MODERATING EFFECT OF COLLABORATIVE CAPABILITY ON THE RELATIONSHIP BETWEEN GREEN SUPPLY CHAIN MANAGEMENT PRACTICES AND PERFORMANCE OF MANUFACTURING FIRMS IN KENYA

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DECLARATION

This thesis is my original work and has not been presented for a degree in any other university or for any other award.

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This thesis has been submitted for examination with our approval as university supervisors.

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DEDICATION

This proposal is dedicated to my wife, Amalia kithure and my children for their support and encouragement.

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In all ways this work could not have been accomplished had it not been for God's grace. I thank God for enabling me accomplishing this work. I wish to acknowledge and thank my supervisors Prof. Willy Muturi and Dr. Noor Shallee for their constant guidance in ensuring that indeed this work was of the required standard. I express my special thanks to my family for being at my side all along, and for according all kinds of support that I needed. A special word of gratitude goes to you. My sincere appreciation goes to my colleagues both at Meru University and Jomo Kenyatta University of agriculture and technology for their concern, support and encouragement to forge ahead. They were always ready to answer the many questions I asked in my bid to make this work make a contribution to knowledge and the business world. God bless you all.

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ABBREVIATIONS AND ACRONYMS

CCA Climate Change Act

CG Corporate Governance

CCRA Carbon Reduction Initiatives

ECD Environmentally Conscious Design

ECIS Environmental Condition Indicators

GDP Gross Domestic Product

GLM Green Logistics Management

GMM Generalized Method of Moments

GOK Government of Kenya

GRI Global Reporting Initiative

GSCM Green Supply Chain Management

ISO International Organization for Standardization

KEBS Kenya Bureau of Standards

LCA Life Cycle Assessment Analysis

NEMA National Environmental Management Authority

NDP **New Product Development**

NGO Non-Governmental Organizations

RBV Resource-Based View

ROK Republic of Kenya

SCM Supply Chain Management

SMES Small and Micro Enterprises

TCE Transaction Cost Economics

UK United Kingdom

UNEP United Nations Environment Program

USA United States of America

USCAR United States Council for Automotive Research

WHO World Health Organization

DEFINITION OF TERMS

Collaborative capability Is defined as the actor's capability to build and manage network relationships based on mutual trust, communication and commitment (Hollos et al,2012).

Environmental performance Environmental performance is defined as measurable results of the environmental management systems relating to the management of the environmental aspects performed by the organization based on its environmental policies and objectives (Gupta *et al.*, 1998).

Green disposal Is described as refurbishing and reusing old computers and properly recycling unwanted computers and other electronic (Testa, F., & Iraldo, F. (2010).

Green distribution It refers to all activities to reduce/eliminate environmental damages and waste during shipment (Zhu, Sarkis & Lai, 2008).

Green manufacturing: Is a productions process which converts inputs into output by reducing hazardous substances, increasing energy efficiency in lighting and heating, minimizing waste by actively designed and redesigning green process. Green manufacturing requires products design that facilitate the reuse, recycle and recovery of parts and material components; avoid or reduce the use of hazardous products within production process; minimize consumption of materials as well as energy (Melnyk *et al.,* 2009manufacturers).

Green marketing Involves all the activities required to deliver the final product to the consumer. It may involve packaging transportation

location analysis, inventory management and warehousing (Green,Zelbst, Meacham &Bhadauria, 2012)

Green procurement Is the purchase of products and services that cause minimal adverse environmental impacts. It incorporates human health and environmental concerns into the search for high quality products and services at competitive prices (yang & zhang, 2012). Itrefers to the purchasing of products and services with specific attributes such as energy or water efficiency, or use of bio based or recycled materials or nontoxic chemicals

Green supply chain management It refers to the practice of improving environmental performance along the Supply chain, including product design, operations management, and custom relationships (Srivastava 2007) it is an approach used to design and or redesign the supply chain to Supplier ,manufacturer, distributor, wholesaler, retailer, customer, etc.), directly or indirectly, in producing and delivery products or services to ultimate customers – both in upstream and downstream sides through physical distribution, flow of incorporate practices that minimize the impact of a firm`s activities on the environment (Green, Zelbst, Meacham &Bhadauria, 2012)

Manufacturing firms Agus (2000) described the manufacturing industry as that which comprised of processing of raw materials, assembling products parts and repairing of manufactured products.

Supply chain A supply chain is a network that consists all parties involved (e.g. information and finances (Meltzer JT; 2001). Is the networking or integration of organizations that facilitate the flow of materials from Source to the ultimate consumer (Kumar &Chandrika, 2012).

ABSTRACT

In Kenya, the growing importance of green supply chain Management is driven mainly by the escalating deterioration of the environment characterized by diminishing raw material resources, overflowing waste sites and increasing levels of pollution. Green supply chain management has emerged as a set of managerial practices that integrate environmental issues into supply chain Management. If implemented successfully, green supply chain management can be a way to achieve competitive advantage while enhancing the environmental sustainability of the firm. Therefore, there is need to establish the effect of GSCM practices on manufacturing firms' performance and provide policy recommendations that can help encourage the adoption of more green practices. The study will also contribute to the discussion on green supply chain management practices from the perspective of their drivers and performance implications. The study sought to establish moderating effect of collaborative capability on the relationship between green supply chain management and performance of manufacturing firms in Kenya; The study adopted descriptive survey design using both qualitative and quantitative approaches. The study targeted 957 manufacturing firms in Kenya registered under the Kenya Association of Manufacturers as at the year 2017.A sample size of 386 firms was targeted and obtained by use of stratified random sampling. The theoretical background arose from the literature on competitive strategy, firm performance and green supply chain management. Primary data was collected using questionnaire that was addressed to firms operational and procurement managers. Descriptive statistics was used aided by Statistical Packages for Social Sciences version 21 to compute percentages of respondents 'answers. Inferential statistics using multiple regression and correlation analysis was applied to assist examining relationship between the research variable. The findings showed that green procurement, green manufacturing, green distribution and green disposal had significant and positive effect on performance of manufacturing firms in Kenya. Further, collaborative capability moderates the relationship between green procurement and firm performance, relationship between green manufacturing and firm performance, relationship between green distribution and firm performance and relationship between green disposal and firm performance. As such, adoption of flexible green procurement practices through appropriate research will help the manufacturing firm to meet diverse yet drastic changing needs as well as address challenges arising from a dynamic global business environment. Therefore, it is utmost necessary for the firms to use inputs with relatively low environmental impacts. The mediation variable in this research was collaborative capability. Collaborative capability provided evidence that a company can compete in market share, increase the economy, improve product networks, and improve the socio-technical landscape. By having effective collaborative capability, companies can reduce the environmental impact argued about by external parties to significantly maintain and improve firm performance

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study.

The expanding global economy has brought prosperity but also environmental degradation (World bank, 2012), such as climate change, ozone layer depletion, loss of biodiversity, pollution, degradation and the depletion of air, water, minerals and land (United nations environment program, 2012; World bank, 2012). These issues have become important to firms because their stakeholders, such as regulatory authorities, customers, competitors, non- governmental organizations and employees, are increasingly demanding that firms address environmental and social sustainability in business operations (Carter & Easton, 2011). GSCM has emerged one of the best innovative strategies to improved business competitiveness in a sustainable environment. On the other hand, many organizations worldwide are making an effort to purchase products and services which are less harmful to local and global environments (Nikbakhsh,2009).

Firms wishing to minimize their environmental impacts might discover that their ability to do so is dependent on their ability to manage increasingly complex supplier relationships (Ahi & Searc 2013).green supply chain management (GSCM) is an integration of environmental thinking into supply chain management, It is aimed at planning and controlling business processes from raw material suppliers and end-customer and links together partners in a supply chain which provides an excellent starting point for improving sustainability (Seuring, 2013). This research addresses the economic dimension of sustainability, particularly in the context of green procurement, green manufacturing, green distribution and green disposal. According to Brandenburg, Govindan, Sarkis & Seuring (2014), the focus of environmental management has shifted from firm level to supply chain level.

As a result, GSCM has emerged as a way to combine elements of environmental management and supply chain management (green jr, zelbst, mea]; Cham &

Bhadauria, 2012). The whole life cycle of a product is taken into account, from product design to end-of-life management (Srivastava 2007). Firms tend to adopt GSCM practices due to external factors, which are mostly linked to stakeholder pressure and internal factors stemming from business-led strategic processes (Ashby, Leat & Hudsonm, Smith, 2012).

In a survey by McKinney (2014), 43 per cent of respondents said that their company seeks to align sustainability with their overall business goals. Previous studies argue that properly designed environmental management in the supply chain can create competitive advantage and result in performance improvements (Pagell & Shevchenko, 2014). Following this stream of thought, the present study sought to exam the effects of collaborative capability on the relationship between green supply chain management practices and the performance of manufacturing firms in Kenya. Pollution prevention seeks to prevent waste and emissions at the source instead of at the end-of-the-pipe. Sustainable development, which goes beyond simply reducing environmental damage, encompasses economic and social concerns. A significant body of GSCM research has examined the competitiveness effects of these strategies, pollution prevention in particular (Winter & Kneeler, 2013). In another study, Bonney (2011) confirmed that, investing to reduce environmental costs improves environmental performance and increases total profits of the firm.

Manufacturing firms in kenya just like other organizations throughout the world are increasingly becoming aware of the danger posed by environmental issues such as global warming, carbon emissions, toxic substance usage, and resource scarcity. It is this worrying realization that has made policy makers and activists advocate for going green, and many organizations including manufacturing firms throughout the world have responded to this by adopting green supply chain practices (Xie & Breen,2012).

1.1.1 Global Perspective of Green Supply Chain Practices.

Both locally and globally consumers and governmental entities have begun to demand that processes, products, and services be environmentally friendly, it is

important that managers identify and implement environmental sustainability practices that extend throughout their supply chains. The world manufacturing managers are responsible for the performance of the organizations for which they work (Green *et al*.,2012).

In India, both manufacturing and service organizations consider the impact production processes have on the environment and the economic viability of the firm as well as on the environmental performance. They link success of a manufacturing firm to supply chain and there are concerted efforts by businesses to adopt green production strategies. Customers and governmental entities have begun to demand that processes, products, and services be environmentally friendly, therefore making it important for managers to identify and implement environmental sustainability practices that extend throughout the supply chain (Mud gal, Shankar, Talib & Raj, 2010).

In the USA, United States council for automotive research (USCAR), a research institution involved not only in the major car manufacturers, but also the suppliers, materials manufacturers, universities and relevant industrial associations, prepares database about scrap parts and materials to identify how to recycle and reuse the materials. Scrap dealers have extracted 95% of the aluminum and steel and major brass and copper from 10 million scrap cars per year that they have sold to secondary recycling market. Close to 75 percent of car crap materials are recycled at present (Diabetes & Govindan,2011).

In Malaysia, the manufacturing industry is the largest contributor to the country's pollution index. A lot of efforts are being put into minimizing environmental footprints of the manufacturing industry to enhance environmental protection and sustainable development. It is on this basis that, green supply chain management (GSCM) practices are now gaining popularity as a management approach in facilitating matters related to environmental issue and firms ‘performance. However, GSCM practices are still less adopted by manufacturing firms in Kenya.

1.1.2 Regional Perspective of Green Supply Chain Practices

In Nigeria, the overall focus is on cost reduction. There are some main drivers behind applying GSCM in a manufacturing industry, such as straightforward cost reduction to facilitate the development of co-operative relationships with suppliers and encouraging life-cycle. Despite there being an increasing green environment awareness, there is still slow implementation of GSCM across enterprises in Nigeria leading to a general consensus that turning the awareness and pressures into practices will take some time in the manufacturing sector (Ojo, Mbowa & Akinlabi, 2014). In south Africa, the concept of GSCM has been adopted by a number of manufacturing plants and is now being applied in full scale. After overcoming initial challenges associated with policy implementation, these firms are now reaping maximum benefits from green operations and operate at a relatively more competitive position than other firms that are yet to internalize the concept. Woolworths, for instance, are offering environmentally-friendly products, and are charging premium prices for them. They are also able to charge higher prices for organic food, since people are more than willing to pay for organically grown food. It is this sustainability in production that has offered the manufacturing firms a distinct competitive advantage (Mazumder, 2010). Manufacturing firms that have not yet adopted GSCM are being phased out of the market due an increasing aspect of competitive advantage.

Research on GSCM in the food industry in Tanzania has shown that the food industry has failed to tap the advantages of GSCM concept due to misunderstanding of the concept (Ruteri & Xu, 2009). There are no formal structures which are well laid to enhance adherence to the GSCM by the manufacturing firms in the country.

1.1.3 Kenyan Perspective of Green Supply Chain Practices

The global market for our products is threatened by "international green trade barriers" which directly affect the business competitiveness in the local and global market (Muma, Nyaoga, Matwere & Nyambega, 2014). It is therefore important that green economy be embraced for conservation of the environment and natural resources. In this regard, the Ministry is expected to formulate policies, standards and

procedures to support the implementation of sustainable development. Customers in Kenya increasingly incline to the environmentally friendly products due to a large number of unethical business practices in the consumer goods industry that have been exposed (Mwaura, Letting, Ithinji & Orwa, 2016). Despite Kenya being a major manufacturing country which brings opportunities, it faces substantial burden on the environment. The multinational organizations and developed countries are using third world countries such as Kenya as their point for disposal of end-of-life products which has resulted to environmental degradation (Jemutai, 2014).

Kenya has launched a strategic plan to provide a roadmap for Kenya ‘s transition to a green economy. Green supply chain practices emerge as a new systematic environmental approach in supply chain management and have been increasingly accepted and practiced by forward thinking organizations in Kenya. The current environmental requirements that influenced manufacturing activities has increased attention in developing environmental management strategies for supply chain. Thus the concept of GSCM is becoming an important factor for business activities (Barasa, 2017). This economic power demonstrates the influence that manufacturing firms in Kenya have on the supply chain, hence the need for greening their processes (Okemba, 2014).

Manufacturing Firms in Kenya

The manufacturing sector in Kenya constitutes 70 per cent of the industrial sector contribution to GDP (Ker, 2013). Kenya vision 2030 identifies the manufacturing sector as one of the key drivers for realizing a sustained annual GDP growth (Ker, 2013). This sector has the potential to generate foreign exchange earnings through exports and diversify the country ‘s economy (Awino, 2011).

The contribution of the manufacturing sector to GDP has continued to stagnate at about 10 per cent, with contribution to wage employment on a declining trend (Rok, 2013). Kenya ‘s share of manufacturing exports to the global market is about 0.02 per cent. While this compares favorably with neighboring Uganda and Tanzania, the performance is unimpressive compared with South Africa, Singapore, china and

Malaysia. For example, south Africa ‘s global share of manufacturing exports is about 0.3 per cent, while that of Singapore and Malaysia are about 2.4 per cent and 1.3 per cent, respectively. According to a recent Kenya economic report low value addition and high costs of production impede competitiveness of Kenya ‘s manufactured products in the global market (Rok, 2013).

A number of empirical studies have been carried out in the manufacturing sector in Kenya. For instance, Okello and Were (2014) found out that product development process, inventory management, lead time, technology and innovation have a significant influence on the performance of the firms. Stephen, tom and Julius (2012) found out that there exit low level implementations of the green supply chain management systems in the manufacturing industries in Kenya while Margaret (2013) indicated that different firms adopt practices that best suit their sector in order to enhance supply chain performance. Notably, few studies have combined green supply chain practices and environmental performance being moderated by existing formal governance mechanisms.

1.2 Statement of the Problem

Manufacturing firms are under a lot of pressure to develop and incorporate eco-friendly measures (Murphy, 2012). Many countries have put in place programs with a purpose of reducing production to landfill, (Hasan, 2013). As a result, eco-friendlier activities are being embraced by various industries such as the integration of design for the environment into their products (Murphy, 2012) and the use of sustainable distribution practices. Manufacturers therefore must appreciate the requirements and ensure that their products conform to the regulations. The export of products manufactured in Kenya is threatened by‒international green trade barriers" which directly affect business competitiveness in the global market. Consumers, investors, shareholders and regulatory agencies are increasingly demanding that organizations behave in an environmentally responsible manner (Mwaura, Letting, Ithinji & Orwa, 2016).

Social and political concerns about the environment in Kenya have increased in the

recent years. Recently, the Kenyan government has established a new environmental management and natural resources act, that aims to ban the use, manufacture and importation of all plastic bags used for commercial and household packaging, a move which was faced by huge protests from the manufacturers (Mwiti, 2017). Srivastava (2010) argue that success in the environmental protection contributes to the building of a positive image for customers and provide many new opportunities to expand business thus improving the environmental as well as the overall performance of a firm.

However, it is not just about being environment friendly; it is about good business sense and higher profits. With increase in environmental concerns during the past decade, a consensus is growing that environmental pollution issues accompanying industrial development should be addressed together with supply chain management (Sheu, Chou & Hu, 2015). However, there was need for more research in the area as most of the previous studies had not focused on GSCM and their link to business performance. Although there was a growing body of literature supporting the view that–being green pays off (king & Lenox, 2001; Rao & holt, 2005; de Giovanni & Esposito Vinz, 2012; yang *et al*, 2013; Zhou *et al*, 2013), it was necessary to shed light on which type of GSCM practices are most effective in terms of performance. The unclear performance outcomes of GSCM practices might be an obstacle for firms seeking to justify GSCM implementation (Zhou *et al*, 2015). Although it seems that environmental sustainability is a source of competitive advantage for an increasing number of firms, the relationship between competitive strategy and GSCM remained unclear. Given the inconclusive results of previous studies, it remained unclear if firms that comprehensively adopt GSCM perform better.

This study therefore sought to establish the influence of green supply chain practices on the performance of manufacturing firms in Kenya and whether the firm ‘s level of collaboration moderates the relationship between GSCM practices and firms ‘performance. A significant number of GSCM studies have investigated whether the implementation of green supply chain management strategies leads to enhanced firm performance (Sarkis 2012). Although there was a growing body of literature

supporting the view that–being green pays off (King & Lenox, 2001; Rao&holt, 2005; de Giovanni & Esposito Vinz, 2012; yang *et al*, 2013; Zhou *et al*, 2013), it was necessary to shed light on which type of GSCM practices are most effective in terms of performance hence the need for this study.

1.3 Objectives of the Study

1.3.1 General objective

The general objective of the study was to establish the effect of collaborative capability on the relationship between green supply chain management practices and the performance of manufacturing firms in Kenya.

1.3.2 Specific objectives

To establish the effect of green procurement on the performance of manufacturing firms in Kenya

To establish the effect of green manufacturing on performance of manufacturing firms in Kenya

To establish the effect of green distribution on performance of manufacturing firms in Kenya

To establish the effect of green disposal on performance of manufacturing firms in Kenya

To establish the moderating effect of collaborative capability on the relationship between green supply chain management practices and performance of manufacturing firms in Kenya

1.4 Research Hypotheses

The study will seek to address the following research hypotheses:

H_{01} Green procurement does not significantly affect performance of

manufacturing firms in Kenya

H_{02} Green manufacturing does not significantly affect performance of manufacturing firms in Kenya

H_{03} Green distribution does not significantly affect performance of manufacturing firms in Kenya

H_{04} Green disposal does not significantly affect the performance of manufacturing firms in Kenya

H_{05} Collaborative capability does not have a significant moderating effect on the relationship between green supply chain management practices and the performance of manufacturing firms in Kenya

1.5 Justification of the Study

Empirical analysis of green supply chain management practices and how these practices affect performance of manufacturing firms in Kenya would provide valuable information to the management of these firms and policy makers apart from providing materials of intellectual pursuits. It will improve operations and provide solutions to the environmental challenges. The study of manufacturing firms in relation to environmental impact and their place in supply chains is relevant as it will provide insights of significant importance to a number of key stakeholders who are after eco- value. Some of the stakeholders who can find the findings of the study useful include government policy makers, Kenya association of manufacturers, management of manufacturing firms and academicians.

1.5.1 Government Policy Makers

Understanding and analyzing the GSCM practices adopted by manufacturing firms will help policy makers in government ministries and other state agents involved with environmental matters including NEMA and KEBS to come up with specific sound policies and programs that will actively stimulate the growth and sustainability

of the manufacturing industry and the entire economy. Collaborative relationship among the members of supply chain is one of the drivers of a successful green supply chain practices. Governments can thus leverage on the information generated through this research to formulate the right policies and regulations to respond to environmental issues and to improve the economic and social welfare of its citizens. The government was motivated to direct more resources in support of research and development of studies on GSCM. It will need to create awareness of this critical area that requires urgent focus.

1.5.2 Kenya Association of Manufacturers

The findings of this study will provide the association with valuable policy recommendations that will guide the activities of member corporate firms to enhance business sustainability. The KAM is solely responsible for activities of large manufacturing firms through promotion of trade and investment, upholding trading standards, encouraging formulation, enactment and administration of sound policies that facilitate a competitive business environment and enhancing overall reduction of production costs. By adopting policies geared towards promoting green production and green supply, KAM was addressing global environmental issues that have engulfed production for many years and therefore they will rely heavily on the recommendations of this study for policy guidelines. The study will offer an understanding on the importance of adopting GSC practices and will therefore improve their environmental performance and competitiveness in the manufacturing industry.

1.5.3 Management of Manufacturing Firms

The findings of this study will assist the managers to make sound and informed strategic management decisions and enable them to focus on their customer ‘s demand more efficiently. With such exposition, managers will understand how firms can perform better and add value to the shareholders under green supply chain practices orientation. Green supply chain is one of the most recent innovations for the enhancement of capabilities of supply chain management. Environmental issues,

referred to in economics as externalities are critical for business performance and very little research has been done in this study to analyze the effects of GSCM practices on environmental performance since most studies have linked it to overall firm performance.

1.5.4 Academicians and Scholars

With availability of scanty information linking GSCM to environmental performance of manufacturing firms in Kenya as argued by green *et al*. (2012) that there is a lack of empirical research that looks into GSCM from a holistic and integrated perspective, academicians and scholars are therefore expected to find this study helpful as its finding was based on a thoroughly researched statistical data across all the manufacturing firms in Kenya. The study has recommended areas of further studies which future scholars can conduct study in.

1.6 Scope of the Study

The study specifically sought to establish the most influential green supply chain management practice on the performance of manufacturing firms in Kenya with collaborative capability as a moderator. This study target 757 manufacturing firms in Kenya registered under the Kenya association of manufacturers as at 2017. The reason why the study focused on the manufacturing firms is because of their overall production impact on the environment that is second to none according to the 2017 Nema report. A sample size of 386 firms was targeted. The units of observation were operation managers and procurement managers.

1.7Limitation of the Study

This study makes significant contributions to academic research knowledge and practices on influence of collaborative capability on the relationship between green supply chain management practices and the performance of manufacturing firms in Kenya. However, limitations that provides opportunities for further research were experienced at the empirical stage of study.

1.7.1 Methodological Limitation

The limitations of this study were largely related to the methodologies used. The limitations of this research is restricted to only those manufacturing firms registered under KAM hence the data collected is only relevant to this part of the total population. This study, emphasized more on quantitative approach rather than qualitative.

1.7.2 Reluctant to Provide Information

The other limitation is that some respondents were reluctant to answer questions while others gave exaggerated information. The researcher however, was able to convince them with a promise to keep all information confidential. Also, to address this, the researcher made sure that the management was in support.

1.7.3 Managers Lack of Time

The other limitation of the study was dealing with the busy managers, some of whom did not have time to fill questionnaires. It was difficult to obtain sufficient information from such respondents. However, for most of the respondents who were busy or were not able to fill the questionnaire within the required time; the researcher gave them an ample time to fill the questionnaires.

1.7.4 Fear of Information Privacy

Finally, study participants were adamant in filling the questionnaire because of fear that the information might be revealed to their competitors. These fears were countered by assuring them that the information given was solely utilized for academic purpose. This was supported by a letter from the University authorizing data correction.

CHAPTERTWO

LITERATURE REVIEW

2.1 Introduction

This chapter presents literature review of the theories that inform the variables in this study that is green procurement, green manufacturing, green distribution and green disposal. Similarly, it reviews both critical and empirical literature of all the key variables stated. It also provides a summary and critique of the literature reviewed and finally presents a conceptual research framework which forms the basis for the research hypothesis.

2.2 TheoreticalReview

The theoretical perspective relevant to this study was based on green supply chain practices that were presumed to influence the effectiveness of a business value chain consequently affecting environmental and economic performance of manufacturing firms in Kenya. This study was informed by natural resourced based view theory, transaction cost economics theory, institutional theory and the resource dependence theory.

2.2.1 Natural Resourced Based View

The resource-based view (RBV) was first developed by Werner felt (1984) who perceived a firm as a broader set of resources compared to the traditional view which accounts only for categories such as labor, capital and land. The extension of the RBV to the natural-resource-based view (NRVB) is widely used in explaining why firms adopt GSCM. The NRBV posits that strategy and competitive advantage can be created from capabilities facilitating environmentally sustainable economic activities (Hart 1995). Hart argues that for a resource to be valuable, rare, inimitable and non-substitutable, it must possess three characteristics: it must be causally ambiguous, socially complex and firm specific.

However, the potential importance of resources was understood much earlier. In the 1930s, economists, such as Edward Chamberlin and Joan Robinson highlighted firm heterogeneity (Fahy 2000). The idea was later developed by Edith Penrose (1959) who argued that the internal resources of affirm have a profound impact on the growth of the firm. A resource is‒anything which could be thought of as a strength or weakness of a given firm‖. The resources a firm possesses can provide a source of competitive advantage (Barney 1991).

Although the requirement for firm-specificity has been challenged, the relational view posits that organizational capabilities can be developed beyond organizational boundaries by combining resources existing in different supply chain members (Dyer & Singh 1998). These resources are causally ambiguous and socially complex and thus difficult for competitors to imitate (shi *et al*. 2012). The relational view has been combined with the NRBV (Vachon & Klassen 2008; shi et al. 2012) to argue that environmental management in the supply chain can create competitive advantage. Environmental collaboration can lead to the development of knowledge-sharing routines and the development of the capability to integrate external resources (Vachon & Klassen, 2008).

Thus, the theory was relevant to the study as NRBV theory is often used to explain more strategic motivations of GSCM adoption, such as why firms operating within the same context (market or industry) pursue different GSCM strategies despite experiencing similar institutional pressures (Testa & Iraldo 2010). According to the theory, environmental management in the supply chain can create competitive advantage to those practicing it. It highlights the whole concept of adopting this practice. Availability of the necessary infrastructure will make adoption of green practices easier hence the theory links to the independent variable of the study which is infrastructure.

2.2.2 Transaction Cost Economics Theory

The transaction cost economics theory was first proposed by Williamson in 1981 and later expounded by Sarkis *et. A* ,(2011). The theory explores how much effort and

cost is required for two entities to complete an economic exchange or transaction which includes searching costs, bargaining costs and control costs. Concerning environmental practices, information costs are associated with learning about new technologies, ideas, competitive landscapes, and even determining the costs of acquiring competency in a given arena (Avdagic, 2011). Bargaining costs accumulate primarily due to the time and effort involved in bargaining and developing an agreement (Avdagic, 2011). Time spent on bargaining activity reduces the time available for primary functions (Pearce 1997).

Finally, transaction costs are incurred when monitoring the sustainability performance of suppliers (Varsei, Soosay, Fahimnia, & Sarkis, 2014). It should also be noted that the supplier might not be willing to invest in deepening the relationship if the transaction costs for meeting a particular buyer ‘s environmental requirements are considered to be too high (Avdagic, 2011). The theory of TCE explains which transactions should be performed internally by the firm, which activities should be done outside of the firm through market mechanisms and why (Avdagic, 2011). The traditional make-or-buy decision can be extended to environmental issues.

Firms might consider outsourcing some environmentally damaging processes in order to reduce liability, clean-up or image costs, or to gain environmental expertise (Sarkis *et al.* 2011). Firms with environmental specialties can have competencies and skills in areas such as environmental restoration, the transportation of hazardous materials and environmental product design, while the outsourcing firm can concentrate on core competencies instead of devoting time to developing additional skills (Zsidisin & Siferd 2001). However, this type of outsourcing might result in increasing monitoring and control costs (Sarkis *et al.* 2011).

Moreover, the GSC practices as explained by Vachon and Klassen (2006) can also be examined from the TCE perspective. Also, environmental monitoring corresponds to the externalization dimension of the TCE framework and environmental collaboration to the internalization dimension. While there might be substantial initial investment involved in a buyer–supplier relationship, collaboration helps firms reduce the costs of opportunism and monitoring (that are intrinsic to market

transactions) through the development of process integration and mutual trust (Cao & Zhang 2011). This theory was therefore relevant to the green distribution practice variable under consideration in this study.

2.2.3 Resource Dependence Theory

The resource dependence theory suggests that firms rely on others to provide critical resources, components or capabilities provided by others (Awaysheh & Klassen 2010). The dependence of one party provides the basis for the power of the other (Emerson 1962). Thus, firms with strong bargaining power can exercise control over weaker parties (Crook & Combs 2007). The diffusion of environmental practices in the supply chain can be explained with reference to the power development aspect of the resource dependence theory (Sarkis *et al*. 2011). Depending on their ability to control resources and potential substitutes, firms have several options for securing access to environmental resources. The procuring entity ‘s ability to motivate suppliers to commit to environmental partnerships is usually based on the supplier ‘s dependence of the buyer (Min & Galle 2001).

Large, dominant buyers are more likely to require environmentally friendly practices be adopted by their smaller supplier ‘s (min& Galle 2001). The party with the dominant market power can influence the 53 environmental policies and strategies of other supply chain members and dictate supplier participation in green supply chain activities, even though these might not be perceived as directly beneficial by suppliers (Caniëls et al. 2013). Brockhaus et al. (2013) found that their case companies had a tendency towards efforts initiated by the dominant firms and then forced onto the weaker upstream members rather than the development of long-term competitive advantage for the supply chain as a whole. However, the suppliers are likely to comply but only to reactively fulfil minimum requirements (Caniëls et al. 2013).

Although this approach might not be good in the long run, organizations might be unwilling to increase their dependence on other firms (Blockhouse et al. 2013). The resource dependence theory also suggests that firms lacking the required resources

are likely to develop relationships with others to acquire those resources (Sarkis et al. 2011). Due to their lack of capital and know-how, smaller firms try to comply with the environmental requirements of their larger partners in order to secure their continued access to resources in the supply chain (González et al. 2008). Given that manufacturers have augmented their collaborative efforts with selected first tier suppliers in order to address market demands, many suppliers have a strong justification to invest in and signal proactivity in sustainability-related practices in order to be selected for collaborative projects (Foerstl et al. 2015).

Incentives in buyer-supplier relationships can be grouped into competitive incentives, i.e. Suppliers are awarded present and future business based on their performance relative to other suppliers – typically in an arm ‘s length relationship; and cooperative incentives, i.e. A sharing of the benefits of increased performance within a dyadic buyer–supplier relationship based on their joint performance (Foerstl et al. 2015). Hence, environmental monitoring can be considered to consist mainly of competitive incentives while environmental collaboration involves mainly cooperative incentives. A supply chain is a network of all parties involved in the transmission of materials from their original source through manufacturing to the ultimate consumer. The theory is relevant to the study as it informs the green procurement variable in this study.

2.3 Conceptual Framework

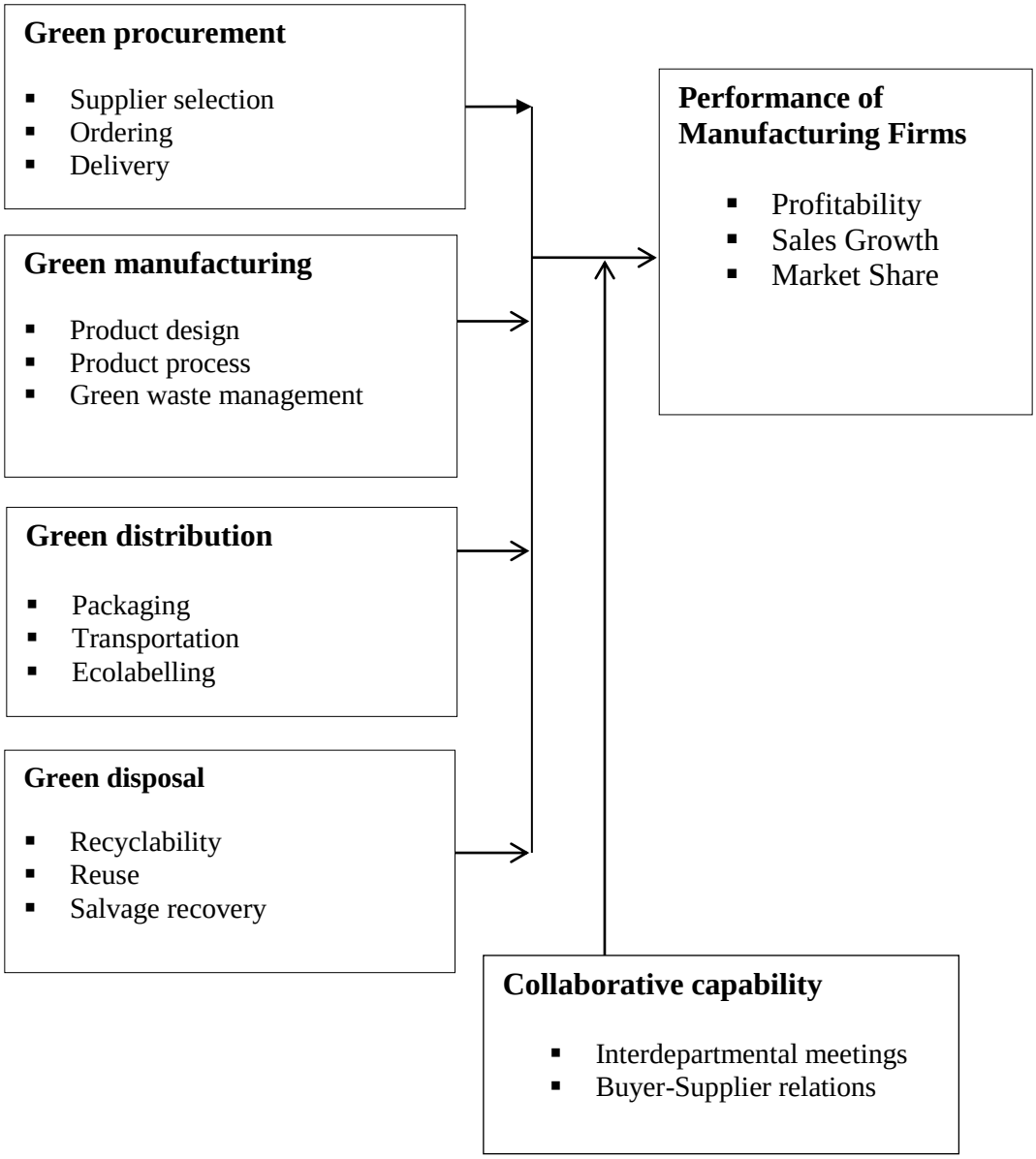

Figure 2.1: Conceptual framework

2.3.1 Green Procurement

Green purchasing is a key strategy for enterprises to reduce waste and improve efficiency and enhance competitiveness Green procurement is a set of supply-side

practices utilized by an organization to effectively select suppliers based on their environmental competence, technical and eco-design capability, environmental performance, ability to develop environmentally friendly goods and ability to support focal company's environmental objectives (Olson, 2009). Green procurement means purchasing products and services that cause minimal adverse environmental impacts. It incorporates human health and environmental concerns into the search for high quality products and services at competitive prices.

Yang and Zhang (2012), pointed out the potential aim of green procurement is to eliminate waste, and purchasing department will focus on value by comprehensive considering the total cost in the process of eliminating waste, which should focus on the business of waste disposal activities. Green procurement can also be construed as sustainable procurement; it means purchasing products and services that cause minimal adverse environmental impacts. It focuses on the practice of procuring products and services that are less harmful to the environment (land, air and water).

Green products purchased should be those that are made with less harmful materials or which when produced or used or consumed would have a minimal impact on the environment. This includes buying local and reducing your carbon footprint (Yang et.al, 2012). The kinds of materials from which a product is manufactured may substantially affect the environmental footprint of the product. For example, mining or logging may have low to high impact, depending on the practices of the companies involved, through energy and water use, waste production, and effects on health and ecosystems.

Research in this area has consistently shown that professional purchasers who consider environmentally preferable criteria in the procurement process have the power to reduce or even eliminate waste and environmental impacts as well as reduce costs. In fact, global experience and examples show how environmentally preferable criteria early in the procurement process improve the organizations 'environmental performance, while addressing ethics, social regeneration and economic concerns. In addition to improved environmental performance, many green products work as well or better than traditional products and can even save money

(Chin, *et.al*2015).

2.3.2 Green manufacturing

Green manufacturing (gm), is a process that integrates product and product design with issues of manufacturing, planning and control in such a manner to identify, quantify, access and manage the flow of environmental waste with the goal of reducing and ultimately minimizing environmental impact while also trying to maximize resources efficiency (Melnyk *et al.,* 2009). Green manufacturing is defined as production process which use inputs with relatively low environmental impacts, which are highly efficient and which generate little or no waste or no pollution. The impacts of processes used in manufacturing products and developing services also vary. Manufacturing firms are under a lot of pressure to develop and incorporate eco-friendly measures (Murphy, 2012). Many countries have put in place programs with a purpose of reducing the quantity of packaging that enter the misuse flow so as to tackle the environmental effect of packaging, (Hasan, 2013). As a result, governments have adopted environmental policies and regulation frameworks in their administration production to land fill. As a result, eco-friendlier activities are being embraced by various industries such as the integration of design for the environment into their products (Murphy, 2012) and the use of sustainable distribution practices. Manufacturers therefore must appreciate the requirements and ensure that their products conform to the regulations.

Manufacturing processes may differ in the efficiency of input use, the amount and kind of waste generated, and environmental effects on ecosystems and human health. Such impacts may be reduced by manufacturers through various means, ranging from improvements focusing on individual factors such as amounts and sources of energy used, to integrated approaches such as lean manufacturing techniques, which aim to reduce waste and improve efficiency throughout the manufacturing process.

It can lead to lower raw material costs, production efficiency gains, reduced environmental and occupational safety expenses and improved corporate image (Ninlawan *et al.,* 2010). Green technology and eco- innovation is one the green

manufacturing practices. It is the driver in the move towards green and low carbon economy. Many organizations view the application of green manufacturing technologies as the corner stone for their policies for economic growth (Defra, 2008).

Green manufacturing converts inputs into output by reducing hazardous substances, increasing energy efficiency in lighting and heating, minimizing waste, actively designing and redesigning green processes (Newman, & Jensen, 2013). Green products generally require fewer resources to manufacture and operate, so savings can be made on energy, water, fuel and other natural resources.

Green manufacturing requires manufacturers to design products that facilitate the reuse, recycle and recovery of parts and material components; avoid or reduce the use of hazardous products within production process; minimize consumption of materials as well as energy (Newman, *et.al* 2013). It is a sustainable form of manufacturing that integrates the life cycle concept, including green designs, production and distribution of raw materials, maintenance and disposal processes which minimize resource depletion. Products are generally produced in a manner that consumes fewer natural resources or uses them more sustainably. They may involve less energy in their manufacture and may consume less energy when being used (Newman, *et.al*2013).

2.3.3 Green Distribution

Green distribution consists of, green packaging, marketing, transportation, storage, sales and green logistics. Packaging characteristics such as size, shape and materials have an impact on the distribution (Zhu, Sarkis & lai, 2008). Better packaging along with rearranging loading patterns can reduce materials usage, increase space utilization both in the warehouse and trailer and reduce amount of handling required. Some of the green distribution practices are: green design which is the use of environmentally conscious design (ECD) and life cycle assessment analysis (LCA) with the aim of developing and understanding how design decisions affect the product environmental compatibility (Glantsching, 1994; Chandra, 1991) and also waste minimization (Johnson, 1998; Sarkis & Cordeiro, 2001).

Environmental labeling/ Eco labeling is another practice of green distribution. It entails describing the information of a product about the environmental impact associated with the production or use of the product (Zhu, *et.al* 2008). It is important that environmental concerns are taken care of by offering environmentally friendly products through environmentally friendly distribution and marketing system. Green distribution is achievable through; green packaging, green transportation and logistics (Nimawat & Namdev, 2012).

According to Ninlawan *et al.*, (2010 green packaging involves downsized packaging and use of green packaging materials. They also point out the need to cooperate with vend ors to standardize packaging, encourage and adopt returnable packaging methods, promote recycling and reuse of packaging materials. The storage facility is another important aspect of green distribution. The storage facility should be capable of storing different categories of materials.

In addition, the design and construction of storage facilities must meet the requirements of non- polluted environment, while strengthening maintenance of good humidity, corrosion, waterproofing among other factors (zhang & zheng, 2010). Key in distribution is transportation, according to Al-odeh and Smallwood (2012), factors like fuel, modes of transport, infrastructure, and operational practices are important factors to consider in developing green transportation.

2.3.4 Green Disposal

The fate of a product after its useful life has ended may also have significant impacts. Products may be discarded into landfills, refurbished and reused, or recycled—disassembled and parts and materials recovered and reused. Each of those alternatives will have impacts that vary with the kind of product and the processes chosen. While reuse and recycling are generally considered environmentally preferable where possible, the ways in which those processes are carried out can vary significantly in impact. For example, computers and other electronics may be recycled for disposal. It may not be possible to determine before disposal how items were recycled. Such waste is often exported.

Recycling by recipients may be performed in ways that are dangerous to the health of workers and damaging to the local environment. Another method used to reduce the impact of disposal is leasing or other forms of ―product takeback‖ at the end of the life cycle. With this approach, a vendor of a product agrees to accept those disposed of by users and recycle them or make them available for reuse. An automobile trade-in is a classic example of this approach, but it is used increasingly with other kinds of products such as electronics.

2.3.5 Performance of Manufacturing Firms in Kenya.

An increasing number of studies have addressed the relationship between environmental sustainability and firm performance. Yet the findings from these studies have been inconsistent, giving practitioners no clear answers as to what actions would be beneficial to pursue (Golicic & Smith 2013). On the one hand, the implementation of GSCM practices is anticipated to result in environmental performance improvements in a firm. However, there is a concern that such practices might not translate into improvements in financial performance, such as profitability or market share (Green et al. 2012b).

GSCM is a way to minimize the risk of potential losses resulting from poor environmental performance by the focal firm or by firms in the same industry. Barnett and King (2008) pointed out that negative events, such as chemical spills, can have a profound effect on the whole industry. They demonstrated that firms can voluntarily come together with industry self-regulation to prevent harmful spillover effects, such as reputational risks, which could, in turn, damage the financial performance of the firms. The threat of new legislation or regulations and activist campaigns targeted at firms in the same industry can stimulate other firms to act proactively to avoid being targeted (Reid & Toffel 2009).

The results of the previous studies tend to support the positive relationship between GSCM practices and financial and/or economic performance (e.g. King & Lenox 2001 a; Rao & Holt 2005; Zhu et al. 2008; Azevedo et al. 2011; Green et al. 2012b). Although the great majority of previous studies acknowledges the positive effect of

GSCM on financial performance, there is a small number of studies with contradictory results. For example, Cordeiro and Sarkis (1997) found a negative connection between environmental pro-activism and earnings-per-share performance forecasts, and Wang & Sarkis (2013) found a negative relationship between environmental SCM programmers and financial performance.

Hence, while an increasing number of studies have examined the relationship between GSCM and performance, the field could benefit from an examination of more nuanced relationships and a larger set of performance metrics. Internal GSCM practices, such as top management support, environmental management systems and certifications, have been recognized as comprehensive mechanisms for achieving superior performance (Yu et al. 2014). Building on the natural resource-based view, Shi et al. (2012) argue that intra-organizational environmental practices develop over time in organizations and create tacit knowledge and efficient management routines that are causally ambiguous to the competitors and, consequently, improve organizational performance It can facilitate inter- organizational learning (Vachon & Klassen 2008) and support efficiency and synergy among business partners (Yang et al. 2013), which can translate into better financial performance.

2.3.6 Collaborative capability

From the dynamic capability perspective, collaborative capability is defined as a firm's ability to manage any inter firm cooperation by identifying, building and adapting its partnerships (Lambe et al., 2002; Schreiner et al., 2009; Sivadas and Dwyer, 2000; Tyler, 2001).10 Jul 2020. (Feng Zhang, Lei Zhu 2020) in His study collaborative capability and new product development performance, found that Firms with strong collaborative capability are identified to gain better knowledge acquisition from their partners and achieve higher NPD performance. While acquired technological knowledge has a greater effect on NPD creativity than acquired marketing knowledge, the latter has a greater effect on NPD speed. In addition, these two types of knowledge acquisition form different mediating paths between collaborative capability and NPD performance.

Profitability

Reducing the total costs of sourcing materials reduces the costs of goods sold and subsequently contributes to profitability (Zsidisin, 2003). Reduction of inventory holding costs through proper inventory management also contributes to the profitability of a firm (Stapleton et al, 2002). Reduction of current assets such as inventory helps a firm to improve the utilization of assets and thereby increases the profits of a firm (Peterson, 2015). In addition, reduction of inventory reduces the operational costs that are associated with holding inventory. This reduces the amount of capital tied up in stock which in turn increases the liquidity of a firm

Sales Growth

A research carried out by (McKinsey& Company, 2011) showed that 31-40% of the respondents indicated that the company executives rarely meet with the sales representatives to discuss supply chain tensions. The study also indicated that the sales and marketing department has difficulties collaborating with other functions such as manufacturing and planning. Supply chains constantly struggle with volatile demand because a rise in order volumes increases labor and distribution costs. Inaccurately forecasting sales can similarly lead to stock outs, loss of sales or increased inventories which are sold at a discount to move it off the shelf.

There is need therefore to develop proper planning and forecasting processes in order to enable and predict volatility in demand (McKinsey& Company, 2011). Results of a study carried out by Ray et al (2014) shows that there is a positive relationship between increased levels of service, customer retention and sales volume. With growing consumer awareness about the environment, a number of environmentally conscious consumers are willing to pay more for eco-design products (Akehurst et al. 2012) Improvements along the supply chain therefore must be focused on reducing costs without negatively impacting on customer service, or improving services without disproportionately increasing costs.

Moreover, continuous eco-design innovations not only improve a firm’s image as a

green champion but also serve as the principal source of competition, leading to higher sales growth (Chen 2008). For example, Toyota Motor Corporation has introduced an LCA system called Eco-VAS (Eco-Vehicle Assessment System) to heighten the environmental performance of its vehicles (Nakano et al. 2017). The Toyota Prius has earned a reputation as the first hybrid car, achieving significant sales growth since its introduction in 1997. Therefore, it is reasonable to expect that eco-design contributes to financial performance as well as environmental performance.

Market Share

According to Wharton (2011) manufacturers today are more focused on timely delivery of complete, damage free and correctly invoiced products to the customers. The number one asset to the company is the customer and therefore delivery of products the right products on time is key to maintaining a strong relationship with the customer (lee, 2004). Manufacturing firms are now focused on reducing risks that affect their relationship with the customers by implementing automated processes that allow visibility of the orders and the status of the shipment. Reliance on manual processes for customer and supply chain collaboration hinders the ability of the firms to manage the volatile demand, obtain demand signals in real time and this increases the risk of damaging the relationship between the firm and the customers (Wharton, 2011).

Customer satisfaction according to (Zerbini et al, 1007) is one of a firm ‘s major milestones to profitability. Companies are now focusing on satisfying the customer with the sole aim of improving their competitive position in the industry (Rad, 2008). Success of a company depends on the ability of the supply chain partners to focus on the customer (Lee, 2004).

2.3.6 Collaborative Capability

A research carried out by (McKinsey& Company, 2011) showed that 31-40% of the respondents indicated that the company executives rarely meet with the sales

representatives to discuss supply chain tensions. The study also indicated that the sales and marketing department has difficulties collaborating with other functions such as manufacturing and planning. Supply chains constantly struggle with volatile demand because a rise in order volumes increases labor and distribution costs. Inaccurately forecasted sales can similarly lead to stock outs, loss of sales or increased inventories which are sold at a discount to move it off the shelfA significant number of GSCM studies have investigated whether the implementation of environmental supply chain strategies leads to enhanced firm performance (Sarkis 2012).

However, the results of these studies were mostly mixed, ranging from little or no improvement (Zhu et al. 2005). To explain these contrasting results, several researchers have explored factors that influence this relationship (Lopez-Gamero et al. 2009; Sarkis et al. 2010; Zhu and Sarkis 2007). Following this stream of thought, the present study intends to examine another possible moderating effect—collaborative capability, which can be defined as a firm‘s ability to leverage other actors‘ resources and knowledge (Kotabe et al. 2003; Koufteros et al. 2007; Patnayakuni et al. 2006). Collaboration relationships have helped firms to reduce transaction costs and create a sustainable competitive position in highly uncertain business environments (Cao and Zhang2011).

Recently, a number of major firms have begun to capitalize on the potential of supply chain collaboration in the implementation of green strategies. For instance, Coca-Cola has launched a wide range of collaborative green practices such as the Community Water Partnership (Reuters2011). Working jointly with bottling partners and environmental charities, it has developed Plant Bottle, the first recyclable plastic beverage bottle made partially from plants. Coca-Cola has also formed a strategic partnership with H. J. Heinz Company, which uses Plant Bottle for it sketch up. Despite the popularity of collaborative strategies, there has been little systematic research on the role of collaborative capability in the adoption of these strategies.

Shi et al. (2012) propose that inter-organizational environmental practices create socially complex resources that prevent competition by being difficult to imitate and

hence can be a source of competitive advantage. External environmental collaboration with supply chain partners implies that a firm is capable of effectively integrating internal and external knowledge, skills and technology (Yang et al. 2013). Environmental collaboration with customers helps a firm to identify and fulfil customer needs, whereas environmental collaboration with suppliers enables quick responses to customer requirements. Hollos et al. (2012) highlight that a supplier ‘s efforts to improve sustainability need to be combined with a buying firm ‘s internal efforts in order to achieve superior performance. Environmental purchasing can improve a firm's economic position by reducing disposal and liability costs, conserving resources and improving public image (Carter et al. 2000). GSCM with customers maximizes profits through reduced business waste and environmental costs and increases customer satisfaction (Azevedo et al. 2011).

2.4 Empirical Literature

This section reviews some of the existing studies conducted on the theme of the study. The empirical literature review has been done per objective that is green procurement, green manufacturing, green distribution, and green disposal A descriptive study by Eltayeb, Zailani and Jayaraman (2010) examined the enablers of green procurement among firms with environmental certification in Malaysia, specifically, the study focused on the impact of four drivers namely; legislations, client demands, societal expectations, and the desired gains from Green procurement in the Malaysian manufacturing sector. Using a random sampling research technique, they held key informant guided interviews with leaders of the corporations in the sample size. The results of the research revealed that green practices are influenced by legislations, client demands, societal expectations, the desired gains, and firm ownership. The study also indicated that despite firms adopting corporate social responsibility, it is not a convincing enabler for green procurement.

A study conducted by Blomea, Hollosby and Paulrajac (2013) to establish the effect of green procurement and green supplier development on supply chain performance of western European firms within the manufacturing and service sector used a target population comprising of senior corporate leaders from supply chain consulting

companies in Europe. Data was collected using questionnaires. The findings of the study indicated that green supplier development has a direct impact on supply chain performance.

Otanez and Glantz (2011) conducted a research on social responsibility in tobacco production in Tanzania and Malawi. The results of the study showed that tobacco industry uses green supply chains to make tobacco farming in developing countries appear sustainable while continuing to purchase leaf produced with child labor and high rates of deforestation. Results of the study further indicated that strategies to counter green supply chain schemes consist of securing implementing protocols for the who framework convention on tobacco control to regulate the companies' practices at the farm level.

Pembere (2016) conducted a study to determine the effect of green procurement practices on the supply chain performance of companies listed at the Nairobi securities exchange. The study adopted descriptive research design. The target population for the study was procurement managers of each listed company. The study used primary data. The findings of the study revealed that the adoption of green procurement practices improves the supply chain performance.

Another research by kyalo (2015) sought to evaluate the influence of green supply chain management practices on operational performance of alcoholic beverage manufacturers in Kenya. The study used descriptive design. The research also conducted a census on the study population. The target population for the study included 41 registered alcoholic beverage manufacturers operating in Kenya. Results of the study showed that manufacturers utilize lean production, use biodegradable materials and total quality management in their operations.

Nasiche et al. (2014) conducted a case study on determinants of green procurement in public sector. The study evaluated factors that affect implementation of green practices in public sector with a biased on Kenya pipeline company (KPC). The research discovered that internal capacities to implement green strategies and external motivators including demands from stakeholders and government legislation

affected adoption of green practices to a great extent. The issue of cost of implementation was not a major concern. The study showed that the institutional governance set up may be a success factor in going green. The major limitation is that the study only focused on one company; KPC. This makes the results inconclusive.

Preliminary findings on a study that was conducted by Ghazilla, Sakundarini, Abdul-Rashid, Ayub, Olugu, and Musa, (2015) on drivers and barriers analysis for green manufacturing practices in Malaysian Mses. used the Delphi survey method to explore, identify and verify the drivers and barriers of green manufacturing practices by obtaining consensus from a panel of experts were required to answer questionnaires in three rounds. The results of this study revealed several barriers and drivers towards adoption of for green manufacturing practices that included among others holistic intervention programmers; high commitment from various stakeholders, support from external stakeholders; internal organization, regulations, good environmental education, competitiveness; culture; use and availability of information.

Another study by Diabat and Govindan (2011), provided an in-depth analysis of the drivers affecting the implementation of green supply chain management. The paper investigated the responsibility of identifying twelve common drivers of green manufacturing from the combined assistance of existing literature, industrial managers, and expert opinion in the relevant field. A questionnaire on these common drivers was circulated among 120 leading firms in south India, and aided by their replies; a pair-wise comparison was made among the drivers. The analysis resorted to the use of a fuzzy multi criteria decision making (Mcdm) approach. The obtained results were validated by a two-stage sensitivity analysis of different de-russification methods that are further evaluated through the spearman coefficient and assigning varying weight to the essential top priority drivers of green manufacturing among all common drivers. The paper concluded with some insight into the future path of green manufacturing in developing countries and an acknowledgment of the study's own limitations.

A separate pilot study conducted by Gezen and Cankaya, (2013) on the effects of green manufacturing and eco-innovation on sustainability performance. Data for the study were collected through a questionnaire-based survey across 53 companies from automotive, chemistry and electronic sectors in turkey. The empirical model was - tested using regression analysis, to verify the hypothetical relationships of the study. The results of this study indicated that the green manufacturing applications have a significant positive impact on environmental performance and social performance. Additionally, eco-process innovation has a significant positive impact on corporate sustainability. However, eco-product innovation was not found to have a significant effect on any of the three types of performance.

A study by Deif, (2011) presented a system model for green manufacturing. The model captured various planning activities to migrate from a less green into a greener and more eco-efficient manufacturing. The various planning stages presented are accompanied by the required control metrics as well as various green tools in an open mixed architecture. The system model was demonstrated by an industrial case study. The proposed model provided a comprehensive qualitative answer to the question of how to design and/or improve green manufacturing systems as well as a roadmap for future quantitative research to better evaluate this new paradigm.

Mama, Nyaoga, Matwere and Nyambega (2014) conducted a study on green distribution using green packaging and logistics variables. This study which adopted a correlational research design was carried out to determine the effect of GSCM on environmental performance among tea processing firms in Kericho County-Kenya. The findings of this study indicated a positive relationship between green distribution and environmental performance. However, this study was carried out among tea processing firms where the product has an established market unlike food manufacturers who have to curve a niche in the market for their products.

Another study by Kankanit (2015) sought to examine the influence of green supply chain management on business performance of electronic industry in Thailand. The study used both email and telephone survey. The target population for the study was 81 electronic manufacturing firms. The findings of the study revealed that green

distribution have significant effect on competitive performance. The results further showed that green manufacturing and green distribution have positive and significant effect to economic and operational performance

Mwaura *et al* (2016) also sought to evaluate green distribution practices and competitiveness of food manufacturing firms in Kenya. The study used cross sectional survey. The target population for the study was 130 companies listed by Kenya association of manufacturers. The study used primary data collected using questionnaires. The results of the study indicated that technology has greatly influenced distribution techniques with more firms using the internet as a distribution channel.

Studies done by Amemba*et al.* (2013) suggest that better packaging and rearranged loading patterns reduces the use of materials, as well as increasing warehouse and trailers utilization. This also reduces the amount of handling required. Both studies indicate that green packaging involves use of packaging the goods into smaller units so as to reduce the amount of space and the materials used hence increasing warehouse utilization. Green distribution is achievable through; green packaging, green transportation (Dheeraj & Visual, 2012) and green storage.

The fate of a product after its useful life has ended may also have significant impacts. Products may be discarded into landfills, refurbished and reused, or recycled—disassembled and parts and materials recovered and reused. Each of those alternatives will have impacts that vary with the kind of product and the processes chosen. While reuse and recycling are generally considered environmentally preferable where possible, the ways in which those processes are carried out can vary significantly in impact. For example, computers and other electronics may be recycled for disposal. It may not be possible to determine before disposal how items were recycled.

Recycling by recipients may be performed in ways that are dangerous to the health of workers and damaging to the local environment. Another method used to reduce the impact of disposal is leasing or other forms of ―product takeback‖ at the end of the

life cycle. With this approach, a vendor of a product agrees to accept those disposed of by users and recycle them or make them available for reuse. An automobile trade-in is a classic example of this approach, but it is used increasingly with other kinds of products such as electronics.

A study by Obembe, Ojo and Ilori (2014) evaluated the effects of Technological Capabilities, Innovations and clustering on the performance of firms in furniture making industry in Southwestern Nigeria. The random sampling method was used from the furniture makers. Primary data was obtained using structured and unstructured questionnaires. Three hundred and sixty (360) questionnaires were administered to the furniture makers. The result showed a positive impact of technological capabilities, innovations, and clustering on the performance of the firms on new furniture products.

Similarly, Margarida, Maria and Madalena (2016) examined the impact of technological capabilities on organizational innovation and the influence of organizational innovation on export performance. Survey data of 471 exporting manufacturing firms based in Portugal was used to test the relationships between the constructs analyzed in this study. These were randomly selected from 3000 manufacturing firms. An online questionnaire, developed from the open source software Lime Survey, was the basis of the data used to test the model. The findings demonstrate that technological capabilities have a significant effect on organizational innovation intensity, which in turn has a positive impact on export Ahmed (2017) sought to examine the relationship between interdepartmental relations and its influence on the overall organizational performance: in the context of size of the organization and ownership. The random sampling technique was used in selection of the sample organizations that included the organizations from manufacturing and service sector. The structured questionnaire was adopted to get the structured and standardized responses for statistical analysis purposes. The survey method and face-to-face interview approach was used. The findings revealed that there is a relationship between departmental interrelations and organizational performance.

A study by Feng Zhang, Lei Zhu (2020) established Firms with strong collaborative

capability are identified to gain better knowledge acquisition from their partners and achieve higher NPD performance.

A study by Kyalo (2015) focused on green supply chain management practices and how they affect operational performance of alcoholic beverage manufacturers in Kenya. Sales growth was used as a measure of the operational performance. He used a descriptive design and carried out a census of the study population. The study found out that manufacturers employ lean production and total quality management in their operations and also use biodegradable materials. The major limitations were that the findings might not be consistent with other sectors and hence limiting replicability. Mugabe (2013) carried out a study to establish the relationship of green supply chain practices and the supply chain performance of pharmaceutical companies in Nairobi, Kenya. Methodology used was descriptive in nature and a census was adopted for all the target companies in the study population. The study discovered that majority of the pharmaceutical companies are not practicing the green supply chain practices, however most of them are using eco-packaging that are biodegradable and some have adopted reverse logistics strategies. Study shortcomings included a narrow focus on the pharmaceutical companies in Nairobi, and not all green supply chain practices were considered.

Nikos (2007) studied the effect of operational performance and focus on profitability of the U.S. airline industry. The study found that both operational efficiency and quality affects profitability. The study also found the relationship between operational performance and profitability to be contingent on a company's operating model. "Focused" airlines showed a link between late arrivals and profitability, while full-service airlines do not. Also, capacity utilization is a stronger driver of profitability for full-service airlines than for focused airlines. The study recommended that in operations management research, the benefit is more when longitudinal methodology is used, which would enable rigorously testing of operation management theories.

2.5 Critique of the Existing Literature

A study conducted by Blomea, Hollosby and Paulrajac (2013) to establish the effect of green procurement and green supplier development on supply chain performance of western European firms within the manufacturing and service sector used a target population comprising of senior corporate leaders from supply chain consulting companies in Europe. Data was collected using questionnaires. The findings of the study indicated that green supplier development has a direct impact on supply chain performance. The study was conducted in Europe a developed count but not in Kenya. The study was also based on the performance of the supply chain and not the performance of manufacturing industries.

On the other hand, Shi et al, (2012) pointed out that GSCM practices is a strategic asset that contributes directly to better firm performance. However, he did not indicate the magnitude to which each GSCM influences performance. In another study, Bonney (2011) confirmed that, investing to reduce environmental costs improves environmental performance and increases total profits of the firm

Pembere (2016) conducted a study to determine the effect of green procurement practices on the supply chain performance of companies listed at the Nairobi securities exchange. The study adopted descriptive research design. The target population for the study was procurement managers of each listed company. The study used primary data. The findings of the study revealed that the adoption of green procurement practices improves the supply chain performance. However, the study focused on Green procurement activities which although have a strategic and important function that interfaces focal company and supplies, is only one part of the GSCM practices. The study was not supported by any theories and it had no moderating variable.

Another research by Kyalo (2015) sought to evaluate the influence of green supply chain management practices on operational performance of alcoholic beverage manufacturers in Kenya. The study used descriptive design. The research also conducted a census on the study population. The target population for the study

included 41 registered alcoholic beverage manufacturers operating in Kenya. Results of the study showed that manufacturers utilize lean production, use biodegradable materials and total quality management in their operations. This study sought to evaluate the influence of GSCM practices on operational performance and not on financial performance.

Nasiche et al. (2014) conducted a case study on determinants of green procurement in public sector. The study evaluated factors that affect implementation of GP in public sector with a biased on Kenya pipeline company (KPC). The research discovered that internal capacities to implement green strategies and external motivators including demands from stakeholders and government legislation affected adoption of GP practices to a great extent. The issue of cost of implementation was not a major concern. The study showed that the institutional governance set up may be a success factor in going green. The major limitation is that the study only focused on one company; KPC. This makes the results inconclusive. The study lacked theories to support and show relationships among the variables. The study findings were limited to the descriptive case study and therefore, the findings cannot be generalized in the whole manufacturing firms because there are different manufacturing sectors which are unique from one another

A separate pilot study conducted by Sezen and Cankaya, (2013) on the effects of green manufacturing and eco-innovation on sustainability performance. Data for the study were collected through a questionnaire-based survey across 53 companies from automotive, chemistry and electronic sectors in turkey. The empirical model was tested using regression analysis, to verify the hypothetical relationships of the study. The results of this study indicated that the green manufacturing applications have a significant positive impact on environmental performance and social performance. The study did not investigate the influence of Green practice on the financial performance of the firm.

Another study by Kankanit (2015) sought to examine the influence of green supply chain management on business performance of electronic industry in Thailand. The study used both email and telephone survey. The target population for the study was

81 electronic manufacturing firms. The findings of the study revealed that green distribution have significant effect on competitive performance. The results further showed that green manufacturing and green distribution have positive and significant effect to economic and operational performance. The study was conducted in Thailand and therefore the findings cannot be Generalized to be applicable in Kenya.

Mwaura et al (2016) also sought to evaluate green distribution practices and competitiveness of food manufacturing firms in Kenya. The study used cross sectional survey. The target population for the study was 130 companies listed by Kenya association of manufacturers. The study used primary data collected using questionnaires. The results of the study indicated that technology has greatly influenced distribution techniques with more firms using the internet as a distribution channel. The study sought to evaluate the influence of Green distribution practices on the competitiveness food manufacturing industries in Kenya but not all manufacturing firms. The study did not also consider the influence of other GSCM practices.

A study done by Hasan (2013) using case studies concludes that green distribution has an important part to play in the link between environmental innovation and competitive advantage. This study concluded that the benefits achieved by companies were increased efficiency, reduced cost, improved risk management, improved service, increased profits. The study however, did not specify whether green distribution practices enhanced firm competitiveness or increased market share. However, the ability to create new products helps build a competitive advantage for organizations. Yet many firms may not be able to earn this image benefit due to consumers 'inability to discern how green the products from the supply chain are.

Another study by Sari and Vanginlar (2015) on the impact of green logistics practices on firm performance as an evidence from Turkish healthcare industry was based on explanatory factor analysis and regression methods while the current study will apply both descriptive and inferential statistics for analyzing the effect of green supply chain practices on manufacturing firm 's performance. This study was also

based in the Turkish healthcare industry while the current study establishes the effect of green supply chain practices on the Performance of manufacturing firms in Kenya

The studies by Blomea, Hollosby and Paulrajac (2013) to establish the effect of green procurement and green supplier development on supply chain performance of western European firms, Pembere (2016) on the effect of green procurement practices on the supply chain performance of companies listed at the Nairobi securities exchange, Nasiche *et al*. (2014) on determinants of green procurement in public sector, Ghazilla *et.al* (2015) on drivers and barriers analysis for green manufacturing practices in Malaysian Smes and Gezen *et.al* (2013) on the effects of green manufacturing and eco-innovation on sustainability performance all focused on a single green supply chain practice such as green procurement and green manufacturing practices on performance and not particularly on the same independent variable (green supply chain management) as the current study. According to Kankanit (2015), a number of green supply chain practices collectively affect environmental performance hence the aforementioned studies fail to factor in this condition.

In addition, the studies by Nasiche et al. (2014) on determinants of green procurement in public sector, Kankanit (2015) on green supply chain management on business performance of electronic industry in Thailand and sari and Vanginlar (2015) on the impact of green logistics practices on firm performance an evidence from Turkish healthcare industry were all based in different sectors compared to the current study that was conducted among manufacturing firms in Kenya.

A significant number of GSCM studies have investigated whether the implementation of green supply chain management strategies leads to enhanced firm performance (Sarkis 2012). Although there is a growing body of literature supporting the view that being green pays off (King & Lenox, 2001; Rao & Holt, 2005; de Giovanni & Esposito Vinz, 2012; yang *et al*, 2013; Zhou *et al*, 2013), it is necessary to shed light on which type of GSCM practices are most effective in terms of performance. The unclear performance outcomes of GSCM practices might be an obstacle for firms seeking to justify GSCM implementation (Zhou *et al*, 2015). Although it seems

that environmental sustainability is a source of competitive advantage for an increasing number of firms, the relationship between competitive strategy and GSCM remains unclear. Given the inconclusive results of previous studies, it remains unclear if firms that comprehensively adopt GSCM perform better. most literatures reviewed does not support their variable with the theories in order to help in understanding a phenomenon, in identifying the relationships among variables and in enhancing the generalizability of findings across different contexts (Foy et al. 2011). This study therefore seeks to establish the influence of green supply chain practices on the performance of manufacturing firms in Kenya and whether the firm‘s level of collaboration moderates the relationship between GSCM practices and firms ‘performance.

Azubuike (2013) attempted to find out the relationship between technological innovation capability and firm’s performance in new product development. Firms were selected randomly from the database from the Nigerian chamber of commerce. Survey design was adopted. The sample consisted of manufacturing firms drawn from six main manufacturing sectors in Lagos State, Nigeria. Ten firms were selected randomly and questionnaires were applied simultaneously through surveys and randomly selected face-to-face interview were arranged concurrently. The survey findings verified the existence of correlation between technological innovation and firm performance on new product development. The study did not also consider the influence of other capability practice such as collaborative capability.

Huda, Mohammad and Binti (2014) sought to find out the Influence of Knowledge Management Capabilities on Organizational Performance of Private University in Malaysia. The study employed a quantitative approach; the population of the study was the entire postgraduate students, academic and non-academic staff at the university. A non-probability convenience sampling technique was employed. A total of 39 respondents participated in this study. Data was collected using Questionnaires. The casual effect of the relationship was tested by using regression analysis. The finding confirms the proposed effect of knowledge management capability on

performance. The study was conducted in Malaysia and therefore the findings cannot be Generalized to be applicable in Kenya.

2.6 Research Gaps

The review of existing literature pertinent to the current study has revealed conceptual, contextual as well as methodological gaps that the current study will attempted to address. Lack of specific studies on the relationship between Green Supply Chain management practices and business economic performance in the context of manufacturing sector presents a distinct knowledge gap. It means that we cannot clearly understand how GSCM practices impacts on the financial performance of manufacturing industries and which of the Green practices has greater impact. GSCM research to date has concentrated almost exclusively on the developed world context. Moreover, the cultural and economic differences that exist between developed and developing economies suggest that perceptions and responses to GSCM practices may differ between these contexts. There are grounds for believing that the most catastrophic effects of Green supply chain failures (particularly on the environment and human life) have occurred in developing countries. For instance, the infiltration of counterfeit drugs into the pharmaceutical supply chain has been more prevalent and caused more severe effects in the developing world than in developed countries (Chika *et al*. 2011; Benjamin *et al*., 2015).

Also from literature it shows that there is limited implementation of GSCM practices in developing countries as compared to developed countries. Lack of theory may also have limited our ability to understand the relationship between GSCM practices and firms 'performance. It also makes the generalization of research findings from one context to another difficult. It is therefore important that the GSCM research makes greater use of theory to improve our understanding of the phenomenon (Benjamin *et al*., 2015).

The growing importance of Green Supply Chain practices in Kenya is driven mainly by the escalating deterioration of the environment for instance diminishing raw

material resources, overflowing waste sites and increasing levels of pollution Also the expanding global economy has brought prosperity but also environmental degradation (World Bank, 2012), such as climate change, ozone layer depletion, loss of biodiversity, pollution, degradation and the depletion of air, water, minerals and land (United Nations Environment Program, 2012; World Bank, 2012). These issues have become important to firms because their stakeholders, such as regulatory authorities, customers, competitors, non-governmental organizations and employees, are increasingly demanding that firms address environmental and social sustainability in business operations (Carter & Easton, 2011).

This study therefore sought to establish whether the implementation of Green supply chain management practices influences the performance of manufacturing industries in any way. The study addresses the economic and environmental dimensions of sustainability, particularly in the context of green supply chain management (GSCM). According to Brandenburg, Govindan, Sarkis & Seuring (2014), the focus of environmental management has shifted from firm level to supply chain level. From literature most studies focused on the effect of a single green supply chain practice on performance and not particularly on manufacturing firms 'performance hence presenting a conceptual gap.

In the Kenyan context, the influence of Green supply chain management on the Kenya manufacturing firms remains unexplored and there is lack of a guiding framework on how manufacturing firms should embrace Green supply chain management practices. Hence this creates major gaps this study is going to fulfill.

2.7 Summary of Literature

The section presented the theoretical, empirical review, conceptual framework as well as the critique of literature that yielded the research gaps. With regard to theoretical review, the study focused on the theories that underpin the theme of the study. The theories reviewed are NRBV theory that explains more strategic motivations of GSC adoption, transaction cost economics theory that explains intrinsic market conditions of costs of opportunism and monitoring through the

development of process integration and mutual trust therefore relevant to the green distribution practice variable under consideration in this study, the institutional theory linking the role of the formal governance mechanisms as well as other external forces such as suppliers and customers in achievement of green supply chain practices by the manufacturing firms and resource dependence theory that informs the green procurement variable in this study.

This chapter also presented the conceptual framework which indicated diagrammatically the independent variables that influences dependent variable (manufacturing firm ‘s performance) as well as the moderating variable of the study (Collaborative capability). The chapter also reviewed some of the past studies relevant to the theme of this study for the purpose of establishing research gap. The chapter critiqued the reviewed literature based on their conceptual as well as contextual inconsistencies to the current study and he resulting research gaps justifying the current study were extracted.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1Introduction

This chapter presents the methodology, which was used to carry out the study. It describes the research philosophy, research design, population, the sampling frame, the sample and sampling techniques that was used to select the sample size. It also presents data collection tool and method as well as data analysis and presentation. The last section of the chapter presents the diagnostic tests which was conducted by the study.

3.2 Research Philosophy

Research philosophy are the assumptions and beliefs that govern the way we view the world Saunders, Lewis and Thornhill (2015). According to Saunders, Lewis and Thornhill (2015) research philosophy is the foundation of knowledge, and the nature of that knowledge contains important assumptions about the researcher's view of the world. Research philosophies could be positivism, realism or pragmatism. These philosophies share a common set of assumptions, and their commonalities identify them as examples of broader philosophies. This study used a positivism research philosophy.

The study was based on theoretical foundations from which hypotheses was derived, and quantitative methods were used for logic and evidence testing. Factual data was established for causal relationships, and the study of supplier collaboration adoptions in seeking to establish possible relationships on performance of Kenyan manufacturing firms. Positivism believes that reality is stable and can be observed from an objective viewpoint by arguing that phenomena can be isolated and observation can be duplicated. This involves manipulation of reality with variations in independent variable in order to identify regularities and form relationships between constituent elements of the social world (Wilfred, 2006).

Research with a positivism view needs to determine and evaluate the causes that influence the outcomes of a phenomenon in interest. A positivist study is also reductionist where the idea is reduced into small, discrete sets to be tested with regard to hypotheses and research questions. Furthermore, developing numeric measures of observations is fundamental for a positivist approach. Positivists adopt scientific methods to conduct research (Creswell 2009) and are most likely to employ a highly structured methodology to enable replication (Gill & Johnson 2002). Hence, based on this review, the present research was consistent with the criteria of positivism

3.3 Research Design

A research design is a framework that guides the collection and analysis of the data and is a detailed plan for how research study is conducted according to the data required in order to investigate the research questions in an economical manner. It is a presentation of the plan, the structure and strategy of investigation, which seeks to obtain or answer various questions (Mugenda & Mugenda 2003). Research design constitutes the blue print for collection, measurement and analysis of the data (Cooper & Schindler, 2011; Kothari, 2009). Cooper and Schindler (2011) posit that research design enables the researcher in allocation of limited resources by posing crucial choices in methodology. Kothari (2009), on the other hand, clarify that the design includes an outline of what the researcher will do from writing hypothesis and its operational implications to the final analysis of data.

This study adopted descriptive research design using both quantitative and qualitative approaches. Quantitative approach emphasizes measurement and data is analyzed in a numerical form to give precise description. According to Mugenda and Mugenda (2003), quantitative approach also known as the scientific method has traditionally been considered as a mode of inquiry in both research and evaluation. Quantitative approach places emphasis on methodology, procedure and statistical measures to test hypothesis and make predictions. According to Berg (2001), qualitative research helps in analyzing information in a systematic way in order to come to some useful conclusions and recommendations on the social settings and the

individuals who portray those characteristics.

3.4 Target Population

A population is the total collection of all the elements about which the study wishes to make some inference (Blumberg, cooper & Schindler, 2014). Other scholars such as Nachiamis and Nachamis (2012) define population as the entire set of relevant units of analysis or data while Ott *et al* (2015) argue that a target population consists of a list of elements or individual members of the overall population from which a sample is drawn. The target population for this study was the entire population of 757 manufacturing firms which are registered members of Kenya association of manufacturers (KAM, 2017), of which about 80% are within Nairobi county. The list of all the firms is attached as appendix vi. The firms are stratified into 14 sectors, 12 of which are in processing and value addition while the other two offer essential services to enhance formal industries. Sub-sectors are defined by the type of raw materials they companies import or the products they manufacture. All the 14 sub-sectors were considered for this study. The five major sectors are chemical and allied, food and beverages, metal and allied, paper and paper board and plastics and rubber. The other nine minor sectors are building construction. The researcher selected supply chain or procurement managers from each of the sampled Manufacturing Companies to be respondents in this study.

3.5 Sampling Frame

Lavrakas (2008) defines a sampling frame as a list of the target population from which the sample is selected. The sampling frame should capture, in a statistical manner, the target population and that a perfect sampling frame is one that is complete, accurate and up-to-date (Lavrakas, 2008). As per Nachiamis and Nachamis (2012), the sampling frame for this study consisted of the list of all units comprising the population from which a sample was drawn. The list was hence all the 757 manufacturing firms from the KAM (2017) directory. From KAM (2017) directory, there are 757 registered manufacturing in Kenya. 80% are located within Nairobi and Kiambu County. The target population for this study was 757 manufacturing industry

from Nairobi and Kiambu counties where over 80% of industries registered under KAM are located.

Table 3.1: Population of the Study

No	Sector	Population
1	Food and beverages	213
2	Chemical and allied	84
3	Plastics and rubber	86
4	Metal and allied	88
5	Paper and paper board	79
6	Building construction and mining	35
	Energy, electrical and electronics	55
8	Fresh produce	14
9	Leather and footwear	8
10	Motor vehicle and accessories	55
11	Pharmaceutical and medical equipment	25
12	Services and consultancy	118
13	Textiles and apparels	67
14	Timber , wood and furniture	27
	Total	**757**

3.6 Sampling and Sampling Technique

A sampling technique is a procedure used to obtain a smaller sample from a large target population which is believed to have the characteristics of the population (Wilson, 2014). Sampling is important in research because it enables the researcher to minimize the cost since only a portion of the population is involved. Sampling is the procedure a researcher uses to gather people, places or things to study (Nachiamis & Nachamis, 2012). It is the process of selecting a number of individuals or objects from a population such that the selected group contains elements representative of characteristics found in the entire group.

Researchers have developed a rule of thumb in determining sample size. For example, Olusola et al (2013) argues that a minimum number of 15 in experimental research, 30 in correlational research and a minimum of 100 in survey research is adequate. However, Nachiamis & Nachamis (2012) argued that if the target population is finite, the following formula may be used to determine the sample size.

$n = \frac{Z^2 NP(1-p)}{d^2(N-1)+Z^2 P(1-p)}$ **Equation 1** (Nachiamis & Nachamis ,2012)

Where:

n = required sample size

Z = z value (1.96 for 95% confidence level)

N = population size

P = population proportion derived from the pilot study.

d = degree of accuracy (5%), expressed as a proportion (0.1); it is margin of error substituting the values in the formula gives,

$$n = \frac{(1.96)^2(757)(0.5)(0.5)}{(0.05)^2(756)+(1.96)^2(0.5)(0.5)} = 386$$

This represents 40% of the target population of 757 registered manufacturing companies in Kenya as per 2017 KAM Directory. A sample size of 40% of the total population in this study was hence good. The researcher used geographical cluster sampling technique to select representatives from each stratum. Each cluster is a geographical area. Because a geographically dispersed population can be expensive to survey, greater economy than simple random sampling can be achieved by grouping several respondents within a local area into a cluster. The sample size for this study was 386 manufacturing firms from Nairobi County where over 80% of the industries are located. The 386 firms were conveniently selected, and from each firm the researcher administered questionnaire to procurement manager and operational managers to be respondents in the study. The table below indicates the sample size distribution.

Table 3.2: Sample size

No.	Firms listing by Sector	No of firms	Strata Sample size
1	Food and beverages	217	75
2	Chemical and allied	84	29
3	Plastics and rubber	86	30
4	Metal and allied	88	30
5	Paper and paper board	79	27
6	Building construction and mining	35	12
7	Energy, electrical and electronics	55	19
8	Fresh produce	14	4
9	Leather and footwear	8	2
10	Motor vehicle and accessories	55	19
11	Pharmaceutical and medical equipment	25	8
12	Services and consultancy	3	10
13	Textiles and apparels	67	23
14	Timber , wood and furniture	27	9
	Total	**757**	**386**

3.7 Data Collection Instruments

Parahoo (2014) defines a research instrument as a tool used to collect data. An instrument is a tool designed to measure knowledge attitude and skills. The study w used both quantitative and qualitative primary data. The primary data collection instrument in this study was a questionnaire. A questionnaire is preferred because it allow the respondent to present their feelings on the subject matter enabling a greater depth of response. The study collected primary data using structured questionnaires and capture information through a 5-point Likert scale type (see Appendix 11) Likert scale is an interval scale that specifically uses five anchors of strongly disagrees, disagree, neutral, agree and strongly agree. The Likert measures the level of agreement or disagreement. This type of questionnaires was more appropriate because it enables consistency in questions asked and data yielded is easy to analyze. Likert scales are good in measuring perception, attitude, values and behavior (Upgrade & Shende, 2012). A questionnaire was more appropriate for this study as it enabled the researcher to collect first-hand information over a short period of time.

3.8 Data Collection Procedure

Data collection procedure started by obtaining a permit from the university. Primary data was collected through the administration of the questionnaires to the relevant managers. Field (2013) describes primary data as that which is collected afresh and for the first time and thus happens to the original character. The target participants were the supply chain managers and the operational managers who dealt with the day to day activities of the organization. The target population had adequate knowledge on the supply chain management because they were highly involved in the supply chain decisions. The organizations were first contacted to inform them of the intention to drop the questions. Questionnaires were administered by trained research assistants. All the questionnaires were distributed to manufacturing entities as per the sampling frame. The filled questionnaires were picked at different times depending on the availability of the respondents. A duration of two weeks was taken to complete the process. This enhanced the response rate. If the respondents did not fill the questionnaires within a week, they were given one more week. The use of drop and pick methodology enhanced the response rate of the study and that is why it was appropriate for this study (Allred & Ross-Davis, 2011).

3.9 Pilot Study

The questionnaire was pre-tested before being used for actual data collection procedure. Pre- testing of questionnaires was important to avoid drawbacks after administering the data collection tool. Babin (2010) argues that pre-testing is a screening method that allows the researcher to try the questionnaire on a smaller group of respondents initially to allow for feed-back and corrections. This approach helped the researcher to minimize on wrong answers due to misinterpretation of questions or blanks in questionnaires due to respondents misunderstanding of questions.

Further pilot tests were used to test the validity and reliability testing of the data collection instrument. A pilot study was undertaken on 5% population of the sample population which will not be included in the final research (Lewis, Saunder &

Thornhill, 2007). This will represent 12 manufacturing firms out of the 757 firms. Cooper and Schindler (2014) argue that the respondents in a pilot test do not have to be statistically selected. A 5-10% of the population is sufficient for a pilot. In line with this argument, a pilot test on 12 manufacturing firms out of the 757 firms (5% of the target population) will hence be sufficient for this study.

3.9.1 Reliability of the Research Instrument

According to Adejimi, Oyediran and Ogunsanmi (2010), reliability refers to the consistency of measurement and is frequently assessed using the test–retest reliability method. Reliability was increased by including many similar items on a measure, by testing a diverse sample of individuals and by using uniform testing procedures. Portney and Watkins (2010) asserts that the positivists 'paradigm insists on strict criteria for judging the quality or trustworthiness of the research findings objectivity and that one must show evidence that the findings are consistent with occurrences in the real world.

In this study, reliability was measured using Cronbach alpha. Cronbach alpha is a test of internal consistency frequently used to calculate the correlation values among answers on an assessment tool (Sullivan, 2011). Cronbach alpha calculates correlation among all the variables, in every combination. Cronbach's alpha (α) indicates the extent to which a set of measurement items could be treated as measuring a single latent variable (Cronbach, 1951). Cronbach's alpha can be written as a function of the number of test items and the average inter-correlation among the items. It can be calculated using the formula;

$$\alpha = \frac{N \cdot \bar{c}}{\bar{v} + (N-1) \cdot \bar{c}}$$

Where;

N= the number of component (items)

= the average inter-item covariance among the items (that is average Pearson correlation coefficients between the components) and

= the average variance

According to Cronbach (1951) and Cooper and Schindler (2009), reliability is the proportion of variance attributable to the true measurement of a variable and consistency of such measurement over time. It is concerned with the internal properties of a measure and the random error in the data and ranges from nil (0) to perfection (1). Cooper and Schindler (2009); Cronbach (1984) noted that a Cronbach alpha coefficient of 0.7 and above was acceptable because random error always exists regardless of the procedure used in the study. Christensen, Johnson, turner & Christensen (2011) noted that the threshold for Cronbach‘s alpha varies among disciplines and the nature of the study. They argued that a value above 0.7 is generally accepted while a value of0.6 is normally accepted for completely new instruments.

The measurement scale for reliability was tested using Cronbach alpha coefficient for every independent variable and for an alpha (α) of 0.7 and above the instrument was interpreted as reliable (Cronbach, 1951).

A high reliability estimate should be as close to 1 as possible. The study will adopt a Cronbach alpha of 0.7 which is accepted for instruments that are not completely new.

3.9.2 Validity of Data Collection Instruments

Validity in research refers to how accurately a study answers the study question or the strength of the study conclusions (Sullivan, 2011). In testing for validity, we need to ask whether the questions posed adequately address the objectives of the study. This should include whether or not the manner in which answers are recorded is appropriate There are different forms of research validity and main ones are specified by Cohen, Manion, Morrison, *et.al*., (2007) as content validity, criterion-related validity, construct validity, internal validity, external validity, concurrent validity and face validity. This study will test for criterion, content and construct validity of the

research instrument.

3.9.3 Content Validity

For content validly, the questionnaire was tested to ensure that there are no errors both typographical and in form through expert opinions. Pilot testing will help to detect some, if not all the errors (Brace, 2013). The pilot respondents were allowed to ask questions relating to clarity of the questions which will help the researcher know the validity of questions framed. The feedback from the pilot test will form a basis for reviewing the questionnaire before final administration. The supervisors as well as industry experts will assess the questionnaire to ensure that it is not indistinct, vague or offensive. Using their knowledge in the subject matter, they will interpret the questions and statements in the questionnaire. The questionnaire will therefore be revised based on the feedback from the pilot test to eliminate ambiguities and inadequate wording in the research instrument.

3.9.4 Criterion Validity

To ensure criterion or face validity, the researcher critically examined each question against study objectives and how they would be answered by the operation managers and then make the necessary adjustments. The instruments developed for other similar studies will also be used for comparison purposes. Brace (2013) argues that the constructs of a study can be established based on the existing studies so as to enhance criterion validity.

3.9.5 Construct Validity

The study adopted confirmatory factor analysis to test for construct validity. Factor analysis acts as a gauge of the substantive importance of a given variable to the factor and it is used to identify and remove hidden constructs or variable items that do not meet the objectives of the study and which may not be apparent from direct analysis (Finchman, 2012). Communalities was used to indicate the substantive importance of variable factors where a loading value of 0.4 as a rule of thumb was used to be satisfactory. Smith (2015) argued that a facto loading of 40% and above is

satisfactory and hence the variable is not dropped in such a case.

3.10 Data Analysis and Presentation

Smith (2015) defines data analysis as a systematic manipulation, processing, arrangement and organization of data in order to produce meaningful information. Data gathered using the questionnaires was analyzed quantitatively using both descriptive statistics and inferential statistics. SPSS which generate both descriptive and inferential statistics was employed. Descriptive statistics including the mean and standard deviation was used to capture the characteristics of the variables under study. Descriptive analysis is defined by Nachmias and Nachmias (2008) as statistical procedures that are used to describe the population one is studying. They also contended that descriptive statistics use graphical and numerical summaries to give a picture of a data set. Inferential statistics will also be used in the study. Nachmias and Nachmias (2008) further define inferential statistics as the methods of establishing relationships between variables.

This study also tested normality, heteroscedasticity and autocorrelation. Normality will play a vital role in predicting the scores of the dependent variable and also in knowing the shape of the distribution (Paul & Zhang, 2009Park (2008) posits that heteroscedasticity makes analysis more complicated because in regression analysis, many methods are based on the assumption of equal variance. Autocorrelation according to Box and Jenkins (1976) refers to the correlation of a times series with its own past and future values. The function of autocorrelation can be used in the detection of non-randomness in data and also in the identification of an appropriate model for time series if the data are not random.

3.10.1 Relationship between GSCM practices and performance of manufacturing Industries

Correlation analysis was done to establish the nature and strength of the relationship between the variables. Therefore, a correlation matrix was determined as follows

$\square_{ij}$ - Correlation of independent variable *i* and *j*

r_{ij} -Correlation of independent variable *i* and performance indicator *j*

p_{ij} - Correlation of performance indicator *i* and performance indicator *j*

Table 3.3: Correlation matrix

	X_1	X_2	X_3	X_4	Y_1	Y_2	Y_3
X_1	1	$\square_{12}$	$\square_{13}$	$\square_{14}$	r_{11}	r_{12}	r_{13}
X_2		1	$\square_{23}$	$\square_{24}$	r_{21}	r_{22}	r_{23}
X_3			1	$\square_{34}$	r_{31}	r_{32}	r_{33}
X_4				1	r_{43}	r_{42}	r_{43}
Y_1					1	p_{12}	p_{13}
Y_2						1	p_{23}
Y_3							1

3.11 Measurement of Variables

According to Mugenda and Mugenda (2003), linear regression analysis attempts to determine whether a group of variables together predict a given dependent variable and in this way, attempt to increase the accuracy of the estimate. The general linear regression model for this study was:

3.11.1 Test direct effect of green supply chain management practices on performance of manufacturing firms

To test the effect of green supply chain practices on the environmental performance, inferential statistics regarding correlation and multivariate regression modeling was adopted. Multiple regressions were conducted to determine which among the green supply chain practices affects the dependent variable most and determine the direction and magnitude of effect. The adjusted coefficient of determination (r^2) was used to indicate the percentage of variability of the variables that is accounted for by the factors under analysis. This was followed by determination of standardization

beta (coefficient which will indicate the direction (+ or -) and the magnitude of the effect as well as compare the relative contribution of each independent variable on performance (Barlett, Kotrlik & Higgins, 2011). The composite of each variable was established from its sub constructs before being used to run the inferential statistics. To derive the composite index for the variables under study, the harmonic mean formula was used (Barlett, Kotrlik & Higgins, 2011)

Ci = ∑fiwi ’∑fi Where

C_i = composite index for variable F = total number of respondents

W_i = the relative weight given to each component in a particular variable.

The following regression models were used in determination of coefficients of the independent variables (green supply chain practices) in relation to the dependent variable (environmental performance). The multivariate models was as follows: Correlation Matrix

3.11.2 Test direct effect of green procurement on performance of manufacturing industries

$$y_i = \beta_{1i} + \beta_{11} X_{11} + \beta_{12} X_{12} + \beta_{13} X_{13} + \beta_{14} X_{14} + e_{1i}$$

Where

y_i $i = 1,2,3$ are the performance indicators.

1-Profitability 2-Market share 3-Growth

$X_{1j}, j = 1,2,3,4$

are the indicators of Green procurement

1-Supplierselection, 2-Green Ordering, 3-Green Delivery

3.11.3 Test direct effect of green manufacturing on performance of manufacturing industries

$$y_i = \beta_{2i} + \beta_{21} X_{21} + \beta_{22} X_{22} + \beta_{23} X_{23} + e_{2i}$$

y_i $i = 1,2,3$ is defined as above

X_{2j}, $j = 1,2,3$, are the indicators of Green Manufacturing.

ECO design

Green production process

Green waste management

3.11.4 Test direct effect of green distribution on performance of manufacturing industries

$$y_i = \beta_{3i} + \beta_{31} X_{31} + \beta_{32} X_{32} + \beta_{33} X_{33} + \beta_{34} X_{34} + \beta_{35} X_{35} + e_{5i}$$

y_i $i = 1,2,3$ is defined as above

X_{3j}, $j = 1,2,3,4,5$ are the indicators of Green distribution.

Green packaging

eco-labeling

Green transportation

3.11.5 Test direct effect of green disposal on performance of manufacturing industries

$$y_i = \beta_{4i} + \beta_{41} X_{41} + \beta_{42} X_{42} + \beta_{43} X_{43} + \beta_{44} X_{44} + e_{4i}$$

y_i i = 1,2,3 is defined as above

X_{4j}, j = 1,2,3,4 are the indicators of Green disposal.recyclability reuse

salvage recall

3.11.6 Testing Moderating Effect of collaborative capability

In line with the recommendations of Baron and Kenny (1986) and Hayes (2012), Hierarchical multiple regression analysis was used to test the moderating effect of collaborative capability on green supply chain management and performance of manufacturing industry. This provided evidence on whether to support or reject *$H_0$5abcd.*The test for moderation in this study involved analysing the interaction effect between green supply chain management and performance of manufacturing industry and reflecting upon the significance or insignificancy of the resulting effect.

The process involved a number of steps and the resulting 'R square', 'F change' and 'p values' was reported and for moderation to exist, all effects was significant. The first step involved regressing the control variables against firm performance. The second step involved regressing green supply chain management dimensions (green procurement, green manufacturing, green distribution and green disposal) against performance of manufacturing industry for direct effects. The third step involved the introduction of the interaction term (collaborative capability) being regressed against the dependent variable (firm performance). Finally, the interaction term between the independent variable and moderator variable (was calculated by multiplying the two variables to yield a product term that represents the interaction effect. The above process of moderation testing was depicted and summarized using the moderation equation below. The paths giving rise to the moderation equation below were also statistically depicted by Figure 3.1

$$Y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_5 + \beta_5 m + \beta_6 x_1 * m + \beta_7 x_2 * m + \beta_8 x_3 * m + \beta_9 x_4 * m + \varepsilon$$

$X_{1:}$ Represents green procurement

$X_{2:}$ Represents green manufacturing

$X_{3:}$ Represents green distribution

$X_{4:}$ Represents green disposal

Y: Represents the dependent variable (firm performance)

m: Represents the Moderator variable,

'ε_{40}': Represents the error terms

$\beta_{0,:}$ Is a constant representing the Y intercept

'$C_{1,}$ $C_{2,}$ C_3'represents the effect of slope coefficients denoting the influence of the associated predictor variables over the dependent variable.

From the regression above, relationship management was said to have a significant moderating effect if the beta coefficient of the interacting term ($\beta_{i)}$ is significant (has a p-value less than 0.05). T-test and f- statistic at 5% level of significance was used to examine significance of coefficients of variables in the model.

3.12 Diagnostic Tests

The study conducted diagnostic tests to ensure that the assumptions of ordinary least square were satisfied before conducting a multiple linear regression analysis and testing the hypothesis. The tests were as follows; normality test, linearity test, multicollinearity, goodness of fit and homoscedasticity test.

3.12.1 Normality Test

A normal distribution was not skewed and is defined to have a coefficient of kurtosis of three or less. In order to assess likelihood that the data set is normally distributed, Kolmogorov-Smirnov (k-s) test was performed. According to Ghasemi and Zahediasl (2012), k-s test is the most commonly used normality test possibly because of disadvantages of other tests and that it can easily be examined using SPSS.

One-sample Kolmogorov-Smirnov test (KS) was conducted to test the normality of the dependent variable. The Kolmogorov-Smirnov test is a non-parametric procedure that determines whether a sample of data comes from a specific distribution, such as normal, uniform or exponential distribution. The null and alternative hypotheses are stated below as follows:

Ho: the data is normally distributed (not different from a normal distribution) H1: the data is not normally distributed (different from a normal distribution)

The rule is that if the p-value is greater than 0.05 (not significant), H_o is not rejected and H_1: is rejected, if the p -value is less than 0.05 (significant), H_o is rejected and H_1 is not rejected.

3.12.2 Linearity Test

Chan & tong (1986) argue that linearity means that two variables, "x" and "y," are related by a mathematical equation "y = cx," where "c" is any constant number. The importance of testing for linearity lies in the fact that many statistical methods require an assumption of linearity of data (the data is sampled from a population that relates the variables of interest in a linear fashion).

This means that before using common methods like linear regression, tests for linearity must be performed (otherwise, the linear regression results cannot be accepted). The study used a scatter plot computed using statistical package for social sciences version 21 to test for linearity and then observe the resulting plot for linearity.

Linearity is displayed by the data points being arranged in the shape of an oval. If any other shape other than oval is observed, it is most likely that the population from which the data came from is not linear in terms of the variables being analyzed. Thus, if the oval shape is not observed, it is not indicative of linearity and hence the data will fail the test of linearity. In such a case, a linear regression model will not be suitable for the study.

3.12.3 Multicollinearity

Multicollinearity refers to excessive correlation of the predictor variables. When correlation is excessive (using the rule of thumb, r > 0.80), standard errors and beta coefficients become large, making it difficult or impossible to assess the relative importance of the predictor variables. Multicollinearity is less important where the research purpose is sheer prediction since the predicted values of the dependent remain stable, but multicollinearity is a severe problem when the research purpose includes causal modeling (Finchman, 2008).

The study used a correlation matrix to determine the presence of multicollinearity among the independent variables before running the regression model. A Pearson correlation value greater than 0.8 indicates presence of multicollinearity (finch man, 2008). The study will further use variance inflation factor (VIF) which was applied using the threshold of 10 for severe multicollinearity. In general, the typical acceptable values are vif less than 5 and tolerance values (1 / vif) values greater than 0.2.

3.12.4 Goodness of Fit

The goodness of fit of the multiple linear relationships between the dependent variable and all the independent variables was tested using the f-test (anovatest) by computing the f calculated and comparing it with the f critical. F calculated was obtained using the following formula below:

Where rss_1 is the residual sum of squares of model. The model is said to be fit / significant if the f calculated from the data is greater than the critical value of the f-distribution for some desired false-rejection probability (like0.05).

3.12.5 Homoscedasticity Test

Homogeneity describes a situation in which the error term (that is, the noise‖ or random disturbance in the relationship between the independent variables and dependent variable) is the same across all values of independent variables.

Homoscedasticity suggests that the dependent variable has an equal level of variability for each of the values of the independent variables (Garson, 2012). A test for homoscedasticity is made to test for variance in residuals in the regression model used. If there exist equal variance of the error term, we have a normal distribution. Lack of an equal level of variability for each value of the independent variables is known as heteroscedasticity. Levine‘s test was used to test for homogeneity.

3.13 Hypothesis Testing

Multiple regression analysis in the form of analytical model was applied to test whether or not the null hypotheses stipulated in this study are true. Cooper and Schindler (2009) advocate that multiple regression helps to decide whether the individual hypothesis is statistically supported or not. Student ‘s t-test was used to test the significance of the dependent variable on the influence of the independent variables x_1- x_4 at 5% level of significance. For the hypothesis to be accepted or rejected, comparison was made between the critical t-values and the calculated t values. If the calculated t-value is greater than critical t-value, then the alternative hypothesis was accepted.

3.14 Operationalization of Variables

Operationalization of the variables is a system that helps in working up associations that exist between variables and showing how such associations can be measured.

Table 3.4: Measures of the Study Variables

Variables	Proxy	Measure
Performance	P	Profitability, Sales growth, Market share
Green procurement	GP	Supplier selection, ordering and delivery
Green manufacturing	GM	Product design, product process & green waste mgt
Green distribution	GD	Packaging, transportation & ecolabel ling
Green disposal	GD	Re cycbility, reuse and salvage recovery
Collaborative capability	CC	Design and packaging

Source: Author

CHAPTER FOUR

RESEARCH FINDINGS AND DISCUSSIONS

4.1 Introduction

This chapter presents data analysis, presentation and interpretation of the findings. The thesis sought to establish the influence of green supply chain practices on the performance of manufacturing firms in Kenya. To attain the fundamental objective, the study relied on five specific objectives. The specific objectives of the study were to establish the influence of green procurement on the performance of manufacturing firms in Kenya, determine the impact of green manufacturing on performance of manufacturing firms in Kenya, assess the effect of green distribution on performance of manufacturing firms in Kenya, establish the impact of green disposal on performance of manufacturing firms in Kenya and to establish the moderating effect of collaborative capability on the relationship between green supply chain management and performance of manufacturing firms in Kenya

The chapter highlights the fundamental results of the examination based on which further investigations was attempted to test the hypotheses. This chapter therefore presents the results and interpretations of various tests namely; reliability test, factor analysis, correlation analysis, test of assumption of regression (normality, linearity, test of homogeneity of variances, multicollinearity and autocorrelation test) and finally test of hypotheses. Moreover, the use of descriptive statistics in explaining the manifestations of the variables under study is explained. Mean scores have been used to show the extent of the manifestations of the variables across the responses.

4.2 Response Rate

Response rate of survey is significant concern in a study because it ensures the questionnaires collected are valid for data analysis (Hair *et al.,* 2010). Response rate defined by Hamilton (2009) as the percentage of respondents who participated in the survey from the sample size determined for the research. Bartlett *et al.* (2001) in this

study,386 questionnaires set were distributed to respondents. However, 242 questionnaires were retrieved. Therefore, this makes the response rate of 62.7%, though; out of the 242 collected questionnaires only 224 were found to be useful for further analysis, because 18 questionnaires were excluded from the analysis due to missing data and outlier problems. This accounted for 70% valid response rate. According to Sekaran and Bougie (2010), response rate of 30% is acceptable for surveys. Hence forward, response rate of this study is adequate for further analysis.

4.2 Reliability Results

Reliability is a measure of how much instruments yield predictable outcomes or data after repeated preliminaries (Mugenda and Mugenda, 2003). The results of the reliability tests carried out in Table 4.1 show that green procurement ($\alpha = 0.764$) and collaborative capability ($\alpha = 0.764$) had the lowest coefficient. Nunnally (1978) recommends Cronbach's alpha coefficient of 0.7 as the cut-off point for reliability, Davis (1964) suggests 0.5 as the minimum reliability coefficient. While Sekeran (2003) posits that any values between 0.5 and 0.8 are adequate to accept internal consistency. Green disposal had the highest reliability coefficient ($\alpha = 0.882$) followed by green manufacturing ($\alpha = 0.833$) and firm performance ($\alpha = 0.83$). Green distribution had a reliability coefficient score of 0.809. The results for all the variables are above the 0.7. This was confirmation of reliability and validity of the data used to draw conclusions from theoretical concepts. Low reliability has severe implications on the entire instrument as the instrument may not correlate with a gold standard instrument or may also have implications for the instrument's convergent and concurrent validity. An average alpha of over 0.7 for this study, as Table 4.1 shows, indicates a respectable scale which is highly internally consistent.

Table 4.1: Reliability Results

	Reliability Statistics		
	Cronbach's Alpha	**Cronbach's Alpha Based on Standardized Items**	**N of Items**
Firm performance	0.814	0.83	13
Green procurement	0.764	0.764	9
Green manufacturing	0.829	0.833	9
Green distribution	0.813	0.809	8
Green disposal	0.883	0.882	9
Collaborative capability	0.746	0.764	7

4.3 Demographic Information

4.3.1 Procurement Manager Characteristics

The study deemed it important to highlight procurement manager characteristics since their attributes has a bearing on the performance of manufacturing firms in Kenya. Their characteristic focused on their age, level of education and work experience. The findings are as presented in table 4.2

As the study reveals, most of the respondents (45.5%) were of the 41- 50 years' age bracket, 22.3% of the respondents specified they belonged to the age category of over 50 years, 17.4% were aged between 21-30 years whereas 14.7% of the respondents indicated that they were 31-40 years. The finding indicates that there was a fair age distribution of the respondents.

On respondents' level of education achieved, the research showed that majority of the respondents as indicated by 91.1% had a university degree whereas 8.9% of the respondents had attained tertiary education. The results suggest that those at management level in the procurement department have at least a degree or tertiary level of education.

Regarding the work experience, 88.4% of the procurement managers have been with the firm for over 3 years, 8% of them for 3 years and 3.6% for 2 years. Overall, the procurement managers have worked with the manufacturing firms for over 3 years.

These results indicate the manufacturing firms have mature and experienced personnel capable of providing reliable information.

Table 4.2: Characteristics of Procurement managers

		Frequency	Percent
Respondents Age	21 - 30 Years	39	17.4
	31- 40 Years	33	14.7
	41 - 50 Years	102	45.5
	Over 50 Years	50	22.3
	Total	224	100
Level of Formal Education	Tertiary	20	8.9
	University	204	91.1
	Total	224	100
Work Experience	2 Years	8	3.6
	3 Years	18	8
	Over 3 Years	198	88.4
	Total	**224**	**100**

4.3.2 Operational Manager's characteristics

The study sought to establish operational managers' characteristics in an attempt to identify demography related gaps within the study and how they influence the realization of the study's objectives. Table 4.3 highlights the results.

The findings of the respondents' age indicated that 48.2% of the operational managers are in the 41 to 50 years' age bracket, 27.7% of them were over 50 years and 24.1% are between 31 to 40 years. The age profile of the operational managers clearly indicates that it takes years of experience for an employee to be at managerial level since 75.9% of operational managers are over 41 years of age. Furthermore, all the managers had university level of education with 92% of them having over 3 years of work experience. In addition, all the operational managers were aware of environmental sustainability practices. Further on the same, 64.3% of the operational managers noted that staff are informed about environmentally sustainable practices through meeting while 35.7% through training. The implication is that both managers

and staff are well informed on environmental sustainability practices.

Table 4.3: Operational Manager's characteristics

		Frequency	Percent
Respondents Age	31- 40 Years	54	24.1
	41 - 50 Years	108	48.2
	Over 50 Years	62	27.7
	Total	224	100
Level of Formal Education	University	224	100
Work Experience	3 Years	18	8
	Over 3 Years	206	92
	Total	224	100
Informed about environmental sustainability practices	Yes	224	100
	Meetings	144	64.3
Staff informed about environmental sustainability practices	Training	80	35.7
	Total	224	100

4.4 Green Supply Chain Management characteristics

This section of the analysis focuses on green supply chain management characteristics. The findings are as presented in table 4.4. Based on the findings in the table, 89.3% of the respondents confirmed that there is safe disposal of hazardous waste. In most of the cases, waste is disposed with the use of a garbage collector (76. 3%).There is also recycling (17%) and the burning of waste (3.1%).

In addition, 92.9% of the management confirmed that the products do not contain banned or restricted substance. Further, 85.3% of the respondents stated that the firm has adopted green supply chain management practices while 14.7% of them were in disagreement. Besides, 85.7% of the respondents stipulated that the cost of production changed due to implementation of GSCM. However, 14.3% of them were of the opinion that there was no change in the cost of production once GSCM was implemented.

Regarding the years of adoption of green supply chain management practices, 19.2% of the respondents noted that their firm has adopted green supply chain management

practices foe up to a year, 45.9% for a period of 2 to 4 years, 28.6% for 5 to 7 years while 6.2% have adopted green supply chain management practices for a period ranging from 8 to 13 years. Finally, 91.1% of the respondents noted that there is budget allocation or green supply chain management. It is only 8.9% of them that denied there is budget allocation for GSCM.

Table 4.4: Supply Chain Management characteristics

		Frequency	Percent
Safe disposal of hazardous waste	Yes	200	89.3
	No	24	10.7
	Total	224	100
Method used for Disposal	Burning	7	3.1
	Garbage collector	171	76.3
	Not applicable	8	3.6
	Recycling	38	17
	Total	224	100
Products Contain Banned or Restricted Substance	Yes	16	7.1
	No	208	92.9
	Total	224	100
Firm Adopted Green Supply Chain Management Practices	Yes	191	85.3
	No	33	14.7
	Total	224	100
cost of production changed due to implementation of GSCM	Yes	192	85.7
	No	32	14.3
	Total	224	100
Years of adoption of green Supply Chain Management Practices	0	33	14.7
	1	10	4.5
	2	30	13.4
	3	44	19.6
	4	29	12.9
	5	30	13.4
	over 5 years	53	48
	Total	224	100

4.5 Descriptive statistics

4.5.1 Firm performance

Firm performance is on the premise that an organization is in possession of

productive assets such as human, physical, and capital assets required to accomplish a common purpose (Hayes, 2013). The benefits made by firms through the utilization of assets is expected to be of advantage to the firms so long as the benefits incurred supersede the costs. Firm performance is alluded to as productivity and viability in the usage of assets to accomplish desired targets. There are various measures of firm performance that have been identified for both short and long-haul targets between financial and non-financial. Table 4.5 highlights the results.

Basing on the findings, there hasn't been much change in profits after the introduction of green supply chain management (mean = 1.23, SD = 0.43). In fact, there has only been a slight percentage change in profits after the introduction of green supply chain management (mean = 2.24, SD = 0.44). There is a possibility that the firms have not aligned their corporate strategies with green supply chain management hence the firms have not elicited an increase in the profit levels.

Similarly, the direction of market share has not elicited much change after the introduction of green supply chain management (mean = 1.40, SD = 0.49). As such, there is minimal percentage change in market share after the introduction of green supply chain management (mean = 2.13, SD = 0.66). The implication is that the introduction of green supply chain management has not been instrumental in increasing the market share. It could be that the firms have not implemented green supply chain management hence they have not been able to fully benefit from it.

Further, the direction of change of average return on investment after the introduction of green supply chain management is minimal (mean = 1.41, SD = 0.50). This has also reflected in percentage change in average return on investment after the introduction of green supply chain management (mean = 2.21, SD = 0.61). The results suggest that there has not been returns on investment after the introduction of green supply chain management. This could be due to inability to fully implement GSCM.

As well, the introduction of green supply chain management has not brought about change of average sales volume (mean = 1.17, SD = 0.37). This is evident in the

percentage change in average volumes after the introduction of green supply chain management (mean = 2.29, SD = 0.61). As such, the introduction of GSCM has not been key in bringing about a change in the sales volume. Moreover, there is minimal change of earnings per share after the introduction of green supply chain management (mean = 1.24, SD = 0.64). As such, there is slight percentage change in earnings per share after the introduction of green supply chain management (mean = 2.13, SD = 0.67).

In addition, there is no change in the firm's usage of energy resources after the introduction of green supply chain management (mean = 1.24, SD = 0.43). Consequently, there is minimal percentage change in the firm's usage of energy resources after the introduction of green supply chain management (mean = 1.80, SD = 064).

The implication is that the manufacturing firms have not fully adopted GSCM hence they are unable to elicit changes in the firms' usage of energy resources.

In a nutshell, firm performance realized a mean of 1.71, standard deviation of 0.21, skewness of -0.26 and a kurtosis of 0.22. The results suggest that not much change has been elicited in the performance of the manufacturing firms after the introduction of green supply chain management.

Table 4.5: Firm performance

n=224	Mean	Std. Dev	Skewness	Kurtosis
Profitability has changed after the introduction of green supply chain management	1.24	0.43	1.22	-0.52
percentage change in profits after introduction of green supply chain management	2.24	0.44	1.38	0.36
Direction of change of market share after introduction of green supply chain management	1.40	0.49	0.40	-1.85
percentage change in market share after introduction of green supply chain management	2.13	0.66	-0.15	-0.72
Direction of change of average return on investment after introduction of green supply chain management	1.41	0.50	0.49	-1.50
percentage change in average return on investment after introduction of green supply chain management	2.21	0.61	0.35	0.47
Direction of change of average sales volume after introduction of green supply chain management	1.17	0.37	1.82	1.31
percentage change in average sales volume after introduction of green supply chain management	2.29	0.61	-0.24	-0.60
Direction of change of earnings per share after introduction of green supply chain management	1.24	0.64	2.79	6.97
percentage change in earnings per share after introduction of green supply chain management	2.13	0.67	-0.05	-0.53
Direction of change of company's usage of energy resources after introduction of green supply chain management	1.24	0.43	1.22	-0.52
percentage change in company's usage of energy resources after introduction of green supply chain management	1.80	0.64	0.20	-0.64
Firm performance	**1.71**	**0.21**	**-0.26**	**0.22**

4.5.2 Green Procurement

Large and Thomsen (2011) defined green procurement as the integration of environmental considerations into purchasing policies, programmes, and actions. Specifically, there is involvement of the purchasing function in supply chain management activities such as life-cycle analysis (LCA) and environment design that facilitates recycling, reuse and resource reduction. The study therefore sought to establish the influence of green procurement on the performance of manufacturing firms in Kenya. The result is as presented in table 4.6.

Basing on the results, the selection of suppliers in not based on their ability to develop environmentally friendly goods (mean = 2.12, SD = 0.82). The results suggest that the firms' focus is not on ensuring that they acquire environmentally friendly goods.

Also, the company has not made sufficient efforts towards ensuring that there is effective selection of suppliers based on their ability to support firms' environmental objectives (mean = 2.13, SD = 0.67). This could be detrimental ensuring there is sustained GSCM since there is no emphasis on suppliers that conform with the firms' environmental objectives. Further, it is undefined if the company purchases products with biodegradable packaging (mean = 2.50, SD = 0.63).

Regarding supplier selection, it is not clear if the use of toxic and hazardous is minimized in the ordering process (mean = 2.04, SD = 1.34). Further, it is undefined whether purchase orders are placed through mail (mean = 2.79, SD = 0.62) and if order follow is done electronically (mean = 2.54, SD = 0.63). It is evident that during supplier selection there is no emphasis on ensuring that the use of toxic and hazardous materials is minimized. Besides, a paperless ordering process has not been attained since it is unclear if orders are placed through mail and follow up done electronically.

With respect to ordering, it is uncertain if the materials purchased for manufacturing are of recyclable nature (mean = 2.32, SD = 0.76). Also, there are no considerations

on green specifications during inspection on delivery (mean = 2.21, SD = 0.49).

Moreover, there is doubt if there is use of Eco labeling practices (mean = 2.64, SD = SD = 0.67). Evidently, there is no emphasis on environmentally friendly material since the focus of the manufacturing is not on ensuring the materials are of recyclable nature and considerations made on green specifications during inspection on delivery.

Overall, green procurement summed up to a mean of 2.37, standard deviation of 0.31, skewness of 0.69 and kurtosis of 0.04. The implication is that the manufacturing firms in Kenya have made minimal efforts towards the adoption of green procurement. The findings concur with those of Yang and Zhang (2012) who argues that potential aim of green procurement is to eliminate waste, and purchasing department will focus on value by comprehensive considering the total cost in the process of eliminating waste, which should focus on the business of waste disposal activities.

Table 4.6: Green Procurement

	Mean	Std. Dev	Skewness	Kurtosis
Selection of suppliers is based on their ability to develop environmentally friendly goods	2.12	0.82	0.37	-0.36
The company effectively select suppliers based on their ability to support company's environmental objectives	2.13	0.67	0.37	0.39
The company purchases products with biodegradable packaging	2.50	0.63	0.00	-0.26
supplier selection	**2.25**	**0.46**	**1.10**	**0.95**
The use of toxic and hazardous material is minimized in the ordering process	2.04	1.34	5.37	34.11
Purchase orders are placed through mail (paperless)	2.79	0.62	0.18	-0.55
Order follow up is electronically done	2.54	0.63	-0.14	-0.23
Ordering	**2.45**	**0.59**	**2.75**	**13.78**
Materials Purchased for manufacturing are of recyclable nature	2.32	0.76	0.37	-0.07
Green specifications are considered during inspection on delivery	2.21	0.49	0.43	0.06
There is use of eco-labeling practices	2.64	0.67	-0.17	-0.07
Delivery	2.39	0.45	0.21	-1.31
Green procurement	**2.37**	**0.31**	**0.69**	**0.04**

4.5.3 Green Manufacturing

Green manufacturing describes manufacturing practices that do not harm the environment during any part of the manufacturing process. It advocates efficient, clean, low-carbon, recycling, and takes the road of ecological civilization. AS such, the study deemed it important to establish if the manufacturing firms in Kenya had an emphasis on green manufacturing in their operations. The results on green manufacturing are illustrated in table 4.7.

As evidenced in the table, the firm minimally uses inputs with relatively low environmental impacts (mean = 2.21, SD = 0.62). Similarly, the use of product design that facilitates recycling of the parts or material component has been lowly

evidenced (mean = 2.25, SD = 0.64). Moreover, there has been limited efforts towards the adoption of a green procurement policy that en courages the production department to reduce waste to landfill (mean = 2.18, SD = 0.60). The implication is that the manufacturing firms are not using inputs with relatively low environmental impacts. Besides, there is no focus on product design that facilitates recycling and the firms have not adopted a green procurement policy. This could be detrimental to the overall performance of the manufacturing firms.

Furthermore, it is undefined if the company has adopted green technology in manufacturing processes (mean = 2.95) However, it is clear that there is limited use of inputs that generate little pollution (mean = 2.21, SD = 0.56) and the use of machines with little air emission (mean = 2.36, SD = 0.55). Evidently, there is low adoption of green technology in manufacturing processes and limited use of inputs that generate little pollution.

In the production process, not much has been done to reduce the generation of effluent waste (mean = 2.29, SD = 0.45) and ensuring that solid waste is recycled (mean = 2.43, SD = 0.82). Further, minimal efforts have been directed towards ensuring that there is minimized consumption of materials as well as energy to minimize resource depletion (mean = 2.39, SD = 0.67).

Overall, green manufacturing summed up to a mean of 2.36, standard deviation of 0.47, skewness of 1.69 and kurtosis of 3.54. Evidently, the manufacturing firms have not emphasized on green manufacturing in their processes right from product design, production and the management of waste. The study findings add to the observation of Newman, & Jensen, (2013) who pointed out that Green manufacturing converts inputs into output by reducing hazardous substances, increasing energy efficiency in lighting and heating, minimizing waste, actively designing and redesigning green processes.

Table 4.7: Green manufacturing

n=224	Mean	Std. Dev	Skewness	Kurtosis
The company uses inputs with relatively low environmental impacts	2.21	0.62	1.65	2.87
The company uses product design that facilitates recycling of the parts or material component	2.25	0.64	1.43	2.06
The company has adopted green procurement policy that encourages production department to reduce waste to landfill	2.18	0.60	0.90	1.77
Product design	**2.21**	**0.47**	**0.50**	**0.85**
The company has adopted green technology in manufacturing processes	2.95	2.94	6.14	37.60
The company uses inputs that generate little pollution	2.21	0.56	1.27	2.35
The company uses machines with little air emission	2.36	0.55	1.24	0.57
Production process	**2.51**	**1.02**	**5.01**	**28.03**
The company has reduced generation of effluent waste	2.29	0.45	0.96	-1.10
The company's solid waste is recycled	2.43	0.82	0.62	-0.31
The company has minimized consumption of materials as well as energy to minimize resource depletion	2.39	0.67	0.75	0.27
Waste management	**2.37**	**0.52**	**0.29**	**-0.87**
Green manufacturing	**2.36**	**0.47**	**1.69**	**3.54**

4.5.4 Green Distribution

The focus of green distribution is on reducing the amount of fossil fuels and greenhouse gases used in distribution and to increased emphasis on the environment during distribution. The study therefore sought to assess the effect of green distribution on performance of manufacturing firms in Kenya. Table 4.8 illustrates the findings.

Based on the results, the use of green packaging materials is lowly evidenced (mean = 2.43, SD = 0.56). Also, there are limited collaborations with vendors to standardize packaging (mean = 2.61, SD = 0.56). Moreover, there is less cooperation with vendors to encourage reuse of packaging materials (mean = 2.57, SD = 0.73). The

results suggest that the firms have laid less emphasis on collaborating with vendors who standardize packaging and encourage the reuse of packaging materials.

In regards to packaging, there is doubt if the company's logistics providers have increased space utilization in the trailers to reduce handling requirement (mean = 3.14, SD = 0.79). Besides, there is doubt if firms' have set up pick up points for wastes to optimize waste disposal (mean = 2.96, SD = 0.83). Also, it is undefined if the company considers fuel factors in the selection of transporter (mean = 3.00, SD = 0.8).

The results suggest that there are several gaps in the packaging process that range from space utilization to waste disposal and the consideration of fuel factors. As such, the firms are incapable of improving the overall green distribution since adequate considerations have not been made on setting up pick up point for disposing wastes, fuel factors and the selection of logistic providers that increase space utilization.

With reference to transport, it is undefined if the company has adopted life cycle assessment analysis to understand environmental compatibility of products (men = 2.82, SD =0.71). Further, it is not clear whether efforts have been made towards the adoption of Eco labeling to describe the information of a product about the environmental impact associated with its use (mean =2.71, SD =0.70).

Overall, green distribution had a mean of 2.77, standard deviation of 0.62, skewness of 0.37 and kurtosis of -0.55. The firms have made efforts towards ensuring packaging is environmentally friendly though transport and ecolabel ling has not been sufficiently optimized. The study findings add to the findings of the study by Nimawat & Namdev, (2012) who states that it is important that environmental concerns are taken care of by offering environmentally friendly products through environmentally friendly distribution and marketing system.

Table 4.8: Green Distribution

n=224	Mean	Std. Dev	Skewness	Kurtosis
The company uses green packaging materials	2.43	0.56	-0.32	-0.84
The company works in collaboration with vendors to standardize packaging	2.61	0.56	0.19	-0.85
The company cooperates with vendors to encourage reuse of packaging materials	2.57	0.73	0.31	-0.40
Packaging	**2.54**	**0.48**	**0.42**	**-0.79**
The company's logistics providers have increased space utilization in the trailers to reduce handling requirement	3.14	0.79	0.18	-0.55
Setting of pick up points for wastes to optimize waste disposal	2.96	0.83	-0.32	-0.64
The company considers fuel factors in the selection of transporters	3.00	0.80	0.00	-1.45
Transport	**3.04**	**0.64**	**0.09**	**-1.04**
The company has adopted life cycle assessment analysis to understand environmental compatibility of products	2.82	0.71	0.27	-1.00
The company has adopted ecolabel ling to describe the information of a product about the environmental impact associated with its use	2.71	0.70	-0.17	-0.11
Eco labelling	**2.77**	**0.62**	**0.37**	**-0.55**
Green Distribution	**2.77**	**0.62**	**0.37**	**-0.55**

4.5.5 Green Disposal

This section of the analysis highlights the findings on green disposal. As presented in table 4.9, the respondents confirmed that products are not put on alternative use after useful life (mean = 2.08, SD = 0.63). Also, there is no recycling of scrap materials (mean = 2.00, SD = 0.90). It was further indicated that all parts and components are not recyclable (mean = 2.40, SD = 0.64).

Basing on the results, the recyclability of materials has been focused on. This has been evidenced by the fact that products are not put on alternative use after useful life and that parts and components are not recyclable.

Further, there is doubt whether the company returns products to the manufacturer for reuse or recycling (mean = 2.52, SD = 0.86) and if there is existence of practices that involve processing of returned merchandise (mean = 2.60, SD = 0.75). In addition, there are no organization policies on disposal methods (mean = 2.06, SD = 0.64). Evidently, there is no reuse of products and organization policies on disposal methods.

Besides, practices that involve processing of returned merchandise are non-existent. Moreover, there is doubt if the company product and their parts are reusable (mean = 2.82, SD = 0.96). Also, it is uncertain if the company products can be returned to the manufacturer for reuse or recycling (mean = 2.58, SD = 0.86). However, the company byproducts are not sold for alternative usage (mean = 2.42, SD = 0.86).

Overall, the findings on green disposal had an aggregate mean of 2.61, standard deviation of 0.70, skewness of 0.75 and kurtosis of 0.95. The implication is that the targeted manufacturing firms are yet to capitalize on green disposal since not much has been done with respect to recyclability and reuse. The study findings add to the findings of the study by Hasan, (2013) who states that many countries have put in place programs with a purpose of reducing the quantity of packaging that enter the misuse flow so as to tackle the environmental effect of packaging.

Table 4.9: Green Disposal

n=224	Mean	Std. Dev	Skewness	Kurtosis
Products are put on alternative use after useful life	2.08	0.63	1.89	4.82
Scrap materials are recycled	2.00	0.90	0.67	-0.24
All parts and components are recyclable	2.40	0.64	1.33	0.60
Recyclability	**2.16**	**0.61**	**2.17**	**4.09**
The company returns product to the manufacturer for reuse or recycling	2.52	0.86	0.33	-0.65
There is existence of practices that involve processing of returned merchandise	2.60	0.75	0.81	-0.77
The company has organization policies on disposal methods	2.06	0.64	0.37	0.68
Reuse	**2.39**	**0.62**	**0.18**	**-0.87**
The company product and their parts are reusable	2.82	0.96	-0.13	-1.15
The company products can be returned to the manufacturer for reuse or recycling	2.58	0.86	0.24	-0.74
The company byproducts are sold for alternative usage	2.42	0.86	0.55	-0.46
Salvage recovery	**2.61**	**0.70**	**-0.14**	**0.33**
Green disposal	**2.39**	**0.57**	**0.75**	**0.95**

4.5.6 Collaborative Capability

The focus of this section of the analysis is on collaborative capability. Table 4.10 illustrates the results. From the findings, there is limited focus on customer concerns on green products (mean = 2.23, SD = 0.42). Also, there is no existence of effective interdepartmental and inter organizational communication (mean = 2.07, SD = 0.48). Further, there is doubt if there is reliance on their partners engineering capacity for eco design (mean = 2.55, SD = 0.64). As well, it is undefined if there is cooperation with manufacturing department for green production and consumption (mean = 2.52, SD = 0.64). Moreover, there is limited cooperation with manufacturing for using less energy during production and transportation (mean = 2.71, SD = 0.61). Besides, there is not much emphasis on cooperation with distributors for green packaging

(mean = 2.71, SD = 0.61). Finally, there is doubt if communication with supply chain partners is bilateral rather than unilateral (mean = 2.36, SD = 0.63). In a nutshell, the findings on collaborative capability summed up to a mean of 2.45, standard deviation of 0.33, skewness of 0.84 and kurtosis of -0.37. The findings indicate that the manufacturing firms have not fully optimized on the collaborative capability. The findings supports Cao and Zhang,(2011) who cited that collaboration relationships have helped firms to reduce transaction costs and create a sustainable competitive position in highly uncertain business environments.

Table 4.10: Collaborative capability

n=224	**Mean**	**Std. Dev**	**Skewness**	**Kurtosis**
Customer concerns on green products are addressed as matter of urgency	2.23	0.42	1.28	-0.37
There is existence of effective interdepartmental and inter organizational communication	2.07	0.48	0.21	1.30
Reliance on our partners engineering capacity for Eco design	2.55	0.64	0.73	-0.48
Cooperation with manufacturing department for green production and consumption	2.52	0.64	0.86	-0.32
Cooperation with manufacturing for using less energy during production and transportation	2.71	0.61	0.23	-0.59
Cooperation with distributors for green packaging	2.71	0.61	0.23	-0.59
Communication with our supply chain partners is bilateral rather than unilateral	2.36	0.63	-0.44	-0.66
Collaborative capability	**2.45**	**0.33**	**0.84**	**-0.37**

4.6 Factor Analysis

Factor analysis is a statistical method used to describe variability among observed, correlated variables in terms of a potentially lower number of unobserved variables called factors. For example, it is possible that variations in six observed variables mainly reflect the variations in two unobserved (underlying) variables.

Factor analysis searches for such joint variations in response to unobserved latent

variables. The observed variables are modelled as linear combinations of the potential factors, plus "error" terms. Factor analysis aims to find independent latent variables. Followers of factor analytic methods believe that the information gained about the interdependencies between observed variables can be used later to reduce the set of variables in a dataset. Users of factor analysis believe that it helps to deal with data sets where there are large numbers of observed variables that are thought to reflect a smaller number of underlying/latent variables. It is one of the most commonly used inter-dependency techniques and is used when the relevant set of variables shows a systematic inter-dependence and the objective is to find out the latent factors that create a commonality.

4.6.1 Firm Performance

Factor analysis was carried out on firm performance. In general, the extraction method was principal component analysis and the rotation method was varimax with Kaiser Normalization and the findings were presented in Table 4.11. From the findings, all the items related to firm performance were significantly loaded on their respective factors thus all were retained for analysis. Furthermore, factor 2 accounted for a cumulative variance of 32.769% while all two, accounted for 57.453% of the total variation in firm performance. Sampling adequacy was tested using the Kaiser-Meyer- Olkin (KMO) Measure of sampling adequacy. As evidenced in Table 4.11, KMO was greater than 0.5 (0.63), and Bartlett's Test was significant, $\chi 2$ (66) = 2345.481, p-value < 0.001.

Table 4.11: Firm Performance

	1	2
Profitability has changed after the introduction of green supply chain management	0.714	
percentage change in profits after introduction of green supply chain management	0.662	
percentage change in market share after introduction of green supply chain management	0.626	
percentage change in average return on investment after introduction of green supply chain management	0.866	
percentage change in average sales volume after introduction of green supply chain management	0.901	
Direction of change of earnings per share after introduction of green supply chain management	0.658	
percentage change in earnings per share after introduction of green supply chain management	0.695	
Direction of change of market share after introduction of green supply chain management		0.921
Direction of change of average sales volume after introduction of green supply chain management		0.829
Direction of change of average return on investment after introduction of green supply chain management		0.767
Direction of change of company's usage of energy resources after introduction of green supply chain management		0.731
percentage change in company's usage of energy resources after introduction of green supply chain management		

Total Variance Explained

Rotation Sums of Squared Loadings		
Total	% of Variance	Cumulative %
3.932	32.769	32.769
2.962	24.684	57.453

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.631
Bartlett's Test of Sphericity	Approx. Chi-Square	2345.481
	df	66
	Sig.	0.000

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

4.6.2 Green Procurement

Factor analysis was carried out on green procurement. In general, the extraction

method was principal component analysis and the rotation method was varimax with Kaiser Normalization and the findings were presented in Table 4.12. The findings in the table show that all the items related to green procurement were significantly loaded on their respective factors thus all were retained for analysis. Furthermore, all four factors accounted for 57.299% of the total variation in green procurement. Sampling adequacy was tested using the Kaiser- Meyer- Olkin (KMO) Measure of sampling adequacy. As evidenced in Table 4.12, KMO was greater than 0.5 (0.534), and Bartlett's Test was significant, $\chi 2\ (36) = 934.399$, p-value < 0.001.

Table 4.12: Green Procurement

		1	2
Selection of suppliers is based on their ability to develop environmentally friendly goods		0.561	
The company effectively select suppliers based on their ability to support company's environmental objectives		0.709	
The company purchases products with biodegradable packaging		0.567	
The use of toxic and hazardous material is minimized in the ordering process		0.78	
Materials Purchased for manufacturing are of recyclable nature		0.86	
Green specifications are considered during inspection on delivery		0.62	
Purchase orders are placed through mail (paperless)			0.83
Order follow up is electronically done			0.859
There is use of eco labeling practices		1	0.538
Total Variance Explained			
Rotation Sums of Squared Loadings			
Total	% of Variance		Cumulative %
3.124	34.707		34.707
2.033	22.592		57.299
KMO and Bartlett's Test			
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.			0.534
Bartlett's Test of Sphericity	Approx. Chi-Square		934.399
	df		36
	Sig.		0

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

4.6.3 Green Manufacturing

Factor analysis was carried out on green manufacturing. In general, the extraction method was principal component analysis and the rotation method was varimax with Kaiser Normalization and the findings were presented in Table 4.13. The findings in the table show that all the items related to green manufacturing were significantly loaded on their respective factors thus all were retained for analysis. Furthermore, all factors accounted for 60.742% of the total variation in green manufacturing. Sampling adequacy was tested using the Kaiser- Meyer- Olkin (KMO) Measure of sampling adequacy. As shown in Table 4.13, KMO was greater than 0.5 (0.593), and Bartlett's Test was significant, $\chi 2\ (36) = 1365.463$, p-value < 0.001.

Table 4.13: Green Manufacturing

	1	2	3
The company uses inputs with relatively low environmental impacts	0.575		
The company uses inputs that generate little pollution	0.849		
The company uses machines with little air emission	0.929		
The company has reduced generation of effluent waste	0.631		
The company has minimized consumption of materials as well as energy to minimize resource depletion	0.69		
The company uses product design that facilitates recycling of the parts or material component		0.61	
The company has adopted green procurement policy that …		0.835	
The company has adopted green technology in manufacturing processes			0.845
The company's solid waste is recycled			0.603

Total Variance Explained

Rotation Sums of Squared Loadings

Component	Initial Eigenvalues	% of Variance	Cumulative %
1	3.15	34.996	34.996
2	2.317	25.746	60.742

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.593
Bartlett's Test of Sphericity	Approx. Chi-Square	1365.463
	df	36
	Sig.	0.000

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

4.6.4 Green Distribution

Factor analysis was carried out on green distribution. In general, the extraction method was principal component analysis and the rotation method was varimax with Kaiser Normalization and the findings were presented in Table 4.14. The findings in the table shows that all the items related to green distribution were significantly

loaded on their respective factors thus all were retained for analysis. Furthermore, all factors accounted for 61.941% of the total variation in green distribution. Sampling adequacy was tested using the Kaiser- Meyer- Olkin (KMO) Measure of sampling adequacy. As shown in Table 4.14, KMO was greater than 0.5 (0.782), and Bartlett's Test was significant, $\chi 2\ (28) = 672.292$, p-value < 0.001.

Table 4.14: Green distribution

		1	2
The company's logistics providers have increased space .		0.685	
Setting of pick up points for wastes to optimize waste..		0.744	
The company considers fuel factors in the selection of ..		0.841	
The company has adopted eco labelling to describe the ..			0.732
The company uses green packaging materials			0.688
The company works in collaboration with vendors to ..			0.712
The company cooperates with vendors to encourage reuse of .			0.791
The company has adopted life cycle assessment analysis ..			0.715
Total Variance Explained			
Rotation Sums of Squared Loadings			
Component	Initial Eigenvalues	Cumulative %	
1	2.669	33.368	
2	2.286	61.941	
KMO and Bartlett's Test			
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.			0.782
Bartlett's Test of Sphericity	Approx. Chi-Square		672.292
	Df		28
	Sig.		0.000

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

4.6.5 Green Disposal

Factor analysis was carried out on green disposal. In general, the extraction method was principal component analysis and the rotation method was varimax with Kaiser Normalization and the findings were presented in table 4.15. The findings in the table show that all the items related to green disposal were significantly loaded on their respective factors thus all were retained for analysis. Furthermore, all four factors accounted for 66.131% of the total variation in green disposal. Sampling adequacy was tested using the Kaiser- Meyer- Olkin (KMO) Measure of sampling adequacy.

As evidenced in Table 4.15, KMO was greater than 0.5 (0.687), and Bartlett's Test was significant, $\chi 2\ (28) = 1319.651$, p-value < 0.001.

	1	2
Scrap materials are recycled	0.709	
The company returns product to the manufacturer for reuse or recycling	0.918	
There is existence of practices that involve processing of returned merchandise	0.869	
The company products can be returned to the manufacturer for reuse or recycling	0.763	
All parts and components are recyclable		0.89
Products are put on alternative use after useful life		0.898

Total Variance Explained

Rotation Sums of Squared Loadings

Component	Total	% of Variance	Cumulative %
1	2.997	37.459	37.459
2	2.294	28.672	66.131

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	0.687
Bartlett's Test of Sphericity, Approx. Chi-Square	1319.651
Df	28
Sig.	0.000

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

4.6.6 Collaborative Capability

Factor analysis was carried out on collaborative capability. In general, the extraction method was principal component analysis and the rotation method was varimax with Kaiser Normalization and the findings were presented in Table 4.16. The findings in the table show that all the items related to collaborative capability were significantly loaded on their respective factors thus all were retained for analysis. Furthermore, all factors accounted for 64.73% of the total variation in collaborative capability. Sampling adequacy was tested using the Kaiser- Meyer- Olkin (KMO) Measure of sampling adequacy. As indicated in Table 4.16, KMO was greater than 0.5 (0.664), and Bartlett's Test was significant, $\chi 2\ (21) = 684.624$, p-value < 0.001.

Table 4.15: Collaborative Capability

	Component	
	1	2
Customer concerns on green products are addressed	0.618	
There is existence of effective interdepartmental	0.727	
Reliance on our partners engineering capacity	0.846	
Cooperation with manufacturing department	0.899	
Cooperation with distributors for green packaging	0.596	
communication with our supply chain partners		0.895
Cooperation with manufacturing for using ..		0.51

Total Variance Explained

Component	Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %
1	2.87	40.997	40.997
2	1.661	23.733	64.73

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	0.664
Bartlett's Test of Sphericity, Approx. Chi-Square	684.624
Df	21
Sig.	0.00

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

4.7 Correlation Results

Correlation analysis is carried out in research to ascertain the level to which two factors converge or diverge together depending on the case so as to establish the significance of the relationship. A positive value of the correlation coefficient shows that the two variables move together in the same trend, and when there is a negative value, it shows that the variables move in opposite direction or trend. Essentially, correlation analysis depicts to a given degree, the aspect of how one factor influences another although correlations do not imply a cause-effect relationship. The study thus carried out correlation analysis of the independent factors and the dependent factor and the findings were summarized and presented in Table 4.17.

From the findings in the table, green procurement has a positive and significant relationship with firm performance (r = 0.692, p-value = 0.000) at 0.01 level of significance. The findings also showed that green manufacturing did have a positive and significant relationship with firm performance (r = 0.661, p-value = 0.000).

Additionally, the findings revealed that there is a positive and significant relationship between green distribution and firm performance (r = 0.580, p-value = 0.000) at 0.01 level of significance. As well, the findings also showed that green disposal has a positive and significant relationship with firm performance (r = 0.517, p-value = 0.000) at 0.01 level of significance. Finally, collaborative capability did have a positive and significant relationship with firm performance (r = 0.599, p-value = 0.000).

Table 4.16: Correlation results

		FP	GP	GM	GD	GDs	CC
FP	R	1.000					
	P value						
GP	R	.692**	1.000				
	P value	0.000					
GM	R	.661**	.781**	1.000			
	P value	0.000	0.000				
GD	R	.580**	.657**	.638**	1.000		
	P value	0.000	0.000	0.000			
GDs	R	.517**	.467**	.514**	.385**	1.000	
	P value	0.000	0.000	0.000	0.000		
CC	R	.599**	.604**	.515**	.392**	.537**	1.000
	P value	0.000	0.000	0.000	0.000	0.000	

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

FP = *Firm performance*

GP = *green procurement*

GM = *green manufacturing*

GD = *Green Distribution*

GDs = *Green Disposal*

CC = *Collaborative capability*

4.8 Diagnostics Statistics

4.8.1 Normality

The Shapiro-Wilk test was utilized to test for normality. This test establishes the degree of normality of the data by detecting the presence of skewness or kurtosis or both. Shapiro-Wilk measurement ranges from zero to one with figures higher than 0.05 demonstrating that the data is normal (Razali and Wah, 2011). As shown in table 4.18, the findings demonstrated that every one of the variables were above 0.05 ($p > 0.05$) thus affirming data normality. Normality assumes that the sampling dispersion of the mean is normal.

Table 4.17: Normality

	Kolmogorov-Smirnova			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Unstandardized Residual	0.024	224	.200*	0.994	224	0.140
Standardized Residual	0.024	224	.200*	0.994	224	0.140
Standardized Residual	0.024	224	.200*	0.995	224	0.175

* This is a lower bound of the true significance.
a Lilliefors Significance Correction

4.8.2 Linearity

Hair *et al.* (2010) argue that linearity is an assumption of all multivariate techniques based on co-relational measures of association, including regression, multiple regression and factor analysis. Therefore, it is crucial to test the relationship of the variables to identify any departure that may impact the correlation. The results of tests of linearity in table 4.19 below depicts that there is a linear relationship between firm performance and green procurement (F = 346.87, ρ- value = 0.000). There is also a linear relationship between firm performance and green manufacturing (F = 473.02, ρ- value = 0.000). Furthermore, results indicate that there is a linear relationship between firm performance and green distribution (F = 381.42, ρ- value = 0.000).

In addition, there is a linear relationship between firm performance and green disposal (F = 318.99, ρ- value = 0.000). Finally, there is a linear relationship between firm performance and collaborative capability (F = 136.33, ρ - value = 0.000). The result in table 4.19 showed that all the variables are linear with each other. Thus, there is no violation of the linearity assumption.

Table 4.18: Linearity

			F	Sig.	R Squared	Eta	Eta Squared
Firm performance * green procurement	Linearity		346.87	0.00	0.46	0.71	0.50
	Deviation from Linearity		1.19	0.25			
Firm performance * green manufacturing	Linearity		473.02	0.00	0.54	0.77	0.59
	Deviation from Linearity		1.12	0.29			
Firm performance * green distribution	Linearity		381.42	0.00	0.48	0.72	0.52
	Deviation from Linearity		1.45	0.09			
Firm performance * green disposal	Linearity		318.99	0.00	0.43	0.72	0.53
	Deviation from Linearity		1.51	0.12			
Firm performance * Collaborative Capability	Linearity		136.33	0.00	0.24	0.61	0.37
	Deviation from Linearity		1.80	0.37			

4.8.3 Heteroscedasticity Test

Homoscedasticity was measured by Levene's test. This test examines whether or not the variance between independent and dependent variables is equal. If the Levene's Test for Equality of Variances is statistically significant α= 0.05 this indicates that the group variances are unequal. It is a check as to whether the spread of the scores in the variables are approximately the same. From the results in Table 4.20, P-values of Levene's test for homogeneity of variances were greater than 0.05. The test therefore was not significant at α= 0.05 confirming homogeneity.

Table 4.19: Heteroscedasticity Test

Test of Homogeneity of Variances

	Levine Statistic	df1	df2	Sig.
Green procurement	0.386	1	222	0.535
Green manufacturing	0.351	1	222	0.554
Green Distribution	0.827	1	222	0.364
Green disposal	0.118	1	222	0.732
Collaborative capability	2.493	1	222	0.116

4.8.4 Multicollinearity

Multicollinearity is a phenomenon whereby high correlation exists between the independent variables. It occurs in a multiple regression model when high correlation exists between these predictor variables prompting questionable assessments of regression coefficients. This leads to strange outcomes when attempts are made to decide the degree to which the independent variables explain the changes in the outcome variable (Creswell, 2014).

Multicollinearity test was used to check whether high correlation existed between one or more variables in the study with one or more of the other independent variables. Variance inflation factor (VIF) measured correlation level between the predictor variables and estimated the inflated variances due to linear dependence with other explanatory variables. A common rule of thumb is that VIFs of 10 or higher (conservatively over 5) points to severe multi-collinearity that affects the study (Newbert, 2008). A tolerance threshold value of below 0.2 indicates that collinearity is present (Menard, 2000).

Table 4.21 presents the result of tests for Multicollinearity. As shown in the table, the results revealed no problem with multicollinearity. The variables of the study indicated VIF values of between 1.583 and 3.341 which is less than the figure recommended by the rule of thumb. This indicated that the data set displayed no multicollinearity.

Table 4.20: Multicollinearity

	Collinearity Statistics	
	Tolerance	VIF
Green Procurement	0.299	3.341
Green Manufacturing	0.339	2.946
Green Distribution	0.526	1.902
Green Disposal	0.632	1.583
Collaborative Capability	0.550	1.817

4.8.5 Autocorrelation

A key assumption in regression is that the error terms are independent of each other. This section presents a simple test to determine whether there is autocorrelation or serial correlation. The Durbin-Watson test was used to test autocorrelation. Findings in table 4.22 show a Durbin-Watson of between 1.8-2.0 indicating minimal autocorrelation which does not influence the outcome of regression results. Hence, the assumption was met.

Table 4.21: Autocorrelation

	Durbin-Watson
Green procurement	2.013
Collaborative Capability	1.825

4.9 Hypothesis testing (regression results)

H_{01} *Green procurement does not significantly influence performance of manufacturing firms in Kenya*

The first hypothesis ($H_{O1:}$) stated that green procurement does not significantly influence the performance of manufacturing firms in Kenya. However, the findings in table 4.23 showed that green procurement has a positive and significant effect on performance of manufacturing firms ($\beta_1 = 1.026$, $p<0.05$). Thus, the hypothesis was rejected and this can be explained further by assessing the value of the t-test which indicates that green procurement would be attributed to the regression model 14 times more compared to the effect of the standard error associated with the estimated

coefficient (t = 14.264). More findings in Table 4.23 indicated that the variation in performance of manufacturing firms was attributed by 47.8% change in green procurement. In line with the findings, Blomea, Hollosby and Paulrajac (2013) established that green procurement and green supplier development directly impacted on the supply chain performance of western European firms within the manufacturing and service sector. In addition, the findings are in tally with that of Pembere (2016) which indicated that the adoption of green procurement practices improves the supply chain performance.

Table 4.22: Influence of Green Procurement on Performance of Manufacturing Firms in Kenya

	Unstandardized Coefficients		Standardized Coefficients		
	B	**Std. Error**	**Beta**	**t**	**Sig.**
(Constant)	-0.261	0.183		-1.428	0.155
Green procurement	1.026	0.072	0.692	14.264	0.000
Model Summary statistics					
R	0.692				
R Square	0.478				
Adjusted R Square	0.476				
Std. Error of the Estimate	0.635				
Model Fitness Statistics (ANOVA Results)					
F	203.468				
Sig.	0.000				

a Dependent Variable: firm performance

H_{02} *Green manufacturing does not significantly affect performance of manufacturing firms in Kenya*

The second (H_{O2} :) hypothesis postulated that green manufacturing does not significantly affect performance of manufacturing firms in Kenya. However, the findings in Table 4.24 showed that green manufacturing has a positive and significant effect on firm performance ($\beta_2 = 0.840$, $p<0.05$). Hence, hypothesis was rejected. this can be explained further by assessing the value of the t-test which indicates that green manufacturing would be attributed to the regression model 13

times more compared to the effect of the standard error associated with the estimated coefficient (t = 13.141) The findings in Table 4.24 further indicated that the variation in firm performance was attributed by 43.8% change in green manufacturing.

Consistent with the findings, Ninlawan *et al.*, (2010) echoed that green manufacturing has the potential of lowering raw material costs, reducing environmental and occupational safety expenses and improving corporate image. Similarly, Defra, (2008) argued that several firms view the application of green manufacturing technologies as instrumental in improving the overall firm performance. In a similar vein, Newman, & Jensen, (2013) stipulated that green manufacturing converts inputs into outputs by reducing hazardous substances, minimizing waste, actively designing and redesigning green processes. Furthermore, Gezen and Cankaya, (2013) concluded that green manufacturing applications have a significant positive impact on environmental performance and social performance.

Table4.23: Influence of Green Manufacturing on Performance of Manufacturing Firms in Kenya

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	T	Sig.
(Constant)	0.304	0.157		1.943	0.053
Green manufacturing	0.840	0.064	0.661	13.141	0.000
Model Summary statistics					
R	0.661				
R Square	0.438				
Adjusted R Square	0.435				
Std. Error of the Estimate	0.659				
Model fitness statistics (ANOVA results)					
F	172.673				
Sig.	0.000				

a Dependent Variable: firm performance

H_{03} *Green distribution does not significantly affect performance of manufacturing firms in Kenya*

The Third ($H_{O3:}$) hypothesis postulated that green distribution does not significantly affect performance of manufacturing firms in Kenya. However, the findings in table 4.25 showed that green distribution has a positive and significant effect on firm performance (β_3 = .691, $p<0.05$). Thus, hypothesis was rejected. This can be explained further by assessing the value of the t-test which indicates that green distribution would be attributed to the regression model 10 times more compared to the effect of the standard error associated with the estimated coefficient (t = 10.613). The findings in Table 4.25 further indicate that the variation in firm performance was attributed to 33.7% change in green distribution. Cognate to the results, Mama, Nyaoga, Matwere and Nyambega (2014) in a study focusing on tea processing firms in Kericho County-Kenyaindicated a positive relationship between green distribution and environmental performance. As well, Kankanit (2015) affirmed that green distribution had significant effect on the business performance of electronic industry

in Thailand.

Table 4.24: Influence of Green Distribution on Performance of Manufacturing Firms in Kenya

	Unstandardized Coefficients		Standardized Coefficients		
	B	**Std. Error**	**Beta**	**T**	**Sig.**
(Constant)	0.471	0.177		2.666	0.008
Green Distribution	0.691	0.065	0.580	10.613	0.000
Model Summary Statistics					
R	0.580				
R Square	0.337				
Adjusted R Square	0.334				
Std. Error of the Estimate	0.716				
Model Fitness Statistics (ANOVA Results)					
F	112.627				
Sig.	0.000				
a Dependent Variable: firm performance					

H_{04}*Green disposal does not significantly impact on the performance of manufacturing firms in Kenya*

The fourth (H_{O4} :) hypothesis postulated that green disposal does not significantly impact on the performance of manufacturing firms in Kenya. Nevertheless, the findings in table 4.26 showed that green disposal has a positive and significant effect on firm performance ($\beta_4 = 0.602$, $p<0.05$) thus, the hypothesis was rejected. This can be explained further by assessing the value of the t-test which indicates that the effect on green disposal would be attributed to the regression model compared 9 times more compared to the effect of the standard error associated with the estimated coefficient (t = 9.006). The findings in Table 4.26 further indicated that the variation in firm performance was attributed by 26.8% change in green disposal. In tally with the findings, Amembaet al. (2013) noted that green packaging involves the use of packaging the goods into smaller units with the goal of reducing the amount of space and the materials used thereby increasing warehouse utilization. In a similar vein, Kyalo (2015) confirmed that manufacturers utilize lean production, use biodegradable materials and total quality management in their operations with the

intent of improving their operational performance.

Table 4.24: Influence of Green Disposal on Performance of Manufacturing Firms in Kenya

	Unstandardized Coefficients		Standardized Coefficients		
	B	**Std. Error**	**Beta**	**T**	**Sig.**
(Constant)	0.807	0.171		4.720	0.000
Green disposal	0.602	0.067	0.517	9.006	0.000
Model Summary Statistics					
R	0.517				
R Square	0.268				
Adjusted R Square	0.264				
Std. Error of the Estimate	0.752				
Model Fitness Statistics (ANOVA Results)					
F	81.113				
Sig.	0.000				

a Dependent Variable: firm performance

4.10 Overall regression results

The overall objective of this study was to establish the influence of green supply chain practices on the performance of manufacturing firms in Kenya. An overall regression model was developed to explain this relationship and the findings were summarized and presented in Table 4.27 for the model summary, Table 4.28 for the analysis of variance and Table 4.29 for the coefficient estimation.

4.10.1 Model Summary

According to table 4.27, the R value indicates a strong correlation between predictor variables and the response variable (firm performance). This is because the R value is positive (0.558). This means that the variation in firm performance was attributed by 55.8% change in the predictor variables. According to the value of the R-Square, 55.8% of firm performance could be explained by the independent variables while the remaining 44.2% could be attributed to other factors other than the predictor variables.

Table 4.25: Model summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.747a	0.558	0.55	0.58806

a Predictors: (Constant), green disposal, green Distribution, green procurement, green manufacturing

4.10.2 Test of Goodness of Fit (ANOVA)

The analysis of variance is important in assessing the significance of the variation contributed by the explanatory variables on the response variable compared to the variation contributed by the residuals. The study thus carried out the analysis of variance and the findings were summarized and presented in Table 4.28. The findings in the table showed that the total sum of squares for the regression model was 171.508. Further, the analysis of variance indicated that the above discussed coefficient of determination was significant as evidenced by F = 69.237 with p < 0.000. Thus, the model was fit to predict firm performance using the independent variables.

Table 4.26: Test of Goodness of fit (ANOVA)

	Sum of Squares	Df	Mean Square	F	Sig.
Regression	95.774	4	23.943	69.237	.000b
Residual	75.734	219	0.346		
Total	171.508	223			

a Dependent Variable: firm performance
b Predictors: (Constant), green disposal, green Distribution, green procurement, green manufacturing

4.10.3 Optimal Regression Coefficient

A regression model is generally used to assess and depict a cause-effect relationship that has been, to a certain degree, been depicted by the correlation analysis. The regression model gives the magnitude of the cause-effect relationship as well as the direction of the relationship. This is achieved through the estimation of the

coefficients of estimations attributed to the explanatory variables. This means that a negative coefficient of estimation would often imply a decrease by the magnitude of the estimated coefficient in the response variable. In order to increase the accuracy of the estimated model, the standardized coefficients of estimation are utilized. Thus, basing on the predicted regression model, the study sought to determine the effect of green procurement, green manufacturing, green distribution and green disposal on the performance of manufacturing firms. Table 4.29 gives a summary of the coefficients of estimate.

The findings in table 4.29 showed that green procurement had a significant effect on firm performance (β_1 = 0.353, p-value = 0.000) indicating that there would be an increase of 0.353-unit increase in firm performance. This can also be shown by the t-test value of 4.607 which indicated that implied that the variation in firm performance attributed to green procurement was significantly greater than that attributed by the standard error.

In addition, the findings revealed that green manufacturing was shown to have positive and significant effect on firm performance (β_2 = 0.186), the effect attributed to it was significant (p-value = 0.017) and this can further be evidenced by the value of the t-test which showed that the effect on firm performance would be attributed to green manufacturing 2 times more compared to the effect attributed to the standard error (t = 2.416).This means that firm performance would increase by 0.186 units with each unit increase in green manufacturing.

The study ++ also showed that green distribution has a positive and significant effect on firm performance (β_3 = 0.153, p-value = 0.014) indicating that there would be an increase of 0.153 units in firm performance. This can also be shown by the t-test value of 2.480 which indicated that implied that the variation in firm performance attributed to green distribution was significantly greater than that attributed by the standard error.

Finally, the findings showed that green disposal had a positive and significant effect on firm performance (β_4 = 0.198, p-value = 0.000). This means that firm

performance would increase by 0.198 units with each unit increase in green disposal. In fact, the effect on firm performance is attributed to green disposal by over 2 times more compared to the effect attributed to the standard error associated with it.

Table 4.27: Coefficients of Estimate

	Unstandardized Coefficients		Standardized Coefficients		
	B	**Std. Error**	**Beta**	**t**	**Sig.**
(Constant)	-0.613	0.183		-3.348	0.001
Green Procurement	0.524	0.114	0.353	4.607	0.000
Green Manufacturing	0.237	0.098	0.186	2.416	0.017
Green Distribution	0.183	0.074	0.153	2.480	0.014
Green Disposal	0.230	0.061	0.198	3.741	0.000

a Dependent Variable: firm performance

4.10.4 Testing for Moderation

H_{05} Collaborative capability does not have a significant moderating effect on the relationship between green supply chain practices and performance of manufacturing firms in Kenya

Table 4.34 presents H_{05a}, H_{05b}, $H_{05c,}$ and H_{05d} from Model 3 to Model 7 for the moderating effect of Collaborative capability. These hypotheses were tested using hierarchical regression. Prior to conducting hierarchical regression analyses, all study variables were standardized as z-scores to test for interaction terms (Aiken & West, 1991; Jose, 2008). Z-standardization of the variables allows easy interpretation of the interaction effects (Dawson, 2014). Model 1 represent the effect of independent variables on firm performance respectively. The hypotheses formulated are explained below.

Ho_{5a} Collaborative capability has no significant effect on the relationship between green procurement and firm performance.

The moderation results show that Collaborative capability has a positive and significant moderating effect on the relationship between green procurement and

firm performance ($R^2\Delta$=0.04; β= 0.79; ρ<0.05). The results show that there is a 4% increase in the variation of the firm performance by the addition of Collaborative capability on the relationship between green procurement and firm performance. The increase is significant (ρ<0.05) and positive (β= 0.79). The results suggest that Collaborative capability strengthens the relationship between green procurement and firm performance. The null hypothesis that Collaborative capability has no significant moderating effect on the relationship between green procurement and firm performance was thus rejected.

Ho_{5b} Collaborative capability has no significant effect on the relationship between green manufacturing and firm performance.

Further, the results indicate a positive and significant moderating effect of Collaborative capability on the relationship between green manufacturing and firm performance ($R^2\Delta$=0.03 β= 0.92; ρ<0.05). The results show that there is a 3% increase in the variation of the firm performance by the addition of collaborative capability on the relationship between green manufacturing and firm performance. The increase is significant (ρ<0.05) and positive (β= 0.92). The results suggest that Collaborative capability strengthens the relationship between green manufacturing and firm performance. The null hypothesis that Collaborative capability has no significant moderating effect on the relationship between green manufacturing and firm performance was thus rejected.

Ho_{5c} Collaborative capability has no significant effect on the relationship between green distribution and firm performance.

In addition, Collaborative capability has a positive and significant moderating effect on the relationship between green distribution and firm performance ($R^2\Delta$=0.01 β= 0.66; ρ<0.05). The results show that there is a 1% increase in the variation of the firm performance by the addition of Collaborative capability on the relationship between green distribution and firm performance. The increase is significant (ρ<0.05) and positive (β= 0.66). The results suggest that Collaborative capability strengthens the relationship between green distribution and firm performance. The

null hypothesis that Collaborative capability has no significant moderating effect on the relationship between green distribution and firm performance was thus rejected.

Ho_{5d} Collaborative capability has no significant effect on the relationship between green disposal and firm performance.

Finally, the results show an insignificant moderating effect of Collaborative capability on the relationship between green disposal and firm performance ($R2\Delta=0.01$ $\beta= .49$; $\rho>0.05$). The results show that there is a 1% change in the variation of the firm performance by the addition of Collaborative capability on the relationship between green disposal and firm performance. The variation is significant ($\rho>0.05$) and positive ($\beta= .49$). Therefore, Collaborative capability has moderating effect on the relationship between green disposal and firm performance. The null hypothesis that Collaborative capability has significant moderating effect on the relationship between green disposal and firm performance was thus rejected

Table 4.28: Regression Coefficients of the Interaction of Collaborative Capability on Supply Chain Management and Firm performance

	Model 1 B(Se)	Model 2 B(Se)	Model 3 B(Se)	Model 4 B(Se)	Model 5 B(Se)	Model 6 B(Se)
(Constant)	0.07(.04)	0.07(.04)	0.05(.03)	0.02(.03)	0.03(.03)	0.02(.03)
Score (GP)	0.42(.08)**	0.32(.06)**	(-0.07(.08)	0.18(.09)*	0.25(.08)**	0.29(.08)**
Score(GM)	0.29(.07)**	0.23(.07)**	0.20(.06)**	(-0.19(.08)*	(-0.09(.08)	(-0.02(.08)
Score (GD)	0.183(.07)**	0.19(.06)**	0.17(.06)**	0.15(.06)**	(-0.16(.08)*	(-0.03(.09)
Score(Ds)	0.26(.07)*8	0.11(.06)	0.13(.06)*	0.13(.06)*	0.13(.05)*	(-0.09(.09)
Score(CC)		0.46(.05)**	(-0.01(.09)	(-0.27(.08)**	(-0.45(.09)**	(-0.44(.09)
Score (GP_CC)			0.79(.11)**	0.21(.13)	0.09(.13)	0.01(.13)
Score(GM_CC)				0.92(.13)**	0.63(.14)**	0.48(.15)**
Score(GD-CC)					0.66(.16)**	0.39(.16)*
Score(GsP_CC)						0.49(.15)**
Model Summary						
R	0.79	0.83	0.85	0.87	0.88	0.88
R Square	0.62	0.69	0.73	0.76	0.77	0.78
Adjusted R Square	0.61	0.68	0.72	0.75	0.77	0.77
Std. Error of the Estimate	0.81	0.73	0.69	0.65	0.63	0.62
Change Statistics						
R Square Change	0.61	0.08	0.04	0.03	0.01	0.01
F Change	156.18	94.96	52.16	47.98	24.24	10.49
df1	4.00	1.00	1.00	1.00	1.00	1.00
df2	394.00	393.00	392.00	391.00	390.00	389.00
Sig. F Change	0.00	0.00	0.00	0.00	0.00	0.00

Dependent variable: Firm performance

Legend: GP – Green procurement, GM – Green manufacturing, GD – Green distribution, GDs – Green disposalCC – Collaborative capability – GP-CCGreen procurement and Collaborative capability, GM_CC – Green manufacturing and Collaborative capability, GD_CC– Green distribution and Collaborative capabilityGDs-CC – Green disposal and Collaborative capability

Table 4.29: Summary of Hypotheses Testing

Hypotheses		Beta	p-value	Decision
Hypothesis H_{O1}	There was no significant effect of green procurement on performance of manufacturing firms in Kenya	0.183	.000	Reject
Hypothesis H_{O2}	There was no significant effect of green manufacturing on performance of manufacturing firms in Kenya	0.342	.000	Reject
Hypothesis H_{O3}	There was no significant effect of green distribution on performance of manufacturing firms in Kenya	0.220	.000	Reject
Hypothesis H_{O4}	There was no significant effect of green disposal on performance of manufacturing firms in Kenya	0.128	.011	Reject
Hypothesis H_{O5a}	There was no significant moderating effect of collaborative capability on the relationship between green procurement and performance of manufacturing firms in Kenya	0.79	.000	Reject
Hypothesis H_{O5b}	There was no significant moderating effect of collaborative capability on the relationship between green manufacturing and performance of manufacturing firms in Kenya	0.92	.000	Reject
Hypothesis H_{O5c}	There was no significant moderating effect of collaborative capability on the relationship between green distribution and performance of manufacturing firms in Kenya	0.66	.000	Reject
Hypothesis H_{O5d}	There was no significant moderating effect of collaborative capability on the relationship between green disposal and performance of manufacturing firms in Kenya	0.49	.000	Reject

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the summary of the findings conclusions derived from the findings, and the recommendations that will help in improving the performance of manufacturing firms in Kenya. Areas of further study are also suggested.

5.2 Summary of Findings

The study established number of findings, the summary of the findings is outlined under

5.2.1 Green Procurement

The findings on green procurement indicated that the selection of suppliers in not based on their ability to develop environmentally friendly goods. Also, the company has not made sufficient efforts towards ensuring that there is effective selection of suppliers based on their ability to support firm's environmental objectives. Further, it is undefined if the company purchases products with biodegradable packaging. Moreover, it is not clear if the use of toxic and hazardous is minimized in the ordering process. Further, it is unclear whether purchase orders are placed through mail and if order follows is done electronically. Similarly, there is uncertainty as to whether materials purchased for manufacturing are of recyclable nature. Also, there are no considerations on green specifications during inspection on delivery. Moreover, there is doubt if there is use of Eco labeling practices.

5.2.2 Green Manufacturing

The results on green manufacturing revealed that the firm minimally uses inputs with relatively low environmental impacts. Similarly, the use of product design that facilitates recycling of the parts or material component has been lowly evidenced.

Moreover, there has been limited efforts towards the adoption of a green procurement policy that encourages the production department to reduce waste to landfill. Furthermore, it is undefined if the company has adopted green technology in manufacturing processes. However, it is clear that there is limited use of inputs that generate little pollution and the use of machines with little air emission. In the production process, not much has been done to reduce the generation of effluent waste and ensuring that solid waste is recycled. Further, minimal efforts have been directed towards ensuring that there is minimized consumption of materials as well as energy to minimize resource depletion.

5.2.3 Green Distribution

In relation to green distribution, the use of green packaging materials is lowly evidenced. Also, there are limited collaborations with vendors to standardize packaging. Moreover, there is less cooperation with vendors to encourage reuse of packaging materials. In regards to packaging, there is doubt if the company's logistics providers have increased space utilization in the trailers to reduce handling requirement. Besides, there is doubt if firms' have set up pick up points for wastes to optimize waste disposal. Also, it is undefined if the company considers fuel factors in the selection of transporter. With reference to transport, it is undefined if the company has adopted life cycle assessment analysis to understand environmental compatibility of products. Further, it is not clear whether efforts have been made towards the adoption of Eco labeling to describe the information of a product about the environmental impact associated with its use.

5.2.4 Green Disposal

The findings on green disposal revealed that products are not put on alternative use after useful life. Also, there is no recycling of scrap materials. It was further indicated that all parts and components are not recyclable. Further, there is doubt whether the company returns products to the manufacturer for reuse or recycling and if there is existence of practices that involve processing of returned merchandise. In addition, there are no organization policies on disposal methods. Moreover, there is

doubt if the company product and their parts are reusable. Also, it is uncertain if the company products can be returned to the manufacturer for reuse or recycling. However, the company byproducts are not sold for alternative usage.

5.2.5 Collaborative capability

The results on collaborative capability indicated that there is limited focus on customer concerns on green products and lack of effective interdepartmental and inter organizational communication. Further, there is doubt if there is reliance on their partners engineering capacity for eco design. As well, it is undefined if there is cooperation with manufacturing department for green production and consumption. Moreover, there is limited cooperation with manufacturing for using less energy during production and transportation. Besides, there is not much emphasis on cooperation with distributors for green packaging. Finally, there is doubt if communication with supply chain partners is bilateral rather than unilateral.

5.3 Conclusion

From the results of the study and the forgoing discussions, it is clear that there is a strong connection between green procurement and the performance of manufacturing firms in Kenya (β_1 = 0.353, p-value = 0.000). This indicate that there would be an increase of 0.353-unit increase in firm performance. This can also be shown by the t-test value of 4.607 which indicated that implied that the variation in firm performance attributed to green procurement was significantly greater than that attributed by the standard error.

Also, green manufacturing exhibited a positive and significant effect on the performance of manufacturing firms. This can be evidenced by the value of the t-test which showed that the effect on firm performance would be attributed to green manufacturing 2 times more compared to the effect attributed to the standard error (t = 2.416). This means that firm performance would increase by 0.186 units with each unit increase in green manufacturing.

In addition, green distribution exhibited a positive and significant influence on the

performance of manufacturing firms (β_3 = 0.153, p-value = 0.014). This indicates that there would be an increase of 0.153 units in firm performance. This can also be shown by the t-test value of 2.480 which indicated that implied that the variation in firm performance attributed to green distribution was significantly greater than that attributed by the standard error.

Finally, green disposal elicited a positive and significant influence on the performance of manufacturing firms (β_4 = 0.198, p-value = 0.000). This means that firm performance would increase by 0.198 units with each unit increase in green disposal. In fact, the effect on firm performance is attributed to green disposal by over 2 times more compared to the effect attributed to the standard error associated with it.

5.4 Recommendations

5.4.1 Green procurement

Green procurement needs to be embraced to help the management team appreciate the direct effect on the performance of manufacturing firms. As such, adoption of flexible green procurement practices through appropriate research will help the manufacturing firm to meet diverse yet drastic changing needs as well as address challenges arising from a dynamic global business environment. Specifically, emphasis of the manufacturing firms needs to be on ensuring that suppliers are selected based on their ability to develop environmentally friendly goods. Also, the firms should ensure that the materials purchased for manufacturing are of recyclable nature. Also, the firms need to make considerations on green specifications during inspection on delivery.

5.4.2 Green manufacturing

Green manufacturing contributes to improved performance of manufacturing firms. Therefore, it is utmost necessary for the firms to use inputs with relatively low environmental impacts. Besides, emphasis needs to be on designing products that are recyclable and generate little pollution. Further, there is also need for manufacturing

firms to ensure there is a reduction in the generation of effluent waste. In addition, there should be concerted efforts towards ensuring that a green procurement policy is fully adopted within the firms.

5.4.3 Green distribution

Green distribution is key in improving the performance of manufacturing firms. It is therefore recommended for the firms to focus on cooperation with vendors to encourage reuse of packaging materials. Moreover, it is important for the firms to set up pick up points for wastes to optimize waste disposal. Besides, they should fully adopt life cycle assessment analysis to understand environmental compatibility of products. Finally, there is need to adopt Eco labeling to describe the information of a product about the environmental impact associated with its use.

5.4.4 Green disposal

Green disposal is essential in improving the performance of manufacturing firms. Therefore, it is important for the firms to ensure that their products can be put to on alternative use after useful life. Specifically, all parts and components need to be recyclable and practices that involve processing of returned merchandise need to be in place. Further, there should be organizational policies on disposal methods.

5.5 Further Research Recommendations

In connection with the findings, this study makes a number of possible implications on the influence of green supply chain practices on the performance of manufacturing firms in Kenya. First, this study has opened an insight into how green procurement, green manufacturing, green distribution and green disposal influence performance of manufacturing firms thus expanding on the existing literature that lays emphasis on developed countries. It has opened up further research avenues to compare and contrast these results with other sectors.

Second, it has highlighted the key role played by collaborative capability in moderating the relationship between green supply chain management and

performance of manufacturing firms in Kenya. One direction of future research would be a replication study in other sectors not covered in the study. Furthermore, in terms of methodology, future scholars can conduct a longitudinal study as well as appreciate both the quantitative and qualitative aspects of research. Nonetheless, the thesis has contributed knowledge that is needed for this kind of research.

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APPENDICES

Appendix I: Letter of Introduction

Date: …….

To …….

Dear Sir/Madam,

RE: COLLECTION OF RESEARCH DATA

I am currently pursuing a PhD at Jomo Kenyatta university of agriculture and technology. One of the requirements for the award of the degree is to write a thesis in the area of my studies. The title of my research is ***'to establish the influence of green supply chain practices on the performance of manufacturing firms in Kenya''.*** I am in the process of collecting data and I have identified you as one of my respondents in this study. I kindly request you to respond to the attached questionnaire. The information you give was treated with utmost confidentiality and at no time will your name be referred to directly. The information given will only be used for academic research purpose.

Thank you in advance for your time and cooperation.

Yours sincerely,

Rutere Yusuf (PhD student)

Appendix II: Questionnaire

SECTION I

Kindly fill your responses in the space provided or tick (√) appropriately.

Section i: Background information

Age:

Below 21 years ☐

21-30years ☐

31-40years ☐

41-50years ☐

Over 50 years ☐

Level of formal education:

None Primary Secondary Tertiary University

Work experience:

below one year one year ☐

two years ☐

three years ☐

over three years ☐

3 Are staff informed about environmental sustainability practices that are in place?

YES, ☐ NO ☐

How long have you been engaging in GSCM practices?

1 - 5 Years ☐

5 - 6 Years ☐

Over 6 Years ☐

If YES indicate how they are informed

Meeting ☐

Internal memos ☐

training ☐

if others specify _____

4 Is waste and specifically hazardous waste disposed of safely?

YES ☐ NO ☐

If yes, which method is used for disposal?

_____

☐

5 Does the product contain any banned or restricted substances?

YES ☐ NO ☐

6 Has your firm adopted green supply chain management practices?

YES ☐ NO ☐

7 In your own words, explain the challenges faced in your firm in the implementation of green supply chain practices.

_____

_____

_____

8 In your own opinion, which of the following green supply chain management practices is most embraced by your firm.

Green disposal ☐

Green procurement ☐

Green manu ☐

Green distribution ☐

SECTION II

Kindly indicate your level of agreement on the following statements regarding green procurement practices by your firm. By ticking (√) where appropriate.5. Strongly agree 4. agree 3. Neutral. 2. Disagree. 1. Strongly disagree.

Statement	Strongly agree	Agree	Neutral	Disagree	**Strongly disagree**
supplier selection					

Selection of suppliers is based on their ability to develop environmentally friendly goods					
The company Effectively select suppliers based on their ability to support the company‘s environmental objectives					
The company Purchases products with bio degradable packaging					
Ordering					
purchase orders are placed through mail (paperless)					
Order follow-up is electronically done					
Delivery					
Materials Purchased for manufacturing are of recyclable nature.					
Green specifications are considered during inspection on delivery					
There is Use of eco labeling practices					

Statement	Strongly agree	Agree	Neutral L	Dias reed	Strongly disagree
product design					
The company uses product Design that facilitate reuse of the parts or material components					
The company uses inputs with relatively low environmental Impacts					
The company uses product Design that facilitate recycling of the parts or material components					
production process					
The company has adopted a Green Procurement Policy that encourages production department to Reduce waste to landfill					
The company has adopted green manufacturing					
The company uses inputs that generate little pollution					
Green waste management					
The company uses machines with little air emissions					
The company Reduced generation of effluent waste					
The company's solid wastes is recycled					

GREEN MANUFACTURING

Kindly indicate your opinion on the extent of adoption of the following green manufacturing practices by your firm by ticking (√) where appropriate

GREEN DISTRIBUTION

Kindly indicate your opinion on the extent of adoption of the following specific green distribution practices by your organization by ticking (√) where appropriate

Statement	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Packaging					
The company uses green packaging materials					
The company Cooperating with vendors to standardize packaging					
The company Cooperates with vendors to encourage reuse of Packaging materials					
Transportation					
Increase space utilization in the trailer to reduce amount of handling required					
Setting of pickup points for wastes to optimize waste Minimization					
The company Considers fuel consumption in the selection of transporters.					
Ecolabelling					
The company has Adopted life cycle assessment analysis to understand environmental compatibility of products					

The company has adopted Eco labeling to describe the information of a product about the environmental impact associated with its use					

GREEN DISPOSAL

Kindly indicate your opinion on the extent of adoption of the following specific green disposal practices by your firm by ticking (√) where appropriate

Statement	**Strongly agree**	**Agree**	**Neutral**	**Disagree**	**Strongly disagree**
Recyclability					
The company has adopted the Practice of putting products on alternative usage after their useful life.					
Scrap materials produced in the company are recycled					
All parts and components used in the company are of recyclable Nature					
Reuse					
The company returns product to the manufacturer for reuse or Recycling					
There is Existence of practices that involves processing returned Merchandise					
The company has organization policies on disposal methods					

Salvage recovery					
The company product and their parts are reusable					
Company products can be returned to the manufacturer for reuse or recycling					
The company byproducts are sold for alternative usage					

COLLABORATIVE CAPABILITY

Kindly indicate your opinion on the extent to which the following collaborative capability issues influence the relationship between Green Supply Chain practices and performance of manufacturing firm by ticking (√) where appropriate

Statement	**Strongly agree**	**Agree**	**Neutral**	**Disagree**	**Strongly disagree**
Customer concerns on green products are addressed as matter of urgency					
There is existence of effective interdepartmental and inter organization communication					
We rely on our partners engineering capacity for eco Design					
We have Cooperated with manufacturing department					

for green production and consumption					
There is Cooperation with manufacturers for using less energy during production and transportation					
We have Cooperation with distributors for green Packaging					
The direction of our communication with our supply chain partners is bilateral rather than unilateral.					

Performance of manufacturing industries

Statement	**Direction of Change**	**0to10%**	**11% 20%**	**21% 30%**	**Above 30%**
Our profitability has changed after the introduction of green supply chain management practices by :	**Positive** ☐ **Negative** ☐	☐			
Percentage change in profits after introduction of green supply chain management	**Positive** ☐ **Negative** ☐	☐			

Direction of change of market share after introduction of green supply chain management	Positive ☐ Negative ☐				
Percentage change in market share after introduction of green supply chain management.	Positive ☐ Negative ☐				
Direction of change of average return on investment after introduction of green supply chain management	Positive ☐ Negative ☐				
percentage change in average return on investment after introduction of green supply chain management	Positive ☐ Negative ☐				
Direction of change of average sales volume after introduction of green supply chain management	Positive ☐ Negative ☐				

Percentage change in average sales volume after introduction of green supply chain management	**Positive** ☐ Negative ☐				
Direction of change of earnings per share after introduction of green supply chain management	Positive Negative ☐				
Percentage change in earnings per share after introduction of green supply chain management	Positive ☐ Negative ☐				
Direction of change of company's usage of energy resources after introduction of green supply chain management	Positive ☐ Negative ☐				
Percentage change in company's usage of energy resources after introduction of green supply chain management	Positive ☐ Negative ☐				

Thank you for Your Cooperation

Appendix III: Samling Frame

Building, Mining & Construction Sector (35)

African Diatomite Industries

Athi River Mining Ltd

Bamburi Cement Ltd

Bamburi Special Products Ltd

Boyama Building Materials

East African Portland Cement Company Ltd

Erdemann Gypsum Ltd

Flamingo Tiles (Kenya)Ltd

Glenn Investments Ltd C/O The Mehta Group Ltd

Homa Lime Co. Ltd

International Green Structures Manufacturing Kenya Ltd

Kay Salt Ltd

Kemu Salt Packers Productions Ltd

Kenbro Industries Ltd

Kenya Builders & Concrete Ltd

Kisumu Concrete Products

Koto Housing Kenya Ltd

Krystalline Salt Ltd

Kurawa Industries Ltd

Lexcon Enterprises Ltd

Malindi Saltworks Ltd

Mombasa Cement Ltd

National Cement Ltd

Orbit Enterprises Ltd

Pride Enterprises Ltd

Reliable Concrete Works Ltd

Rexe Roofing Products

Saj Ceramics Ltd

Sandblasting & Coating (K) Ltd

Savannah Cement Ltd

Skylark Construction Ltd

Space and Style Ltd

Tana River Quarrying Ltd

Tile & Carpet Centre

Twyford Ceramics Ltd

Chrysal Africa Ltd

Chryso Eastern Africa Ltd

Cooper K- Brands Ltd

Coral Paints Ltd

Sector: Chemical & Allied Sector (84)

Crop Nutrition Laboratory Services Ltd

Anffi Kenya Ltd

Crown Paints (Kenya) Ltd

Basco Products (K) Ltd

Darfords Enterprises Ltd

Basf East Africa Ltd

Decase Chemicals (Ltd)

Bayer East Africa Ltd

Deluxe Inks Ltd

Beiersdorf East Africa Ltd

Desbro Kenya Ltd

Blue Ring Products Ltd

Diversey Eastern and Central Africa Ltd

BOC Kenya Ltd

Buyline Industries Ltd

Dow Chemicals East Africa Ltd

Canon Chemicals Ltd (former United Chemicals Ltd)

Eastern Chemicals Industries Ltd

Carbacid (CO2) Ltd

Elex Products Ltd

Central Glass Industries Ltd

Enviro Hub Holdings Ltd

Evonik East Africa

Flame Tree Africa Ltd

Galaxy Paints & Coating Co. Ltd

H.B. Fuller Kenya Ltd (Formerly Continental Products Ltd)

Haco Tigerbrands East Africa Ltd

Henkel Kenya Ltd

Henkel Polymer Company Ltd

Hi-Tech Inks & Coatings Ltd

Highchem East Africa Ltd

IMCD Kenya Ltd (Formerly Chemicals and Solvents (EA) Ltd

Impact Chemicals Ltd

Instant Pest Control Services Ltd

Interconsumer Products Ltd

Jumbo Matress Industries Ltd

Kanku Kenya Ltd

Kaolin Crowners Company Ltd

Kapi Ltd

Kel Chemicals Ltd

Kemia International Ltd

Ken Nat Ink & Chemicals Ltd

Kip Melamine Co. Ltd

S East AfricaLtd

Maroo Polymers Ltd

MEA Ltd

Mekan (Kenya) Ltd

Metoxide Africa Ltd

Milly Glass Works Ltd

Murphy Chemicals (E.A)(Ltd

Norbrook Kenya Ltd

Odex Chemicals Ltd

Orbit Products Africa Ltd (Formerlt Orbit Chemicals)

Osho Chemicals Industries Ltd

Pan Africa Chemicals Ltd

PolyChem East Africa Ltd

Procter & Gamble East Africa Ltd

Protea Chemicals Kenya Ltd

Pyrethrum Board of Kenya

PZ Cussons EA Ltd

Reckitt Benckiser (E.A.) Ltd

Revolution Stores Ltd

Rok Industries Ltd

Rumorth EA Ltd

Rutuba Bio Agric and Organic Fertilizers company Ltd

Sadolin Paints (E.A.) Ltd

Sanergy Ltd

Sanvoks Industries Ltd

SC Johnson and Son Kenya

Energy, Electrical and Electronics Sector (55)

African Cables Ltd

Alternative Energy Systems Ltd

Amedo Centre Kenya Ltd

Aquila Development Co. Ltd

Asano International Ltd

Assa Abloy East Africa Ltd

Seweco Paints Ltd

Shreeji Chemicals Ltd

Style Industries ltd (Previously Strategic)

Super foam ltd

Synergy Gases (K) Ltd

Syngenta East Africa Ltd

Synresins Ltd

Tata Chemicals Magadi Ltd

Tri-Clover Industries (K) Ltd

Tropikal Brand (Afrika) Ltd

Twiga Chemical Industries Ltd

Aucma Digital Technology africa Ltd

Avery (East Africa) Ltd

Azuri Technologies Kenya Ltd

Baumann Engineering Ltd

Biogas Power Holdings (EA) Ltd

Burn Manufacturing USA LLC

Centurion Systems Ltd

Daima Energy Services

East African Cables Ltd

Holman Brothers (E.A) Ltd

Ibera Africa Power (EA) Ltd

Kenwest Cables Ltd

Kenya Petroleum Refineries Ltd

Kenya Power Co. Ltd

Libya Oil Kenya Ltd.(Formerly Mobil Oil Kenya)

Manufacturers & Suppliers (K) Ltd

Marshall Fowler (Engineers) Ltd

Metlex International Ltd

Metsec Cables Ltd

Muhoroni Briquette Co. Ltd

Mustek East Africa

Nationwide Electrical Industries Ltd

Oilzone (East Africa) Ltd

Optimum Lubricants Ltd

Ourupower Ltd

Pan Africa Transformers & Switchgears Ltd

Patronics Services Ltd

PCTL Automation Ltd

Pentagon Agencies

Philips East Africa Ltd

Plenser Ltd

Powerex Lubricants Ltd

Premier Solar Solutions Ltd

Protel Studios

Rabai Power Ltd

Repelectric (K) Ltd

Rich Enviro Fuels Ltd (Formerly Karan Biofuel)

Roka Industries Ltd

Schneider Electric Ltd (Formerly Power Technics Eat Africa)

Siera Cables

Sloimppexs Africa Ltd

Socabelec (EA) Ltd

Solimpexs Africa Ltd

Solinc East Africa Ltd (Formerly Ubbink East Africa)

Sollatek Electronics (Kenya) Ltd

Food & Beverages Sector (213)

Aariva Ltd

Afribon (K) Ltd

Africa Spirits Ltd

African Coffee

Afrimac Nut Company

Agri Pro-Pak Ltd

Agricultural & Veterinary Supplies Ltd (Agrivet)

Agriner Agricultural Development

Agro Chemical & Food Company Ltd

Al-Mahra Industries Ltd

Alliance One Tobacco Kenya Ltd

Almasi Beverages Ltd

Alpha Fine Foods Ltd

Specialised Power Systems Ltd

Steam Plant Ltd

Synergy Lubricant Solutions Ltd

Synergy-Pro

Alpha Grain Millers Ltd

Alpine Coolers Ltd

Aquamist Ltd

Arkay Industries Ltd

Aviano East Africa

Bakers Corner Ltd

Bakex Millers Ltd

Bakhresa Grain Milling (K) Ltd

Bdelo Ltd

Belat Enterprises

Belfast Millers Ltd

Bidco Africa Ltd

Bio Food Products Ltd

Brava Foods

Breakfast Cereal Company (K) Ltd

(Formerly Weetabix)

British American Tobacco Kenya Plc FormalyBritish American Tobacco Ltd

Broadway Bakery Ltd

Brookside Dairy Ltd

Brown Biashara Ltd

Buffalo Millers

Bulto Foods Ltd

Bunda Cakes & Feeds Ltd

Bunge East Africa Ltd

Burton and Bamber Company Ltd

Butali Sugar Mills Ltd

Buuri Millers Enterprises

Buzeki Dairy Ltd

C. Dormans Ltd

C.Czarnikow Sugar(EA) ltd

Cadbury Kenya Ltd

Caffe Del Duca Ltd

Candy Kenya Ltd

Capel Food Ingredients

Capwell Industries Ltd

Centrofood Industries Ltd

Chai Trading Company Ltd

Chemelil Sugar Company Ltd

Chirag Kenya Ltd

Coastal Bottlers Ltd

Coca-Cola East Central and West Africa Ltd

Coca-Cola Juices (K) Ltd

Coffee Agriworks Ltd

CoffTea Agencies

Crown Beverages LTD

Danone Baby Nutrition Africa and Overseas

Del Monte Kenya Ltd

Diamond Industries Ltd

Doinyo Lessos Creameries Ltd

DPL Festive Ltd

Dutch Waters Ltd

East African Breweries Ltd

East African Sea Food Ltd

East African Seed Co. Ltd

Eastern Produce Kenya Ltd (Kakuzi)

Edible Oil Poducts

Eldoret Grains Ltd

Elekea Ltd

Elle Kenya Ltd

Equator Bottlers LtdErdemann Co. (K) Ltd

Europack Industries Ltd

Excel Chemicals Ltd

Farmers Choice Ltd

Frigoken Ltd

FRM EA Packers Ltd

Frutarom Kenya (Ltd)

General Mills East Africa Ltd

Giloil Company Ltd

Githunguri Dairy Farmers Co-operative Society

Glacier Products Ltd

Global Fresh Ltd

Global Tea & Commodities (K) Ltd

Gold Crown Foods (EPZ) Ltd

Golden Africa Kenya Ltd

Gonas Best Ltd

Grain Bulk Handlers

Green Forest Foods Ltd

Happy Cow Ltd

Heritage Foods Kenya Ltd

Highlands Mineral Water Co. Ltd

Honey Care Africa

Insta Products (EPZ) Ltd

Italian Gelati & Food Products Ltd

Jambo Biscuits (K) Ltd

James Finlay Kenya Ltd

Jetlak Foods Ltd

Jjasm Mini-Distillery

Juja Coffee Exporters

Jungle Group

Kabianga Dairy Ltd

Kambu Distillers Ltd

Kamili Packers Ltd

Kapa Oil Refineries Ltd

Karirana Estate Ltd

Kedsta Investment Ltd

Kilimanjaro Biscuits Ltd

Kinangop Dairy Ltd

Kirinyaga Flour Mills

Kisii Bottlers Ltd

Koba Waters Ltd/ Broomhill Springs Water

Krish Commodities Ltd

Kuguru Food Complex Ltd

Kwale International Company Ltd

Kwality Candies & Sweets Ltd

Landeco Ltd

Luma Stores & Supplies Enter. Ltd

Mace Foods Ltd

Mafuko Industries Ltd

Malindi Natural Juice Processors Ltd

Mama Millers Ltd

Mamboleo Distillers Ltd (Formerly Kenlab Supplies Ltd

Manji Food Industries Ltd

Mastermind Tobacco (K) Lt

Mayfeeds Kenya Ltd

MDI Ltd

Megatech Ltd

MelvinMarsh International

MenengaiOil Refineries Ltd

MeruGreens Horticulture Ltd

Meru Water & Sewerage Services

Milly Fruit Processors Ltd

Mini Bakeries (Nbi) Ltd

Miritini Kenya

Mjengo Ltd

MombasaMaize Millers Ltd

Monwalk Investment Ltd

Morani Ltd

Mount Kenya Bottlers Ltd

Mumias Sugar Co. Ltd

Munyiri Special Honey Ltd

Mwanga Millers

Mzuri Sweets Ltd

Nairobi Bottlers Ltd

Nairobi Flour Mills Ltd

NalPackaging Holdings Ltd

NAS Airport Services Ltd

NesFoods Industries Ltd

Nestle Kenya Ltd

New Kenya Co-Operative Creameries Ltd

Nicey Nicey Maize Millers Ltd

Nicola Farms Ltd

NjoroCanning Factory(Kenya) Ltd

Norda Industries Ltd

Nzoia Sugar

Olivado EPZ Ltd

Palmhouse Diaries Ltd

Patco Industries Ltd

Pearl Industries Ltd

Pearly LLP

Pembe Flour Mills Ltd

Pernod Ricard Kenya Ltd

Platinum Distillers Ltd

Premier Flour Mills Ltd

Premier Food Industries Ltd

Pride Industries Ltd

Pristine International Ltd

Proctor & Allan (E.A.) Ltd

Promasidor (Kenya) Ltd

Propack Kenya Ltd

Pwani Oil Products Ltd

Rafiki Millers Ltd

Raka Milk Processors

RAZCO Ltd

Re-Suns Spices Ltd

Rift Valley Bottlers Ltd

Sahara Venture Capital Company Ltd

Salim Wazarani Kenya Company

Sameer Agriculture & Livestock (Kenya) LTD

SBC Kenya Ltd

Scepter Millers Ltd

Selecta Kenya Gmbh & Co. .KG

Shree Sai Industries

Sigma Supplies Ltd

Simply Foods Ltd

Sky Foods Ltd

South Nyanza Sugar Company

Spectre International Ltd

Spice World Ltd

Stawi Foods and Fruits Ltd

Sunny Processors Ltd

Sweet Rus Ltd

T.S.S. Grain Millers Ltd

Tropical Heat Ltd (Formerly Deepa Industries)

Trufoods Ltd

Trust Feeds Ltd

Trust Flour Mills Ltd

Fresh Produce Sector (14)

Big Flowers Ltd

Dilpack Kenya Ltd

Exotic Penina Fields Group Ltd

Flamingo Horticulture Kenya Ltd

Fontana Ltd

Fresh Produce Exporters Association of Kenya

From Eden

Groove Ltd

Kankam Exporters Ltd

Kenya Horticultural Exporters (1977)

Mahee Flowers Ltd

Maridadi Flowers

Rainforest Farmlands Kenya

Sunland Roses Ltd

Metal and Allied (88)

African Marine & General Engineering Co. Ltd

Agro Irrigation & Pump Services Ltd

Allied East Africa Ltd

Alloy Steel Castings Ltd

Apex Steel Ltd - Rolling Mill Division

Arvind Engineering Ltd

Ashut Engineers

Leather and Footwear (8)

Alpharama Ltd

Athi River Tanneries Ltd

Bata Shoe Co (K) Ltd

Budget Shoes Ltd

C & P Shoes Industries Ltd

Leather Industries of Kenya Ltd

Macquin Shoes Ltd

Sandstorm Africa Ltd

ASL Ltd

ASP Company Ltd

Athi River Steel Plant Ltd

Atlantic Ltd

Blue Nile Wire Products Ltd

Booth Extrusions Ltd

Brollo Kenya Ltd

Buhler Ltd

City Engineering Works Ltd

Cook 'N Lite Ltd

Corrugated Sheets Ltd

Crystal Industries Ltd

Davis & Shirtliff Ltd

Devki Steel Mills Ltd

Doshi & Company Hardware

East Africa Spectre Ltd

East African Foundry Works (K) Ltd

East African Glassware Mart (Nairobi)

Easy Clean Africa Ltd

Eco-Steel Africa

Eldoret Farm Machinery

Elite Tools Ltd

Farm Engineering Industries Ltd

Fine Engineering Works Ltd

Fit Tight Fasteners Ltd

Friendship Container Manufacturers Ltd

Globology Ltd

Greif Kenya Ltd

GZI Kenya Ltd

Heavy Engineering Ltd

HebatullahBrothers Ltd(FormerlyGeneral Aluminium Fabricators))

Hobra Manufacturing Ltd

Insteel Ltd

Iron Art Ltd

Kab Kam Enterprises Ltd

Kaluworks Ltd

Kens Metal Industries Ltd

Kenya General Industries Ltd

Kenyon Pte Ltd

Khetshi Dharamshi & Co. Ltd

Kitchen King Ltd

Laminate Tubes Industries

M-Kopa Kenya Ltd

Mabati Rolling Mills Ltd

Marine Crafts & Boat Repairs

Mecol Ltd

Metal Crowns Ltd

Mitsubishi Corporation

Modulec Engineering Systems Ltd

Nails & Steel Products Ltd

Nalin Steel Works

Nampak Kenya Ltd

Napro Industries Ltd

Narcol Aluminium Rolling Mills Ltd

Ndume Ltd

Orbit Engineering Ltd

Palak International Ltd

Patnet Steel Makers Manufacturers Ltd

Prime Steel Ltd

pyrrex General Agencies Ltd

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Red Oak Ltd

Richfield Engineering Ltd

Safal Building Systems Ltd

Sheffield Steel Systems Ltd

Silverspread Hardwares Ltd

Siya Industries (K) Ltd

Soni Technical Services Ltd

Southern Engineering Co. Ltd

St Theresa Industries Kenya Ltd

Standard Rolling Mills Ltd

Steel structures Ltd

Steelmakers Ltd

Steelwool (Africa) Ltd

Sufuria World Ltd

Superfit Steelcon Ltd

Tarmal Wire Products Ltd

Tensiles EA Ltd

Tononoka Rolling Mills Ltd

Tononoka Steel Ltd

Top Steel Kenya Ltd

Towertech Africa Ltd

Motor Vehicle Assemblers & Accessories Sector (55)

Ace Motors

Alamdar Trading Company Ltd

Associated Battery Manufacturers (E.A.) Ltd

Associated Vehicle Assemblers Ltd

Auto Ancilliaries Ltd

Auto Industries Ltd

Auto Springs Manufacturers Ltd

Autofine Filters & Seals Ltd

Azad Automobile Trimmings Ltd

Banbros Ltd

Bhachu Industries Ltd

BMG Holdings Ltd

Choda Fabricators Ltd

Chui Auto Spring Industries Ltd

Cica Motors

Dalcom Kenya

Dodi Autotech

Foton East Africa Ltd

General Motors East Africa Ltd

Global Motors Centre Ltd

Handa (K) Ltd

Harveer Bus Body Builders Ltd

Honda Motorcycle Kenya Ltd

Igo Holdings Ltd

Impala Glass Industries Ltd

Kenya Coach Industries Ltd

Kenya Vehicle Manufacturers Ltd

Kibo Africa Ltd formerly Koneksie Ltd

King Finn Kenya Ltd

King-Bird (K) Ltd

Labh Singh Harnam Singh Ltd

Load Trailers

Makindu Motors Ltd

Mann Manufacturing Co. Ltd

Master Fabricators Ltd

Megh Cushion Industries Ltd

Mobius Motors Kenya Ltd

Mutsimoto Company Ltd

Passion Profit Ltd

Pipe Manufacturers Ltd

R.T. (East Africa) Ltd

Romageco Kenya Ltd

Ruidu (Kenya) Company Linited

Scania East Africa Ltd(Merged with Kenya Grange Vehicles)

Simba Caetano Formula Ltd

Skyline Holdings Ltd

Sohansons Ltd

Songyi Motocycles International Ltd

Soroya Motors Spares Ltd

Springtech (K) Ltd

Theevan Enterprises Ltd

Toyota Tshusho East africa Ltd

Transafrica Motors Ltd

Transtrailers Ltd

Turaco Ltd

Paper & Board Sector (79)

Adpak International Ltd

Allpack Industries Ltd

Anvi Emporium Ltd (Formerly Andika Industries

ASL Packaging Ltd

Associated Paper & Stationery Ltd

Autolitho Ltd

Avery Dennison Kenya Ltd

Bag and Envelope Converters Ltd

Bags & Balers Manufacturers Ltd

Boxpack Ltd

Brand Printers

Capitol Printers

Carton Manufacturers Ltd

Cartubox Industries (E.A.) Ltd

Cempack Solutions Ltd

Chandaria Industries Ltd

Colour Labels Ltd

Colour Packaging Ltd

Colourprint Ltd

D. L. Patel Press (Kenya) Ltd

Digital Hub Ltd

Dodhia Packaging Ltd

East Africa Packaging Industries Ltd

East African Paper Mills (Formerly Kenya Paper Mills

Economic Industries

Elegant Printing Works

Elite Offset Ltd

Ellams Products

English Press Ltd

Essential Manufacturing Co. Ltd

Euro Packaging Ltd

Fortunes Printers & Sationers Ltd

Franciscan Kolbe Press

General Printers Ltd

Graphic Lineups Ltd

Green Pencils Ltd

Guaca Stationers Ltd

Highland Paper Mills Ltd

International Paper & Board Supplies Ltd

Juja Pulp & Paper Ltd

Kartasi Industries Ltd

Kenafric Diaries Manufacturers Ltd

Kenafric Manufacturing Ltd

Kenya Stationers Ltd

Kim-Fay East Africa Ltd

Kul Graphics Ltd

L.A.B International Kenya Ltd

Manipal International Printing Press Ltd

Mega Pack (K) Ltd

MFI Ultra Print Ltd

Modern Lithographic (K) Ltd

Nation Media Group Ltd

National Printing Press Ltd

Ndalex Digital Technology

Packaging Manufacturers (1976) Ltd

Palmy Enterprises

Paper House of Kenya Ltd

Paperbags Ltd

Pressmaster Ltd

Prime Cartons Ltd

Printing Services Ltd

Printpak Multi Packaging Ltd

Printwell Industries ltd

Punchlines Ltd

Ramco Printing Works Ltd

Regal Press Kenya Ltd

Rodwell Press Ltd

Shri Krishana Overseas Ltd

Sintel Security Print Solutions Ltd

Skanem Interlabels Nairobi Ltd

Sketchers Design Promoters Ltd

Soloh Worldwide Inter-Enterprises Ltd

Standard Group Ltd

Statpack Industries Ltd

Taws Ltd

Tetra Pak Ltd

The Print Exchange Ltd

Tissue Kenya Ltd

Twiga Stationers & Printers Ltd

Pharmaceutical & Medical Equipment Sector (25)

African Cotton Industries Ltd

Alpha Medical Manufacturers Ltd

Autosterile (East Africa Ltd

Benmed Pharmaceuticals Ltd

Beta Healthcare International Ltd

Biodeal Laboratories Ltd

Biopharma Ltd

Cosmos Ltd

Dawa Ltd

Elys Chemicals Industries Ltd

Glaxo Smithkline Kenya Ltd

KAM Industries Ltd

Laboratory & Allied Ltd

Medisel Kenya Ltd

Medivet Products Ltd

Oss.Chemie (K) Ltd

Pharm Access Africa Ltd

Pharmaceutical Manufacturung Co. (K) Ltd

Promed Industries Ltd

Questa Care Ltd

Regal Pharmaceuticals Ltd

Revital Healthcare (EPZ) Ltd

Skylight Chemicals Ltd

SoSure AFRIpads Ltd

Toyota Kenya Ltd

Plastic & Rubber (2)

Hi-Tech Poly Ltd

Plast Packaging Industries Ltd

Plastics & Rubber Sector (86)

A-One Plastics Ltd

ACME Containers Ltd

Africa PVC Industries Ltd

Afro Plastics (K) Ltd

Betatrad (K) Ltd

BlueSky Industries ltd

Bobmil Industries Ltd	Bobmil Industries Ltd
Brush Manufacturers Ltd	Brush Manufacturers Ltd
Canaaneast Company Ltd	Canaaneast Company Ltd
Coast Polythene	Coast Polythene
Cocorico Investments Ltd	Cocorico Investments Ltd
Complast Industries Ltd	Complast Industries Ltd
Coninx Industries Ltd	Coninx Industries Ltd
Darshan Plastic Ltd	Darshan Plastic Ltd
Digital Packaging Innovations Holdings Ltd	Digital Packaging Innovations Holdings Ltd
Dune Packaging Ltd	Dune Packaging Ltd
Dynaplas Ltd	Dynaplas Ltd
Elgitread (Kenya) Ltd	Elgitread (Kenya) Ltd
A-One Plastics Ltd	Elgon Kenya Ltd
ACME Containers Ltd	Eslon Plastics of Kenya Ltd
Africa PVC Industries Ltd	Finlay Brushware Ltd
Afro Plastics (K) Ltd	Five Star Industries Ltd
Betatrad (K) Ltd	Flair Kenya Ltd
BlueSky Industries ltd	Foam Mattress Ltd

General Plastics Ltd

Hi-Plast Ltd

Hope Plastics

Jamlam Industries Ltd

Jay Giriraj

Jumbo Chem (K) Ltd

Jumbo Quality Products

Just Plastics Ltd

Kamba Manufacturing (1986) Ltd

Kenpoly Manufacturers Ltd

Kenrub Ltd

Kenstar Plastic Industries Ltd

Kentainers Ltd

Kenya Suitcase Manufacturers Ltd

King Plastic Industries

Kinpash Enterprises Ltd

Kwality Packaging House Ltd

L.G. Harris & Co. Ltd

Lakhir Plastics Ltd

Laneeb Plastic Industries Ltd

Malplast Industries Ltd

Mega (EA) Plastics Ltd

Metro Plastics Kenya Ltd

Mombasa Polythene Bags Ltd

Nairobi Plastics Ltd

Nakuru Plastics

Ombi Rubber Rollers Ltd

Packaging Industries Ltd

Packaging Masters Ltd

Plastic Electricons

Plastics & Rubber Industries Ltd

Polly Propelin Bags Ltd

Polyblend Ltd

Polyflex Industries Ltd

Polythene Industries Ltd

Premier Industries Ltd

Prosel Ltd

Pyramid Packaging Ltd

Raffia Bags (K) Ltd

Rubber Products Ltd

Rushabh Industries Ltd

Safepak Ltd

Sameer Africa Ltd

Sanpac Africa Ltd

Scandic Ltd

Shiv Enterprises (E) Ltd

Signode Packaging Systems Ltd

Silafrica Kenya Ltd (Formerly Sumaria Industries)

Silpack Industries Ltd

Silver Coin Imports Ltd

Singh Retread Ltd

Smartpack Ltd

Solvochem East Africa Ltd

Springbox Kenya Ltd

Styroplast Ltd

Super Manufacturers ltd

Supreme Poly Pack (K) Ltd

Techno-Plast Ltd

Techpak Industries Ltd

Top pak Ltd

Torrent East Africa Ltd

Treadsetters Tyres Ltd

Service & Consultancy (3)

Hotpoint Appliances Ltd

Kenya Airways

Sols Inclinations Ltd

Service & Consultancy (115)

AAM Resources

Access Alliance Ltd

Adafric Communications Ltd

Africote Ltd

Agricultural Employers Association

AIG Kenya Insurance Co. Ltd

Alexander Forbes Risk and Insurance Brokers

Analabs Ltd

Andest Bites Ltd

Ascent Capital Advisory Services LLP

ASKADOC

Askdoc

BlueKey Software Solutions (K) Ltd

Bold Ltd

Brand ID Technologies (EA) Ltd

Brightermonday.com

Broadband Communications Networks Ltd

BroadcastSolutions International Ltd

Capital Colors Creative Designers Ltd

Ceven Ltd

CFL Advocates

Chase Bank

Citigroup Kenya

City Clock (K) Ltd

Cityscape Trends Services Ltd

Commercial Bank of Africa Ltd

Compulynx Ltd

Connect Experiential Ltd

Consumer Options

Control Risk East Africa

Cooperative Bank of Kenya

CosmoSol Ltd

De La Rue

Deloitte & Touche

DiverseManagement Consultancy Ltd

DNV GL Kenya Ltd

E-MomentumInteractive Systems Ltd

East African Development Bank,

Country Office (Kenya)

East African Tea Trade Association (EATTA)

Entrepreneurs Boot Camp

Ernst & Young

Esat African Tea Trade Association (EATTA)

Express Communications Ltd

Farm Refrigeration and Electrical Systems

Flexi Personnel

GE East Afrika Services Ltd

Grant Thornton Consulting Ltd

Great Lions

GreenbellCommunications Ltd

GS1 Kenya

Guaranty Trust Bank (K) Ltd

Halliday Finch Ltd

HTM Capital Ltd

IDB Capital Ltd

Ikapamedia East Africa Ltd

Industrial & Commercial Development Corporation

Industrial and Scientific Support Services

Industrial Promotion Services

InsightManagement consultants Ltd

Institute of Packaging Professionals

International Energy Technik Ltd

International Supply Chain Solutions Ltd

Intersoft Ltd

Intertek Testing Services (EA)PTY Ltd

Intraspeed Arcpro Kenya Ltd

Kanaga&Associates Advocates

Karcher Ltd

Kenya Flower Council

Knights and Apps Ltd

Kuza Project

Leadership Management International Kenya

Lori Systems Ltd

Louis Dreyfus Kenya Ltd

Lynxbits Global Ltd

Manage IT Ltd

Mantoz Enterprises K. Ltd

Marubeni Corporation

Mckay and Company Ltd

Meghraj Capital Limitesd

Metropol Credit Reference Bureau

Mitsui & Co Europe PLC

Mount Elgon Orchards Ltd

Multivac North Africa KenyaABC

Muri Mwaniki & Wamiti Advocates

Muriu Mungai & Company

Muthaura Mugambi Ayugi & Njonjo Advocates

Nkemi Consulting

Novastar Ventures LLP

O+`fgen Ltd

Oloidien Estate & Engineering Ltd

Oraro & Company Advocates

Origicheck Company Ltd

Pentair Kenya Ltd

PKF Consulting

Premier Training Services Ltd

Raiser Resource Ltd

Red Lands Roses Ltd

Rentco East Africa Ltd

Rickshaw Travels (K) Ltd

Rodl & Partners Ltd

Sagisa Process Engineering (K) Ltd

Samco Holdings Ltd

Scales & Software (K) Ltd

Sierra Flora

Sperkjet East Africa Ltd (Seal)

Sproxil East Africa

Stanlib Kenya Ltd

Strategic Value Ltd

Stratostaff EA Ltd

Symbiotic Media Consortium

Tally Solutions Kenya Ltd

Tatu City Ltd

Techno Brain Ltd

The Helios Group

TMS Consultants

Textile & Apparels Sector (67)

Adpack Ltd

Africa Apparels EPZ LTD

Alltex EPZ Ltd

Alpha Knits Ltd

Ashton Apparel EPZ Ltd

Beberavi Collections Ltd

Bedi Investments Ltd

Brand Track Ltd

Brilliant Garments EPZ Ltd

Chalange Industries

Dharamshi & Co. Ltd

Ethical Fashion Artisans EPZ Ltd

Fantex (K) Ltd

Forces Equipment (Kenya) Ltd

Global Apparrels Ltd

Gone Fishing

Hanitex (EPZ) Ltd

Hantex Garments EPZ Ltd

Hela Intimates EPZ LTD

Insight Kenya

Kamyn Industries Ltd

Kapric Apparels EPZ Ltd

Kavirondo Filments Ltd

Kema E.A. Ltd

Ken-Knit (Kenya) Ltd

Kenya Shirts Manufacturers Company Ltd

Kenya Tents Ltd

Kenya Trading EPZ Ltd

Kikoy Co. Ltd

Kikoy Mall

Le-Stud Ltd

Leena Apparels Ltd

Long-Yun (Formerly Senior Best Garments)

Longyun Garments Kenya EPZ Ltd

Manchester Outfitters Ltd

Mega Apparel Industries (EPZ) Ltd

Mega Garment Industries Kenya (EPZ)

Midco Textiles (EA) Ltd

Mills Industry Ltd

Mombasa Apparells

New Wide Garments Kenya EPZ LTD

Ngecha Industries Ltd

Norsam Enterprises

Omega Apparels Ltd

Oriental Mills Ltd

Panah Ltd

Penny Galore Ltd

Rivatex (East Africa) Ltd

Roar Media Ltd

Royal Garment Industries EPZ Ltd

Shin-Ace Garments Kenya (EPZ) Ltd

Simba Apparel EPZ Ltd

SOKO EPZ Ltd

Spin Knit Ltd

Spinners & Spinners Ltd

Squaredeal Uniforms Centre Ltd

Straightline Enterprises Ltd

Suman Shakti

Summit Fibres Ltd

Sunflag Textile & Knitwear Mills Ltd

Supra Textiles Ltd

Tarpo industries

Teita Estate Ltd

Thika Cloth Mills Ltd

TSS Spinning and Weaving Ltd

Tulips Collections Ltd

Ubuntu Life Foundation (FormerlConfort the Children International)

Timber, Wood & Furniture Sector (27)

African Retail Traders

Budget Furniture Ltd

Comply Industries Ltd

Economic Housing Group Ltd

Elburgit Enterprises Ltd

Fine Wood Works Ltd

Fun Kidz Ltd

Furniture International Ltd

GreenPot Enterprises Ltd

Marvel Lifestyle Ltd

Match Masters Ltd

Newline Ltd

Panesar's Kenya Ltd

PG Bison Ltd

Rai Plywoods (Kenya) Ltd

Renocon