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GREEN SUPPLY CHAIN MANAGEMENT AND GREEN PERFORMANCE; THE MODERATING EFFECT OF RADICAL GREEN STRATEGY

BY

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DECLARATION

I hereby declare that this thesis is the result of my original work towards the MSc in Procurement and Management and that, to the best of my knowledge, it neither contains materials published by another person, nor materials which have been accepted for the award of any other degree of the University, except where due acknowledgements have been made in the text.

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ABSTRACT

This study examines the deployment of green supply chain management (GSCM) practices and its effect on green performance in Ghana, an emerging economy. The main problem of the study emanates the fact that extant studies only consider the relationships among GSCM practices within the context of organisational or business strategy but have not been much explored in the Sub-Saharan context and their effect on green performance. The main purpose of the study was to test the direct path from green supply chain management practices to green performance and then the moderating effect of radical green strategy on the relationship. Using simple

random and convenience sampling techniques to select a sample of 100 respondents who were staff and management of selected firms in the Western region, questionnaire was administered to them as them data gathering instrument. The findings revealed that the firms employ green supply chain management practices in their operations. It further revealed that out of the four independent variables (green purchasing, ecological design, green production and reverse logistics), only ecological design and reverse logistics had positive and significant effects on green performance Also, radical green strategy is to a large extent achieved by firms in the Western region. Even though radical green strategy has an impact on green performance, it does not moderate the relationship between green supply chain management practices and green performance. Therefore, it can be concluded that radical green strategy does not moderate green supply chain management practices to impact on green performance. As such, it implies that firms should focus on been innovativeness in purchasing products that are environmentally friendly, adopt reverse logistics practices in their operations as well as management thoughts should be green-orientation so as to contribute the firm's green performance.

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LIST OF ABBREVIATIONS

CSCMP	Council of Supply Chain Management Professional
EU	European Union
GSCM	Green Supply Chain Management
NGO	Non-Governmental Organisation
RBV	Resource-Based View Theory
SCM	Supply Chain Management
SCOR	supply chain operations reference model
SPSS	Statistical Package for Social Sciences
TCE	Transaction Cost Economic
TQEM	Total Quality Environmental Management

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DEDICATION

I dedicate this thesis to my Uncle Mr. John Kwaku Boadi, God bless you.

NYANSAPO WO SANE NO BADWENMA

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CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

The concept of supply chain management has gained massive attention in research for the past two decades; however, keen interest in green supply chain management or sustainable supply chain management research and had only come more into the fore in the last decade (Mitra and Datta, 2014). Since, then sustainability and green environment issues have emerged and become key competitive priorities for organisations aside cost, quality, delivery, flexibility and innovation which are indicators of operational performance of organisations (Krause et al., 2009).

The interest in green supply chain management is mirrored in the increasing interest in the environment and climate change and the efforts by governments and businesses across the world to minimise their impact to the organisation (Laosirihongthong et al., 2013). Again, Sarkis (2012) argued that the integration of environmental issues and supply chain management (SCM) has become a thriving past two decades.

Hollos et al. (2012) with reference to the resource-based view (RBV) indicated that sustainability is one of the valuable, rare, inimitable and non-substitutable resource that may come as a competitive advantage to firms. As such, incorporating green concepts and sustainable supply chain management practices not only help organisations to gain competitive advantage but also build systems which are difficult to imitate, and been able to explore new markets and opportunities to would add to their advantage (Flint and Golicic, 2009; Hazen et al., 2011; Narasimhan and Schoenherr, 2012; Schoenherr, 2012).

There has been little doubt in a firm's commitment towards green supply chain management practices that lead to its performance improvement as extant literature rarely explains which particular environment practices or strategies are more effective in improving a firm's performance (Choi et al., 2017). This dilemma necessitated an investigation which Zhu and Sarkis (2004) delved into the potential relationship between the adoption of green supply chain management (GSCM) practices and on a firm's operating performance. Focusing on Chinese manufacturers, the study of Zhu and Sarkis (2004) revealed that firms having higher levels (or more mature) stage of GSCM practices tend to reap economic benefits in terms of operational cost savings such as decrease in environmental compliance cost while increasing other operating costs (including cost of purchasing environmental-friendly materials).

In spite of the increasing popularity of the concept of green supply chain management (GSCM) in advanced countries, there are still several areas which require further research especially the aspect of greening the supply chain as identified as a key issue of sustainable supply chain management (Large and Thomsen, 2011; Kenneth et al., 2012). However, most studies of these nature are conducted in developed countries, but there have been little studies of GSCM in developing and emerging economies such as Ghana.

To the best of the researcher's knowledge, there has been little study on GSCM practices in Ghana so far. As such, this study is set to conduct a survey to assess the extent of adoption of green supply chain management practices in Ghanaian businesses and explore the causal relationships between GSCM practices and firm performance. Though there has been much studies in this area in extant literature, the effect of GSCM practices on firm performance has not been conclusive (Pagell et al., 2004; Cegielski and Hanna, 2011; Green et al., 2012; Zhu et

al., 2012). It is expected that this study finds a positive relationship between GSCM practices and firm performance, which would be a motivating factor for Ghanaian firms to more proactively adopt environmentally sustainable or green practices. As such, the key objectives of this study include the following – (a) to examine the relationship between GSCM practices and green performance among firms in Ghana and (b) to examine the moderating effect on radical green strategy on the relationship between green supply chain management practices and green performance.

1.2 Problem Statement

Over the last decade, the planet earth has been bedevilled wit harsh and cycle of unprecedented heat waves, droughts, floods, wildfire, global warming (Choi et al., 2017) with Ghana not excluded from these conditions. The rapid rise in carbon dioxide emitted into the atmosphere and its adverse effects is attributed to human activities including use of vehicles, waste disposal, product manufacturing and energy creation among others (Choi et al., 2017).

To deal with this menace, there have series of attempts made to examine the impact of environmental (environmental-friendly) management on firm performance, growth and return on investment (Green et al., 2012; Zhu et al., 2012). There has been a number of studies including Claver et al. (2007), Yang et al. (2011), Schrettle et al. (2014) and Lannelongue et al. (2015) which have all ascertained the link between green supply chain management (GSCM) practices and firm performance with varied findings. This study rather seeks identify some GSCM practices including green purchasing, ecological design, green production and reverse

logistics and explore their extent of usage among firms in Ghana and their effect on performance.

As such, this study examines the deployment of green supply chain management (GSCM) practices and its effect on green performance in Ghana, an emerging economy. The main problem of the study emanates from two folds. First, although there are several studies that examine GSCM practices and firm performance (Eltayeb et al., 2011; Lee et al., 2012), most of these studies only consider the relationships within the context of organisational or business strategy. For instance, Testa and Iraldo (2010) iterated the need to consider the impact of business strategy in the implementation of GSCM initiatives. Secondly, extant studies examined the outcomes of GSCM initiatives within the context of tangible measures such as environmental, operational and economic performance (Zhu et al., 2005; Green et al., 2012; De Giovanni and Esposito Vinzi, 2012). However, there seems to be limited studies on intangible outcomes such organisational image, goodwill, among others (Eltayeb et al., 2011).

Therefore, this study attempts to identify different green supply chain management practices including green purchasing, ecological design, green production and reverse logistics which have not been much explored in the Sub-Saharan context and their effect on green performance and the moderating effect of radical green strategy.

1.3 Objectives of the Study

The study has a general objective of examining the effect of green supply chain management practices on green performance by focusing on the moderating role of radical green strategy among firms in Ghana. However, the specific objectives are as follows;

1. To examine the relationship between green supply chain management practices and green performance among firms in Ghana.

2. To examine the moderating role of radical green strategy in the relationship between green supply chain management and green performance among firms in Ghana.

1.4 Research Questions

1. What is the relationship between green supply chain management practices and green performance among firms in Ghana?

2. What is the moderating role of radical green strategy in the relationship between green supply chain management and green performance among firms in Ghana?

1.5 Significance of the Study

A study on effect of green supply chain management on green performance is relevant as it would provide the needed information for policy makers of business organisations in the country about how environmental-friendly supply chain management practices would influence on their green performance. The findings would contribute immensely for different stakeholders of the business arena in Ghana.

Secondly, the significance of the study is to fill the gap in literature in Ghana and other developing countries by providing an insight to other researchers for extensive investigation of the field to delve into green supply chain management practices and how it influences green performance.

This study is also significant because the issues that it could address are expected to bring about massive contribution to efforts directed towards supply chain management practices at both organisational, economy and environment as a whole.

Finally, the study would bring to light critical information and academic breakthrough that would fill the gap in literature in Sub Saharan Africa as far as the subject matter is concerned. The study would be of great advantage to different stakeholders along an organisation's supply chain and also to academia as a whole. The study would be beneficial to these players and also contribute to current literature in the area of green supply chain management and supply chain management as a whole.

1.6 Overview of Methodology

The study adopted the explanatory survey research designs and a quantitative research approach in an attempt to measure the moderating effect of radical green strategy in the relationship between green supply chain management practices and green performance. Since quantitative research seeks to measure a particular phenomenon, a conceptual framework that depicts the relationships which this study seeks to measure and test was developed. Green supply chain management practices are the independent variables of the study whereas green performance is the dependent variable with radical green strategy as the moderating variable. The conceptual model was tested in quantitative survey using questionnaire to collect data and test the relationships. The questionnaire items were adopted from the extant studies to measure all variables. The data gathered were analysed quantitatively with the aid of relevant statistical tools such as frequency tables, measures of location and dispersion. Simple linear regression

was adopted to test the relationships among the variables. Finally, the data were interpreted and summarized in order to draw conclusions and suggest some useful recommendations.

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1.7 Scope of the Study

This study is limited to assessing the effect of green supply chain management on green performance. The study was focused on firm-level. Some of the organisations selected include educational sector, health sector, financial institutions, legal and revenue and local government in Ghana. However, because of limited resources and time constraints with respect to the researcher, only selected firms in the Western region were contacted and used for this study.

1.8 Limitations of the Study

With every research, there are some limitations that are subjected with the current study been no exception. The main limitation of this study is the extent of coverage of this study. As it has been specified in the scope of the study, the study did not cover the entire country as the researcher was constrained with time and financial ability. As a result, the study was limited to firms in the Western region in Ghana. Since the unit of analysis was top executives of the selected firms, there were instances where some of the respondents showed apathy to filling the questionnaires administered to them. There were also instances of unfilled spaces in the questionnaire returned to the researcher. However, these limitations did not affect the research quality in terms of validity and reliability.

1.9 Organization of the Study

This research work is organized into five (5) chapters. These are briefly described below:

Chapter One: This chapter covers the introduction, background of the study, and statement of the problem, objectives of the study, research questions, significance of the study, overview of methodology, scope of the study, limitations of the study and the organization of the study.

Chapter Two: The chapter two also contains the theoretical framework and literature review of the research. Thorough research concerning this study will be made through reading books that relate to this research; extracts from other related long essays, magazines, journals, the internet, and other relevant sources.

Chapter Three: The Methodology used in this research is presented under this chapter. The Methodology will concern the research design, population, sample size, sampling method, research instrument, analysis tools used and the profile of the organization. Questionnaires will be developed and sent to respondents in the organization to seek their view.

Chapter Four: This chapter discusses the data analysis and the research findings which will be a conclusive outcome of the findings. The questionnaires administered to the respondents will be critically discussed and analyzed.

Chapter Five: Chapter five is the concluding part of the study where the whole findings of the study will be summarized; make recommendations and drawn conclusion.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter contains the review of related literature. The literature reviewed provides information about previous studies on the topic and helps to compare the findings of this research with existing ones. Major literature reviewed includes the concept of supply chain, supply chain management, green supply chain management, green performance, relationship between green supply chain management, green performance, theoretical review as well as empirical review. It finally ends with the theoretical framework for the study.

2.2 Conceptual Review

2.2.1 The Concept of Supply Chain Management

The concept of supply chain management (SCM) became known in business operations in the early 1990s. Before its recognition, the term “logistics” and “operations management” were popularly used and still some studies use the term SCM and Logistics Management interchangeably.

Chopra and Meindl (2007) define SC as the various direct and indirect stages involved in the process of meeting the requirement of customers. They argue that SC encompasses a number of elements including production, supplies, warehouse, transport, retails and customers. Peck (2005) defines SC as the network of organizations, which works by means of upstream and downstream linkages throughout the processes of the organizational activities and results in the creation of value for the customers. According to Peck (2005), SCM is aimed at enhancing the

competitiveness of companies and is achieved through the integration of both the internal and the external functions of companies. Hence, SCM is based on collaboration, trust, information and technology sharing and partnerships between the internal activities and that of the external activities of a company.

Otchere et al. (2013) adopted the definition by the Council of Supply Chain Management Professional (CSCMP) and defined SCM as a concept that integrates key business processes which involve the final consumer of a good or service, via authentic suppliers that provide product, services and information which provide value for customers and stakeholders. Otchere et al. (2013a) postulate that the main aim of SCM is to effectively improve the business processes of companies via effective coordination of the company's activities down the SC so that competitive advantages would be attained.

Mentzer et al. (2001) also describe SCM as a system, which strategically coordinates the traditional business function in an enterprise as well as the business function strategies within a company and across businesses down the SC which is aimed at boosting the overall longterm operation of the enterprise. The existence of SC in every organization is aimed at improving efficiency, and this is realized through the coordination of the SC within the main business functions within the organization.

2.2.2 Green Supply Chain Management

Green supply chain management (GSCM) is defined as same as supply chain management by just adding the element of green in the definition. There has been a lot of work in recent years in this field. Authors and researchers have been busy tracking the roots for the need of green

supply chain management. Srivastava (2007) provides a state-of-the-art literature review on green supply chain management. Srivastava (2007) uses current literature and concepts and bring it down to a single document to provide the findings and focus of work done by different authors in preceding years. Similarly, Porter and Linde (1995) brings the literature regarding rudimentary concepts of green supply chain management.

Similarly, Kumar and Chandrakar (2012) talks about the application of green supply chain management and argues about the waste and emission produced by the companies. Further, Kumar et al. (2012) talks about sustainability in green supply chain management and introduces a simple model to help understand the reader for improvement in supply chain sustainability. Then Bhattacharjee (2015) explains the differences between the conventional supply chain management and green supply chain management in addition to the necessity of green supply chain management in the modern era.

Businesses will likely need to put plans in place to lessen the negative effects that their products and services have on the environment, the economy, and society as a result of rising pressure for green supply chain management (Sannes, 2008). If the green supply chain system is successfully addressed, new chances for competitiveness and new approaches to enhancing the value of core business initiatives may arise (Ngugi & Nderitu, 2014). Influence from the use of green supplies can be seen throughout a product's life cycle. As a result, GSCM has become a crucial new model for businesses seeking to accomplish profit and market share goals by reducing their environmental, economic, and social risks and influences while increasing their ecological efficiency (Erasmus & van Hock, 2000). Most people believe that green supply chain management helps to improve environmental performance, reduce waste, and create cost

savings by encouraging efficiency and synergy between business partners and their lead firms. According to Li (2011), this synergy is anticipated to improve the company's reputation, competitive edge, and marketing exposure. From a global perspective, the concept of "green supply chain management (GSCM)" and worldwide environmental challenges have made supply chain management a viable field in achieving sustainability with the globalization of economies. One contemporary and innovative managerial notion has been the idea of supply chain environmental management. It is challenging to accurately identify contradicting and contrasting themes that could be termed genuine "debates" because this topic is so novel. Sarkis, 2005, in fact, offers a thorough overview of the state of study on this developing subject by tracing the work of academics who have looked into the problems with, the justifications for embracing these techniques, as well as how they have been applied in various companies.

Production, distribution, and reverse logistics should all be included in the supply chain system, according to Sarkis (2005). This demonstrates how companies prioritize total quality management (TQM), with its emphasis on raising product quality, achieving defect-free products, increasing customer satisfaction, providing employees with training opportunities, etc., and integrate it with environmental management to produce total quality environmental management (TQEM) (Sharfman, 2009). Researchers have characterized green supply chains from various angles, motivating factors, and objectives.

The supply chain is referred to by Sarkis (1999) as a system that involves procurement, manufacture, distribution, and reverse logistics. According to a recent definition (Handfield and Nichols, 1999), The flow and transformation of goods from raw materials (extraction) through the ultimate consumer, as well as related information flows, are all included in the supply chain.

In each of the key supply chain phases, numerous writers are looking into environmental initiatives (Muma et al., 2014). In this study, green supply chain management is divided into four phrases: green purchasing, green production, ecological design and reverse logistics.

2.2.3 Importance and need for Green Supply Chain Management

acid rain in the present century. Kumar and Chandrakar (2012) argues that the main source of these problems is waste and emission that is caused by supply chain management. There has been a call for green practices and policies to take into action. In the 21st century, one of the challenges for logistics management is the concern of supply chain management and making greener. To begin with, the main concern to be addressed is the way of delivering environmental awareness in the logistics activities of the supply chain management (Kumar and Chandrakar, 2012).

Srivastava (2007) argues that green supply chain management has gained popularity amongst the companies and researchers in the field of supply chain management. This is reflected by the implementation of environmental management practices by the companies such as ISO14001. This acts as a subliminal message that the companies have been putting the efforts to minimize the environmental issues. Srivastava (2007) also argues that the driving force behind the implementation of these practices and increased aware- ness of green supply chain management is the fact that environment is deteriorating over a period of time. This includes shrinking of resources i.e. raw material and surge in pollution and waste sites.

2.2.4 Green Supply Chain Management practices

The main independent variable for this study was green supply chain management practices and it was necessary to conduct empirical review on key GSCM practices identified for this study. Empirical literature reviews studies previously carried out on the dependent variables as well as the independent variable (Kumar, 2005). In this study, empirical literature will cover ecological design, reverse logistics, green production and green purchasing.

2.2.4.1 Green Purchasing

The first green purchasing initiatives emerged in the public organizations in 1980s, 1990s, (Erdmenger et al., 2008) and today in EU, a survey has estimated up to 85% public respondents that involve environmental consideration into their procurement process (Ochoa and Erdmenger, 2008). Private organizations are less responsive to the environmental issues, except those influenced by stakeholders, NGOs and government (Min and Galle, 2007). Moreover; the firms that have serious engagement with the environmental regulations are more likely to adopt green supplier selection. However, green criteria are rarely incorporated in purchasing decisions, unless there are clearly defined benefits for the buyer or there are strict governmental regulations (Porter and Van der Linde, 2008).

Barber (2010) asserts that although consumers may identify as "Green," it is unclear if they will actually choose products that appear to be environmentally friendly, particularly when quality is the deciding factor. Firms should be made aware of the need to manage and supply their output sustainably as a result of this.

2.2.4.2 Ecological Design

'Green' Design or eco-design, which is also sometimes referred to as "design for the environment," entails creating products with lower energy and material consumption rates, as well as with higher rates of reuse, recycling, and component recovery (Aital and Vijai, 2016). Wanyoike and Lagat (2015) continue. Purchasing eco materials is the first step in producing green products within a supply chain since ecological design is defined as "any form of design that minimizes environmentally destructive impacts by integrating itself with living processes" (Huang and Keskar, 2007). According to Ingari et al. (2012), ecological design is an integrative, environmentally conscious design field. It aids in tying together dispersed activities in several sectors, such as ecological engineering, sustainable agriculture, green building, and ecological restoration. Ninety sciences were given the "eco" prefix, including eco-management, eco-technique, and eco-cities (Muma et al. 2014). The practice of ecological design was initially described as the "adding in" of environmental considerations to the design process, but later attention was paid to specifics of the discipline, such as product systems, individual products, or the industry as a whole.

2.2.4.3 Green Production

The mechanisms that are in place to make sure that all parties involved in the tea industry abide by the Triple Bottom Line or the three pillars of sustainability, i.e., that social, economic, and ecological issues are satisfied, are the subject of this article (Toke, 2010). It is the use of clean manufacturing techniques that lessen or do away with environmentally hazardous pollutants (Lean et al., 2016). The consequences of techniques used in the production of goods and services can vary, as stated by Mohan and Sahay (2000). The efficiency with which information

is used, the quantity and kind of waste produced, and the environmental effects on biological systems and human health can all vary amongst manufacturing processes. Manufacturers can reduce these effects in a variety of ways, from upgrades that concentrate on specific factors, like the amounts and sources of energy used, to coordinated methodologies, like lean manufacturing strategies, which aim to reduce waste and increase productivity throughout the manufacturing process.

In order to reduce ecological constraints, it is quite helpful to pursue green product development. According to Tan et al. (2002), "green production" refers to a manufacturing strategy that decreases waste and pollution through the use of natural processes throughout the manufacture of goods.

2.2.4.4 Reverse Logistics

According to Muma et al. (2014), all procedures involving the reuse of products and materials are referred to as reverse logistics. It is "the process of moving goods from their usual final destination" in order to capture value or dispose of commodities properly. According to Karen (2006), reverse logistics may also include procedures like remanufacturing and reconditioning. Reverse logistics was defined by Rogers and TibbenLembke (1998) as "the process of planning, implementing, and controlling the efficient and cost-effective flow of raw materials, in-process inventory, finished goods, and related information, from the point of consumption to the point of origin, for the purpose of recapturing value of proper disposal". This definition emphasizes the relationship between economic concerns and the requirement for knowledge.

The relationship between information systems and the outcomes of the deployment of reverse logistics programs was scientifically investigated by Daugherty et al. (2002). Another intriguing definition offered by Carter and Ellram (1998) focused on the environmental component and described it as "the process by which companies can become more environmentally efficient through recycling, reusing, and reducing the amount of materials used". Reverse logistics, as defined by Kroon and Vrijens (2004), "refers to the logistics management skills and activities involved in reducing, managing, and disposing of hazardous or non-hazardous waste from packaging and products". It is becoming increasingly pertinent due to the expansion of green supply chain management concepts and practices (Samir, 2008). The management and sale of extra and returned machinery and equipment from the hardware leasing industry are included in the reverse logistics process. According to Muma et al. (2014), logistics often deals with actions that get the product closer to the client.

2.2.5 Green Performance

Higher profitability can result from greening procurement, which is a key factor in the topic's increased attention over the past 10 years (Theyel et al. 2001; Vachon and Klassen 2006). For instance, (Carter et al. 2000) demonstrates that environmentally conscious purchasing can result in both higher net revenue and reduced costs, hence enhancing business performance. Despite the fact that early green purchasing research primarily focused on goods suppliers, interest has gradually evolved to encompass services (Bjorklund, 2011). Carter and Rogers (2008) created a framework for sustainable supply chains and further defined its connection to firm performance metrics that are relevant to the environment, society, and the economy.

Environmental, operational, and economic performance were examined by Zhu et al. (2005) as elements that influence a firm's performance.

Further, using the supply chain operations reference model (SCOR), which combines commercial and environmental performance, Bai et al. (2012) created sustainable performance measurements for supply networks. Environmental logistics and 'green' supply chain management were taken into consideration when Bjorklund et al. (2012) established a framework for performance monitoring. Digalwar et al. (2013) recently identified the performance indicators for "green" manufacturing adopting firms in Indian manufacturing firms, including top management commitment, knowledge management, employee training, green product and process design, employee empowerment, environmental, health and safety, supplier and materials management, production planning and control, quality, cost, customer environment-mental performance requirement, and customer responsiveness and cooperation. Environmental, operational, and economic performance were examined by Zhu et al. (2005) as elements that influence a firm's performance. With reference to the supply chain operations reference model (SCOR), which combines the performance of the business and the environment, Bai et al. (2012) created sustainable performance measurements for supply chains. Environmental logistics and 'green' supply chain management were taken into consideration when Bjorklund et al. (2012) established a framework for performance monitoring. Digalwar et al. (2013) recently identified the performance indicators for "green" manufacturing adopting firms in Indian manufacturing firms, including top management commitment, knowledge management, employee training, green product and process design, employee empowerment, environmental, health and safety, supplier and materials

management, production planning and control, quality, cost, customer environment-mental performance requirement, and customer responsiveness and co-operation.

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2.3 Theoretical Review

A theory is a hypothesis or a set of ideas that aims to explain something, particularly one that is founded on general principles that are unrelated to the subject of the explanation. Therefore, the theoretical underpinnings of the significance of green supply chain management strategies on organizational performance are presented in this section. Resourcebased view theory, transaction cost economy theory, and supply chain operations reference model theory will serve as the foundation for this study.

2.3.1 Resource-Based View Theory (RBV)

A company's overall methods of expanding production or profit, including its plant, labor force, raw materials, and assets, are referred to as its resources (Clark, 2007). This idea thus provides an explanation for why companies in the same industry consistently perform differently over time. Alternatively, why do some businesses consistently outperform others? Porter (1982), who developed the revolutionary idea of the value chain to explain why some businesses have a competitive advantage over others. When a company emphasizes that a resource must be valued, uncommon, imperfectly imitable, and non-substitutable, RBV contends that internal competencies and resources will produce a competitive advantage (Miles and Covin, 2010).

These resources, which fall under the categories of tangible and intangible resources, can include assets, capabilities, organizational procedures, or information. According to the

theoretical cornerstones, resources that are completely under the control or ownership of the focus organization should be developed to increase their contribution to the company's competitive advantage in its industrial setting (Hoffman and Sandilands, 2005). This theory ties the research variable to the question of whether there is any impact on company performance following the adoption of green production (Li and Geiser, 2009).

In this context, factories that have adopted eco design, which is distinctive in nature, could better positioned than others (Hooley and Greenley, 2005), and answer the question of whether there is a change in firm performance after adoption of Eco-design. A resource is rare if the number of firms in the competitive arena possessing it is less than the number of firms needed to generate perfect competition (Pfeffer, 2003). Competencies describe what a company is good at (Prahalad and Hamel, 1990), whereas core competencies cover what the company excels at (Lawson and Lorenz, 1999). According to the resource-based perspective, resources allocated to non-core activities result in opportunity costs.

This is crucial for green purchasing in the tea industry. According to strong evidence (Bouwer et al., 2006; Brammer and Walker, 2011), the majority of green products, services, and works typically cost more than their non-green counterparts.

2.3.2 Transaction Cost Economic Theory

Originally, Transaction Cost Economic (TCE) theory addresses these questions: Why do businesses exist? Which tactics are most successful for maximizing profits? What should businesses produce? What else should businesses buy? The primary theoretical justification for this idea focuses on the circumstances under which specific traits of the transaction or the

transaction's aim might result in its internal hybrid or external governance (Coase, 2009). It has two important fundamental behavioural assumptions bounded rationality (Nderitu and Ngugi, 2014). What are these two assumptions talking about? Bounded rationality refers to that people have rationality, but limited.

This means that an incomplete contract can only be signed by both parties to a transaction (William, 2008). Opportunism is the term for persons who deceitfully act in an opportunistic manner at the expense of others. Opportunism is thought to be less dangerous within firms than it is in market coordination since it can be stopped both inside firms through the authority principle (hierarchy) and outside firms through stakeholders like clients, suppliers, or shareholders (Muma et al. 2014). The basic argument is that the principal transfers decision rights to the agent. To make sure that the agent behaves as expected the principal sets incentives. The sole existence of firms is to make profit and therefore a firm that embrace sustainable supply chain is better placed over its competition. For example, if the tea factories are able to effectively run the sustainability programme, they are able to enhance performance of the firm in the industry making it profitable. Previous research by scholars in this field for example Sannes (2008), was able to bring out the cost of doing business was affected by how well the firm was able to give to the society and what it was able to take as its raw materials. The more sustainable practices it embraced the more positive synergy it attracts thus good performance which eventually brings profitability (Muma et al., 2014).

2.4 Empirical Review

This section provides a review of works of several authors on the key variables of the study. These are summarised in Table 2.1.

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Table 2.1: Empirical Studies on Green Supply Chain Management Practices and Performance

SN	Author(s)	Country	Title	Main purpose	Construct/Framework	Theory	Methodology	Findings
1.	Mitra and Datta (2013)	India	Adoption of green supply chain management practices and their impact on performance: an exploratory study of Indian manufacturing firms	This paper presents one of the earliest surveys on GSCM practices in Indian manufacturing firms and how they affect corporate performance	Environmentally sustainable purchasing practices Environmentally sustainable manufacturing and logistics practices Firm performance	Empirical Review	Survey of Indian manufacturing firms	Results showed that supplier collaboration for environmental sustainability had a positive impact on environmentally sustainable product design and logistics, which in turn was positively related to competitiveness and economic performance of the firm. We compared the results with the observations made by other researchers for developed and developing countries and provided managerial implications for the government and manufacturers as to what steps need to be taken to generate awareness towards environmental sustainability and facilitate the adoption of GSCM practices among Indian firms to a greater extent.

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2.	Lee et al. (2012)	Rep. of Korea	Green supply chain management and green performance	The purpose of this study is to explore green supply chain management (GSCM) practices and their relationship with green performance. More specifically, this research explores the effect of GSCM efforts and other organizational factors on firm performance of small and medium enterprises (SMEs) that serve as suppliers to large customer firms in the electronics industry	GSCM Practices Business Performance Employee satisfaction, Operational Efficiency Relational Efficiency	Empirical Review	Survey questionnaires, from 223 SMEs in the electronics industry in Korea.	The most anticipated finding of the study was a direct link between GSCM practice implementation and business performance. However, no statistical significance was found. Instead, significant indirect relationships were found between GSCM practice implementation and business performance through mediating variables of operational efficiency and relational efficiency. This result indicates that business performance will be improved when GSCM enhances operational efficiency and operational efficiency

3.	Green et al. (2012)	USA	Green supply chain management practices: impact on performance	The aim is to contribute significantly to the first wave of empirical investigations related to the impact of green supply chain management (GSCM) practices on performance. The paper also aims to theorize and empirically assess a comprehensive GSCM practices and performance model.	Internal environmental management Green information systems Green purchasing Cooperation with customers Eco-design Investment recovery	Empirical Review	Data collected from 159 manufacturing managers were analyzed using a structural equation modelling methodology. Manufacturing managers provide data reflecting the degree to which their organizations work with suppliers and	Generally, the adoption of GSCM practices by manufacturing organizations leads to improved environmental performance and economic performance, which, in turn, positively impact operational performance. Operational performance enhances green performance.
				The model incorporates green supply chain practices that link manufacturers with supply chain partners (both suppliers and customers) to support environmental sustainability	Environmental performance Economic performance Operational performance Green performance		customers to improve environmental sustainability of the supply chain	

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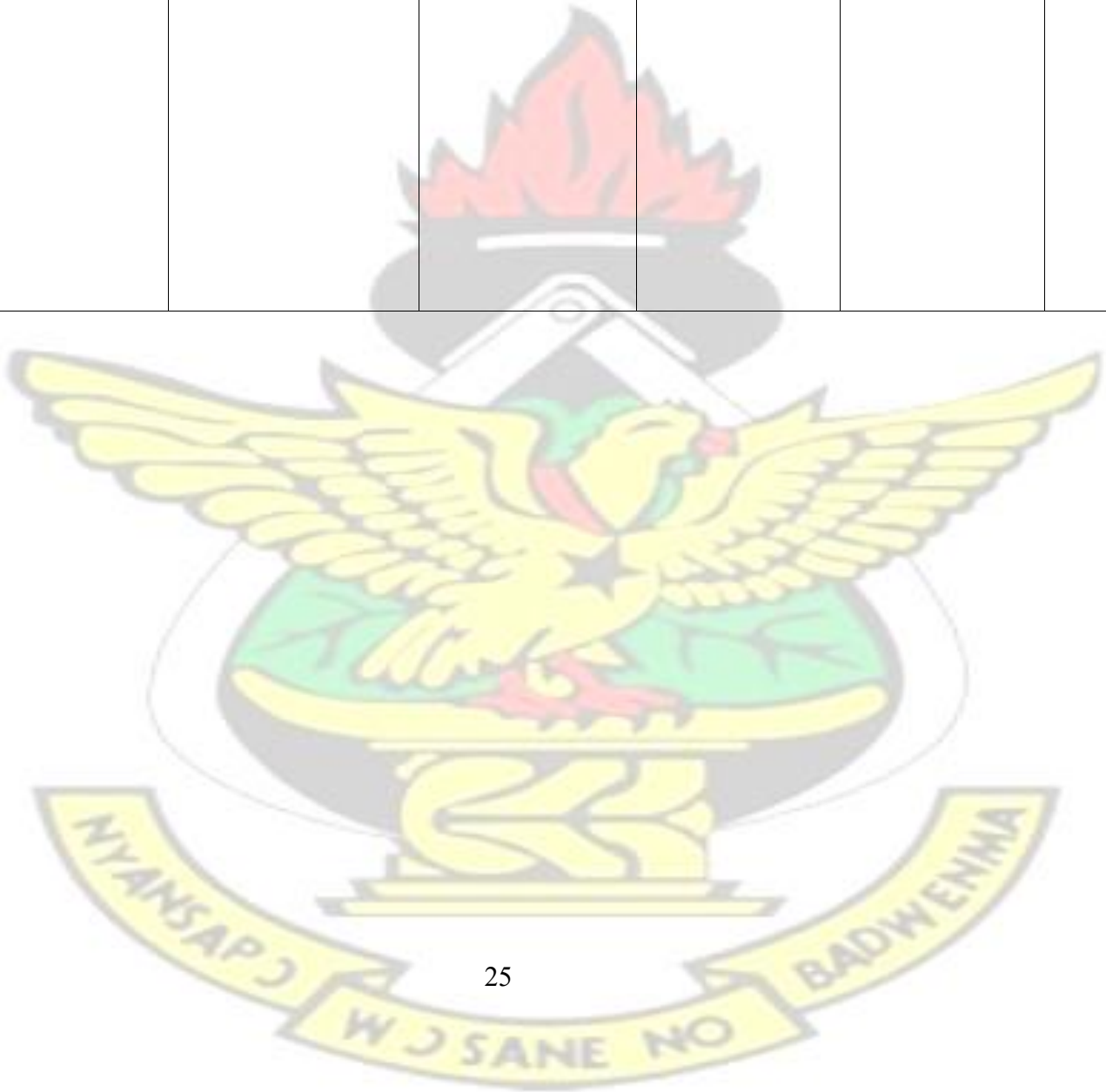
				throughout the supply chain				



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4.	Zhu et al. (2012)	China	The effects of green supply chain management practices and their mediations on performance improvements	This paper examines three models used to evaluate the mediation relationships between the external and internal practices of GSCM with respect to environmental, economic, and operational performance	GSCM practices Environmental performance Economic performance Operational performance	Coordination theory Empirical Review	Survey data collected from 396 Chinese manufacturing enterprises are used to validate arguments by testing the mediation effects of two categories of GSCM practices	Empirical results show support for the mediation effects, which indicates the importance for manufacturers to coordinate between the internal and external aspects of implementing GSCM practices to reap the performance benefits. Coordinating internal and external GSCM practices to seek performance improvements is an important aspect of the manufacturing operations strategy. The dynamics of implementing GSCM practices and the performance contingencies are worthwhile topics to pursue in future research

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5.	Laosirihongth al. ong et (2013)	Thailand	Green chain pply management and practices performance	The purpose of this study is to examine the deployment of pro-active and reactive practices in the implementation of green supply chain management (GSCM) and analyze their impact on environmental, economic, and intangible performance by considering business strategy as organizational focus	Green Purchasing Practices Product Related Eco-Design Practices Packaging Related Eco-Design Practices Reverse Logistics Practices Legislation and Regulations Environmental Performance Economic Performance Intangible Performance	Empirical Review	Data were collected from a sample of 190 ISO 14001 certified Manufacturing companies in Thailand and used to test the research hypotheses. Factor analysis was used to examine the construct validity while multivariate linear regression was used to test criteria validity.	The threat o legislation and regulation (re -active practices) was a nsideration that in resulted mpanies enhancing the ivironmental, and economic, angible Reverse performance. gistics practices (pr -active practices) had low levels of adoption and do not have a significant on GSCM impact formance.

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6.	Fang and Zhang (2018)	China	Performance of green supply chain management: A systematic review and meta-analysis	To investigate the overall relationship between GSCM practice and firm performance. To determine under what situations is the link between GSCM and performance is	Resource Based View	Empirical Review Meta-analysis	A random-effects meta-analysis is used to synthesize the empirical results of 54 selected literature with 245 effect sizes	(large (r=0.481)	ıt, internal and M practices are ted, and they are y related to firm Particularly, their ith environmental ormance is the st, operational and
				stronger or weaker.				(r=0.464) performance. In addition, test of moderators discovers that industry type, ISO certification, export orientation and the cultural dimension of uncertainty avoidance all have moderating effect on the practiceperformance relationship.

7.	Laari et al. (2016)	Finland	Firm performance and customerdriven green supply chain management	The aim of this study is to identify the direct and indirect relationships between customer-driven green supply chain management (GSCM) practices and environmental and financial performance in manufacturing	GSCM practices Environmental performance Financial Performance	Empirical Review	Partial least squares methodology is used to test the hypotheses on a sample of 119 Finnish manufacturing firms	The findings confirm that manufacturers can respond to customer pressure by transferring environmental requirements upstream in the supply chain, either by collaborating or monitoring the suppliers' environmental performance. Environmental monitoring is found to be an enabler of environmental collaboration. Furthermore, performance outcomes of GSCM appear to depend on the type of practice. The results indicate that manufacturers with strong internal GSCM practices combined with arm's length environmental monitoring of suppliers are likely to perform well in environmental issues. If a firm seeks to improve financial performance, it needs
								to form more collaborative relationships with customers to achieve environmental goals.

8.	Kirchoff et al. (2016)	USA	The impact of strategic organizational orientations on green supply chain management and firm performance	The purpose of this research was to answer the research question, *what roles do strategic orientations play in fostering successful green SCM?*	Green SCM practices Cost Efficiency Cost Effectiveness Environmental Differentiation	Resource Based Theory (RBT)	Survey of U.S. manufacturing firms SEM using AMOS software	Results suggest that strategic orientations can be valuable capabilities, employed by managers to develop and implement green SCM practices, which in turn, improves firm performance. RBT helped to explain which capabilities are necessary to achieve competitive advantage. SCT helped to explain how the capabilities have been adapted to meet the needs of a firm's external environment.
9.	Choi et al. (2016)	Korea	Assessing the impact of green supply chain practices on firm performance in the Korean manufacturing industry	This paper aims to classify various types of green supply chain management (GSCM) practices and then assess the impact of each of these distinct types on the firm's operational performances (especially manufacturing and marketing	Customer-driven Opportunitydriven Regulation-driven Competitor-driven Manufacturing performance Marketing performance	Empirical Review	Survey of randomly targeted 330 multinational Korean manufacturing firms listed on the Korea Composite Stock Price Index (KOSPI) and Korea Securities Dealers Automated Quotations	Experimental results reveal that the chosen type of GSCM practices influences the firm's performance differently

				performance). Also, this paper examines how the firm's organisational profiles such as firm size affect the particular firm's choice of GSCM practices.			(KOSDAQ) Stock Market that had been engaged in export activities and adopted GSCM practices as a potential sample	
10.	Yu et al. (2017)	China	Green supply management and performance: a resource-based view	This study develops and empirically tests, from the resourcebased perspective, a conceptual framework linking green supply management and performance.	Green purchasing personnel Green Supplier Selection Green Supplier Collaboration Environmental performance Operational Performance	Resource-based view.	The proposted model is usir a data fro 126 sample (automotive in manufactures China.	The results suggest that both green purchasing personnel and green supplier selection have a significant positive effect on green supplier collaboration, and that building green collaboration with suppliers is significantly and positively related to both environmental and operational performance. Accordingly, knowledge and skill development of the purchasing function can be recognised as an important resource in building green supply capabilities and performance.

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11.	Chan et al. (2012)	China	Environmental orientation and corporate performance: The mediation mechanism of	This study proposes and empirically tests a model delineating the relationship among environmental orientation, green	Internal Environmental Orientation External Environmental Orientation	Empirical Review	Survey Quantitative Analysis Moderation Mediation and	First, it demonstrates that while both internal and external environmental orientations exert a positive and significant influence on the practice of green purchase and customer

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			green supply chain management effect moderating utional of pressures	supply chain management (GSCM) activities (green purchase, customer cooperation and investment recovery) and corporate performance.	Competitive Intensity Green Purchase Customer Cooperation Investment Recovery Corporate Performance			cooperation, internal environmental orientation further serves as a significant driver for the practice of investment recovery. Second, it shows that the practice of these three major GSCM activities, in turn, significantly enhances corporate performance. Last, the study reveals that institutional pressures strengthens the positive influence of customer cooperation on corporate performance. Overall, the findings explicate the importance for firms, in particular those operating in a highly competitive market condition, to nurture a proenvironmental corporate culture and improve their sensitivity to salient external stakeholders' environmental demands so as to pursue greener supply chain management.

12.	Chin et al. (2015)	Malaysia	Green Supply Chain Management, Environmental Collaboration and Sustainability Performance	The purpose of this paper is two-fold: (i) review the extant literature on the relationship between GSCM, environmental collaboration and sustainability performance and (ii) propose a plausible conceptual model to elucidate the relationship between these three variables in the context of Malaysian manufacturing companies. Accordingly, such thought depends upon more detailed empirical research by using advanced structural equation modelling approaches.	GSCM Practices Environmental Collaboration Sustainability Performance	Relational View Theory (RVT)	Survey Quantitative Analysis Mediation analysis	Based on the literature review, undoubtedly, GSCM and sustainability performance are two inextricably related SCM concepts. As noted earlier, majority of studies have indeed reported a significant relationship between these two constructs. However, there are some issues such as involving collaboration with suppliers in designing green products and adopting environmental practices into processes have yet to be researched fully. In view of this matter, environmental collaboration has been proposed as a moderator of the link between GSCM practices and sustainability performance in this paper. The presence of the environmental collaboration is expected to facilitate GSCM practices, which would ease the implementation of GSCM practices.

13.	Chiou et al. (2011)	Taiwan	The Influence of Greening the Suppliers and Green Innovation on Environmental Performance and Competitive Advantage in Taiwan	This paper aims to bridge this gap by providing empirical evidence to encourage companies to implement green supply chain and green innovation in order to improve their environmental performance, and to enhance their competitive advantage in the global market	Greening the supplier Green Innovation Environmental Performance Competitive Advantage	Empirical Review	Survey Quantitative Analysis Mediation analysis	A prominent result of this study is that greening the supplier through green innovation contributes significant benefits to the environmental performance and competitive advantage of the firm
14.	Govindan et al. (2014)	India	Barriers analysis for green supply chain management implementation in Indian industries using analytic hierarchy process	This work focuses on identifying barriers to the implementation of a green supply chain management (Green SCM) based on procurement effectiveness	N/A	Empirical Review	Use of Analytic hierarchy process (AHP) to select suppliers	This paper has attempted to present a benchmarking framework to ease these complicated elements and to trim down barrier identification difficulties to make managers' efforts towards environmental improvement a little easier

15.	Green Jr. et al. (2012)	USA	Green supply chain management practices: impact on performance	The aim is to contribute significantly to the first wave of empirical investigations related to the impact of green supply chain management (GSCM) practices on performance. The paper also aims to theorize and empirically assess a comprehensive GSCM practices and performance model. The model incorporates green supply chain practices that link manufacturers with supply chain partners (both suppliers and customers) to support environmental sustainability throughout the supply chain.	Internal Environmental Management Green Information Systems Green Purchasing Cooperation with Customers Eco-design Environmental Performance Economic Performance Investment Recovery	Empirical Review	Firm-level analysis Quantitative approach Mediation Analysis	Generally, the adoption of GSCM practices by manufacturing organizations leads to improved environmental performance and economic performance, which, in turn, positively impact operational performance. Operational performance enhances green performance.

16.	Masoumik et al. (2014)	India	Adoption of green supply chain management practices and their impact on performance: an exploratory study of Indian manufacturing firms	Research on green supply chain management (GSCM) or sustainable supply chain management (SSCM) has attracted increased attention in recent years. Although GSCM/SSCM has been studied for developed and developing countries, there has been little information about the adoption of GSCM/SSCM practices in India. This article presents one of the earliest surveys on GSCM practices in Indian manufacturing firms	Collaborative relationships with suppliers Environmentally sustainable product design and logistics Environmental Performance Competitiveness	Empirical Review	Firm-level analysis Quantitative approach Mediation Analysis	They found that the state of adoption of GSCM practices by Indian firms was still in its infancy, the awareness of environmental sustainability was quite low among consumers, and the regulatory framework was also lacking in terms of promoting environmental sustainability. Results of data analysis showed that supplier collaboration for environmental sustainability had a positive impact on environmentally sustainable product design and logistics, which in turn was positively related to competitiveness and economic performance of the firm

17.	Narasimhan and Schoenherr (2012)	Australia Austria, China, Germany Italy, South Korea, Taiwan and Sweden	The effects of integrated supply management practices and environmental management practices on relative competitive quality advantage	The study examines the role of integrated supply management practices (SMP) and environmental management practices (EMP) as drivers of actual and perceived quality. We suggest that these groups of practices, in addition to quality management practices, are crucial in an increasingly transparent, competitive and global business environment	Integrated supply management practices Environmental Management Practices Quality management practices.	Resource-Based View	Firm-level analysis Quantitative approach Regression analysis	The results lend validity to the arguments concerning SMP as resources with which firms can differentiate themselves in terms of relative competitive quality performance. It is the unique boundary-spanning combination of buyer and supplier characteristics, strengths and skills, which underpin the relational rent
18.	Seman et al. (2012)	Malaysia	Green supply chain management: a review and research direction	The purpose of the paper is to briefly review the recent literatures of the GSCM and also determine the new direction area of this emerging field. A detailed review is used to sort out the literature and develop the research direction	N/A	Literature Review	Review of extant literature on GSCM in Malaysia	The findings showed that manufacturing industry is the most contributors to the environmental problem. Environmental issues have become very important issues of concern for the Malaysian government and the public. With regards to environmental concern into manufacturing

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								industry, it is necessary for the study to investigate the level of
				of the study				adoption and implementation GSCM among certified companies in Malaysia.

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19.	Shen et al. (2013)		A fuzzy multi criteria approach for evaluating green supplier's performance in green supply chain with linguistic preferences	This paper examines GSCM to propose a fuzzy multi criteria approach for green suppliers' evaluation.	N/A	Fuzzy set theory	Use of Fuzzy Set theory and TOPSIS	The possible green supplier evaluation criteria were identified and proposed according to green supplier selection literature survey, using industrial and environmental experts' opinions and managerial judgments. We introduce fuzzy numbers to quantify linguistic variables that express the subjective judgment of evaluators and fuzzy TOPSIS is used to aggregate the ratings and generate an overall performance score measuring each supplier's environmental performance. The supplier with the highest score is the one with best environmental performance. Finally, a sensitivity analysis is conducted to determine the influence of criteria weights on the decisionmaking process. Sensitivity analysis results showed that the final decision is insensitive to the attributes that are used in the evaluation process

20.	Tachizawa, E. M., Gimenez, C., and Sierra, V. (2015)	Spain	Green supply chain management approaches: drivers and performance implications.	The aim of this study is to analyse the complex interrelationships among environmental drivers, GSCM approaches and performance. For this analysis, we will take into account the buying firm perspective, i.e. the impact of supplierrelated environmental initiatives on the buying firm performance.	Green Supply Chain Management Practices Environmental Performance	Empirical Review	Individual-level analysis Quantitative approach Regression analysis	The results suggest that drivers can be classified into two categories: coercive (e.g. regulation environmental standards, etc) and non-coercive (e.g. competitors, financial institutions, etc. With respect to non-coercive drivers, the results suggest that they positively affect GCM monitoring and collaboration.

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2.5 Conceptual Framework

A conceptual framework is a concept that is broadly defined and systematically organized to provide a focus, a rationale, and a tool for the integration and interpretation of information (Elsevier, 2008). The relationship between the independent variables and the dependent variable is shown by the conceptual framework that served as the study's direction and is described in more depth below (Sarkis, 2005). When researching GSCM in tea processing businesses in Kenya, Muma et al. (2014) conceptualized the following independent factors against the dependent variable environmental performance, including green manufacturing, green distribution, green marketing, and reverse logistics. The researcher may now employ the independent variables ecological design, reverse logistics, green buying, and green production in Ghana with confidence. This investigation will be conducted in a different setting that was generally stable.

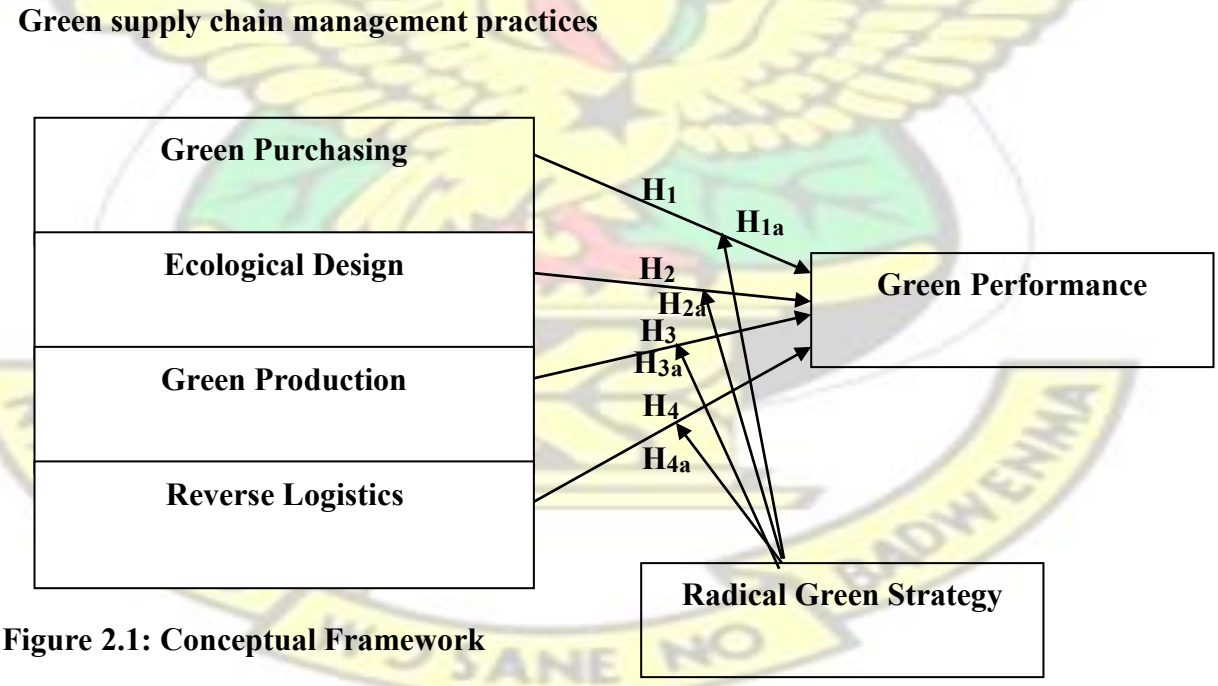

Figure 2.1: Conceptual Framework

Source: Researcher's Construct, 2022

2.5.1 Green Supply Chain Management Practices and Green Performance

This section presents a review on the relationship between green supply chain management (GSCM) practices and green performance. It is founded on the assertion that GSCM methods will improve a company's operational and environmental performance, as shown by multiple studies (Chopra and Meindl, 2004; Green et al., 2012; Lee et al., 2012).

The RBV and TCE theories form the foundation for this study's analysis of the relationship between GSCM practices and environmental performance. Implementing GSCM procedures could increase product value, lower production costs, and improve an organization's reputation, increasing its ability to compete in the market (Porter and Van der Linde, 1995; Hart and Ahuja, 1996; Madsen and Ulhi, 2003).

Due to the reuse of resources, the reduction of energy use, and fines for breaking environmental standards, GSCM techniques are also likely to save prices over time. Improved financial and market performance is the result of cost reduction and volume growth in sales. According to Molina-Azorin et al. (2009), using GSCM practices improves a company's marketing success. According to Welford (1995), employing GSCM techniques enhances businesses' reputations, which strengthens commercial firms' commercialisation.

The direct relationship between GSCM practices and green performance has been the subject of numerous research. These investigations have produced conflicting results. According to certain studies (Rao and Holt, 2005; Chien and Shi, 2007; Zeng et al., 2010; Kirchoff, 2011), there are favorable correlations between GSCM practices and

environmental performance. Others (Pullman et al., 2010; Testa and Irlado, 2010; Lee et al., 2012) found no relationship between these practices and green performance.

Others, however, who looked at the relationship between certain GSCM practices and green performance discovered both positive and negative associations (Eltayeb, Zailani, and Ramayah, 2011; Mittra and Datta, 2013; Laosirihongthong et al., 2013).

There is a research hole in the literature since there is no agreement on this connection. The other gap results from the research' failure to fully examine GSCM, as recommended by Kung et al. (2012) and Hart (1995). Additionally, the financial and market component are not included in the green performance variable for certain studies (Rao and Holt, 2005; Chien and Shi, 2007; Pullman et al., 2010; Testa and Irlado, 2010). This study therefore suggested that the adoption of GSCM methods is associated with improved environmental performance. In this light, the study's second and third hypotheses are formulated as follows;

H1-4: Green supply chain management has a significant and positive relationship with green performance.

2.5.2 Moderating Role of Radical Green Strategy

By definition, radical strategy is more uncertain than incremental initiative, and it is more likely to be abandoned due to the longer period required for production and the need for high investment returns in short time frames (Green and Welsh, 2003). Radical green strategy is gaining traction as a critical component of the transition to a greener, more sustainable economy. Radical green strategy is a broad term that can be applied to a variety of dimensions (Kemp and Pontoglio, 2011). The ability to integrate sustainability and competitiveness is dependent on the partnership between radical

green strategy projects and their subsequent environmental impact (Costantini and Mazzanti, 2012, 2013). On the one hand, radical green strategy are valuable sources of sustainability because they can minimize firms' environmental effects; on the other hand, as the literature on the Porter hypothesis has emphasized since the early 1990s, Radical green strategy can have a significant economic impact (Van Leeuwen and Polder, 2013).

Green performance relates to organizational initiatives to meet and exceed societal expectations vis-à-vis the natural environment (Chan, 2020) in a manner to go beyond mere compliances with rules and regulations (Chen et al., 2015). It encompasses environmental effects of organizational processes, products, and resource consumption in a manner that best fit with legal environmental requirements (Dubey et al., 2015). Previous studies suggest that green performance depends upon the quality of environment-friendly products, green process and product innovation, and incorporation of ecological sustainability matters into business operations and product development (Chen et al., 2015; Dubey et al., 2015; Darnall et al., 2008).

Cainelli, Mazzanti, and Zoboli (2011) investigated the productivity effects of firms' environmental strategies and green features in the Italian manufacturing and service sectors; Earnhart and Lizal (2010) investigated the environmental–economic performances of Czech firms; and Cainelli, Mazzanti, and Zoboli (2011) investigated the productivity effects of firms' environmental strategies and green features in the Italian manufacturing and service sectors, In the case of large German public firms, Oberndorfer et al. (2013) investigated the degree to which stock market valuation combines green firm characteristics.

Using the RBV theory, it is predicted that radical green strategy are critical organizational resources that firm uses to enhance its green performance and earn goodwill amongst key stakeholders. From the afore discussions, the moderating hypotheses is posited as follows;

H2: Radical Green Strategy moderates positively and significantly the relationship between green supply chain management practices and green performance.

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CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter critically considers the methods and procedures employed in conducting the study. Described in this chapter are the research design and the data sources utilized in obtaining data for analysis. The chapter additionally deals with sections such as population, sample and sampling techniques, and the conceptual model.

Finally, the chapter considers data analysis and ethical consideration.

3.2 Research Design

As defined by Kothari (2004), research design is the theoretical structure within which the research is conducted. The research design, he says, constitutes the diagram for the gathering, estimation and investigation of information. Rani (2004), also defined research design as a blueprint or a plant of action that stipulates the methodologies for collection and transformation of data, responding to research questions and establishing solutions to the research problem.

The overall strategy for connecting the conceptual research challenge to applicable and useful empirical research is known as a research design. In other words, it offers a strategy for what information to collect and how to analyze it. In this study, the research design used a case study technique. A cross-sectional survey research design involves using several sources of data to conduct an empirical analysis of a specific contemporary phenomenon in its actual setting.

The reason for using this strategy is because the study called for a variety of sources of proof. A cross-sectional research design gives researchers the chance to gain a thorough

understanding of the issue or circumstance being investigated. Another factor is that the researcher has no control on the topics that will be examined.

3.2.1 Research Strategy

Yin (2003) explained that research strategy could be in the form of explanatory, exploratory and descriptive. Explanatory research seeks to establish a causal relationship between variable with descriptive generating detail descriptions of events and situations based on observations (Yin, 2003). For areas that are under-researched, exploratory research is useful and this requires a theoretical framework for subsequent studies (Babbie, 2010).

The researcher adopted both descriptive and explanatory design to assess the relationship between green supply chain management practices and green performance. Since the study is aimed at assessing the causal-effect relationship between variables of an existing phenomenon, the descriptive and explanatory designs are suitable. Data about the phenomenon, is gathered and further analysed to assess the extent to which the independent variables describe or impact the dependent variable.

3.3 Population of the Study

The term "population" in research refers to the total number of all units of the phenomena under study that are present in the study region (Creswell, 2013).It speaks of the intended audience who would submit data for the study's analyses. This survey intends to collect feedback from businesses in the Western Region.

3.4 Sample Size and Sampling Techniques

The sample size and sampling techniques employed in conducting this research are presented in the sub-sections below.

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3.4.1 Sample Size

Since it would be tedious and time consuming, considering the time constraints of the study, a sample is drawn from the target population. This sample is to serve as a representation of firms within the Western region. Saunders et al. (2009) posited that, a sample is obtained by considering data from a sub-group rather than all possible elements or persons.

A sample size of 100 firms was thus selected for the study.

3.4.2 Sampling Techniques

Due to time and financial limitations, only a sample of the population could be reasonably be used to gather data. Purposive sampling was the method utilized by the researcher. The researcher utilized the purposive strategy to choose management and senior management respondents because she believes they have extensive understanding of the supply chain management process. Finally, respondents who were able and willing to engage in the study were chosen using the convenience sample approach. These two techniques were employed to gain access to the data required to fulfill the study's objectives.

3.5 Data Collection Method

Primary data were primarily utilised in this investigation. This gave the recommendations that were made the trustworthy information they needed. All the chosen employees who were present on data collecting days were handed questionnaires to complete on their own, with the investigator on hand to clarify any questions they didn't understand.

3.5.1 Primary Data

This is the kind of information that the researcher specifically gathered for the project at hand. The key data sources for this study were from information that was directly received from senior management staff members of chosen organizations through questionnaires that were given out in person and by email.

3.5.2 Data Collection Tools

As part of the research activities, the researcher made used questionnaires as main instrument for data collection. Standard questionnaires were developed for the top managers. The items used to measure the various constructs in the questionnaire to represent green supply chain management practices were adopted from several studies including Vachon (2007); Zhu et al. (2008a); Zhu et al. (2008b); Testa and Irlado (2010); Diabat and Govindan (2011); El-Tayeb et al. (2011); Khisa (2011); and Laosirihongthong et al. (2013). Also, items used to measure green performance were adopted from the studies of Li Lu et al. (2016) whereas that of radical green strategy was adopted from Marshall et al. (2015). The data collected from the questionnaires

and interviews were analyzed and based on the analysis, the researcher then came out with the findings. This is as shown in Table 3.1 below:

Table 3.1: Constructs, Measures and Sources

Construct	Type	Number of Items	Sources
Green supply chain management practices: Green Purchasing Ecological Design Green Production Reverse Logistics	Independent variable	5 5 6 5	Vachon (2007); Zhu et al. (2008a); Zhu et al. (2008b); Testa and Irlado (2010); Diabat and Govindan (2011); El-Tayeb et al. (2011); Khisa (2011); and Laosirihongthong et al. (2013)
Environmental Performance	Dependent variable	5	Lu et al. (2016)
Radicalgreen strategy	Moderating variable	5	Marshall et al. (2015).

Source: Author's Construct, 2022

3.6 Data Analysis

Utilizing basic statistics like frequency distribution tables, the acquired data were examined. Microsoft Excel and the Statistical Package for Social Sciences (SPSS) were used to create the tables, charts, and figures.

All of the answers to the closed-ended questions were entered into the SPSS program for data processing and analysis. The system then displayed the results of the analysis as frequency tables and graphs. The aforementioned strategy was chosen because it is suitable for accurately outlining the findings and enables the researchers to produce highly specific and pertinent findings, recommendations, and conclusions. The association between the GSCM, the radical green strategy, and the green performance variables was determined using correlation. In accordance with predetermined goals, the data were also shown on tables and statistical diagrams. Using these, relevant deductions and suggestions were drawn from the study's findings.

3.7 Data Validity and Reliability

In every research endeavour, data collected should be reliable and valid. The reliability and the validity are tied to deciding the practicability and the credibility of the study Reliability refers to the consistency of the instruments in tapping information from more than one respondent and an instrument is said to have high reliability if it can be trusted to give consistent and accurate measurement of an unchanging value. As indicated by Saunders et al. (2009), because of the failure of the respondents to translate and give legitimate response to the inquiries in the questionnaire may lead to something different, it is important to take steps to ensure reliable responses. The response items of the questionnaires were subjected to reliability test by using Cronbach alpha reliability and Composite reliability testing (Ary et al., 2013).

Data validity is the correctness and reasonableness of data. Attention was given to data entry process to ensure correctness of the data entered.

3.8 Ethical Consideration

Saunders et al (2009) defines research ethics as 'the appropriateness of your behaviour to the rights of those who become the subjects or are the affected by your work'. They further state that the research design should not subject the research population into any embarrassment, harm or other disadvantaged material. The major ethical problems experienced in this study were infringement on the privacy and confidentiality of the respondents. The study did not in any way use force to gather the data. The respondents were given the chance to respond freely with no salient intimidation or force or promise of reward. To end this, the researcher ensured that the research process was adequately

explained to participants and that they were made aware that any information given out will not be reported and would be kept as they wished.

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS AND PRESENTATION

4.1 Introduction

This chapter presents the results of the study from the field survey conducted through the administering of questionnaires to firms in the Western region to test the relationship among the variables of the study. The study sought to examine the extent of green supply chain management practices among those selected firms, how it affects green performance and in turn, how the relationship is moderated by radical green strategy of those firms. In all, a sample size of 100 firms was selected and questionnaires administered to. However, 71 questionnaires were returned representing a 71% response rate which was absolutely high. All the presentation of results, analysis and discussions were based on this response rate. The various subsections for this study are captured as follows – demography of respondents, extent of green supply chain management practices, extent of green performance, extent of radical green strategy, reliability and validity of measures, test of model, discussion of findings. These are presented in the next sub-sections.

4.2 Demography of Respondents

It was necessary to ascertain the suitability of the respondents in terms of knowledge and understanding of the subject matter as well as the characteristics of the firms to implement the various supply chain management concepts. The summary of demographic information is as presented in Table 4.1 below.

Table 4.1: Demographic Information of Respondents

Variable	Categories	n	%
Gender of Respondents	Male	35	49.3%
	Female	36	50.7%
Educational Level of Respondents	Secondary	1	1.4%
	HND	15	21.1%
	Degree	36	50.7%
	Masters	16	22.5%
	Other	3	4.2%
Age of Respondents	Less than 25 years	19	26.8%
	25-30 years	30	42.3%
	31 - 40 years	18	25.4%
	41 - 50 years	3	4.2%
	51 years and above	1	1.4%
Years of Experience of Respondents	Less than 1 year	16	22.5%
	1 - 5 years	19	26.8%
	6 - 10 years	19	26.8%
	11 - 15 years	10	14.1%
	15 years and above	7	9.9%
Existence of transport/logistic/supply chain/distribution department	Yes	60	84.5%
	No	11	15.5%

Source: Researcher's Survey, 2023

From the demographic information as presented in Table 4.1 above, it could be seen that there were 35 (49.3%) of males as compared to 36(50.7%) of females. This implies that the supply chain management units of firms are dominated slightly by females.

With the educational background, the modal response was First Degree with 36(50.7%) of respondents followed by those who had master's degree with 23.7% of responses. Also, there were few who had HND with 21.1% of responses.

This proved that the educational background of respondents was adequate to understand the questions posed to them in the questionnaire.

The age of respondents revealed that majority of them are between the ages of 25 – 30 years with 42.3% of responses, followed by those from below 25 years with 26.8% of responses. Those who were from 31 – 40 years with 25.4% of responses. This proves the supply chain management units of firms are relatively a young and energetic age group.

When respondents were asked about years of experience or they have worked, it was revealed majority have worked for either 1 – 5 years or 6 – 10 years with 26.8% of respondents, followed by the next 22.5% who had barely a year experience and then those who have worked for 11 – 15 years and above 15 years with 14.1% and 9.9% respectively.

With the firm characteristics, it was necessary to ascertain if the firms had in existence transport/logistic/supply chain/distribution department. About 84.5% of respondents were in the affirmative whereas the remaining 15.5% of respondents indicated no.
The demographic information of respondents revealed that the respondents understood the various questions posed to them to achieve face validity of the study and proved the results is reliable for decision making and other use.

4.3 Extent of Green Supply Chain Management Practices

The main independent variable for the study was green supply chain management practices which were measured with some practices including green purchasing, ecological design, ecological design and reverse logistics. These sub-constructs of green supply chain management practices were measured with items adapted from the study of Zhu *et al*. (2008) using a 5-point agreement Likert Scale. Tables 4.2 to 4.5

presents the descriptive statistics tables for these measures of supply chain management.

Table 4.2: Extent of Green purchasing

Measuring Items	Min	Max	Mean	Std. Dev
GP1:	1	5	3.97	.854
GP2:	2	5	3.87	.866
GP3:	1	5	3.85	.843
GP4:	1	5	3.70	.966
GP5:	1	5	3.68	.887
Mean Response	**1.67**	**5.00**	**3.82**	**.761**

Source: Researcher's Survey, 2023

From the descriptive statistics in Table 4.2, it shows that there is high extent of green purchasing as the overall mean value of 3.82 indicates. This is because from the 5point Likert Scale, a mean value of 3.0 indicates neutral (neither agree nor disagree). Therefore, mean values of more than 3.0 implies agreement. From the responses, the highest response was the first with mean of 3.97 and standard deviation of 0.854. The least mean response was Item 5 with mean of 3.68 and standard deviation of 0.887. All other items exceeded 3.0 implying agreement. Therefore, it can be said that there is high level of green purchasing among selected firms in the Western region.

Table 4.3: Extent of Ecological design

Measuring Items	Min	Max	Mean	Std. Dev
ED1:	1	5	4.02	.762
ED2:	1	5	4.03	.703
ED3:	1	5	3.98	.757
ED4:	1	5	4.03	.779
ED5:	1	5	4.03	.779
Mean Response	**1.40**	**5.00**	**4.02**	**.632**

Source: Researcher's Survey, 2023

From the descriptive statistics in Table 4.3, it shows that there is high extent of ecological design as the overall mean value of 4.02 indicates. This is because from the 5-point Likert Scale, a mean value of 3.0 indicates neutral (neither agree nor disagree). Therefore, mean values of more than 3.0 implies agreement. From the responses, the

highest responses were the second, fourth and fifth items with mean of 4.03 and standard deviations of .703, .779 and .779 respectively. The least mean response was Item 3 with mean of 3.98 and standard deviation of 0.757. All other items exceeded 3.0 implying agreement. Therefore, it can be said that there is high level of ecological design among selected firms in the Western region.

Table 4.4: Extent of Green Production

Measuring Items	Min	Max	Mean	Std. Dev
GRP1:	1	5	3.88	.829
GRP2:	2	5	3.75	.883
GRP3:	2	5	3.87	.786
GRP4:	1	5	3.66	.808
GRP5:	1	5	3.75	.801
GRP6:	1	5	3.88	.748
Mean Response	**2.33**	**5.00**	**3.80**	**.662**

Source: Researcher's Survey, 2023

From the descriptive statistics in Table 4.4, it shows that there is high extent of the green production as the overall mean value of 3.80 indicates. This is because from the 5-point Likert Scale, a mean value of 3.0 indicates neutral (neither agree nor disagree). Therefore, mean values of more than 3.0 implies agreement. From the responses, the highest responses were the first and last items with mean of 3.88 and standard deviations of .829 and .748 respectively. The least mean response was Item 4 with mean of 3.66 and standard deviation of 0.808. All other items exceeded 3.0 implying agreement. Therefore, it can be said that there is high extent of green production among selected firms in the Western region.

Table 4.5: Extent of Reverse logistics

Measuring Items	Min	Max	Mean	Std. Dev
GL1:	1	5	3.81	.809
GL2:	1	5	3.72	.899
GL3:	1	5	3.51	.925

GL4:	1	5	3.11	1.237
GL5:	1	5	3.48	1.297
Mean Response	**2.00**	**5.00**	**3.68**	**.722**

Source: Researcher's Survey, 2023

From the descriptive statistics in Table 4.5, it shows that there is high extent of reverse logistics as the overall mean value of 3.68 indicates. This is because from the 5-point Likert Scale, a mean value of 3.0 indicates neutral (neither agree nor disagree). Therefore, mean values of more than 3.0 implies agreement. From the responses, the highest response was the first item with mean of 3.81 and standard deviation of 0.809. The least mean response was Item 3 with mean of 3.51 and standard deviation of 0.925. All other items exceeded 3.0 implying agreement. Therefore, it can be said that there is high level of reverse logistics among selected firms in the Western region.

4.4 Level of Radical Green Strategy

The moderating variable for the study was radical green strategy which was measured with some items adapted from the study of Chiou *et al*. (2011) using a 5-point agreement Likert Scale. Table 4.6 presents the descriptive statistics tables for these measures of radical green strategy.

Table 4.6: Extent of Radical Green Strategy

Measuring Items	Min	Max	Mean	Std. Dev
1. they were completely new to our industry	1	5	3.99	.609
2. they exceeded the expressed expectations of our stakeholders (e.g., customers, suppliers, regulators)	1	5	4.00	.657
3. they were associated with radical changes to major aspects of our organization (e.g., mission statement, corporate strategy, organizational structure, human resources, routines)	1	5	3.87	.701
4. they were completely new to our industry	2	5	3.82	.707
5. it delivered value to our customers.	1	5	3.86	.776

Mean Response	**1.00**	**5.00**	**3.91**	**.617**

Source: Researcher's Survey, 2023

From the descriptive statistics in Table 4.6, it shows that there is high extent of Radical green strategy as the overall mean value of 3.91 indicates. This is because from the 5-point Likert Scale, a mean value of 3.0 indicates neutral (neither agree nor disagree). Therefore, mean values of more than 3.0 implies agreement. From the responses, the highest response was the second item with mean of 4.00 and standard deviation of 0.657. The least mean response was Item 3 with mean of 3.86 and standard deviation of 0.776. All other items exceeded 3.0 implying agreement. Therefore, it can be said that there is high level of Radical green strategy among selected firms in the Western region.

4.5 Extent of Green Performance

The dependent variable for the study was green performance which was measured with some items adapted from the study of Lu *et al*. (2016) using a 5-point Likert Scale which compares to that of competitors whether below them, at par with them or above that of competitors.

Table 4.7 presents the descriptive statistics tables for these measures of green performance.

Table 4.7: Extent of Green Performance

Measuring Items	Min	Max	Mean	Std. Dev
1. Traffic accidents in our firm have significantly reduced	1	5	4.52	1.013
2. Industrial accidents in our firm have significantly reduced	3	5	4.62	.709
3. Oil pollution in our firm has significantly reduced.	3	5	4.66	.676

4. Air quality in our firm has significantly improved	1	5	4.44	.996
5. Noise in our firm has significantly reduced	1	5	4.47	.980
Mean Response	**2.33**	**5.00**	**4.55**	**.735**

Source: Researcher's Survey, 2023

From the descriptive statistics in Table 4.9, it shows that there is high extent of green performance as the overall mean value of 4.55 indicates. This is because from the 5point Likert Scale, a mean value of 3.0 indicates neutral (at par with competitors). Therefore, mean values of more than 4.0 for all items implies green performance is above those of competitors. From the responses, the highest response was the third item with mean of 4.66 and standard deviation of 0.676. The least mean response was Item 4 with mean of 4.44 and standard deviation of 0.996 All other items exceeded 3.0 implying agreement. Therefore, it can be said that there is high level of green performance among selected firms in the Western region.

4.6 Validity and Reliability of Measures

It was necessary to determine the internal consistency among items used to measure each construct and also determine the extent to which each item really measures the construct items it was meant to measure. As such tools such as Cronbach's Alpha and Exploratory Factor Analysis were employed. The initial test done was the test of reliability using Cronbach's Alpha and the results are as presented in Table 4.8.

Table 4.8: Reliability Test Using Cronbach's Alpha

Variable	Number of Items	Cronbach's Alpha
1. Green Purchasing	5	0.857
2. Ecological design	5	0.866
3. Green Production	6	0.897
4. Reverse logistics	5	0.899
5. Radical Green Strategy	5	0.876
6. Green performance	6	0.907

Source: Researcher's Survey, 2023

From the reliability test, all variable passed as the Cronbach's Alpha values exceed the minimum threshold of 0.70.

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4.6.1 Exploratory Factor Analysis

It was necessary to determine the unidimensional of the items used to measure each construct. This was the exploratory factor analysis (EFA). It was necessary to perform this validity test and Tables 4.9a and 4.9b provides.

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Table 4.9a: EFA Results for Independent Variables

Construct	Item	Detail	Factor			
			1	2	3	4
GREEN PURCHASING	GREENP1	Our firm provides design specification on environmental requirements to suppliers for purchased items.	.667			
	GREENP2	Our firm cooperates with suppliers in order to attain environmental objectives.	.661			
	GREENP3	Our firm reduces use of paper during the purchasing process (e.g. ordering via email).	.739			
	GREENP4	Our firm makes purchases from suppliers who are compliant with legislation on the environment.	.680			
	GREENP5	Our firm purchases raw materials in bulk in order to minimize use of energy, labour, and packaging materials through bulk packaging.	.623			
ECOLOGICAL DESIGN	ED1	Our firm collaborate with suppliers during the design process to ensure integration of green issues.		.814		
	ED2	Our firm has designs that promotes use of renewable resources.		.761		
	ED3	Our firm has designs that incorporates reduction of energy consumption by product, in addition to promoting use of renewable sources of energy. Design products with biodegradable materials.		.746		
	ED4	Design products that have longer useful life.		.508		
	ED5			.725		
GREEN PRODUCTION	PROD2	Our firm reduces put in place measures for recycling and reuse of waste water.			.848	
	PROD3	Our firm reduces put in place measures to control leakages, emanating from damaged pipes, spillages, losses due to improper handling or faulty machinery Our firm separates hazardous and non-hazardous waste.			.680	
	PROD4				.575	
REVERSE LOGISTICS	REV2	Our firm installs collection points for used products and packaging for reuse and recycling.				.965
	REV3	Our firm ensures safe disposal of unrecyclable or unreusable waste (especially hazardous waste).				.713

Extraction Method: Principal Axis Factoring. Rotation Method: Varimax with Kaiser Normalization.

Source: Researcher's Survey, 2023

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Table 4.9a shows the EFA results of the measures of green supply chain management practices with KMO value of 0.873 which was more than the minimum threshold of 0.6 and X^2 = 1960.651, df =190 and p=0.000. This was done using Principal Axis Factoring with varimax rotation and all Eigen values were set to 1.

Table 4.9b: EFA Results for Moderating and Dependent Variables

Construct	Item	Detail	Factor	
			1	2
RADICAL GREEN STRATEGY	RGS1	Our firm uses less or non-polluting/toxic materials (i.e. Using environmentally friendly material)		.626
	RGS2	Our firm improves and designs environmentally friendly packaging (eg: less paper and plastic material used) for existing and new products.		.695
	RGS3	Our firm practices recovery of company's end-of-life products and recycling Our		.696
	RGS4	firm eco-labeling		.815
	RGS5	Our firm has delivered value to our customers		.850
GREEN PERFORMANCE	GPERF1	Traffic accidents in our firm have significantly reduced	.884	
	GPERF2	Industrial accidents in our firm have significantly reduced Oil	.867	
	GPERF3	pollution in our firm has significantly reduced.	.846	
	GPERF4	Air quality in our firm has significantly improved	.621	
	GPERF5	Noise in our firm has significantly reduced	.838	
	GPERF6	Traffic accidents in our firm have significantly reduced	.881	

Source: Researcher's Survey, 2023

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Table 4.9b shows the EFA results of the measures of green performance and radical green strategy construct with KMO value of 0.748 which was more than the minimum threshold of 0.6 and X^2 = 1911.103, df =231 and p=0.000. This was done using Principal Axis Factoring with varimax rotation and all Eigen values were set to 1.

After the EFA, items that remained for each construct were GREENP1-6, ED1-5, PROD2-4, REV23, RGS1-5, and GPERF1-6 respectively for Green Purchasing, ecological design, green production, reverse logistics, radical green strategy and green performance.

The composite reliability (CR) and average variance extracted (AVE) values for the predictors all revealed that they exceed the minimum thresholds of 0.60 and 0.50 respectively demonstrating convergent validity of the constructs.

4.7 Test of Model

The main objective of the study was to establish the effect of green supply chain management practices on green performance among firms in the Western region and the last objective was to determine the moderating role of radical green strategy in the relationship between green supply chain management practices and green performance among firms in the Western region. This is to say that, the study sought to test the direct path from green supply chain management practices to green performance and then the moderating effect of the three dimensions of radical green strategy.

In order to achieve this, the remaining items per construct after the EFA were composited to measure each individual construct and then the average measures were used for each construct. After this, correlation and regression analysis were performed in SPSS, version 20. Table 4.10 shows the correlation results.

Table 4.10: Correlation among Variables

Variable	1	2	3	4	5	Mean	Std. Dev
1. Green Purchasing	1					3.82	0.761
2. Ecological designs	.689**	1				4.02	0.632

3. Green Production	.642**	.532**	1			3.75	0.728
4. Reverse logistics	.384**	.250**	.476**	1		3.62	0.859
5. Radical Green Strategy	.473**	.453**	.347**	.436**	1	3.91	0.617
6. Green Performance	.044	.152	.248**	.273**	.004	4.55	0.735

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

Correlation is significant at the 0.05 level (2-tailed).

Source: Researcher's Survey, 2023

It could be seen from the correlation Table 4.10 that there are positive correlations among all constructs. There was no case of multi-collinearity as the highest correlation coefficient among the variables was r=.689. Comparing the correlation of all predictor and mediating variables on the dependent variable, it could be seen that though there were positive correlations, all the coefficients were less than 0.5 implying weak correlations. Therefore, it can be said that there was positive but weak correlation between green supply chain management practices and green performance and also, positive but weak correlation between radical green strategy and green performance.

The last test to be performed was the regression analysis and 4 regression models were estimated. Firstly, Models 1 depicted the direct path from the green supply chain management practices to green performance.

Model 1

$ENVPERF = \beta_0 + \beta_1 G + \beta_2 E + \beta_3 P + \beta_4 R + \varepsilon$

Where, β_0 = constant of proportionality β_{1-4} =

Co-efficient of independent variables G =

Green Purchasing (Independent Variable)

E = Ecological design (Independent Variable)

P = Green Production (Independent Variable)

R = Reverse logistics (Independent Variable)

□□*error term*

Models 2 concerned the direct paths from the green supply chain management practices to green performance with moderating effects of radical green strategy respectively.

Model 2

$ENVPERF = \beta_0 + \beta_1 G + \beta_2 E + \beta_3 P + \beta_4 R + \beta_5 A + \beta_6 G \times A + \beta_7 E \times A + \beta_8 P \times A + \beta_9 R \times A + \varepsilon$

A = Radical Green Strategy (Moderating Variable)

The results for the regression result can be seen in Tables 4.11.

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Table 4.11: Ordinary Least Square Regression Estimation

Variable	**Standard Estimates**	
	Model 1	**Model 2**
Direct Path	**Green performance**	**Green performance**
Independent Variables:		
Green Supply Chain Management Practices:		
Green Purchasing (G)	-.147(-.933)	.597(.769)
Ecological design (E)	.334(1.776)	.798(.807)
Green Production (P)	.024(.141)	1.717(1.793)
Reverse logistics (R)	.350(2.179)*	.570(.942)
Moderating Variables		
Radical green strategy measures:		
Radical green strategy (A)		.151(.367)
G × A		.149(.670)
E × A		.295(1.122)
P × A		-.543(-1.990)*
R × A		.216(1.197)
Fit Indices X^2(df)	15.735(4)	21.832(9)
R^2	**.323**	**.457**

***p<0.05 **p<0.01 Source: Researcher's Survey, 2023**

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4.8 Findings

Is section seeks to relate the findings from the test of model in line with the objectives of the study and literature reviewed. The study sought to examine the direct effect of green supply chain management practices on green performance, and then the moderating effect of radical green strategy on this relationship. The study focused on firms in the Western region whereas sample of 100 firms were selected but a response of 71% was achieved. The key findings and their implications are discussed in the next sub-sections.

4.8.1 Direct Effect

From the research model, four green supply chain management practices were developed to influence radical green strategy. From the model run results (model 1), it could be seen that out of the four independent variables (green purchasing, ecological design, green production and reverse logistics), ecological design and reverse logistics had positive and significant effects on green performance (β = .334; t = 1.776) and (β = .350; t = 2.176) respectively.

For the direct path from the green supply chain management practices to green performance, the Rsquare of **.323** implies that about 32.3% changes in green performance among firms in Western region can be explained by green supply chain management practices by the various selected firms at the organisation..

4.8.2 Moderation Effect

For the moderation paths as seen in Model 2, it could be seen that all the green supply chain management practices had either a positive or negative but significant effect on green performance.

For the moderating effect of supply chain management on green performance, the R-square values realized were .457, .442 implies that about 45.7 of changes in green performance can be explained by

the green supply chain management practices been moderated with radical green strategy used among firms in the Western region.

Table 4.12: Summary of Hypothesis Results for Green performance

Hypothesis	B	T-Value	Remarks
H1a: Green supply chain management practices have a significant effect on green performance			
***H1ai**: Green Purchasing → green performance.*	-.147	-0.933	Not Supported
***H1aii**: Ecological design → green performance.*	.334	1.776	Supported
***H1aiii:** Green production → green performance.*	-.024	-0.141	Not Supported
***H1aiv:** Reverse logistics → green performance.*	.350	2.176	Supported
H2a: Radical green strategy moderated positively and significantly on the relationship between green supply chain management practices and green performance			
***H2ai**: Green Purchasing × RGS → green performance.*	0.149	0.670	Not Supported
***H2aiv**: Ecological Design × RGS → green performance.*	0.295	1.122	Not Supported
***H2avii**: Green production × RGS → green performance.*	-.543	-1.990	Not Supported
***H2ax**: Reverse Logistics × RGS → performance.*	.081	0.403	Not Supported

***p<0.05** **Source: Researcher's Survey, 2023**

4.9 Discussion of Result

Finally, for the last objective which looked at the moderating effects of radical green strategy on the relationship between green supply chain management practices and green performance, there were two green performance outcomes (green performance and social and economic performance) and three dimensions of radical green strategy (green product, green process and green managerial innovation). As such, in all, four (4) sub-dimensions of the moderating relationships were tested. **H2** posited that **radical green strategy *moderated positively and significantly the relationship between green supply chain management practices and green performance***. The findings revealed that **all** moderated relationships between the green supply chain management practices and radical green strategy on green performance were either positive or negative but statistically not significant at $p<0.05$. This implies that for the findings of this study, **H2 was NOT SUPPORTED** for this study. As indicated by extant studies, firms should extend the environmental principle to the packaging design, development and

managerial aspects of their goods (Chiou *et al*., 2011). As Khoiruman, and Haryanto (2017) emphasized, continuous and continuing innovation is a vital solution for dealing with demands from consumers, rivals, and regulators. In coping with these environmental pressures, the company will not be afraid or overdramatic as these pressures could be turned into motivations that enable them to conduct radical green strategy and create a competitive advantage and further improve their green environmental results (Shao and Unal, 2019).

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CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

The findings from the preceding chapter are summarized in this chapter. The study's conclusion and recommendations in light of its findings are also included. One hundred (100) responses were gathered from the staff and management of chosen businesses in the Western region using basic random and convenience sampling approaches. 71% of respondents responded in total.

5.2 Summary of Findings

The summary of the study's findings is presented in line with the research objectives as follows:

5.2.1 Relationship between Green Supply Chain Management Practices and Green performance among Organisations in the Western region

The study's primary objective was to investigate the link between environmentally friendly supply chain management methods and business success in the Western area. The study employed four green supply chain management strategies that Zhu et al. (2008) proposed. According to the model run results (model 1), only ecological design and reverse logistics, out of the four independent variables (green purchasing, ecological design, green production, and green performance), had positive and significant, effects on green performance (β =.334; t = 1.776) and (β =.350; t = 2.176), respectively, at $p<0.05$.

5.2.2 The Moderating Effect of Radical green strategy on the Relationship between Green Supply Chain Management Practices and Green performance

The study's second objective was to determine how radical green strategy affected the relationship between green supply chain management practices and environmental performance across Western area organizations. This means that the study aimed to investigate the relationship between the direct

road from green supply chain management techniques to green performance and the moderating path of a radical green strategy. The results showed that none of the moderated associations met the criteria for statistical significance.

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5.3 Conclusions

Therefore, it can be concluded that radical green strategy does not moderate green supply chain management practices to impact on green performance. As such, it implies that firms should focus on been innovativeness in purchasing products that are environmentally friendly, adopt reverse logistics practices in their operations as well as management thoughts should be green-orientation so as to contribute the firm's green performance.

5.4 Recommendations

Based on the summary of findings, the following recommendations are suggested for practice and policy-making:

5.4.1 Attention to Reverse Logistics

It has been realized from the findings that reverse logistics is a key determinant of green performance as it has positive and significant effect on both two dimensions of green performance. The researcher therefore recommends that firms should place much emphasis on how to manage their product returns to improve their green performance.

5.4.2 Focus on Green Purchasing

The findings revealed that there was a positive and significant effect of green purchasing moderated by all dimensions of radical green strategy on social and economic performance. Hence, it is necessary

for firms to be innovative in their green purchasing activities so as to contribute substantially in their green performance.

5.4.3 Green Production to Ensure Green Performance

The findings revealed that green production to a little extent contributes positively and significantly on green performance. It is therefore necessary for firms to adopt green processes in their production so as to contribute to their social and economic performance.

5.4.4 Improvement in Quality of Information Shared

Some organizations may distort information shared with key supply chain partners. When this happens, it may cause bullwhip effect. As such, there is the need to improve the quality of information among parties involved so that they would all be in the known. This would improve the level of green supply chain management relationship among partners.

5.4.5 Supply Chain Coordination and Integration

This a good strategy based on universality and integration with customers and suppliers, processes and activities, and implementation of those activities which improve and intensify cooperation and trust relationship among participants. It would help ensure free flow of information among partners and ensure easy problem solving.

5.5 Areas for further research

In view of the findings and limitations of this study, it is recommended that these areas be further investigated. The scope of the study could be expanded to include other industries such as the service industry, transport industry, to determine the effect of green supply chain management practices through radical green strategy on green performance.

Future studies can consider a second look at the analytical approach of this study by testing for the moderators individually (while controlling for the other) and collectively. This can be done at different levels of the radical green strategy moderators in order to guarantee validity of findings and support for different dimensions of moderation argument.

Again, a similar study could be carried out in a different geographical region to validate the findings.

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Appendix

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY QUESTIONNAIRE

I am a Master of Science in Procurement and Supply Chain Management student of KNUST IDL. As part of the requirements for the award of Master's Degree, I am undertaking a research work to ***assess the moderating role of radical green strategy on the relationship between green supply chain management practices and green performance among firms in Ghana***. This work is purely for academic purposes and the data collected and the results will not be used in any way to jeopardize the interest of our unit and our business as a whole. I guarantee our anonymity and complete confidentiality.

PART A: GREEN SUPPLY CHAIN MANAGEMENT

Kindly indicate your judgment for each of the following statements stated below. Please indicate the GSCM practices that apply in your company, and use 1-5 point scale (1= No extent, 2= Small Extent 3= Moderate Extent 4= Great Extent 5= Very Great Extent.

NB: 1 2 3 4 5

Not at all Small Extent Moderate Extent Great Extent Very Great Extent

	SECTION A: Green supply chain management practices	**1**	**2**	**3**	**4**	**5**
	Green Purchasing					
1.	GP1: Our firm provides design specification on environmental requirements to suppliers for purchased items.					
2.	GP2: Our firm cooperates with suppliers in order to attain environmental objectives.					
3.	GP3: Our firm reduces use of paper during the purchasing process (e.g. ordering via email).					
4.	GP4: Our firm makes purchases from suppliers who are compliant with legislation on the environment.					
5.	GP5: Our firm purchases raw materials in bulk in order to minimize use of energy, labour, and packaging materials through bulk packaging.					
	Ecological Design					
1.	ED1: Our firm collaborate with suppliers during the design process to ensure integration of green issues.					
2.	ED2: Our firm has designs that promotes use of renewable resources.					
3.	ED3: Our firm has designs that incorporates reduction of energy consumption by product, in addition to promoting use of renewable sources of energy.					
4.	ED4: Design products with biodegradable materials.					
5.	ED5: Design products that have longer useful life.					

	Green Production					
1.	GRP1: Our firm reduces use of virgin raw materials by using recycled materials or reusing materials for product manufacturing.					
2.	GRP2: Our firm reduces put in place measures for recycling and reuse of waste water.					
3.	GRP3: Our firm reduces put in place measures to control leakages, emanating from damaged pipes, spillages, losses due to improper handling or faulty machinery					
4.	GRP4: Our firm separates hazardous and non-hazardous waste.					
5.	GRP5: Our firm uses controls and filters for harmful discharges and emissions.					

6.	GRP6: Our firm reduces energy consumption by using alternative sources of energy (e.g. biogas, solar, wind etc).					
	Reverse Logistics					
1.	GL1: Our firm spreads awareness among customers on the firm's product or packaging return or take-back policy.					
2.	GL2: Our firm installs collection points for used products and packaging for reuse and recycling.					
3.	GL3: Our firm ensures safe disposal of unrecyclable or unreusable waste (especially hazardous waste).					
4.	GL4: Our firm offers special incentives to those who return packaging materials.					
5.	GL5: Our firm put in place systems to monitor reverse flows of materials.					

Source: Vachon (2007); Zhu *et al*. (2008a); Zhu *et al*. (2008b); Testa and Irlado (2010); Diabat and Govindan (2011); El-Tayeb *et al*. (2011); Khisa (2011); and Laosirihongthong *et al*. (2013).

PART B: RADICAL GREEN STRATEGY

Kindly indicate your judgment for each of the following statements stated below. Please indicate the level of green innovation using in your company, and use 1-5 point scale.

NB: 1 2 3 4 5

Strongly Disagree Disagree Neutral Agree Strongly Agree

		1	2	3	4	5
	Regarding the environmental preservation initiatives launched by your company in the previous 3 years, it can be said that:					
1.	they were completely new to our industry					
2.	they exceeded the expressed expectations of our stakeholders (e.g., customers, suppliers, regulators)					
3.	they were associated with radical changes to major aspects of our organization (e.g., mission statement, corporate strategy, organizational structure, human resources, routines)					
4.	they were completely new to our industry					
5.	it delivered value to our customers.					

PART C: GREEEN PERFORMANCE

Kindly indicate your judgment for each of the following statements stated below. Please indicate the level of sustainability performance using in your company for the past 5 years, and use 5-point scale.

NB: 1 2 3 4 5

Strongly Disagree Disagree Neutral Agree Strongly Agree

		1	2	3	4	5

1.	Traffic accidents in our firm have significantly reduced					
2.	Industrial accidents in our firm have significantly reduced					
3.	Oil pollution in our firm has significantly reduced.					
4.	Air quality in our firm has significantly improved					
5.	Noise in our firm has significantly reduced					

Source: Lu *et al*. (2016)

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PART D: RESPONDENT'S INFORMATION

1. Your Gender?

   Male ☐ Female ☐

2. What is your age?

   Less than 30 years ☐ 30-40 years ☐ 41-50 years ☐ 51 and above ☐

3. How long have you worked in your organisation?

   Less than 1 year ☐ 1 – 3 years ☐ 4 – 6 years ☐ 7 – 9 years ☐

   10 years and above ☐

4. What is your level of education?

   JHS ☐ SHS ☐ HND Degree ☐ Masters ☐

   ☐ Other, Please specify……

5. Does your firm have a transport/logistic/supply chain/distribution department?

   Yes ☐ No ☐