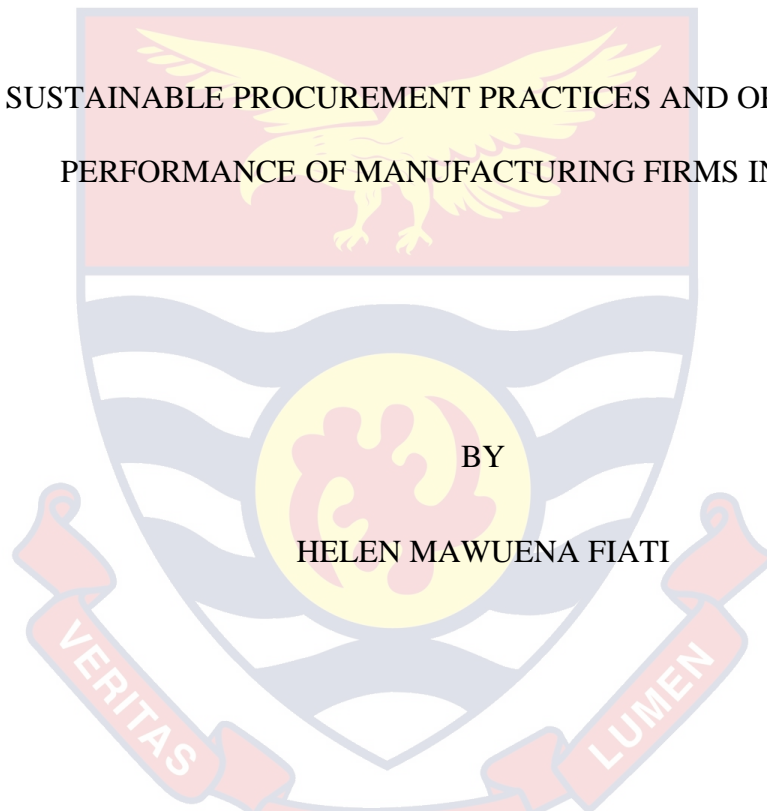


**HELEN MAWUENA FIATI**

2019

UNIVERSITY OF CAPE COAST

SUSTAINABLE PROCUREMENT PRACTICES AND OPERATIONAL  
PERFORMANCE OF MANUFACTURING FIRMS IN GHANA



BY

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SEPTEMBER 2019

## DECLARATION

### Candidate's Declaration

I hereby declare that this dissertation is the result of my own original work and that no part of it has been presented for another degree in this university or elsewhere.

Candidate's Signature..... Date.....

Name: Helen Mawuena Fiati

### Supervisor's Declaration

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

Supervisor's Signature..... Date.....

Name: Dr. Andrews Agya Yalley

Co Supervisor's Signature..... Date.....

Name: Mr. Innocent Kwasi Senyo Acquah

## ABSTRACT

Sustainable procurement has become an important agenda for governments and organisations across the globe. Governments in quest of demonstrating sustainable development in reaction to the Sustainable Development goals (Goal 12.7), among other things, seek to promote public procurement practices. According to United Nations World Summit (WSSD, 2014), public procurement practices ensure sustainable consumption and production (Goal 12). The aim of the study was to examine the effect of sustainable procurement practice on the operational performance of manufacturing firms in Ghana. The research philosophy adopted in the study was the positivism paradigm. The descriptive research design was adopted for this study where a quantitative approach was employed. Data was collected by administering structured questionnaires to 248 randomly sampled manufacturing firms. The findings on study indicated that, sustainable procurement practice (supplier involvement, ethical procurement and green procurement) had a positive significant effect on operational performance of manufacturing firms in Ghana. The study recommended that Ghanaian manufacturing firms should start to view sustainable procurement as strategic in value, since it will change the future of firm, impact society and the environment at large.

## KEYWORDS

Sustainable Procurement Practice

Supplier involvement

Ethical Procurement

Green Procurement

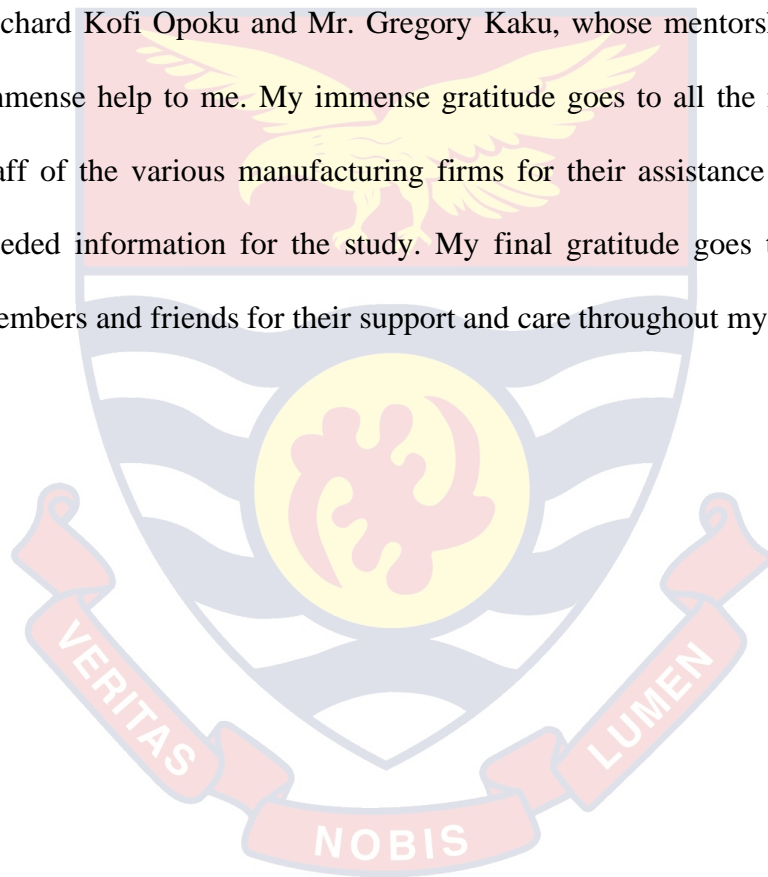
Manufacturing firms



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## DEDICATION

To my family.



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## LIST OF ACRONYMS

SP	Sustainable Procurement
SSCM	Sustainable Supply Chain Management
PLS	Partial Least Square
SEM	Structural Equation Model
GSCM	Green Supply Chain Management
SPSS	Statistical Package for Social Science
PLSR	Partial Least Square Regression
SI	Supplier Involvement
EPP	Ethical Procurement Practice
GPP	Green Procurement Practice
PLS-SEM	Partial Least Square-Structural Equation Modelling
CB-SEM	Co-Variance Based Structural Equation Modelling

## CHAPTER ONE

### INTRODUCTION

Sustainable procurement (SP) has become an important agenda for governments and organisations across the globe (Zhu, Sarkis & Lai, 2008; Meehan & Bryde, 2011; Walker & Brammer, 2009, 2011; Green, Zelbst, Meacham & Bhadauria, 2012). According to United Nations World Summit (WSSD, 2014), public procurement practices ensure sustainable consumption and production (Goal 12). In reacting to the Sustainable Development Goals (Goal 12.7) which consider sustainable procurement, various governments have been forced to promote public procurement practices among public and private sectors respectively. It has generally been found that sustainable procurement improves organisational performances through increased revenue, competitiveness of eco industries, goodwill and financial viability (Azevedo, Carvalho & Machado, 2011; Chang & Wong, 2012; Green *et al.*, 2012; McMurray, 2014). This study attempts to capture how key components of sustainable procurement influence the operational dimension of performances of manufacturing firms in Ghana.

#### **Background to the Study**

Sustainable Procurement ensures that organisations meet the needs for goods, services, works and utilities in a way that achieve value for money on a whole life basis (CIPS, 2008). Organisations are also able to generate benefits not only to themselves, but also to societies and economies, while minimising damages to the environment (Azevedo *et al.*, 2011; Chang & Wong, 2012). Thus, sustainable procurement has been conceptualised to include optimising

prices, quality, availability, environmental life-cycle impact and social impacts linked to product/service's origin (PWC, 2010). There have been several studies suggesting that firm's financial and non-financial performances are greatly enhanced by sustainable procurement (Brandt, Van Biesebroek & Zhang, 2012; Walker, Alexander & Touboulic, 2012; Golicic & Smith, 2013).

Globally, studies by Addo (2017), Brandt *et al.* (2012), Prempeh (2016) and Shin, Ennis and Spurlin (2015) suggested that, the contributions of manufacturing firms to economies can never be underestimated. They are major contributors to job creation, revenue generation and economic growth (Brandt *et al.*, 2012; Panigrahi, 2013). According to Carter and Eastern (2011), manufacturing firms are classified as being the core of industrial activities which deal with a vast range of raw materials with varied implications on the environment. They added that, the consequences of their activities must be sustainable to prevent adverse social and economic consequences on economies. As a result of this, many sustainable procurement practices have evolved in manufacturing sectors to reduce the negative impact of their activities on the environment and society. Most of these practices have been in response to demands by Institutional actors such as organisational Stakeholders and the broad internal and external regulatory environment (Pache & Santos, 2010).

Further, key among these sustainable practices is the development of a comprehensive environmental strategy that incorporates green purchasing (Roos, 2012; Islam, Wahid & Karim, 2017). Other sustainable practices initiated by manufacturing firms worldwide have been identified to include recycling, reuse, resource reduction and substitution of materials with outcomes such as reduced waste generation, among others (Walker & Brammer, 2012; Islam *et*



*al.*, 2017), supplier engagement and involvement, among others. There is also some evidence that, sustainable procurement enhances both financial and non-financial performance of manufacturing firms (Surajit, 2012). Simply put, the performances of manufacturing firms partly hinge on their abilities to adopt the appropriate sustainable procurement practices.

In Ghana, the current legislative framework for public procurement has made sustainable procurement a key management strategy (Public Procurement (Amendment Act), 2016 (Act 914)). As part of the objectives of the amended Act, the Authority has included environmental protection in the Act. This indicates that the Ghana Public Procurement Authority seeks to ensure that manufacturing firms integrate sustainable procurement in their various procurement practices due to the benefits associated with it. Research has identified various procurement practices notable among which include supplier involvement and engagement (Roushdy, Mohamed, Hesham, Elzarka & Hafez 2015; Kiswili & Ismail 2018; Meriläinen 2018) green procurement (Nderitu & Ngugi 2014; Chin, Tat, & Sulaiman 2015; Pembere 2016), ethical procurement (Donker, poff & Zahir 2008; Kilonzo 2017; Makali, Wainaina, & Ombati 2018), electronic procurement (Chang, Tsai, & Hsu, 2013; Chang & Wong 2010; Liu, Ke, Wei, & Hua 2013) among others.

Research has generally conceptualised firm performance around two main pillars, financial and non-financial. At the core of non-financial performance is operational performance. Even though previous studies have established some relationship between sustainable procurement practice and performance, existing study employed weak analytical methods in examining the relationship between sustainable procurement practices and performance



(McMurray, 2014; Koranchie, 2016; Muniru, 2017; Lindgreen., Swaen, Maon, Walker & Brammer, 2009). It is in this light that, this study examines sustainable procurement practices and its effect on operational performance of manufacturing firms in Ghana using a more rigorous analytical method in establishing the relationship.

### **Statement of the Problem**

Organisational stakeholders are increasingly demanding that organisations address and manage the environmental and social issues relating to their procurement activities (Carter & Eastern, 2011). At the international level, this demand is expressed in the sustainable development goals 12.7 which among other things seek to promote public procurement practices to ensure sustainable consumption and production (Goal 12), United Nations World Summit (WSSD, 2014) However, sustainability consideration in procurement is a phenomenon which is less prevalent in the procurement policies of most developing countries (Islam, Wahid & Karim, 2017).

The concept of sustainability has been treated as a problem which consists of three main pillars namely: economic, social and environmental dimensions (Hansmann, Mieg & Frischknecht, 2012). Based on this understanding of sustainability, sustainable procurement practices span across various organisational policies and programmes such as supplier involvement, green procurement, e-procurement, ethical considerations in procurement, among others which are viewed to generally promote sustainability (Kiswili & Ismail, 2016).

In Ghana, for instance, the inclusion of sustainability in national level institutional framework is quite recent (Public Procurement Act as amended, 2016 (Act 914). There is evidence of sustainable procurement practices among many manufacturing companies in Ghana (Doh, Zebaot & Kwadzo, 2014). In the study of Sojamo and Larson (2012), some companies (Cargill) present itself as promoting sustainability through the support of sustainable cocoa growing practices among farmers and use of recyclable materials. Thus, commitment to sustainability appears to exist among some manufacturing companies in the country. However, whether or not these 'so-called' sustainable practices actually lead to operational performance have not been widely studied among Ghanaian manufacturing firms. Operational performance focuses on key non-financial outcomes including flexibility and speed among others (Van Gijssel, 2012).

Ghanaian literature on procurement practices has focused on procurement practices and their impact on organisations without paying attention to the specific sustainability dimensions of these practices on firm performance (Doh *et al.*, 2014). A few have focused on how sustainability in general affects operational performance (Koranchie, 2016; Muniru, 2017). To address existing gap, this study seeks to examine three key sustainable practices and their effect on the operational dimensions of performance among manufacturing firms in Ghana hence peculiar questions which are of keen interest in this study include: what are the effects of supplier involvement on operational performance? What are the effects of ethical procurement practice on operational performance? And what are the effects of green procurement practices on operational performance?

## **Purpose of the Study**

The purpose of the study is to examine the effect sustainable procurement practices on the operational performance of manufacturing firms in Ghana. To achieve this, the study was based on the below mentioned specific objectives to:

1. examine the effects of supplier involvement on operational performance
2. examine the effect of ethical procurement practices on operational performance
3. examine the effect of green procurement practices on operational performance.

## **Research Hypotheses**

The following research hypotheses guide the study:

H<sub>1</sub>: supplier involvement positively influences operational performance.

H<sub>2</sub>: ethical procurement practice positively influences operational performance.

H<sub>3</sub>: green procurement practice positively influences operational performance.

## **Significance of the Study**

The aim of the study is to help improve upon the knowledge on sustainable procurement practice of manufacturing firms in developing countries, especially Ghana. This was done by explaining the effects that sustainable procurement practice has on the operational performance of manufacturing firms. The outcome of this study would be useful to manufacturing firms, procurement managers and researchers. The study provides a starting point for developing a common understanding among public

and private procurers as to what comprises procuring sustainably to meet the sustainable development goals of the United Nations World Summit (WSSD, 2014). Understanding of sustainable procurement practice would go hand in hand which would go beyond the initial focus on environmental issues to address a more holistic range of sustainability aspects through its procurement.

To manufacturing firms, the study's findings would inform policies geared towards improving current sustainable procurement practices and overall performance. It will also enhance the understanding of strategic level managers on the role of sustainable procurement practices on performance. For researchers, it will provide further literature on the relationship and linkages between sustainable procurement practices and firm performance. It will also provide a basis for replicating knowledge because it gives suggestions for further research.

### **Delimitations**

The study was conducted within the scope of examining the effect of sustainable procurement practices on the performance of manufacturing firms in Ghana. The study focused on sustainable procurement practices on the operational dimensions of firm performance. Also, the study focused on manufacturing firms within the selected metropolis registered with the Association of Ghana Industries (2017). Therefore, the study excludes existing manufacturing firms, not registered with AGI.

## Limitations

The study setting was based on firms in four geographical region of Ghana who may have similar characteristics. Study results may therefore not be generalizable to other regions of Ghana. Also, participants at the various manufacturing firms selected were for good reasons based on the multi stage sampling technique. It could therefore be the case that their responses may not be representative of the views of management in general at these firms. The study being a survey research relied on subjective responses of respondents; it may therefore suffer from bias or untruthful responses from some respondents.

## Definition of Terms

**Sustainability:** It deals with protecting the natural environment, human and ecological health while driving innovations without compromising the way of life.

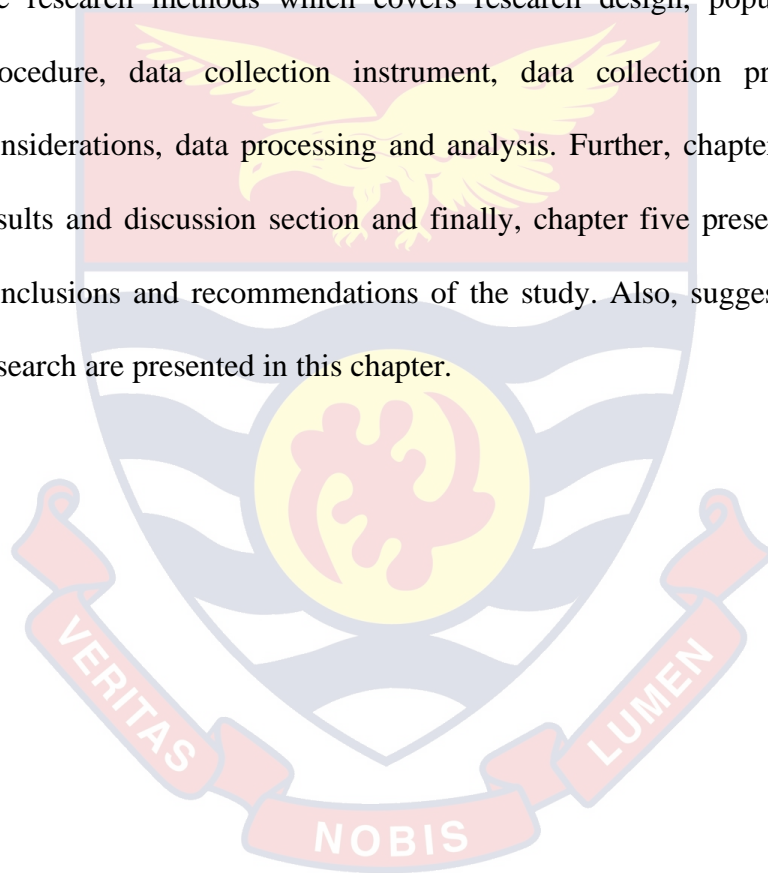
**Firm Performance:** It is a measure of performance of a company that may not only depend on the efficiency of the company itself but also on profitability.

**Operational Performance:** it refers to measuring performance against the standards of efficiency and effectiveness.

**Sustainable Procurement Practices:** These refers to practices namely: supplier involvement, ethical procurement and green procurement, that ensure that organisations meet the needs for goods, services, works and utilities in a way that achieves value for money on a whole life basis without compromising the environment.

## Organisation of the Study

The study comprises five chapters of which, chapter one presents the background to the study, statement of the problem, purpose, objectives of the study, research hypotheses, significance of the study, delimitation, limitation of the study, definition of terms as well as organisation of the study. Chapter two deals with the literature review section of the study. Chapter three focuses on the research methods which covers research design, population, sampling procedure, data collection instrument, data collection procedure, ethical considerations, data processing and analysis. Further, chapter four covers the results and discussion section and finally, chapter five presents the summary conclusions and recommendations of the study. Also, suggestions for further research are presented in this chapter.



## CHAPTER TWO

### LITERATURE REVIEW

This chapter provides the theoretical basis of the work; review existing literature related to the study objectives and set out clearly related studies on the subject being investigated. To achieve this, the work is divided into four parts. The first part provides the theoretical framework; the second part provides literature on each of the key variables namely: sustainability, supplier involvement practices, ethical procurement and green procurement and the conceptual framework for the study, and the last part reviews literature on the relationship between sustainable procurement practices and firm performance.

#### **Theoretical Review**

The study was underpinned by the stakeholder theory and institutional theory as a framework for analysing the research questions for the study.

#### **Stakeholder Theory**

Stakeholder is defined as any individual, organisation or institution that is associated with a firm and is affected by the firm in some way or affects the firm's action and goals (Freeman, 1984). The theory propounds that an organisation should not only be responsible for its shareholders' interests, but also for the interests of customers, employees and the local community as well (Piacentini *et al*, 2000). This goes beyond the purely economic and legal responsibilities once believed to be an organisation's only responsibilities by incorporating the social, economic and moral responsibilities.



The significance of this theory can be attributed to Mitroff (1983) who posits that morals and values with respect to interests of other parties apart from the traditional owners of the business (shareholders), such as employees, customers, suppliers, financiers, communities, governmental bodies, political groups, trade associations and trade associations as well as participants within the supply chain network should be considered in managing an organisation. Obviously, the theory follows the same principles as sustainable development concept and also covers the same aspects of business responsibilities – economic, social and environmental.

Stakeholder theory describes the purpose and strategic direction of the firm through the concept that managers need to simultaneously incorporate the legitimate interests of all appropriate stakeholders when making business decisions (Kiswili & Ismail, 2016). Freeman (1999) suggests that a company's stakeholders need to be considered and satisfied to keep the company healthy and successful in the long-term. He further posits that a healthy company never loses sight of everyone involved in its success. Stakeholder theory posits companies that treat their employees badly and causes harm to the environment are likely to fail. Freeman (1999) also suggested that, when stakeholders are dissatisfied and let down, companies cannot survive even though there might be short-term profits.

In the context of this study stakeholder theory is used to explain the interaction between manufacturing companies and their suppliers and contractors and how this interaction affects the operational performance of the organisation. Thus, simply put, this theory helps explain how involving a stakeholder like suppliers as part of a firms' practice helps to improve



operational dimensions of performance. Also, this theory can be applied to explain how the demand for ethical procurement by stakeholders like contractors, suppliers and consumers tend to take a toll on the operational performance of a firm. Finally, this theory helps to highlight how adopting procurement practices tend to satisfy the various stakeholders agitating for sustainability, hence, translating increased patronage and consequently improved performance.

### **Institutional Theory**

Institutional theory examines the processes and mechanisms by which structures, schemas, rules, and routines become established as authoritative guidelines for social behaviour. It asks how such systems come into existence, how they diffuse, and what role they play in supplying stability and meaning to social behaviour. It also considers how such arrangements deteriorate and collapse, and how their remnants shape successor structures (Scott, 2008). The institutional theory approach provides useful guidelines for analysing organisation-environment relationships with an emphasis on the social rules, expectations, norms, and values as the sources of pressure on organisations.

This theory is built on the concept of legitimacy rather than efficiency or effectiveness as the primary organisational goal (Doug & Scott, 2004). The environment is represented by institutions that may include regulatory structures, governmental agencies, courts, professionals, professional norms, interest groups, public opinion, laws, rules, and social values. Institutional theory assumes that an organisation conforms to its environment.

According to Bansal and Clelland (2004), Hoffman (1999) and Jennings and Zandbergen (1995) institutional theory has been applied since 1930 in response of the firm to understand the increase pressures imposed on management about the environment. Bansal (2005) and Bansal and Clelland (2004) also argues that with the increase in public awareness of organisational failure and environmental demands, the institutional theory recommends that companies can only gain legitimacy through reduction of their environmental impact and being socially responsible. Firms are adopting sustainable procurement practices due to the immense pressure on institutions or organisations. Sharma and Erramilli (2004) explains that there can be a conformance to environmental strategies that complies with regulations and adopting industry standards, or reducing the environmental impact of operations beyond regulatory requirements.

Firms can also create good relationships with regulators by participating in government-sponsored voluntary program which develops a voluntary agreement between government agencies and firms hence encourage technological innovation and reduction in pollution (Delmas & Toffel, 2008). Companies can also work with their customers as well as their suppliers to improve their environmental performance through exchange of ideas/information, suggestions and correction (Nelson & Winter, 2002).

The institutional theory is the traditional approach that is used to examine elements of public procurement (Obanda, 2010). There are three pillars of institutions according to Scott (2004) which are the regulatory, normative and cultural cognitive. The regulatory pillar emphasizes the use of rules, laws and sanctions as enforcement mechanism, with expedience as basis for compliance.

According to Scott (2004) institutions are composed of cultural cognitive and regulative elements that, together with associated activities and resources give meaning to life. The normative pillar refers to norms (how things should be done) and values (the preferred or desirable), social obligation being the basis of compliance (Preuss, 2013). The cultural cognitive pillar rests on shared understanding (common beliefs, symbols, shared understanding).

Therefore, institutions can define what is appropriate or legitimate (i.e., what is acceptable behaviour (Scott, 2007), and thus render other actions unacceptable or even beyond consideration (DiMaggio & Powell, 1991). This will then affect how organisations make decisions to increase performance. It is this that can provide insights into the role of different actors in the development of sustainable supply chains and their role in achieving conformity. The institutional perspective allows for the focus on the role of conformity, regulatory and social pressures in driving organisational actions (Westphal *et al.*, 1997).

Since ethical behaviour is a product of social institutions, institutional theory, in the context of this study, is used to explain how ethical procurement as an institutional norm or a product of social institutions help or contribute to operational performance. Also, since green procurement practices and demands are also driven by institutions, institutional theory will help to explain how these practices affect or influence performance outcomes of manufacturing concerns.

### **Conceptual Review**

This section reviews the concepts of sustainability, sustainable procurement, sustainable supply chain dimensions, sustainable procurement

practice, firm performance and firm size as a control variable. Sustainable procurement and supply chain are derived from the concept and components of sustainability. It is against this background that the principle of sustainability and its core elements are reviewed.

### **Sustainability**

James *et al.* (2015), argues that the organising principle for sustainability is sustainable development, which includes the following interconnected domains: environment, economic and social. Sub-domains of sustainable development have been considered also: cultural, technological and political, and that Sustainable development is the development that meets the needs of the present without compromising the ability of future generations to meet their own needs. Wandenberg (2015) also defines Sustainability as a socio-ecological process characterized by the pursuit of a common ideal lasting solution or way of doing things. An ideal is by definition unattainable in a given time and space. However, by persistently and dynamically approaching it, the process results in a sustainable system.

The increasing influence of sustainability in supply chain management and operations practices can be attributed to the fact that, in addition to increased demands of strong economic performance, organisations are now held responsible for the environmental and social performance by major stakeholders (Zhu *et al.*, 2008; Walker *et al.*, 2014) As such, sustainability has forced the redefinition of the operations function (De Burgos & Lorente, 2001). It is to be noted that Sustainability which births, sustainable supply chain management has become a strategic process enabling firms to create competitive advantage (Sivaprakasam *et al.*, 2014). This assertion is backed by Porter's hypothesis,

which states that the conflict between environmental sustainability and economic competitiveness is a false dichotomy based on a narrow view of the sources of prosperity and a static view of competition. (Porter, 1991).

### **Sustainable Procurement**

According to the United Nations Development programme (UNDP), procurement touches everything from buying office vehicles, health commodities and election materials to procuring energy systems as well as consultancy services. Sustainable procurement means making sure that the products and services we buy are as sustainable as possible, with the lowest environmental impact and most positive social results. Kennard (2006) also views Sustainable Procurement (SP) as the process whereby economic development, social development and environmental protection are balanced against business needs. He outlines the benefits of adopting a sustainable procurement policy as cost control, improved internal and external standards through performance assessment, and compliance with environmental and social legislation, business risk management, improved reputation, sustainable Supply Chain and local business community involvement.

WCED (1987) sees sustainable procurement as the pursuit of sustainable development objectives through the purchasing and supply process, and involves balancing environmental, social and economic objectives. It is rising on the policy agenda for many countries, but knowledge remains limited. Sustainable procurement (SP) is procurement that is consistent with the principles of sustainable development, such as ensuring a strong, healthy and just society, living within environmental limits, and promoting good governance. As McCrudden (2004) notes, SP therefore places government in

two roles by “participating in the market as purchaser and at the same time regulating it through the use of its purchasing power to advance conceptions of social justice”.

### **Sustainable Supply Chain dimensions**

In this 21<sup>st</sup> century, several scholars (Carter & Rogers, 2008; Seuring & Muller, 2008; Winter & Knemeyer, 2013; Reefke & Sundaram, 2016; Khan *et al.*, 2018) have focused on the broader area of sustainable supply chain management (SSCM). Carter and Rogers, for instance, revealed that addressing more than one dimension of sustainability (economic, environmental and social) produce better outcomes than focusing on a particular dimension. Winter and Knemeyer added that, focusing on all the three dimensions or triple bottom line of SSCM is the ideal solution. This section presents a thorough discussion of these dimensions or triple bottom line of sustainability.

#### **Environmental dimension**

This dimension of sustainability has gained attention since the 1980s as result of global warming (Murphy, Poist & Braunschweig, 1994). They made this revelation in a study about sustainable development where economic and environmental issues were considered. The growing interest in this dimension has led to the coining of some new terms, “eco-friendly supply chains”, “green supply chains”, “sustainable supply chain” which have been used to address the impacts of supply chains on the environment (Carter & Easton, 2011; Mollenkopf, Stolze, Tate & Ueltschy, 2010; Vaaland & Owusu, 2012; Wu & Pagell, 2011). Cheng, Yeh and Tu (2008) and Srivastava (2007) were of the view that, green supply chains have moved from reactive monitoring of the general



environment to a more proactive approach to environmental issues through implementation of the various R's (reduce, refurbish, rework, remanufacture, re-use, replace, reverse logistics, recycle, etc).

Practically, environmental sustainability is geared towards reducing green-house emissions in bid to adapt to climate change and protect the environment. According to Ferdows (2009), the continuous increase in global competitions has increased the environmental responsibilities of corporate operations within supply chains. This growing attention on environmental issues has contributed to the emerging design of environmental supply chain network including 'supply chain design that consists of transportation, progress, facilities and progress-synthesising and environmental factors concerned (Large *et al.*, 2013). Some scholars have revealed that, green SCM provide actors within a chain network with benefits such as: revenue growth, competitiveness, reputation, differentiation, increased efficiency and effectiveness (Golicic & Smith, 2013; Mitra & Mentzer, 2014; Swink *et al.*, 2013; Wu & Pagell, 2011; Zhu *et al.*, 2013).

According to Vaaland and Owusu (2012), the focus of environmental sustainability or green supply chain is to link actors within a chain to jointly adopt, implement and coordinate strategies, resources and values in bid to connect all the various levels of corporate social responsibility to the business processes of the chain. Shi, Lenny Koh, Baldwin and Cucchiella (2012) posited that, environmental sustainability is necessary to create ecological and economic benefits. However, ensuring sustained environmental performance may lie on actors' orientations towards green and other sustainable supply chain issues. Bell, Mollenkopf and Stolze (2013) also stressed that, for potential economic

benefits in the long term, it is important to go “green” since without natural resources, business activities would be severely constrained.

Moreover, the environmental perspective seeks to address the negative effects of issues or events such as: energy usage, water usage, waste disposal, pollution, accidents, packaging waste, environmental damages, land use, raw material use, natural disasters, energy consumption, greenhouse gas emissions (Giannakis & Papadopoulos, 2015; UNGC & BSR, 2010). These activities are also seen as environmental sustainability-related risks which if not detected and appropriately addressed in the respective actor’s activities could lead to rippling effects across the entire chain. Some examples of environmental impacts are carbon emission and pollution caused by manufacturing processes that use chemicals and hazardous substances (Golicic & Smith, 2013; Svensson, 2007).

Further, industrial wastes have an impact on the environment and need to be reduced, so they should also be included in the environmental issues that supply chain actors should address. In view of this, Seuring (2013) identified some methods used in handling the environmental aspect of Sustainable Supply Chain Management (SSCM) and they included: inference graph, operational research models, analytic hierarchy process, data envelopment analysis, simulation, equilibrium model as well as life cycle assessment. These methods have extensively been adopted by other scholars (Genovese, Acquaye, Figueroa & Koh, 2015; You & Wang, 2011). You and Wang, for instance, applied the Multiphase-mixed linear programming in combination with Life cycle assessment to identify environmental issues in an organization. They found that, the environmental performances of biological and chemical fuel supply chain



under the modern economy has performed better than the traditional supply chain.

### **Economic dimension**

The economic dimension of SSCM is focused on the traditional corporate responsibility notably tax liability, income generation, improving profits and handling economic fluctuations (Ageron, Gunsdekaran & Spalanzani, 2012; Chaabane *et al.*, 2012). Traditionally, actors within a chain emphasise on costs and profits when analysing their respective business operations. However, in recent times, supply chains have been forced to address environmental and social issues to determine their long-term benefits. These other dimensions of sustainability could affect the economic aspects of supply chains due to the huge costs associated with them. Golicic and Smith (2013) stressed that, adopting SSCM is key for potential economic benefits and appropriate utilisation of resources.

The economic dimension specifically focuses on responsiveness (demand responsiveness), cost (logistics management, manufacturing cost), profit (return on investment, market share, profit margins on sale), quality (products, lead time) and mobility (intensity of good transport) (Brandenburg & Rebs, 2015; Chaabane *et al.*, 2012; Large *et al.*, 2013; Svensson, 2007). It could be deduced that, economic dimension does not only focus on costs or income generation but it needs to address economic benefits such as efficiency, and quality.

## Social dimension

The social dimension focuses on the responsibilities of the actors in a supply chain to stakeholders in the environment (Mani & Delgado, 2018). These responsibilities should be geared towards quality, human rights and safety issues by focusing on social welfare, labour condition, supplier's adherence to law and regulations and protecting the rights of humans (employees) within a chain network (Beske *et al.*, 2014; Gimenez *et al.*, 2012; Svensson, 2007). Also, the social perspective is based on the human resources element found in a traditional supply chain system which focuses on the needs of both intra-organisational stakeholders (employees in an organisation) and inter-organisational stakeholders (suppliers, customers, and communities) (Pullman, Maloni & Carter, 2009).

Pullman *et al.* (2009) added that, the social dimension focuses on delivering responsibilities towards employees, business partners, suppliers, government, customers and societies. Rota *et al.* (2012) added that, social issues should be geared towards ensuring a healthy future for humans and thus play significant role in sustainable development. Numerous studies have divided the social dimension into two criteria: quality of life and health and safety (Beske *et al.*, 2014; Gimenez *et al.*, 2012; Pullman *et al.*, 2009; Rota *et al.*, 2012; Svensson, 2007). The quality of life is concerned with issues related to accidents, education, training and working conditions that affect a firm's employees (Beske *et al.*, 2014; Gimenez *et al.*, 2012). The health and safety addresses issues related to the daily life of individuals within and outside a chain network (Beske *et al.*, 2014; Gimenez *et al.*, 2012). Simply put, social sustainability focuses on

addressing the health and safety and quality of life of all stakeholders including the living organisms within and outside the chain network's environment.

### **Sustainable Procurement Practices**

This section discusses the components of sustainable procurement practices examined in this study namely; supplier involvement, ethical procurement and green procurement.

#### **Supplier Involvement**

Supplier Involvement is defined Mikkola and Skjott-Larsen (2006) and Van Weele (2010) as a vertical collaboration between supply chain partners, such that the manufacturer tries to involve the supplier in the product development process. An approach in supply management to bring on board experts and to form a collaborative synergy of suppliers into the design process is known as supplier involvement. The purpose of supplier involvement is to gain a win-win opportunity in developing alternatives and improving service, technology, materials design cycle time, specifications and tolerance, standards, assembly change, order quantity and lead times, inventory, etc.

Recently, many proactive firms have embraced supplier involvement as an important way of life and a requirement for excellent supply management. (Kiswili & Ismail, 2016). According to Merilainen (2018), supplier involvement refers to resources provided by suppliers such as capabilities, resources, information, knowledge, ideas etc., the task carried out and the responsibilities they assume regarding the development of a part, process or service for the benefit of a current and/or future buyer's product development projects.

Supplier involvement helps in improving and ensuring accountability and also positioning throughout the product development innovations and the launching processes. Suppliers are prequalified carefully to ensure they possess the desired technology and right management capabilities. Sometimes supplier involvement results in the selection process of a single source of supply. Supplier involvement helps in building trust and good communication between suppliers and the buying firm. It also helps in reducing the cost of production; it improves quality and also prevents costly delays. Supplier involvement also encourages risk sharing.

In the quest of protecting the environment, pressure have been exerted on organisations to change the way they behave in protecting the environment especially among the manufacturing firms, mining and the resource sectors (Johann, 2008). Avery (2005) suggested that there is a need for companies to monitor the environmental impact of suppliers and develop an environmental purchasing policy that seeks to reduce the environmental impact of their own and that of their supplies activities, goods and service.

### **Ethical Procurement**

Ethics in procurement plays an important role in procurement and are considered to be important as technology and consumer behaviour change. Being ethical means being in accordance with the rules or standards for right conduct or practice especially the standard of a profession. Ethical procurement spans across supplier selection, evaluation, negotiation, contract sign off and awarding of business to suppliers (Wins, 2018). Element of ethical procurement include fairness, transparency, and consistency in decision making (Meehan & Bryde, 2011). It is appropriate to treat suppliers in a fair and unbiased manner

when interacting with suppliers. When procurement professional fails to abide by ethical practices, it can lead to immoral and illegal practices such as bribery, favouritism, illegal sourcing etc.

According to CIPS, Ethics in purchasing and supply management can relate to a wide range of issues from supplier business procedures and practices to corruption. The common areas of ethics and ethical behaviour in companies include fair-trade, ethical trading, ethical sourcing, social accountability, social auditing, corporate social responsibility, corporate citizenship, codes of conduct and reputation assurance (CIPS: Ethical Business Practices in Purchasing and Supply Chain Management).

Due to the increase important placed on transparency, consumers look beyond the practices to ensure organisations adhere adequately to supply chain ethics, it is important for organisations to conduct risk assessment on supplier evaluation, vendors and other point of contact within the organisational network. In other for organisations to decrease risks associated with suppliers, it is important for the organisation to examine the culture, ethics and compliance practices adopted by supplier (CIPS: Ethical and Sustainable Procurement). This will enable organisations to make inform decisions to select suppliers that fit with their culture and practices. According to Wins (2018), unethical behaviours have a negative impact on the brand image of the organisation. An ethical behaviour helps in establishing long term relationship and good will with suppliers while building good reputations for professionals and organisations.

### **Green Procurement Practice**

In quest for organisations to minimise the adverse environmental impacts, there are an increasing number of organisations making an effort to

abide by green procurement practice. Negative publicity arising from non-compliance of green procurement could be dangerous to the organisation. Green Procurement Practice includes human health and environmental concerns into the search for high quality products and services at competitive prices. Organisations adopt green procurement practice to enhance brand image, increase customer satisfaction, reduce cost and risk, and also to increase shareholders value (Myerson, 2018).

Coddington (2013) posits that the purchase of environmentally friendly products and services, the selection of contractors and the setting of environmental requirements in a contract is termed as green procurement and it is derived from pollution prevention principles and activities which is also known as green or environmental purchasing, green procurement compares price, technology, quality and the environmental impact of the product, service or contract. Green procurement policies are applicable to all organisations, regardless of its size. Green procurement contributes directly to the effectiveness and efficiency of the supply chains.

Environmentally friendly products are easily recycled, last longer and produce less waste. This allows organisations to save money on waste disposal, reduce the harmful impact of pollution and relieve the stress on landfills (IISD, 2013). Fewer resources are required to operate and manufacture green product and this helps in saving energy, water, fuel and other natural resources. For instance, less energy will be used to produce eco-efficient product which will in turn represent lower costs as waste. This is because it is included in a re-use system and it does not contain hazardous substances (UNDP, 2008).

Organisations gain trust and acceptance from customers by promoting green procurement and seeking ways to be environmentally friendly. Consumers, government, and other stakeholders support the green movement, which eventually enhance their brand. The introduction of green product and making the supply chain sustainable, drives innovation in the industry which gives way for energy efficient products leading to cost saving (Carter & Rogers, 2008).

### **Control Variable**

Control variable according to Shah and Ward (2003), and Swink *et al.*, (2007), is a variable which held constant in order not to affect a study's outcome, conclusions and generalisation. Firm size is used in the study as a control variable in the study to account for the differences in operational performance measures (Swink *et al.*, 2007; Lau Antonio *et al.*, 2007). According to Lau Antonio *et al.* (2007), to some extent, the firm size in terms of growth is conceptualised by the economies of scale they enjoy. Niresh and Velnampy (2014) posit that, large firms are more likely to get easy access to more resources thereby adjusting to changes in current competitive and dynamic market and likely to perform better than small firms. In order not to influence the findings of the study, therefore, Firm size was controlled which will in turn aid generalisation of the findings regardless of the firm's size.

### **Firm Performance**

Firm performance is a measure of performance of a company that may not only depend on the efficiency of the company itself but also on the market where it operates (Foley & Guillemette, 2010). Firm performances are measured



using both financial and nonfinancial measures. The financial measures include return on assets, market share, Return on Investment, Operating Profit, growth rates in domestic and export sales growth while the nonfinancial measure of performance includes management's perception of productivity, profitability, market share, and customer satisfaction relative to competitors (Ibrahim & Matari, 2014). Dess and Robinson (1984) suggested that there is a possibility of using nonfinancial performance measures if the accurate objective measures are unavailable. For the purpose of this study the operational performance was adopted which also falls under non-financial performance measure. (Gunasekaran & Kabu, 2007).

Operational performance is the performance of an organisation against its set standards such as waste reduction, productivity, cycle time, environmental responsibility and regulatory compliance (O'Brien, 2009). Operations of firms should be efficient and effective. According to Hubbard (2009), Efficiency is defined as how economic resources of a firm are measured while effectiveness has to do with the extent at which organisations are able to meet and fulfil the needs of its customers. Operational performance indicators include issues such as speed, flexibility, cost reduction, quality, market position and reliability (Hwang, Han, Jun, & Park, 2014). However, in order to enhance accessibility and evaluation of operational performance accurately, there is a need to plan, develop and implement the correct measurement.

## **Empirical review**

This section presented extensive reviews of literature in relation to the study's research objectives. Specifically, the section discussed the effects of sustainable procurement practices on performance.

## **Sustainable Procurement Practices and Performance**

This section presents the empirical review of related literature. It presents the key dimensions of sustainable procurement practices as stated in the study objectives and present findings on how it relates to operational performance.

## **Supplier Involvement and Operational Performance**

Kiswili and Ismail (2018) conducted a study on the role of sustainable procurement practices on supply chain performance of manufacturing sector in Kenya. The main aim of the study was to examine the role of sustainable procurement on the supply chain performance. The study used a case study research design and used staff members at EAPCC (East African Portland Cement Company) headquarters in Machakos County as the population. The stratified random sampling technique was adopted. Both primary and secondary data were used and data was collected from 150 employees in five departments. The study found that, sustainable procurement practices at EAPCC had been fully implemented. Effects of Procurement Preferences and Reservations, Green Procurement Practices, Supplier Involvement and Electronic Procurement were found to be statistically significant with a positive impact on supply chain performance.

Meriläinen (2018) did a study on Early Supplier Involvement with the objective of identifying the elements that influence the need and form of early supplier involvement. The study used a case study research design and data was analysed qualitatively using an interpretative technique among the employees in the case company. The study determined the impact of early supplier involvement and to find the best practices of early supplier involvement from the theory and to adopt and implement. Also, Roushdy, Mohamed, Hesham, Elzarka and Hafez (2015) conducted a study investigating the Impact of Suppliers Relationship Management on Firms' Performance.

The objective of the study was to investigate the extent to which supplier relationship management is implemented in manufacturing firms in Egypt and its impact on firm performance. The exploratory research design was adopted. A Semi-structured interview was conducted with purchasing managers from eight companies belonging to different industrial sectors to provide diverse points of views and enable the researchers to explore differences within and between cases. The study found that, early supplier involvement enables proactive communication and collaboration on product specifications, performance, design, materials and much more.

It also offers additional benefits to the firm, including the management of supply risk in new product development and the upstream supply chain. Companies view that coordination with critical suppliers through ESI are important enablers to product, process and supply chain structure development and as a cost reduction exercise. Additionally, companies that evaluate their suppliers have better visibility into supplier.

Furthermore, Changa, Chenb, Linc, Tienb, and Sheu (2006) did a study on supplier involvement and manufacturing flexibility with data collected from 150 manufacturing firms. A field study was conducted to benchmark various supplier involvement practices in the motherboard industry and to explain the impact of supplier involvement on different dimension of manufacturing flexibility. The study discovered that supplier involvement as a sustainable procurement practice plays a major role in the development and performance of a firms manufacturing flexibility. The study also found specific association between various supplier involvement activities of different dimensions of manufacturing flexibility.

Similarly, a study was done on the impact of supplier selection criteria and supplier involvement on the private hospitals' business performance in Malaysia (Jun Li, 2008). The purpose of the study was to examine whether supplier performance mediates the supplier selection and involvement on the business performance. The study adopted an exploratory approach and survey was conducted in various hospitals in Malaysia. The Results of the study indicated that most commonly used criteria such as competitive pricing, product quality, delivery service and supplier capability were found to be insignificant related to hospitals business performance. On the other hand, buyer-supplier fit has a positive impact on supplier performance. Nevertheless, greater emphasis should be placed on supplier involvement because the intangible criteria impacted significantly hospitals business performance.

Hussein and Shale (2014) did a study on the effects of sustainable procurement practices on organisational performance in manufacturing sector in Kenya. The study sought to investigate the effects of sustainable procurement

practice on organisational performance using Unilever Kenya as a case study. The study adopted a descriptive research design and the target population was the finance and procurement staffs of the Unilever Kenya limited which were 400. Questionnaires were used to collect data and it was analysed using regression. The study found majority of respondent agreeing to corporate social responsibility, product re-usability, supplier involvement and ethical practices as contributors to green procurement in firms. The study also discovered that firm's product reusability contributed greatly to green procurement in an organisation.

However, another research was carried out by Asare, Brashear, Yang and Kang (2013) on the relationship between supplier involvement development and firm performance with the aim of testing the market-base asset framework by examining the role of marketing process improvement in the relationship between a buyer firm's supplier-related activities and its performance. A self-survey was developed in collecting the data for the study; interviews were conducted with 338 executives who were involved in supplier development and the Partial Least Square (PLS) structured equation modelling were used to test the hypothesis developed in the study.

Asare *et al.*'s (2013) study found out that marketing process improvements were found to mediate the relationship between a firm's supplier development efforts and firm performance, thus providing empirical support for the market-based asset framework. The study also found that a firm's supplier development activities can lead to improvements in its marketing processes. There were inconsistencies with regards to the findings and the approaches adopted by the studies reviewed for this work. Also, the analytical methods used

in analysing the data in those studies were not rigorous. Hence, the hypothesis that;

*H<sub>1</sub>: Supplier involvement positively influences operational performance.*

### **Ethical Procurement and Operational Performance**

Some literatures have also proven the concept of ethics and firm performance. For example, Makali, Wainaina, and Ombati (2018) conducted a study on Ethics and Procurement Performance of Humanitarian Organisations in Kenya. The study sought to establish the relationship between ethics and procurement performance of humanitarian organisations in Kenya. The study was carried out drawing data from 70 humanitarian organisations and made multiple regression models to deduce the relationship. The study did not make use of sampling so a survey was done and a questionnaire was administered. The finding shows that humanitarian organisations follow procurement ethics code.

Another study was conducted by Kilonzo (2017), procurement ethics and organisational performance of animal feeds manufacturing firms in Kenya with the objective of determining the extent to which procurement ethics have been implemented among animal feeds manufacturing firms in Nairobi Kenya. A descriptive design was adopted and the census approached was used. The census consisted of 38 animal feeds manufacturing firms in Nairobi Kenya. The study made use of primary data and questionnaires were administered, descriptive statistics was used to analyse the data.

The findings revealed that, procurement ethics have been implemented at animal feeds manufacturing firms to a large extent with serving public interest, professionalism and respect to suppliers and also profession laws and



ethical standard being the most implemented with highest means while low effort has been put on accountability, transparency, honesty and integrity. The study also discovered that there is a positive and significant relationship between procurement ethics and organisational performance.

Additionally, Donker, Poff and Zahir (2008) conducted an empirical study on Corporate Values, Codes of Ethics, and Firm Performance. He presented two new models that are corporate ethics based. The first model numerically quantified the corporate value index (CV-Index) based on a set of predefined parameters and the second model estimated the market-to-book values of equity in relation to the CV-Index as well as other parameters. These models were applied to Canadian companies listed on the Toronto Stock Exchange (TSX). Through their analysis, they found statistically significant evidence that corporate values (CV-Index) positively correlated with firm performance. The study suggested that corporate ethics is vital for management, employees, shareholders and the community at large.

Comparatively, an empirical study conducted by Berrone, Surroca and Tribo (2007) on Corporate Ethical Identity as a Determinant of Firm Performance. The study assesses the impact of corporate ethical identity (CEI) on a firm's financial performance. The theory that underpinned the study was the normative and instrumental stakeholder theory; they argue that firms with a strong ethical identity achieve a greater degree of stakeholder satisfaction (SS), which, in turn, positively influences a firm's financial performance. The study analysed two dimensions of the CEI of firms: corporate revealed ethics and corporate applied ethics. The result of the study indicated that ethics has informational worth and enhances shareholder value, whereas applied ethics has



a positive impact on organisational performance. There were inconsistencies with regards to the findings and the approaches adopted by the studies reviewed for this work. Also, the analytical methods used in analysing the data in those studies were not rigorous. Therefore, the hypothesis that;

*H<sub>2</sub>: Ethical procurement practice positively influences operational performance.*

### **Green Procurement and Operational Performance**

Nderitu and Ngugi (2014) conducted a study on effects of green procurement practices on an organisation performance in manufacturing industry in East African Breweries Limited in Kenya. The study sought to establish the contribution of green procurement concepts to performance using the descriptive research method design. The target population was 122 employees of the East African Breweries Limited (EABL) with a sample size of 37. The study utilized both the primary and secondary data and the data collected was analysed using both descriptive and inferential statistics. The study discovered that, performance of manufacturing industry contributes to one or more factors which green procurement contributes to performance excellence.

Additionally, Pembere (2016) also carried out a study on green procurement practices and supply chain performance of companies listed at the Nairobi securities exchange. The main objective of the study was to establish green procurement practice and supply chain performance of companies listed in the Nairobi Securities exchange (NSE). The study adopted the quantitative method with a target population of 64 respondents. The study used primary data, where the data was collected using a self-administered questionnaire that had

both the close and open-ended questions. The study was analysed by using the descriptive and inferential statistics. The study found out that, green procurement practices enhance supply chain performance. The improved performance was reflected through improved customer service, minimized ordering cost, and reduced inventory stock.

A study piloted by Chin, Tat, and Sulaiman (2015) on the topic Green Supply Chain Management, Environmental Collaboration and Sustainability Performance aimed to review the existing literature on the relationship between GSCM, environmental collaboration and sustainability performance and to propose a possible conceptual model to explain the relationship between these three variables in the context of Malaysian manufacturing companies. A survey was conducted where survey questionnaires were administered to respondents drawn from the “FMM directory of Malaysian Manufacturers 2013. Population of the study consists of all medium and large manufacturing companies of Malaysia totalling 37,694. The study was analysed using the structural equation model (SEM), the SEM was also used to determine the sample size.

The study found that there is a positive relationship between green supply chain management (GSCM) which includes green procurement and sustainability performance. Even though the study agreed to the fact that, there has always been a positive relationship between GSCM and sustainability performance, it found that there are some issues such as involving collaboration with suppliers in designing green products and also adopting environmental practices into processes yet to be researched fully.

Sarhaye and Marendi (2017) did a study of the role of green procurement on organisational performance of manufacturing firms in Kenya. The purpose

of the study was to establish the role of green procurement practices on organisational performance of private sector in Kenya with a specific objective to establish the role of reverse logistics on organisational performance of Coca-Cola Kenya and to determine the influence of supplier assessment on organisational performance of Coca-Cola Kenya. A descriptive research design was adopted and a population of 642 respondent constituting all level of workers in Coca-Cola.

The study adopted the stratified random sampling technique with a sample size of 64 staffs. Both close and open-ended questionnaires were used. The study adopted the mixed method approach; statistical package for social science (SPSS) and content analysis were used to analyse the data. The study established that there is a positive relationship between reverse logistics and organisational performance. The study further concluded that the cost in organisation influences performance and sustainable procurement enhances organisational operations thereby improving performance.

An empirical study was conducted by Dubey, Bag, Ali, and Venkatesh (2013) on green purchase is superior to performance. The study reviewed the current trend in 'green procurement' practices and conceptualized a strategic framework to further strengthen the linkage between the organisation's performance and green procurement adoption. The focus of the study was on manufacturing firms in India. Out of 350 manufacturing companies, the researchers aimed at 125 companies who were either practicing green procurement based on their initial information provided by Ambad Industries & Manufacturers Association. 55 out of 125 firms responded to the questionnaires, because of the low percentage of the response from the firms, the partial least

square regression analyses (PLSR) was used to analyse the data. The theoretical framework of the research(s) were tested and concluded that market pressure, leadership, regulatory framework and quality management are the critical drivers which enhance customer satisfaction.

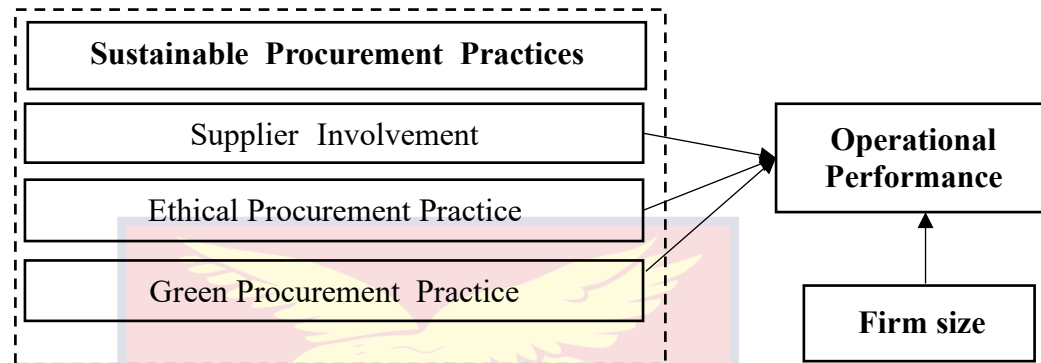
Based on the above reviews, it could be concluded that, supplier involvement, ethics and green procurement practices have effect on the firm performance of manufacturing firms in many countries including Ghana. Also, it has a positive significant relationship with overall performances of the manufacturing industry. Therefore, manufacturing firms need to expand their scope of supplier involvement, ethics and green procurement practice to improve performance. There were inconsistencies with regards to the findings and the approaches adopted by the studies reviewed for this work. Also, the analytical methods used in analysing the data in those studies were not rigorous. Thus, the hypothesis that;

*H<sub>3</sub>: Green procurement practice positively influences operational performance.*

### **Conceptual Framework**

This section presents the conceptual framework of the study in relation to the variables under consideration. It is derived from the review of empirical data which shows a relationship between the dependent and independent variables under study. This framework was designed specifically to explain the relationship between the dependent variable and the independent variable of the study. The independent variable (sustainable procurement practice) predicts the amount of variation in the dependent variable (operational performance) (Kothari, 2008). The value of operational performance depends on any change

in the sustainable procurement practice comprising Supplier involvement (SI), Ethical Procurement (EP), and Green Procurement Practice (GPP) (Green Jr. *et al.*, 2012; Roushdy *et al.*, 2015; Kilonzo, 2017). The conceptual framework was represented.



**Figure 1: Conceptual framework on sustainable procurement practice and operational performance**  
 Source: Author’s own construct, Fiati (2019)

From Figure 1, operational performance (dependent variable) was measured by quality product and services, dependability, on time delivery and cost as propounded by Slack (2005) which support the decision-making process of an organisation by collecting, processing, and analysing quantified data of performance information according to Gimbert *et al.* (2010) and widely used in studies by Naor, Goldstein, Linderman and Schroeder (2008), Flynn *et al.* (2010), Hollos, Blome, and Foerstl (2012), Blome, Hollos, and Paulraj (2014) and Islam *et al.* (2017).

From Figure 1, the operational performance of manufacturing firms is dependent on the various sustainable procurement practices they adopt. As such, any change, either positive or negative, in any of the sustainable procurement practice is likely to cause a change in operational performance. However, the framework does not provide the extent to which the various sustainable procurement practices influence operational performance.

The framework was supported by reviews conducted by Dubey, Bag, Ali, and Venkatesh, (2013), Asare, Brashear, Yang and Kang (2013), Nderitu and Ngugi (2014), Chin, Tat and Sulaiman (2015), Pembere (2016), Sarhaye and Marendi (2017), Kilonzo (2017), Kiswili and Ismail (2018) and Makali, Wainaina and Ombati (2018). The framework was, therefore, developed to provide a pictorial view of the relationship between the various sustainable procurement practices and performance of manufacturing firms in Ghana.





## CHAPTER THREE

### RESEARCH METHODS

The study examines the effect of sustainable procurement practices on operational performance of manufacturing firms in Ghana. In the light of this, this chapter discusses the research methods employed in the study in relation to research design, study area, population, sampling procedure, data collection instrument, data collection procedures, ethical consideration and data processing and analysis.

#### **Research Paradigm**

The research paradigm plays vital roles in any scientific research (Creswell, 2014). Research philosophy is the development of research assumption, its knowledge, and nature (Saunders, Lewis & Thornhill, 2015). Scientific research philosophy is a method which, when applied, allows the scientists to generate ideas into knowledge in the context of research. There are four main trends of research philosophy namely; the positivist research philosophy, interpretivist research philosophy, pragmatist research philosophy, and realistic research philosophy.

The study adopted the positivism philosophy which adheres to the fact that only “factual” knowledge gained through observation, including measurement, is trustworthy (Taylor & Medina, 2011). Taylor and Medina further explained that the role of the researcher in positivism is limited to data collection and interpretation of the data in an objective way and the research outcomes are usually observable and quantifiable. Also, the researcher is independent from the study and there are no provisions for human interests



within the study. Positivism depends on quantifiable observations that lead to statistical analyses. It has also been noted that positivism is in accordance with the empiricist view that knowledge originates from human experience which has an atomistic, ontological view of the world (Collins, 2010).

Collins (2010) added that, positivism comprises discrete, observable elements and events that interact in an observable, determined and regular manner. In relation to the objectives of the study, the study therefore adopted the positivism philosophy because positivism is based on the view that whatever exists can be verified through experiments and observation.

### **Research Approach**

A research design cannot be adopted in a study without given the research approach. Based on the philosophy, the quantitative research approach was considered. The quantitative approach enables the use of quantitative tools such as descriptive and inferential in describing key issues in the study (Hoover & Donovan, 2010). The study therefore employed the quantitative approach because it sought to examine a relationship based on numerical values and thus requires quantitative tools such as correlation.

### **Research Design**

The quantitative approach gave room for the adoption of a descriptive research design. A descriptive research design is a study for which the purpose is to produce an accurate representation of persons, events and situations (Best & Khan, 2016). The purpose of descriptive research design is to collect detailed and factual information that defines an existing phenomenon. It has strengths such as: it helps in producing good amount of responses from a wide range of

people, it gives good statistical results and it is also used with greater confidence with respect to asking specific questions of interest (Kothari, 2004).

Despite these strengths, a descriptive survey comes with some weaknesses such as time consuming in ensuring a representative sample and its difficulty in conducting since it requires more efforts and commitment (Saunders, Lewis, Thornhill & Bristow, 2015). Also, there is a limit to the number of questions estimated in any questionnaire for respondents (Best & Khan, 2016). The descriptive research design was considered appropriate because using this design will give an in-depth understanding of the study (Neuman, 2014). Therefore, the study relied on this research design due to its relativity to the research objectives. The researcher employed the research philosophy, approach and design, because the study sought to identify any relationship between a set of variables (dependent and independent).

### **Study Area**

The study was carried out with focus on manufacturing firms in Ghana. Specifically, the study focused on manufacturing firms in the Greater Accra, Sekondi-Takoradi, Tema and Kumasi Metropolises. With a population of 1,665,086 as of 2010 the Accra Metropolitan District covers a span of approximately 60 km<sup>2</sup> (23 sq mi) and encompasses the Ablekuma Central, Ablekuma South, Ashiedu Keteke, Ayawaso Central, Okaikoi South, and Osu Klottey sub-metropolitan district councils (<http://ghanadistricts.gov.gh>). The metropolis is one of the industrial hubs in Ghana for manufacturing firms, and contains 382 of the 704 manufacturing firms on the AGIs list (AGI Report,

2017). Thus, the metropolis was selected because it contains about 54% of the total manufacturing firms in the country.

The Kumasi metropolis ranks second when it comes to manufacturing firms in Ghana according to AGI's list. The metropolis is a huge haven for most of the country's economic activities such as financial and commercial sectors, pottery, clothing and textile and is concentrated with lots of banks, department stalls, and hotels. There are also huge timber processing communities in the metropolis serving the needs of people in Ghana. This made the metropolis ideal for the study as it contained two hundred and nine (209), (30%) of the manufacturing firms on AGI's list (AGI Report, 2017). Specifically, Bantama, Adum and Bompata (popularly called Roman Hill) were targeted for the study as these cities hold the complete blend of manufacturing firms making the 209 on AGI's list.

The study area also focused on the Tema Metropolis which is made up of four districts (Tema East, South, West and North). This metropolis contained one hundred and four (104) manufacturing firms per AGI's list. Constituting about fifteen percent (15%) out of the total 704 firms. Finally, the Sekondi-Takoradi, metropolis was also part of the study area due to its fast rising and developing status for manufacturing firms and oil exploration. Thus, containing nine firms already and with the influx of more to come due to the oil exploration, this makes this metropolis ideal for a study area as these firms are subject to issues of sustainability if they will survive into the foreseeable future. Thus, these metropolises were chosen because, together they constitute and hold about seventy to eighty five percent (70%-85%) of the manufacturing firms in the country (Addo, 2017).

## Population

According to Creswell (2012), population is a complete group of entities sharing particular features or characteristics. The population of the study comprised all procurement managers of manufacturing firms. The population comprised both private and publicly-owned manufacturing companies in Ghana with focus on four selected metropolises comprising Accra, Kumasi, Tema and Sekondi-Takoradi respectively. According to the Association of Ghana Industries (AGI) (2017) report, the target population consisted of seven hundred and four (704) manufacturing firms as shown in Table 1. Thus, the population comprised 248 procurement officers.

**Table 1: Target population**

Metropolis	Population	Sample Size
Accra	382	134
Tema	104	37
Kumasi	209	74
Sekondi-Takoradi	9	3
<b>Total</b>	<b>704</b>	<b>248</b>

Source: Association of Ghana Industries (2017)

## Sample Size and Sampling Technique

The study scientifically used a sample to represent the entire population due to time constraint coupled with difficulties associated with gathering data from a large group. Using the Cohen's table (2006) sample determination table, the study sampled 248 respondents from the target population of 704. Out of the 248 questionnaires administered, the study had a response rate of 80.6% which was relevant for the study. According to Babble (2007), a response rate > 70%

is provides a representative sample. The sampled respondents were then obtained using the multi-stage sampling technique. This was done in order to give the respondents equal chance of being selected for the study, thus minimising bias ensuring data gathered are of high quality; thus, reliability and competences of the informant must be ensured.

The sample size for PLS-SEM was also checked to ensure that it fits the model. Hair, Sarstedt, Ringle and Mena (2012) provided basic requirements for ensuring sampling adequacy in a PLS-SEM model. They stressed that the minimum sample size should be equal to ten times the largest number of structural paths directed at a given latent variable in the model. For this study, the largest number of structural paths directed at a given latent variable in the structural model is 3. Therefore, the minimum sample size is  $3 * 10 = 30$ . Cohen (2006) sample size table was also used to determine the sample size. Therefore, the use of 248 responses for the model was accurate and relevant.

### **Data Collection Instrument**

Based on the research objectives and approach to the study, a structured questionnaire as a primary data collection instrument was employed to collect data from respondents. A structured questionnaire is a method of data collection in which each member is asked to respond to the same set of questions in a prearranged order (Saunders & Lewis, 2012). It is the major collection instrument used in quantitative study and thus is the most appropriate as compared to the others such as observation and interviews which are appropriate for qualitative study. The questionnaire was self-constructed from reviews of related literature in relation to the study's objectives.

The questionnaire was basically structured in six (6) sections with section A gathering information on the respondents' business characteristics coupled with demographic characteristics. Section B contained question items on the first objective in relation to supplier involvement, Section C contained question items on the second objective in relation to ethical procurement practice, while section D contained question items in relation to the third objective on green procurement practice. Finally, section E contained question items on firm performance and section F contained questions on firm size. The study used firm size as a control variable. The control variable was introduced to test the relationship between the variables. It is to note that, respondents were asked to rate their level of agreement to each of the question items on a five-point Likert scale with 1 representing least agreement and 5 representing highest agreement (See Appendix A).

### **Data Collection Procedure**

Before the data collection exercise, an introductory letter was obtained from the Department of Marketing and Supply Chain Management which was then sent to the various manufacturing firms. This was done to obtain permission from the appropriate management to carry out the data collection exercise. Upon obtaining permission, the questionnaires were then distributed to the respondents. To ensure maximum and timely response rate, a period of 30 working days (25<sup>th</sup> February, 2019 to 5<sup>th</sup> March, 2019) was allocated for the data collection exercise and this was basically due to the busy schedules of the respondents.



However, the exercise was faced with key challenges including unwilling of some of the respondents to partake in the exercise due to various reasons such as confidentiality issues and inflexible schedules. Also, some of the respondents declined to partake in the exercise by making references to strict organisational policies and ethical code of conducts. These difficulties were minimised by providing assurances that the exercise was purely for academic purposes only. Also, respondents who requested to fill the questionnaires in their own conveniences were allowed to do so. These measures were put in place to encourage the respondents to partake in the exercise as their involvement is key to informing the study's outcome.

#### **Data Processing and Analysis**

Data collected from the exercise underwent rigorous scrutiny to ensure that any error arising from incomplete and wrongly filled questionnaires were eliminated or minimised drastically. Data was then carefully coded and edited to avoid missing values (if any). The data was processed using IBM SPSS Statistics version 24 software and the results attained was presented in tables and figures. The processed data was analysed using both descriptive and inferential statistical tools.

The descriptive statistical tools comprised frequencies, percentages, means, standard deviations, Skewness and kurtosis whereas the inferential statistical tool comprised multiple regressions from Partial Least Square-Structural Equation Modelling (PLS-SEM). It is to note that, all the research objectives will be analysed using the PLS-SEM. In view of this, Hair, Sarstedt, Hopkins and Kuppelwieser (2014), posits that the use of these techniques



required that certain underlying assumptions will be met before the results can be relied upon. These assumptions are related to sample size, multicollinearity, indicator reliability, construct reliability, discriminant validity, convergent validity as well as outer model significance. Preliminary tests will be carried out to ensure that these assumptions are met.

### **Data Analysis Methodology and Justification**

As a technique for data analysis, the structural equation modelling (SEM) is considered to be one of the most important components of applied multivariate statistical analyses and has been employed by many researchers in different fields such as economics, education, marketing, medicine, and a variety of other social and behavioural sciences (Al-Ansari *et al.*, 2013). SEM makes use of a confirmatory (i.e. hypothesis-testing) approach to the analysis of a structural theory on a given phenomenon (Babin, Hair & Boles, 2008). According to Hair *et al.* (2011) and Wong (2013), SEM is a significantly complex statistical technique for measuring relations between constructs, including latent variables (which represent conceptual terms employed to express theoretical concepts or phenomena) and observed variables (which represents measures, indicators or items, are variables that are measured directly).

The former and latter of which are described by Kline (2011), as exogenous (independent variables), or endogenous (dependent variables). The latent variables are graphically symbolized by a circle, while the indicators are graphically represented by a square or rectangle (Wong, 2013). According to Coltman, Deinney, Midgley and Venaik (2008), existing literature on SEM

differentiates between two dissimilar operationalisations of the relationship between latent variables Constructs and their observed indicators; as the reflective indicators (principal factor) and the formative indicators (composite index measurement models) of the latent variable.

Basically, there are two main approaches to structural equation modelling namely co-variance based SEM (CB-SEM) and variance based or PLS SEM. Andeev, Heart, Moaze and Pliskin (2009) postulate that CB-SEM attempts to model parameters that will minimize the variance between the calculated and observed covariance matrices yielding goodness-of fit indexes as a result of the magnitude of these differences. The PLS-SEM methodology on the other hand is used to maximise the variance of all dependent variables instead of using the model to explain the covariance of all indicators (Ringle *et al.*, 2009). In both approaches, the parameter estimates are produced based on the ability to minimize the residual variances of the endogenous variables (Henseler *et al.*, 2009; Esposito Vinzi *et al.*, 2010).

The Partial Least Squares path modelling technique was selected in this research study mainly due to its ability to deal with normality violations (i.e. multivariate normality). Thus, it does not require the hard assumption of the distributional properties of raw data, among other rationales that include; PLS handles both reflective and formative indicators. PLS ensures against improper solutions by the removal of factor indeterminacy; PLS is robust in dealing with data noise and missing data; PLS applies many parameters in a complex model with normal residual distributions; PLS handles collinearity in the independent latent variables; PLS has more statistical power than a maximum-likelihood

covariance-based SEM method and is a prediction-oriented technique in maximising the variance explained in the latent variables.

PLS also allows simultaneous modelling of the relations among latent variables; PLS combines regression and factor analysis within the measurement model in each run; PLS is more advantageous in case of new and refined measures; and PLS does not necessitate a large sample size (for example, 200 or fewer cases) (Haenlein & Kaplan, 2004; Henseler, Ringle & Sinkovics, 2009; Ronkko & Evermann, 2013). The next part of this section briefly distinguishes between reflective and formative indicators.

### **Reflective and Formative indicators**

Per the practice in business and business marketing research conventional measurement is based upon reflective indicators, where observed indicators reflect variations in latent variables (Navarro, Losada, Ruzo & Díez, 2010), hence, the path of causality is supposed to run from the latent variable to the observed indicators and, thus, changes in the latent variable are expected to be shown in changes in all observed indicators, including a multi-item scale (Diamantopoulos, 2008), whereas formative indicator models assume the opposite direction of causality, such that the content of the indicators defines the meaning of the latent variable.

An implication of this observation is that classical test theory's reflective indicators must be internally consistent, whereas no such requirement exists for formative indicators (Coltman *et al.*, 2008). Thus, the decision rules should support the researcher in deciding whether a latent variable is formatively or reflectively modelled (Jahns & Moser, 2007). For the purpose of this study, because the observed indicators reflect variations in latent variables and the path

of causality runs from the latent variable to the observed indicators, the operationalisation of the variables (measurement) are reflective. This implies that changes in the latent variable (operational Performance) are expected to be shown in changes in all observed indicators, including a multi-item scale for the independent variables (Supplier Involvement, Ethical procurement practices and Green Procurement Practices).

### **Validity and Reliability**

It is vital that a research collects empirical findings that replicate the reality of situations. One needs to be sure that data are easily accessible and are in line with the research questions (Saunders & Lewis, 2009). As such, the best way to evaluate a primary source is to use the concepts of validity and reliability. According to Rönkkö and Evermann (2013), the degree of reliability measures the extent to which data collection can be trusted. Reliability of the study's instrument will be tested using Cronbach alpha. The reliability coefficient of 0.70 or higher was considered acceptable (Cohen, 2008) and its result will be displayed in the next chapter.

Validity, on the other hand, deals with trustworthiness, in other words, it discusses how well the result of a study agrees with reality (internal validity) while, external validity talks about the degree of generalizability (Rönkkö, & Evermann, 2013). The degree of validity explains the extent to which data methods accurately measure what they are intended to measure. A major weakness with validity is that, it deals with a relatively small sample which makes the results of the study quite restricted. This therefore affects the results since it does not provide the study with clear results that apply to the full

population, and thus makes the chance of generalisation smaller. Validity of the study was achieved through pilot testing of questionnaire, expert review and peer review.

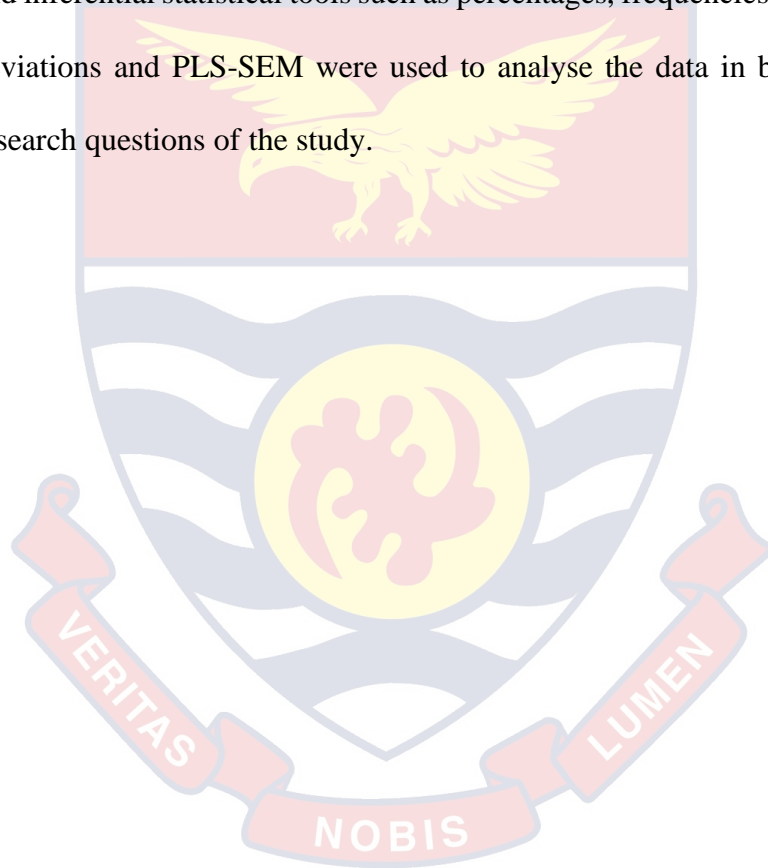
### **Ethical Considerations**

According to Patten and Newhart (2017), the major ethical issues that need to be considered in every research comprise voluntary participation, right to privacy, anonymity and confidentiality of information. As such, all efforts were geared towards ensuring that all these ethical issues are attended to. For instance, with voluntary participation, all respondents will be allowed to participate in the data collection exercise willingly. Also, the possible issues of right to privacy will be realised by allowing respondents to answer the questionnaires on their own and they will also be informed to leave unclear statements unanswered for further explanations through their own convenient medium.

The issue of anonymity will be attended to by restricting respondents from providing their names and contact numbers on the questionnaire. Respondents will, therefore, assured that none of their identities would be leaked to the public domain nor used for any purpose in the study. The study ensured confidentiality of information by assuring respondents that all information provided would be kept confidential. Respondents will also be assured that none of their information shall be used against them nor found in the public domain. Finally, all necessary documents obtained for the study will be appropriately referenced to avoid an ethical issue of plagiarism. In view of these, all major ethical issues/considerations shall be met in the study.

## Chapter Summary

The chapter discussed the research methods employed to achieve the study's purpose. The chapter specifically discussed key elements: design, population, sampling size and technique, data collection instrument, among others used in the study. The descriptive research design was adopted because of the purpose of the study coupled with the approach adopted. Both descriptive and inferential statistical tools such as percentages, frequencies, means, standard deviations and PLS-SEM were used to analyse the data in bid to answer the research questions of the study.





## CHAPTER FOUR

## RESULTS AND DISCUSSION

**Introduction**

This chapter discusses the study's findings in relation to the research objectives. The chapter specifically discusses the business characteristics of the manufacturing firms as well as the demographic characteristics of the respondents. The chapter further discusses the various sustainable procurement practices and finally examine their effect on the overall performance of manufacturing firms in selected metropolises in Ghana. The study's research objectives were analysed using the partial least squares (PLS) approach to structural equation modelling (SEM).

**Table 2: Business characteristics of manufacturing firms**

Type of Business ownership	Variable frequency	Percentage
Private ownership	186	93.0
Wholly state owned	8	4.0
Joint State-Private Ownership	6	3.0
<b>Type of Manufacturing Firm</b>		
Food and beverage processing	76	38.0
Pharmaceuticals/ Chemicals	67	33.5
Aluminium/Metal smelting	56	28.0
Textiles	1	0.5
<b>Total</b>	<b>200</b>	<b>100</b>

Source: Field survey, Fiati (2019)

Table 2 focuses on the business characteristics of the manufacturing firms in the selected metropolis in Ghana. It considers their legal form of ownership and the type of manufacturing firms in the selected metropolis. As presented above, private ownership is dominant in the category with a total



number of 186 (93.0%). There were 8 (4.0%) wholly state-owned firm and 6 (3.0%) joint state – private owned firm.

Also represented in Table 2, the food and beverage processing dominate the manufacturing market with a total of 76 (38.0%). There are 67 (33.5%) of pharmaceutical/chemicals, 56 (28.0%) of aluminium/metal smelting and 1 (0.5%) textile manufacturing firms in the selected metropolis.

### **Demographic Characteristics of respondents**

This section discusses the demographic characteristics and knowledge background data which include gender, age, academic attainment, employment status and number of years in the service. The results (Table 3) indicate that 145 (72.5%) of the respondents have been working in this capacity for less than ten years, 51 (25.5%) have been in the industry for eleven to twenty years, 4 (2.0%) for twenty-one years and above. Out of the 200 respondents, 60 (30.0%) were procurement/ purchasing manager/officer, 76 (38.0%) were production managers, operations manager recorded 52 (26.0%), 11 (5.5%) were warehouse managers and others recorded 1 (0.5%).

From Table 3, 1 (0.5%) of the respondents was above 55 years. 94 (47.0%) were between the ages 36 - 45. 98 (49.0%) were respondents who are between the ages of 46 – 55, aside the ages above fifty-five years, ages between 18 - 20 recorded the variable frequency 7 and its percentage to be (3.5%). From the table, it can be deduced that majority of the respondents were dominated by the middle age in managerial positions 192 (96%), fell within 35 years to 55 years.

**Table 3: Demographic characteristics of respondents**

	Frequency	Percent
<b>Years of work(experience)</b>		
<b>Less than 10 years</b>	145	72.5
10 - 20 years	51	25.5
21 – 30	4	2.0
<b>Current Job Position</b>		
Procurement/purchasing manager/officer	60	30.0
Production/operations manager/officer	76	38.0
Operations Manager	52	26.0
Warehouse Manager	11	5.5
Other	1	0.5
<b>Age group</b>		
18 - 35 years	7	3.5
36 – 45	94	47.0
46 - 55 years	98	49.0
Over 55 years	1	0.5
<b>Educational qualification</b>		
WASSE	3	1.5
HND/Equipment	69	34.5
First degree	93	46.5
Post graduate degree	35	17.5
<b>Gender</b>		
Male	162	81.0
Female	38	19.0
<b>Total</b>	<b>200</b>	<b>100.0</b>

Source: Field survey, Fiati (2019)

On the issue of academic attainment, the result in Table 3 indicates that 93 (46.5%) of respondents had attained first degree qualifications, 69 (34.5%) had HND/Equivalent certificate, while 35 (17.5%) had post graduate degree and 3 (1.5%) had basic or elementary education which is the smallest. This shows that most of the respondents, 197 (98.5%), who are working with manufacturing

firms have some form of formal education which means that, all the respondents were academically inclined and can provide relevant information.

The preference for highly educated managers emanates from empirical evidence associating them with improved firm performance (Peña, 2002). On the issue of age, the result clearly shows that, out of the 200 respondents, only 7 (3.5%) were between the ages of eighteen to thirty-five years. The majority of the respondents, 98 (49.0%) fell in the ages of 46 to 55 years. Regarding the sex of respondents, Table 3 shows that males were in the majority, 162 (81.0%), while the females were in the minority, 38 (19.0%). Ghana's history of restricted access to higher education as well as challenges of combining managerial and domestic responsibilities have been cited, among other reasons, for women not rising to managerial positions (Boohene *et al.*, 2008).

### **Descriptive statistics of Sustainable procurement practices**

This discussed under 3 headings according to the study objectives namely; supplier involvement, ethical procurement practice and green procurement practice.

#### **Supplier Involvement**

Supplier Involvement (SI) is defined as a vertical collaboration between supply chain partners, such that the manufacturer tries to involve the supplier in the product development process. SI is an approach in supply management to bring on board experts and to form a collaborative synergy of suppliers into the design process. The purpose of supplier involvement is to gain win-win opportunities in developing alternatives and improving service, technology, materials, transportation, design cycle time, specifications and tolerance,

standards, assembly change, order quantity and lead times, inventory etc. Using the mean scores, standard deviations, skewness and kurtosis, the study revealed how the firms' studied involve suppliers based on the key elements. The result was presented in Table 4



**Table 4: Descriptive Statistics of Supplier involvement**

Items/indicators	Mean	Std. Dev.	Skewness		Kurtosis	
			Statistic	S. E	Statistic	S. E
Collaborates with its suppliers to develop policies, processes and products which are environmentally friendly	4.00	.902	-.871	.172	.752	.342
Direct involvement of suppliers during planning and forecasting decisions	3.97	.879	-.703	.172	.368	.342
Exchange of information with its suppliers to improve sustainable practices	4.04	.876	-.702	.172	.091	.342
Trains its key suppliers on its core values and rules of conduct	4.07	.894	-.735	.172	.006	.342
Establishes contracts with only suppliers who are sustainability certified and compliant	4.01	.911	-.776	.172	.294	.342
Effective dialogue and feedback with suppliers	4.17	.807	-.889	.172	.845	.342
Suppliers eliminate or reduce the use of harmful substances during storage and transportation of raw materials	4.09	.774	-.757	.172	.892	.342
Developed a sustainable policy with the suppliers	4.11	.846	-.977	.172	1.156	.342
Monitors and evaluate the activities of their suppliers to ensure that they adhere to the required sustainability policies	4.15	.746	-.828	.172	1.303	.342
Established a reward and punishment mechanisms for suppliers who do not adhere to sustainable standards or practice	4.33	.796	-1.448	.172	2.843	.342
Overall average score	4.09	.583	-1.252	0172	1.875	.342

Note: S.E = Standard Error, Std. Dev. = Standard Deviation

Source: Field survey (2019)

In terms of supplier involvement (SI), all the firms agreed that there were reward and punishment mechanisms for suppliers who do not adhere to sustainable standards or practice. This result is 'high' with a mean score of 4.33. The standard deviation statistic of 0.796 indicates that the data points are gathered closely around the mean value confirming it as a great value. The skewness and kurtosis statistics are -1.448 and 2.843 with standard errors of 0.172 and 0.342 shows that the indicator is approximately normally distributed.

Table 4 revealed that all the firms' ensured effective dialogue and feedback with suppliers geared toward promoting sustainable procurement. This is because; the result had a 'high' mean score of 4.17. The standard deviation of 0.807 indicates that the mean score is a great score because its data points are clustered close to it. The skewness and kurtosis distribution are -0.889 and 0.845 with standard errors of 0.172 and 0.342 indicating that the data obtained for this indicator are approximately normally distributed. Also, all the firms' studied agreed that they monitor and evaluate the activities of their suppliers to ensure that they adhere to the required sustainability policies (M=4.15). The standard deviation score of 0.746 indicates that the mean value is great because its data points are gathered close to it. The skewness and kurtosis statistics of -0.828 and 1.303 with standard errors of 0.172 and 0.342 indicate that the data obtained are approximately normally distributed.

The result also gave the indication that, the firms' have developed a sustainable policy with the suppliers (M=4.11). The standard deviation score of 0.846 indicates that the mean value is great because its distribution is spread around it. The skewness and kurtosis statistics of -0.977 and 1.156 with standard errors of 0.172 and 0.342 indicate that the data obtained are approximately

normally distributed. The firms also ensured that the suppliers eliminate or reduce the use of harmful substances during storage and transportation of raw materials with a mean ( $M=4.09$ ) and standard deviation ( $SD=0.774$ ). Skewness and kurtosis with its standard of error recorded  $-0.757(0.172)$  and  $0.892(0.342)$  respectively indicates that the data obtained are approximately normally distributed.

Table 4 reported a mean ( $4.07$ ) and standard deviation ( $0.894$ ) which indicates that firms train their key suppliers on its core values and rules of conduct. Skewness  $-0.735(0.172)$  and kurtosis  $0.006(0.342)$  indicates an approximately normal distribution. The result of the study also indicated that, all firms exchange information with its suppliers to improve sustainable practices with a ( $M=4.04$ ) and ( $SD=0.876$ ), Skewness and kurtosis with their respective standard error  $-0.702(0.172)$ ,  $0.091(0.342)$  respectively indicating an approximate normal distribution. From the table 4, ( $M=4.01$ ) ( $SD=0.911$ ) indicates that firms establish contracts with only suppliers who are sustainability certified and compliant, Skewness and kurtosis with its standard of error  $-0.776(0.172)$  and  $0.294(0.342)$  shows that the data is approximately distributed.

Also, the firms collaborate with its suppliers to develop policies, processes and products which are environmentally friendly. It recorded a high mean of  $4.00$  with a standard deviation of  $0.902$  which implies that the mean value is great because it has its distribution gathered close to it. Skewness and kurtosis statistics with standard error  $-0.891(0.172)$  and  $0.752(0.342)$  respectively indicate that data obtained are approximately normally distributed. It was finally revealed that the firms ensure direct involvement of suppliers during planning and forecasting decisions ( $M=3.97$ ). The standard deviation



score of 0.879 indicates that the mean value is great because it has its distribution gathered close to it. The skewness and kurtosis statistics of -0.703 and 0.368 with standard errors of 0.172 and 0.342 indicate that the data obtained are approximately normally distributed.

The overall mean score of 4.093 with standard deviation score of 0.583 indicate that every firm within the firms' studied are putting great effort into making the supplier involvement a success by established a reward and punishment mechanisms for suppliers who do not adhere to sustainable standards or practice, ensuring effective dialogue and feedback with suppliers. This practice in turn helps the firms to ensure that their products are sustainable.

### **Ethical Procurement**

Ethics in procurement plays an important role in procurement and are considered to be important as technology and consumer behaviour change. Being ethical means being in accordance with the rules or standards for right conduct or practice especially the standard of a profession. Ethical procurement spans across supplier selection, evaluation, negotiation, contract sign off and awarding of business to suppliers. Element of ethical procurement include fairness, transparency, and consistency in decision making. It is appropriate to treat suppliers in a fair and unbiased manner when interacting with suppliers. When procurement professional fails to abide by ethical practices, it can lead to immoral and illegal practices such as bribery, favouritism, illegal sourcing etc. Using the mean scores, standard deviations, skewness and kurtosis, the study revealed how the firms' studied adopts the green procurement practice based on its key elements. The result is presented in Table 5.

**Table 5: Descriptive Statistics of Ethical Procurement Practice**

Items/indicators	Mean	Std. Dev.	Skewness		Kurtosis	
			Statistic	S. E	Statistic	S. E
Sustainable standards are met in every order	4.35	.722	-.653	.172	-.834	.342
Procurement transactions and processes are subjected to scrutiny or proper checks	4.36	.724	-.762	.172	-.423	.342
Adheres to all environmental and social standards during production and transportation of its products to customers	4.27	.707	-.524	.172	-.539	.342
Implemented and constantly follows the safety aspects and governmental laws concerning their operations	4.23	.927	-1.458	.172	2.506	.342
When purchases become competitive, awards go to the lowest responsive and responsible bidder	4.13	.759	-.780	.172	1.032	.342
All staff are held accountable for their procurement activities	4.16	.960	-.921	.172	-.045	.342
Established ethical codes of conduct which guide the activities of their employees and suppliers	4.26	.712	-.604	.172	-.208	.342
Carries out its daily activities under due diligence to ensure sustainable practices	4.40	.764	-1.382	.172	2.575	.342
Established a unit/department which handles all ethical issues	4.26	.696	-.583	.172	-.087	.342
Ensures that its staff act without considering personal gains	4.29	.692	-.456	.172	-.850	.342
Overall average scores	4.27	0.352	-.401	.172	-.467	.342

Source: Field survey, Fiati (2019)

In relation to ethical procurement practice (EPP), the firms carry out their daily activities under due diligence to ensure sustainable practices. EPP result was rated 'high' because it had a mean score of 4.40. The standard deviation statistic of 0.764 indicates that the data points are gathered closely around the mean value confirming it as a great value. The skewness and kurtosis statistics are -1.382 and 2.575 with standard errors of 0.172 and 0.342 shows that the indicator is approximately normally distributed.

The table revealed that all the firms ensured that procurement transactions and processes are subjected to scrutiny or proper checks. This is because; the result had a 'high' mean score of 4.36. The standard deviation of 0.724 indicates that the mean score is a great score because its data points are clustered close to it. The skewness and kurtosis distribution are -0.762 and -0.423 with standard errors of 0.172 and 0.342 indicating that the data obtained for this indicator are approximately normally distributed. Also, all the firms' studied agreed that sustainable standards are met in every order (M=4.35). The standard deviation score of 0.722 indicates that the mean value is great because its data points are gathered close to it. The skewness and kurtosis statistics of -0.653 and -0.834 with standard errors of 0.172 and 0.342 indicate that the data obtained are approximately normally distributed.

The results also gave the indication that the firms ensure that their staff act without considering personal gains (M=4.29). The standard deviation score of 0.692 indicates that the mean value is great because its distribution is spread around it. The skewness and kurtosis statistics of -0.456 and -0.850 with standard errors of 0.172 and 0.342 indicate that the data obtained are approximately normally distributed. The firms also adhere to all environmental and social

standards during production and transportation of its products to customers with a high mean ( $M=4.27$ ) and standard deviation ( $SD=0.707$ ) which indicates a mean value which spreads around it. Skewness and kurtosis with its standard of error recorded  $-0.524(0.172)$  and  $0.539(0.342)$  respectively which indicates that the data obtained are approximately normally distributed. Mean ( $4.26$ ) and standard deviation ( $0.712, 0.696$ ) recorded that firms established ethical codes of conduct which guide the activities of their employees and suppliers and also established a unit/department which handles all ethical issues. Skewness  $-0.604, -0.583(0.172)$  and kurtosis  $-0.208, -0.087(0.342)$  indicates an approximately normal distribution.

The result of the study also indicated that, all firms implemented and constantly follow the safety aspects and governmental laws concerning their operations with a ( $M=4.23$ ) and ( $SD=0.927$ ), skewness and kurtosis with their respective standard error  $-1.458(0.172), 2.506(0.342)$  respectively indicating an approximate normal distribution. From the table, ( $M=4.16$ ) ( $SD=0.960$ ) which indicates that firms' staff are held accountable for their procurement activities, Skewness and kurtosis with its standard of error  $-0.921(0.172)$  and  $-0.045(0.342)$  shows that the data is approximately normally distributed. Finally, it was revealed that when purchases become competitive, awards go to the lowest responsive and responsible bidder ( $M=4.13$ ). The standard deviation score of  $0.759$  indicates that the mean value is great because it has its distribution gathered close to it. The skewness and kurtosis statistics of  $-0.780$  and  $1.032$  with standard errors of  $0.172$  and  $0.342$  indicate that the data obtained are approximately normally distributed.

The overall mean score of 4.273 with standard deviation score of 0.352 indicate that every firm within the firms' studied are putting great effort into making the ethical procurement practice a success by adhering to all environmental and social standards during production and transportation of its products to customers, and establishing ethical codes of conduct which guide the activities of their employees and suppliers. This practice in turn helps the firms to ensure that employees are ethical to ensure sustainability.

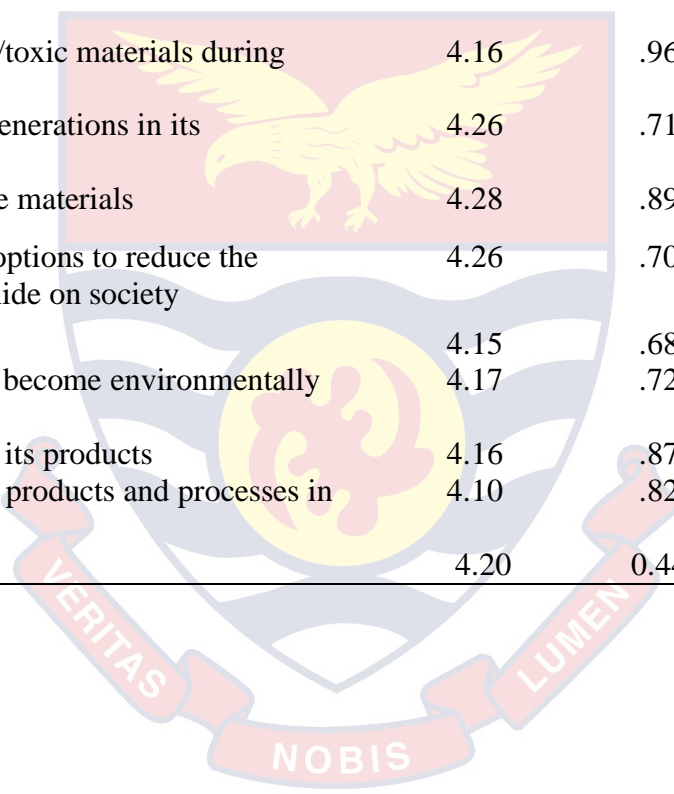
### **Green Procurement**

In the quest of organisations to minimize the adverse environmental impacts, there are an increasing number of organisations making an effort to abide by green procurement practice. Negative publicity arising from non-compliance with green procurement could be dangerous to the organisation. Green Procurement Practice includes human health and environmental concerns and the search for high quality products and services at competitive prices. Organisations adopt green procurement practices to enhance brand image, increase customer satisfaction, reduce cost and risk, and also to increase shareholders value. Using the mean scores, standard deviations, skewness and kurtosis, the study revealed how the firms' studied adopts the green procurement practice based on its key elements. The result is presented in Table 6.

**Table 6: Descriptive Statistics of Green Procurement Practice**

Items/indicators	Mean	Std. Dev.	Skewness		Kurtosis	
			Statistic	S. E	Statistic	S. E
Purchases only raw materials which are environmentally friendly	4.34	.726	-.621	.172	-.878	.342
Emphasizes on environmentally friendly products during its product design stage	4.13	.759	-.780	.172	1.032	.342
Ensuring decreased consumption of harmful/toxic materials during production	4.16	.960	-.921	.172	-.045	.342
Observed decreased liquid and solid waste generations in its production processes	4.26	.712	-.604	.172	-.208	.342
Deals with suppliers who provide sustainable materials	4.28	.892	-1.398	.172	2.200	.342
Encourages the use of sustainable transport options to reduce the environmental impact such as carbon monoxide on society	4.26	.705	-.512	.172	-.536	.342
Ensures efficient utilisation of energy	4.15	.681	-.396	.172	-.081	.342
Developed a waste reduction plan to help us become environmentally responsible	4.17	.721	-.421	.172	-.435	.342
Uses renewable raw materials for packaging its products	4.16	.871	-1.147	.172	1.821	.342
Is innovating more environmentally friendly products and processes in recent years	4.10	.824	-.722	.172	.096	.342
Overall average score	4.20	0.444	-.717	.172	.036	.342

Source: Field survey, Fiati (2019)





With respect to green procurement practice (GPP), all the firms admitted that the purchases of only raw materials which are environmentally friendly are essential. The result is rated 'high' because it had a mean score of 4.34 which is between 3 and 5. The standard deviation statistic of 0.726 indicates that the data points are gathered closely around the mean value confirming it as a great value. The skewness and kurtosis statistics are -0.621 and -0.878 with standard errors of 0.172 and 0.342 which show that the indicator is approximately normally distributed.

The table 6 revealed that the firms' deal with suppliers who provide sustainable materials. This resulted in the 'high' mean score of 4.28. The standard deviation of 0.892 indicates that the mean score is a great score because its data points are clustered close to it. The skewness and kurtosis distribution are -1.398 and 2.200 with standard errors of 0.172 and 0.342 indicating that the data obtained for this indicator are approximately normally distributed. Also, all the firms' studied agreed that they observed decreased liquid and solid waste generations in its production processes and encourage the use of sustainable transport options to reduce the environmental impact such as carbon monoxide on society (M=4.26). The standard deviation score of 0.712, 0.705 indicates that the mean value is great because its data points are gathered close to it. The skewness and kurtosis statistics of -0.604, -0.512 and -0.208, -0.536 with standard errors of 0.172 and 0.342 indicate that the data obtained are approximately normally distributed.

The results also gave the indication that the firms ensure decreased consumption of harmful/toxic materials during production and use renewable raw materials for packaging its products (M=4.16). The standard deviation score



of 0.960, 0.871 indicates that the mean value is great because its distribution is spread around it. The skewness and kurtosis statistics of -0.921, -1.147 and -0.045, 1.821 with standard errors of 0.172 and 0.342 indicate that the data obtained are approximately normally distributed. The firms also ensure efficient utilisation of energy with a high mean ( $M=4.15$ ) and standard deviation ( $SD=0.681$ ) which indicate a mean value which spread around it. Skewness and kurtosis with its standard of error recorded -0.396(0.172) and -0.081(0.342) respectively indicates that the data obtained are approximately normally distributed.

Also, the firms under study emphasized on environmentally friendly product during its product design stage. It recorded a high mean of 4.13 with a standard deviation of 0.759 which imply that the mean value is great because it has its distribution gathered close to it. Skewness and kurtosis statistics with standard error -0.780(0.172) and 1.032(0.342) respectively indicate that data obtained are approximately normally distributed. It was finally revealed that the firms are innovating more environmentally friendly products and processes in recent years ( $M=3.10$ ). The standard deviation score of 0.824 indicates that the mean value is great because it has its distribution gathered close to it. The skewness and kurtosis statistics of -0.722 and 0.096 with standard errors of 0.172 and 0.342 indicate that the data obtained are approximately normally distributed.

The overall mean score of 4.20 with standard deviation score of 0.444 indicate that every firm within the firms' studied are putting great effort into making the green procurement practice a success by encouraging the use of sustainable transport options to reduce the environmental impact such as carbon monoxide on society and purchasing only raw materials which are

environmentally friendly. This practice in turn helps the firms to ensure that their products are sustainable thereby protecting the environment, society and economy at large. From the mean scores discussed above, all mean score of the various variables recorded a high mean ranging from 3.97 to 4.40; the skewness and kurtosis were close to -1 or 1.

### **Assessment of the PLS-SEM**

The study began the data analysis by presenting the structural model specification and assessing the fundamental measurement model qualities in PLS-SEM comprising Cronbach alpha, construct reliability, composite reliability (CR), convergent validity (average variance extracted), multicollinearity (VIF) and discriminant validity. The rho A also known as Dillon-Goldstein's rho or Joreskog which is a better composite reliability measure than Cronbach's alpha in Structural Equational Model (SEM) according to Chin (1998). These measurement model qualities were first assessed to basically obtain sufficient validity and reliability of study in a bid to make meaning out of the structural model results (Straub, 1989; Henseler *et al.*, 2009). The results are presented in table and discussed below.

### **Model Specification (structural and measurement)**

The section specifies the structure of the model of this study. It indicates the exogenous and the endogenous variables with the various indicators. The structural model is specified in figure 2. There are three exogenous variables and one endogenous variable in this study. The exogenous variables are; supplier involvement (SI), ethical procurement practice (EPP) and green procurement practice (GPP) and firm size (FS) as a control variable. The endogenous variable

was represented by operational performance. The latent variable supplier involvement was measured by four indicators (*SI2, SI3, SI4 and SI5*). Ethical procurement practice is measured by three indicators (*EPP4, EPP8, and EPP10*). Green procurement practice has three indicators (*GPP1, GPP5, and GPP6*). The control variable, Firm size is measured with one item (*FS2*) and operational performance is measured by four indicators (*OP2, OP3, OP4, and OP5*). There are 3 paths hypotheses in the model (figure 2). The study anticipates that a positive link between SI and OP. Also, the study anticipates a positive relationship between EPP and OP. The study also hypothesises a significant link between GPP and OP, holding firm size constant.

### **Measurement Model Assessment**

In assessing the measurement model, the study examined the internal consistency reliability (Cronbach's alpha, composite reliability), convergent validity (AVE) and discriminant validity (Fornell Lacker criterion and cross loadings).

### **Internal consistency reliability**

Table 7, presented the construct and indicator reliability of the study variables. Indicator reliability (Cronbach alpha) (CA) shows the aspect of an indicator's variance that can be explained by the underlying latent variable (Hair *et al.*, 2006). The assumption of CA is that the threshold value of any given indicator should be  $> 0.7$  (Chin, 1998b; Hair *et al.*, 2011; Latan & Ghozali, 2013). The threshold value means that the shared variance between a construct and its indicator is greater than the variance of the measurement error (Esposito Vinzi *et al.*, 2010). From the table 7, the indicator reliability results showed the

following: EPP (0.710); GPP (0.795); SI (0.832); OP (0.824) and FS (1.000) respectively. These clearly indicated that the study’s indicators were reliable for the model since their thresholds were acceptable ( $>0.70$ ).

Table 7 also presented the construct reliability results of the study. Construct reliability (CR) assesses the extent to which all the construct’s indicators jointly measure the construct adequately (Bagozzi & Yi, 1988; Straub, 1989). Thus, the CR requires all the indicators assigned to a given construct to have a strong mutual correlation. The composite reliability was used to check for construct reliability as it is appropriate for assessing how well assigned indicators measure a construct ((Bagozzi & Yi, 1988). According to Bagozzi and Yi (1988) and Straub (1989), the CR value should be 0.70 or higher. The results showed that all the CR values were  $> 0.70$  indicating that all the assigned indicators had strong mutual associations with their respective constructs.

**Table 7: Construct and Indicator reliability**

Construct	CA	rho_A	CR	AVE
Ethical Procurement	0.710	0.708	0.838	0.633
Operational Performanc	0.824	0.850	0.881	0.649
Firm Size	1.000	1.000	1.000	1.000
Green Procurement	0.795	0.813	0.878	0.707
Supplier Involvement	0.832	0.873	0.886	0.660

*IR (CA) – Indicator reliability; rho A – Composite reliability; CR – Construct reliability; AVE – Convergent validity.*

Source: Field survey, Fiati (2019)

The result of the convergent validity (CV) of the study was also presented in Table 7. The CV in PLS-SEM models is commonly measured using the Average Variance Extracted (AVE) (Gotz *et al.*, 2010). The AVE explains how the construct is relative to the total amount of variance including the variance of its indicators due to measurement error. Fornell and Larcker (1981),

Bagozzi and Yi (1988) and Hair *et al.* (2011) recommended a minimum AVE of 0.5 for a construct to show convergent validity. This means that an AVE of 0.50 or higher indicates that the construct explains at least 50 per cent of the variance of its items. The study tested CV by examining the AVEs of all the variables in the SEM model. The results revealed that the AVEs of all the latent variables ranged from 0.633 to 0.707 thus  $> 0.5$ . This illustrates that the validity of the measurement scale was convergent.

### Discriminant Validity

The study also tested for discriminant validity as recommended by Hair *et al.* (2011). According to Fornell and Larcker (1981), discriminant validity ensures that the study's constructs or latent variables are independent from one another. Hair *et al.* (2014) also posited that the discriminant validity can be used to assess the structural model for collinearity issues. Thus, if constructs are discriminately valid then they typically do not have significant levels of collinearity (Sarstedt, Hair & Ringle, 2017). Discriminant validity is achieved when the factorial loadings in their respective constructs are larger than all the other correlation values among the latent variables (Chin, 1981; Fornell & Larcker, 1981). Fornell and Larcker (1981) provided a criterion for assessing the existence of discriminant validity. The result was presented in Table 8.

**Table 8: Fornell-Larcker criterion for checking Discriminant validity**

	EP	OP	FS	GP	SI
EP	<b>0.795</b>				
OP	0.668	<b>0.806</b>			
FS	0.303	0.266	<b>1.000</b>		
GPP	0.775	0.699	0.129	<b>0.841</b>	
SI	0.150	0.232	0.110	0.140	<b>0.813</b>

*Note: Diagonal elements in bold = square root of AVE; Off-diagonal elements = correlation between constructs*

From Table 8, it could be deduced that all the factorial loadings in their respective latent variables (constructs) are larger than all the other correlation values among the latent variables. This implies that each construct was truly distinct from the other, thus, ensuring uniqueness in measurement. Also, discriminant validity was verified by examining the cross loadings of the indicators. Hair *et al.*, (2012) suggested that the measurement indicators on their assigned constructs should be an order of magnitude higher than their loadings on other constructs. Table 9 presented the cross loadings of indicators with outer loadings on each construct > 0.70.

It could be confirmed from the table that the model shows an appropriate level of discriminant validity. This is because, the cross loadings of each indicator on its latent variable are larger than the cross loadings on other constructs. The study, therefore, concluded that the latent variables have discriminant validity.

**Table 9: Cross loadings**

	<b>EPP</b>	<b>OP</b>	<b>FS</b>	<b>GP</b>	<b>SI</b>
<b>EPP10</b>	<b>0.754</b>	0.579	0.456	0.415	0.172
<b>EPP4</b>	<b>0.819</b>	0.485	0.113	0.718	0.129
<b>EPP8</b>	<b>0.811</b>	0.514	0.118	0.742	0.050
<b>OP2</b>	0.620	<b>0.792</b>	0.138	0.828	0.129
<b>OP3</b>	0.447	<b>0.858</b>	0.213	0.495	0.200
<b>OP4</b>	0.511	<b>0.808</b>	0.262	0.396	0.258
<b>OP5</b>	0.528	<b>0.762</b>	0.287	0.386	0.189
<b>FS2</b>	0.303	0.266	<b>1.000</b>	0.129	0.110
<b>GPP1</b>	0.804	0.554	0.110	<b>0.871</b>	0.106
<b>GPP5</b>	0.654	0.490	0.074	<b>0.806</b>	0.076
<b>GPP6</b>	0.528	0.685	0.132	<b>0.844</b>	0.157
<b>SI2</b>	0.137	0.247	0.079	0.173	<b>0.853</b>
<b>SI3</b>	0.122	0.160	0.085	0.150	<b>0.831</b>
<b>SI4</b>	0.098	0.178	0.072	0.049	<b>0.797</b>
<b>SI5</b>	0.128	0.138	0.141	0.054	<b>0.767</b>

Source: Field survey, Fiati (2019)



## Structural Model Assessment

The study examined the variance inflation indicator (VIF), Coefficient of determination ( $R^2$ ), effect size ( $f^2$ ), Predictive Relevance ( $Q^2$ ) and effect size of independent variables ( $q^2$ ), in assessing the structural model.

## Multicollinearity among exogenous variables

The PLS-SEM model was further assessed for multicollinearity using both the inner and outer Variance Inflation Factor (VIF) values of each construct. According to Hair *et al.* (2014), multicollinearity diagnostics is assessed to ensure that the path coefficients are free from bias while minimizing the significant levels of collinearity among the predictor constructs. The rule of thumb is that the VIF values of each construct should be less than the cut of point of 5 as suggested by Hair *et al.* (2014). 1 is not correlated, between 1 and 5 is moderately correlated and above 5 is highly correlated.

The development of a good PLS –SEM model could be affected if the multicollinearity among the independent variables thus the VIF values  $>10$ . (Pallent, 2007). Ideally, the VIF value should be close to 3 and lower. (Hair *et al.*, 2017). The inner VIF values of the independent variables include EPP (2.801), GPP (2.590), FS (1.143) and SI (1.031) respectively. This indicate the absence of multicollinearity between the exogenous variables, the result of the outer VIF values were presented in Table 10.

From Table 10, the outer VIF values for each indicator ranged from (1.000) to (2.927) indicating the absence of multicollinearity between the indicators measuring the various exogenous variables since all the VIF values



are <10. The result, therefore, shows that the paths are free from multicollinearity with the highest VIF of 2.927.

**Table 10: Multicollinearity among exogenous variables**

Indicators	VIF
EPP10	1.201
EPP4	1.707
EPP8	1.656
OP2	1.627
OP3	2.730
OP4	2.927
OP5	1.949
FS2	1.000
GPP1	2.095
GPP5	1.807
GPP6	1.511
SI2	1.774
SI3	2.013
SI4	1.772
SI5	1.733

Source: Field survey, Fiati (2019)

**Coefficient of Determination (R<sup>2</sup>)**

This section discussed the model’s predictive accuracy based on the R<sup>2</sup> results. According to Hair *et al.* (2011), R<sup>2</sup> shows the combined effect of exogenous variables. Supplier involvement (SI), Ethical procurement practice (EPP), and Green procurement practice (GPP), were found to explain 55.5 percent variation in the endogenous variable (operational Performance). Chin (1998) suggested R<sup>2</sup> value of 0.67, 0.33 and 0.19 for independent latent constructs in the inner path model as substantial, moderate and weak, respectively. The result is presented in Table 11.

**Table 11: Structural model coefficient of determination and assessment**

Independent Variable	R <sup>2</sup>	Assessment
Ethical Procurement Practice	0.443	Moderate
Green Procurement Practice	0.530	Moderate
Supplier Involvement	0.065	Weak
Firm Size	0.084	Weak
Operational Performance	0.555	Moderate

Source: Field survey, Fiati (2019)

The result from Table 11 shows that, the coefficient of determination, R<sup>2</sup> for ethical procurement practice latent variable is 0.443. This means that ethical procurement practice (EPP) moderately explains 44.3% of the variation in operational performance (OP). Similarly, green procurement practice (GPP) has a coefficient of determination, R<sup>2</sup>, of 0.530 meaning that green procurement practice (GPP) moderately accounts for 53% of the variance in firm performance. However, supplier involvement (SI) and firm size (FS) had coefficient of determination, R<sup>2</sup>, of 0.065 and 0.084 respectively. This means that SI and FS weakly account for 6.4% and 8.4 % of the operational performance.

The model finally suggested that the endogenous latent variable, operational performance (OP) has a coefficient of determination, R<sup>2</sup>, of 0.555. The deduction that could be drawn is that the four latent variables of sustainable procurement practice comprising of EPP, GPP, SI and FS as a control variable moderately explain 55.5% of the variation in operational performance.

Furthermore, the study's exogenous variables comprising ethical procurement practice (EPP), green procurement practice (GPP) and supplier involvement (SI) were found to explain 55.5 percent variation in the endogenous

variable (operational performance). Based on the findings of  $R^2$  result, it explains the variation in the dependent variable caused by the independent variables, (Cohen, 1998; Chuan & Penyelidikan, 2006). Using the Thalheimer and Cook (2002) criterion ( $<0.29 = \text{small}$ ), the study considered the variation to be moderate when it comes to ethical procurement practice and green procurement practice whiles supplier involvement recorded small variation.

### Effect Size ( $f^2$ )

From Table 12, the effect size ( $f^2$ ) shows that supplier involvement (SI) (0.029), ethical procurement practice ( $f^2=0.048$ ), green procurement practice ( $f^2=0.199$ ) and firm size (FS) ( $f^2 = 0.28$ ) had small and medium effects on operational performance respectively. This result was based on Cohen's (1988) impact indicator where values 0.35 (large), 0.15 (medium) and 0.02 (small). However, among the practice, green procurement practice had a relatively higher effect on operational performance which was followed by ethical procurement. However, supplier involvement was found to have the least effect on operational performance.

**Table 12: Effect size of exogenous variables**

Exogenous construct	$f^2$	Assessment
Ethical Procurement	0.048	Small
Firm Size	0.028	Small
Green Procurement	0.199	Medium
Supplier Involvement	0.029	Small

Source: Field Survey, Fiati (2019)

### Predictive Relevance ( $Q^2$ )

The predictive relevance ( $Q^2$ ) of the predictor exogenous latent variables was also presented. The  $Q^2$  was assessed by omitting part of the data matrix, estimating the model and predicting the omitted part using the estimates (Hair *et al.*, 2014). A  $Q^2$  value  $> 0$  for a particular endogenous variable depicts the path model's relevance for that specific variable (Chin, 1998; Henseler *et al.*, 2009). According to Henseler *et al.* (2009), the rule of thumb states that:  $0.02 \leq Q^2 < 0.15$  (weak effect),  $0.15 \leq Q^2 < 0.35$  (moderate effect) and  $Q^2 > 0.35$  (strong effect).

However, Rigdon (2014) and Sarstedt *et al.* (2014) argued that while comparing the  $Q^2$  value to zero indicates that the endogenous variable can be predicted, it does not mean that the prediction is quality or not. The Table below shows that the Q-squared coefficients for the predictive relevance associated with each independent variable in the model, through the dependent latent variables, are all larger than zero, which indicates that the model has predictive relevance.

**Table 13: Predictive Relevance of the independent variables**

Independent Variable	$Q^2$	Assessment
Ethical Procurement	0.301	Moderate effect
Firm Size	0.304	Moderate effect
Green Procurement	0.272	Moderate effect
Supplier Involvement	0.307	Moderate effect

Source: Field Suvey, Fiati (2019)

### Predictive Relevance ( $q^2$ )

Finally, the predictive relevance ( $q^2$ ) for the study was carried out to assess the predictive relevance of each exogenous construct for a specific endogenous construct. This was done by using the formula:  $q^2 = (Q^2 \text{ included} - Q^2 \text{ excluded}) / (1 - Q^2 \text{ included})$ . The rule of thumb is that,  $q^2$  values of 0.35 (large), 0.15 (medium) and 0.02 (small) respectively (Henseler *et al.*, 2009). From Table 14, all the  $q^2$  values (SI = 0.009; EPP = 0.017; GPP = 0.057) for each of the exogenous latent variables were <0.15 thus depicting small effect sizes. Simply put, the effect sizes of the various structural paths in the model were small.

**Table 14: Effect size of the independent variables**

Exogenous construct	$q^2$	Assessment
Ethical Procurement	0.017	Small
Firm Size	0.012	Small
Green Procurement	0.057	Small
Supplier Involvement	0.009	Small

Source: Field survey (2019)

### Significance of path coefficients

Based on the discussion above, the measurement model met the PLS-SEM criterion hence the study proceeded to examine three research hypotheses using the PLS-SEM. The hypotheses specifically dealt with the effects of sustainable procurement practices consisting of supplier involvement (SI), Green Procurement Practice (GPP) and Ethical Procurement Practice (EPP) on operational performance (OP) of manufacturing firms in Ghana. The hypothesis

testing was done by assessing the strength and direction using the path coefficient ( $\beta$ ) and the level of significance with p-values obtained through 5000 bootstraps. The coefficient of determination ( $R^2$ ), effect size ( $f^2$ ), predictive relevance of the model ( $Q^2$ ) using the Stone-Giesser's test criterion and the relative impact of the model ( $q^2$ ) was estimated by PLS-SEM.

It is to note that PLS-SEM interprets the values of the t test and not the p-values (Hair *et al.*, 2014). This is because; t stat values above 1.96 correspond to p-values  $< 0.05$  and vice versa. Thus, the null hypothesis ( $H_0$ ) is rejected when the t-stat is  $< 1.96$  while one fails to reject the  $H_0$  when the t stat is  $> 1.96$ . The results of the hypotheses testing were presented in Table 15.

The first research objective examined the effect of supplier involvement (SI) on operational performance (OP) thus the first hypothesis was formulated to determine whether there is a relationship between supplier involvement (SI) and operational performance (OP). The hypothesis was specifically formulated as:

*H<sub>1</sub>: supplier involvement positively influences operational performance.*

The result in table 15, revealed that supplier involvement had a significant and positive effect on operational performance (OP) ( $\beta = 0.116$ ;  $t = 2.089$ ;  $p < 0.05$ ). This is because, the t-stats of 2.089 was ( $> 1.96$ ) which indicates a positive relationship. The direction of the result was in line with the hypothesis thus the null hypothesis was rejected. Hence, the hypothesis that “supplier involvement positively influences operational performance” was supported. Agreeably, findings of the study revealed a positive relationship between the variables. This further means that involving suppliers directly during planning, forecasting decisions, and also training its key suppliers on its core values and



rules of conduct would result in an increase in performance. Thus, manufacturing firms would be able to increase their performances if they continue to improve on their relationships with suppliers.

The finding of the study is in line with existing studies by Changa *et al.* (2006) who found that supplier involvement as a sustainable procurement practice plays a major role in the development and performance of a firms manufacturing. However, another research was carried out by Asare, Brashear, Yang and Kang (2013) and it was concluded that marketing process improvements were found to mediate the relationship between a firm’s supplier development efforts and firm performance.

Also, Roushdy, Mohamed, Hesham, Elzarka and Hafez (2015) posit that early supplier involvement enables proactive communication and collaboration on product specifications, performance, design, materials and much more. It also offers additional benefits to the firm, including the management of supply risk in new product development and the upstream supply chain.

**Table 15: Result of structural equation model and hypothesis testing**

Structural path	Path Co.(β)	t-stats	p-values	Decision
Ethical Procurement → Operational Performance	0.243	2.393	0.017*	H <sub>1</sub> (supported)
Firm Size → Operational Performance	0.118	2.217	0.027*	(supported)
Green Procurement → Operational Performance	0.479	5.127	0.000*	H <sub>2</sub> (supported)
Supplier Involvement → Operational Performance	0.116	2.089	0.037*	H <sub>3</sub> (supported)

Note: \* = P<0.05

Source: Field survey (2019)



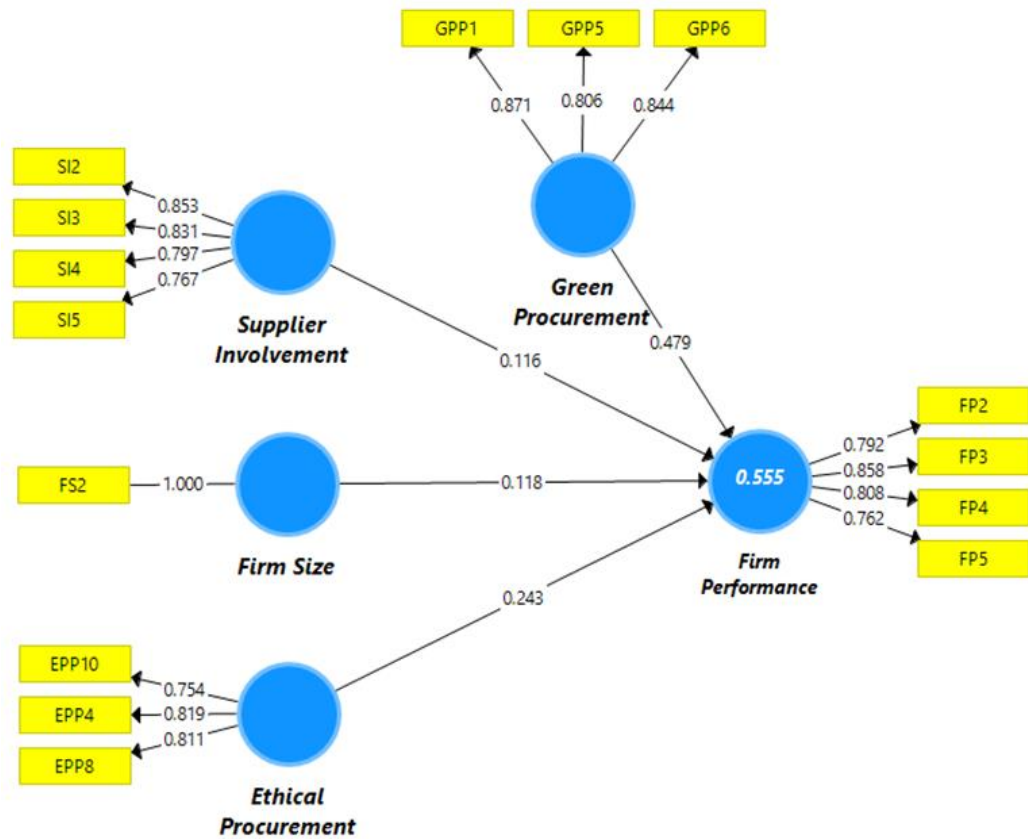
Furthermore, the second hypothesis was formulated to identify whether ethical procurement practice (EPP) has a relationship with firm performance (FP). The formulated hypothesis read:

*H<sub>2</sub>: ethical procurement practice positively influences operational performance*

The result in table 15 again revealed that ethical procurement practice had a significant and positive effect on operational performance (OP) ( $\beta = 0.243$ ;  $t = 2.393$ ;  $p < 0.05$ ). This is because, the t-stats of 2.393 was  $> 1.96$ . As such, the direction of the result was in line with the hypothesis thus the null hypothesis was rejected. Hence, the hypothesis that “ethical procurement practice positively influences operational performance” was supported. This implies that for manufacturing firms to increase their overall performance, it is necessary for the firms to be ethical by setting a high ethical standard and complying with law thereby reducing potential harm that may befall employees and consumers. Manufacturing firms should also carry out their daily activities under due diligence to ensure sustainable practices.

#### **Firm size as a control variable**

The study controlled for firm size (FS) as it could have an influence in the relationships among the study’s research variables. Table 15 reveals that firm size also had significant relationship with operational performance ( $\beta = 0.118$ ;  $t = 2.217$ ;  $p < 0.05$ ). This is because, the t stat of FS was 2.217 which was  $> 1.96$ . This implies that, firm size significantly controls the relationships among the variables. Therefore, firm size, as a control variable, was included from the final PLS-SEM model.



**Figure 2: Structural model results**

This finding is consistent with the findings of Donker, Poff and Zahir (2008) who posits that corporate ethics is vital for management, employees, shareholders, stakeholders, and the community at large. Similarly, Kilonzo (2017) found out that procurement ethics have been implemented at animal feeds manufacturing firms to a large extent with component such serving public interest, professionalism and respect to suppliers, this led to improved performance. The third hypothesis was formulated to determine whether green procurement practice has a relationship with operational performance. The formulated hypothesis read:

*H<sub>3</sub>: Green procurement practice positively influences operational performance.*

The result showed that green procurement practice had a significant positive effect on operational performance (OP) ( $\beta = 0.479$ ;  $t = 5.127$ ;  $p < 0.05$ ). This is because, the t-stats of 5.124 was  $> 1.96$ . As such, the direction of the result was in line with the hypothesis that green procurement practice positively influences operational performance (OP), hence, the hypothesis was supported. This implies that an increase in GPP will cause a change in firm Performance and also manufacturing firms that are environmentally friendly and encourages the use of sustainable transport options to reduce the environmental impact such as carbon monoxide on society among others will be able to increase their performance.

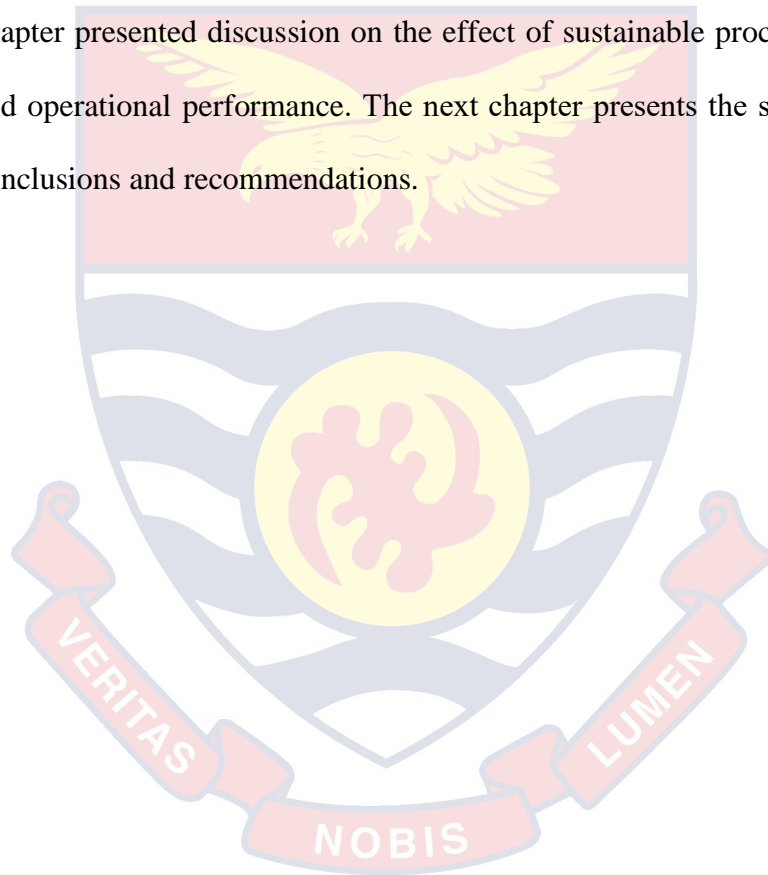
The finding is similar to findings of Nderitu and Ngugi (2014), who found that performance of manufacturing industry, is positively influenced by green procurement practice. Similarly, Chin, Tat and Sulaiman (2015) concluded that there is a positive relationship between green supply chain management (GSCM) which includes green procurement and sustainability performance. Even though the study agreed to the fact that, there has always been a positive relationship between GSCM and sustainability performance, it found that there are some issues such as involving collaboration with suppliers in designing green products and also adopting environmental practices into processes yet to be researched fully.

Additionally, Pembere (2016) also concluded that green procurement practices enhance supply chain performance. The improved performance was reflected through improved customer service, minimized ordering cost, and reduced inventory stock. Sarhaye and Marendi (2017) also found that there is a positive relationship between reverse logistics and organisational performance.

All the aforementioned studies point to the importance of sustainable procurement to firm performance along the supply chain.

### **Chapter Summary**

This chapter presented the results and discussion of the study's data in relation to the objectives. The chapter also presented the demographic features of the respondents (procurement staffs of manufacturing firms). Specifically, the chapter presented discussion on the effect of sustainable procurement practice and operational performance. The next chapter presents the study's summary, conclusions and recommendations.



## CHAPTER FIVE

### SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

#### Introduction

The concluding chapter of this study presents the summary of the study's objectives, methodology as well as data analysis techniques. The summary of key findings relating to each objective, conclusions drawn from the findings, recommendations for policy consideration and suggestions for further research.

#### Summary

Based on extensive literature with conceptual arguments with regards to the importance of sustainable procurement to operational performance, the study's aim was to examine the effect of identified sustainable procurement practices on the operational performance of manufacturing firms within selected metropolis in Ghana. Specifically, the study sought to examine the effects of supplier involvement, ethical procurement practices and green procurement practices on operational performance.

Three hypotheses were formulated based on the stated objectives and tested. The partial least squares structural equation modelling (PLS-SEM) was the main statistical technique for testing the hypotheses adopted by the study. The sample procedure adopted by the study was the simple random technique which took into account 248 respondents out of 704 population. A self-structured questionnaire was used as the primary data collection instrument. It was developed after extensive review of literature on the key variables of study.

The data was processed using IBM SPSS Statistics version 24 software. The significance of the study was tested at an alpha level of 0.05. Major findings of the related specific objectives and hypothesis under study have been summarized below.

The first specific objective of the study was to examine the effect of supplier involvement and operational performance. The findings of the study show that supplier involvement had a positive and significant effect on operational performance ( $R^2 = .065$ ;  $p < 0.05$ ). Findings of the study are consistent with other existing literature that when manufacturing firms involve suppliers directly during planning and forecast decision making it enhances the overall performance of the firms. Hence, supplier involvement plays an important role on the performance of manufacturing firms. In relation to the second objective, the study also examined the effect of ethical procurement practice on operational performance. The findings of the study revealed that ethical procurement practice positively influence operational performance ( $R^2 = .443$ ;  $p < 0.05$ ). This implies that, for every business firm to thrive on the market, ethical issues must be put into serious consideration.

The effect of green procurement practice on operational performance as a third specific objective was equally examined. The study found that, green procurement practice has a positive effect on operational performance of the manufacturing firms ( $R^2 = 0.530$ ;  $p < 0.05$ ). This is because the more firms deal with suppliers that provide raw materials which are environmentally friendly and sustainable, they increase their performance. Green procurement practice which had the higher effect among the independent variables, plays a vital role



in the growth of firms hence firms must pay more attention to it whiles supplier involvement recorded the least effect among them.

The overall effect of supplier involvement, ethical procurement practice and green procurement practice on operational performance was also examined. The findings indicate that supplier involvement, ethical procurement practice and green procurement practice collectively predict the level of performance of manufacturing firms significantly ( $R^2 = .555$ ;  $p < 0.05$ ). This means that sustainable procurement practice accounted for 55.5% of the variation in operational performance.

### **Conclusions**

The aim of the study was to investigate the effect of sustainable procurement practice on operational performance of manufacturing firms in selected metropolis in Ghana. Three specific objectives were therefore set to help investigate the issue. The findings of the first objective leads to conclude that, manufacturing firms in the selected metropolis will increase their performance when they collaborate well with their supplier by involving them directly in planning and forecasting decisions and also by establishing contracts with suppliers who are sustainability certified. This finding is consistence with existing literature which also finds supplier involvement to positively influence performance.

With regards to the second research objective, the study concludes that, ethical procurement practice also positively influences operational performance. As such, implementing and constantly following ethical codes and governmental regulations and laws concerning operations will increase firm performance of



manufacturing firms in Ghana. Also, this result supports previous empirical studies that indicate that, firms that carry out their daily procurement activities in compliance with established ethical codes enhance the growth of the company thereby increasing its performance.

Finally, some existing studies have argued that, green procurement practice has a positive significant effect on manufacturing firms. These assertions supported the study's finding which indicated a positive effect of green procurement practice on performance. Based on this result, the study concludes that, green procurement practices provide positive influence on operational performance in Ghana.

In summary, it is worthwhile to conclude that sustainable procurement practices and operational performance has a positive relationship. The study established that, though supplier involvement significantly influences performance, it recorded the lowest among the research variables (green procurement practice and ethical procurement practice). This implies that, the manufacturing firm under study are yet to realize fully the benefit sustainable procurement can give them if they engage suppliers in their decision making.

### **Recommendations**

On the strength of the research findings and conclusions made, the following recommendations are hereby made. The study recommends that, since sustainable procurement has a positive effect on performance, Ghanaian manufacturing firms should start to view sustainable procurement as strategic in value, given the fact that it will not only change the future of the firm or organisation but will also impact the environment and society at large.

Also, since sustainability has become a global and national issue with the compelling research evidence showing positive relationship between firm sustainable procurement and performance, manufacturing firms at large are encouraged to integrate sustainable procurement practices in their operations to help attain some degree of competitiveness and also to achieve their social and environmental obligations. Also, in view of the fact that sustainable procurement practices have received much national and international acceptance, it will be very useful for Ghanaian firms to adopt same so that they will gain acceptance and properly fit into global and international markets.

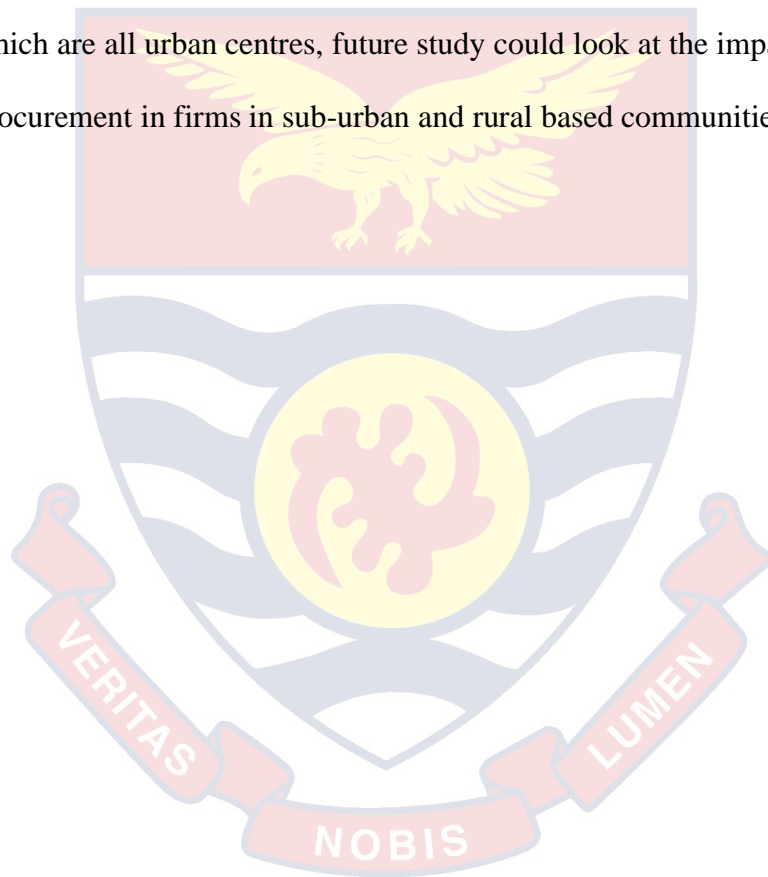
As shown in the study, sustainable procurement severally helps to promote regulatory compliance and sustainable environment. This has good overall effect on national development as it helps the government to realise key milestones in the sustainable development goals. It's therefore recommended that government promote sustainable procurement as part of national policy and encourage firms to integrate same in their practices since research evidence has suggested that it will benefit them as well.

### **Suggestions for Further Research**

Although the study provides useful insight into sustainable procurement practice in the context of manufacturing firms, the study did not exhaust all component of sustainable procurement especially contemporary ones namely; e procurement, corporate social responsibility (CSR) etc., its therefore suggested that future research should focus on these components. Furthermore, future studies can though the study shows that the three independent variables have a significant relationship with operational performance, it fails to go beyond what

will cause firms to behave ethically or adopt any of these practices in the procurement. Thus, future studies can focus on doing an in-depth study on the drivers and barriers to adopting green procurement, supplier involvement and ethical procurement, so as to make recommendations for policy making.

Specifically, a future study may look at “Green procurement, Supplier involvement and Ethical procurement: Drivers and barriers in Ghana”. Also, the study was limited to a few metropolises in Accra, Tema, Takoradi and Kumasi, which are all urban centres, future study could look at the impact of sustainable procurement in firms in sub-urban and rural based communities.



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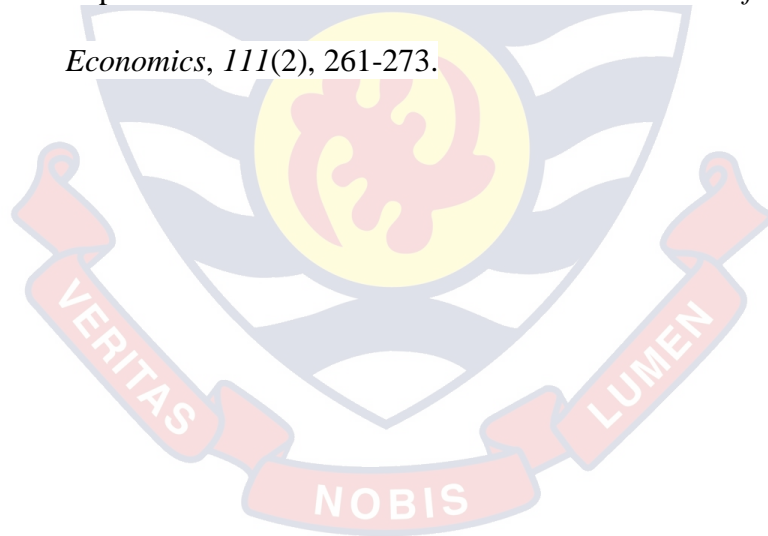
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## APPENDICES

### Appendix A

#### QUESTIONNAIRE ON SUSTAINABLE PROCUREMENT PRACTICES AND OPERATIONAL PERFORMANCE

Dear Sir/Madam,

I am a Master of Commerce student from the Department of Marketing and Supply chain Management, UCC. I am carrying out my Thesis work on the topic “**Sustainable Procurement Practices and Firm Performance**”. Your views are very much important to the study. Any information provided would remain highly confidential. Thanks for accepting to participate in the study.

*Kindly tick in the appropriate box*

#### SECTION B: SUPPLIER INVOLVEMENT

Please indicate your level of agreement to each of the following statements. On a scale of 1 – 5, **With 1 – Strongly disagree, 2 – Disagree, 3 – Neutral, 4 – Agree and 5 - Strongly Agree**

	Statements	1	2	3	4	5
1	My firm collaborates with its suppliers to develop policies, processes and products which are environmentally friendly.					
2	My firm ensures direct involvement of suppliers during planning and forecasting decisions					
3	My firm ensures complete exchange of information with its suppliers to improve sustainable practices					
4	My firm trains its key suppliers on its core values and rules of conduct					
5	My firm establishes contracts with only suppliers who are sustainability certified and compliant					
6	My firm ensures effective dialogue and feedback with suppliers					
7	My firm ensures that its suppliers eliminate or reduce the use of harmful substances during storage and transportation of raw materials					
8	My firm has developed a sustainable policy with the suppliers					



9	My firm monitors and evaluate the activities of their suppliers to ensure that they adhere to the required sustainability policies					
10	My firm has established a reward and punishment mechanisms for suppliers who do not adhere to sustainable standards or practice					

**SECTION C: ETHICAL PROCUREMENT PRACTICES**

Please indicate your level of agreement to each of the following statements. On a scale of 1 – 5, **With 1 – Strongly disagree, 2 – Disagree, 3 – Neutral, 4 – Agree and 5 - Strongly Agree**

	Statements	1	2	3	4	5
1	My firm ensures that sustainable standards are met in every order					
2	All procurement transactions and processes are subjected to scrutiny or proper checks in my firm					
3	My firm adheres to all environmental and social standards during production and transportation of its products to customers					
4	My firm has implemented and constantly follows the safety aspects and governmental laws concerning their operations					
5	When purchases become competitive, awards go to the lowest responsive and responsible bidder in my firm					
6	All staff are held accountable for their procurement activities in my firm					
7	My firm has established ethical codes of conduct which guide the activities of their employees and suppliers					
8	My firm carries out its daily activities under due diligence to ensure sustainable practices					
9	My firm has established a unit/department which handles all ethical issues					
10	My firm ensures that its staff act without considering personal gains					

**SECTION D: GREEN PROCUREMENT PRACTICE**

Please indicate your level of agreement to each of the following statements. On a scale of 1 – 5, **With 1 – Strongly disagree, 2 – Disagree, 3 – Neutral, 4 – Agree and 5 - Strongly Agree**

	Statements	1	2	3	4	5
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1	My firm purchases only raw materials which are environmentally friendly					
2	My firm emphasizes on environmentally friendly products during its product design stage					
3	My firm is ensuring decreased consumption of harmful/toxic materials during production					
4	My firm has observed decreased liquid and solid waste generations in its production processes					
5	My firm deals with suppliers who provide sustainable materials					
6	My firm encourages the use of sustainable transport options to reduce the environmental impact such as carbon monoxide on society					
7	My firm ensures efficient utilization of energy					
8	My firm has developed a waste reduction plan to help us become environmentally responsible					
9	My firm uses renewable raw materials for packaging its products					
10	My firm is innovating more environmentally friendly products and processes in recent years					

### SECTION E: OPERATIONAL PERFORMANCE

Please indicate your level of agreement to each of the following statements. On a scale of 1 – 5, **With 1 – Strongly disagree, 2 – Disagree, 3 – Neutral, 4 – Agree and 5 - Strongly Agree**

	Statements	1	2	3	4	5
1	My firm's sustainable practices ensure that our products meet various environmental conditions (endurance to physical and weather conditions)					
2	My firm's cost of materials purchased per year has been decreasing over the last years due to greener purchasing					
3	The firm's sustainable practices ensure that information and materials move rapidly within the firm's operations					
4	The implementation of sustainable practices ensure minimisation of inventory wastages					
5	The firm's sustainable practices ensure that its production capacities can be quickly adjusted within the shortest time periods to meet current demands					

6	My firm's sustainable practices ensure that its final products meet various environmental conditions					
7	My firm has a sustainable transport system which ensures that production and customer deliveries are made on schedule					
8	My firm's sustainable practices ensure that our production capacities can be quickly adjusted within the shortest time periods to meet current demands					
9	My firm's sustainable practice ensures that the needed information and materials move rapidly within the firm's operations					
10	My firm's sustainable practices ensure that its products consistently conform to customers' requirements (quality, quantity)					

**SECTION F: FIRM SIZE**

Please indicate your level of agreement to each of the following statements. On a scale of 1 – 5, **With 1 – Strongly disagree, 2 – Disagree, 3 – Neutral, 4 – Agree and 5 - Strongly Agree**

	<b>Statements</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
1	The firm's management has the required experience to manage sustainable related issues					
2	The firm has needed resources to handle its sustainability issue					
3	The firm has adequate policies to manage sustainable - related issues					
4	The firm has sufficient number of employees to handle issues related to its sustainable procurement					
5	The firm's total assets are enough to handle sustainability issues					

**THANK YOU FOR YOUR PARTICIPATION**

## Appendix B

### CODING

#### SUPPLIER INVOLVEMENT

ITEMS	Statements
SI1	My firm collaborates with its suppliers to develop policies, processes and products which are environmentally friendly.
SI2	My firm ensures direct involvement of suppliers during planning and forecasting decisions
SI3	My firm ensures complete exchange of information with its suppliers to improve sustainable practices
SI4	My firm trains its key suppliers on its core values and rules of conduct
SI5	My firm establishes contracts with only suppliers who are sustainability certified and compliant
SI6	My firm ensures effective dialogue and feedback with suppliers
SI7	My firm ensures that its suppliers eliminate or reduce the use of harmful substances during storage and transportation of raw materials
SI8	My firm has developed a sustainable policy with the suppliers
SI9	My firm monitors and evaluate the activities of their suppliers to ensure that they adhere to the required sustainability policies
SI10	My firm has established a reward and punishment mechanisms for suppliers who do not adhere to sustainable standards or practice

#### ETHICAL PROCUREMENT PRACTICES

	Statements
EPP1	My firm ensures that sustainable standards are met in every order
EPP2	All procurement transactions and processes are subjected to scrutiny or proper checks in my firm
EPP3	My firm adheres to all environmental and social standards during production and transportation of its products to customers

EPP4	My firm has implemented and constantly follows the safety aspects and governmental laws concerning their operations
EPP5	When purchases become competitive, awards go to the lowest responsive and responsible bidder in my firm
EPP6	All staff are held accountable for their procurement activities in my firm
EPP7	My firm has established ethical codes of conduct which guide the activities of their employees and suppliers
EPP8	My firm carries out its daily activities under due diligence to ensure sustainable practices
EPP9	My firm has established a unit/department which handles all ethical issues
EPP10	My firm ensures that its staff act without considering personal gains

### GREEN PROCUREMENT PRACTICE

	Statements
GPP1	My firm purchases only raw materials which are environmentally friendly
GPP2	My firm emphasizes on environmentally friendly products during its product design stage
GPP3	My firm is ensuring decreased consumption of harmful/toxic materials during production
GPP4	My firm has observed decreased liquid and solid waste generations in its production processes
GPP5	My firm deals with suppliers who provide sustainable materials
GPP6	My firm encourages the use of sustainable transport options to reduce the environmental impact such as carbon monoxide on society
GPP7	My firm ensures efficient utilization of energy
GPP8	My firm has developed a waste reduction plan to help us become environmentally responsible
GPP9	My firm uses renewable raw materials for packaging its products
GPP10	My firm is innovating more environmentally friendly products and processes in recent years

### OPERATIONAL PERFORMANCE

	Statements
OP1	My firm's sustainable practices ensure that our products meet various environmental conditions (endurance to physical and weather conditions)
OP2	My firm's cost of materials purchased per year has been decreasing over the last years due to greener purchasing

OP3	The firm's sustainable practices ensure that information and materials move rapidly within the firm's operations
OP4	The implementation of sustainable practices ensures minimisation of inventory wastages
OP5	The firm's sustainable practices ensure that its production capacities can be quickly adjusted within the shortest time periods to meet current demands
OP6	My firm's sustainable practices ensure that its final products meet various environmental conditions
OP7	My firm has a sustainable transport system which ensures that production and customer deliveries are made on schedule
OP8	My firm's sustainable practices ensure that our production capacities can be quickly adjusted within the shortest time periods to meet current demands
OP9	My firm's sustainable practice ensures that the needed information and materials move rapidly within the firm's operations
OP10	My firm's sustainable practices ensure that its products consistently conform to customers' requirements (quality, quantity)

#### FIRM SIZE

	Statements
FS1	The firm's management has the required experience to manage sustainable related issues
FS2	The firm has needed resources to handle its sustainability issue
FS3	The firm has adequate policies to manage sustainable - related issues
FS4	The firm has sufficient number of employees to handle issues related to its sustainable procurement
FS5	The firm's total assets are enough to handle sustainability issues



### Appendix D

Cohen's table for determining sample size in PLS-SEM

Sample size recommendation in PLS-SEM												
Maximum number of arrows pointing at a construct	Significant level											
	1%				5%				10%			
	Minimum R <sup>2</sup>				Minimum R <sup>2</sup>				Minimum R <sup>2</sup>			
	0.1	0.2	0.5	0.75	0.1	0.2	0.5	0.75	0.1	0.2	0.5	0.75
2	158	75	47	38	110	52	33	26	88	41	26	21
3	176	84	53	42	124	59	38	30	100	48	30	25
4	191	91	58	46	137	65	42	33	111	53	34	27
5	205	98	62	50	147	70	45	36	120	58	37	30
6	217	103	66	53	157	75	48	39	128	62	40	32
7	228	109	69	56	166	80	51	41	136	66	42	35
8	238	114	73	59	174	84	54	44	143	69	45	37
9	247	119	76	62	181	88	57	46	150	73	47	39
10	256	123	79	64	189	91	59	48	156	76	49	41

Source: Cohen, 1988