GREEN SUPPLY CHAIN MANAGEMENT PRACTICES AND THEIR EFFECT ON COMPETITIVENESS OF FOOD MANUFACTURING FIRMS IN KENYA

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DECLARATION AND APPROVAL

I hereby declare that the work contained in this doctoral thesis is my original work and has not been submitted for a degree in any other university or institution.

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APPROVAL

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DEDICATION

This thesis is dedicated to the Almighty God, creator of heaven and earth, and to His Son Jesus Christ, who gave me the strength to continue when all was bleak. Glory be to His name.

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ABBREVIATIONS AND ACRONYMS

EANECE : East African Network for Environmental Compliance & Enforcement

EIA : Environment Impact Assessment

GDP : Gross Domestic Product

GHGs : Greenhouse Gases

GP : Gross Profit

GSC : Green Supply Chains

GSCM : Green Supply Chain Management

IPCC : Intergovernmental Panel on Climate Change

ISO : International Organization for Standardization

JIT : Just in Time

KAM : Kenya Association of Manufacturers

KEBS : Kenya Bureau of Standards

KIPPRA : Kenya Institute for Public Policy Research and Analysis

NEMA : National Environmental Management Authority

RBT : Resource Based Theory of the firm

RoK : Republic of Kenya

SCM : Supply Chain Management

SME : Small and Medium Enterprises

SNT : Social Network Theory

UNEP : United Nations Environmental Program

ABSTRACT

There has been growing concern about environmental sustainability for future generations. Green Supply Chain Management are practices that can be used by companies to re-examine their purposes and create a favourable environmental image as manufacturing firms play an important role in the implementation of sustainable options. However, there has been no research that examines the effect of adopting Green Supply Chain Management on the competitiveness of Kenya's food manufacturing firms, a gap that this research sought to fill. The main purpose of this study was to examine whether or not the adoption of green supply chain management practices enhances firm competitiveness in Kenya's food manufacturing firms. This research was guided by the following specific objectives: an examination of the effect of each of the various aspects of green supply chain; green purchasing, green manufacturing, green distribution and reverse logistics and how they determine firm competitiveness, as well as determining the moderation effect of green supply chain drivers on the relationship of green supply chain practices and firm competitiveness. This study focused on the following theories: the resource-based theory, institutional theory, stakeholder theory and social network theory. The research used the positivism research philosophy and a cross-sectional descriptive survey research design. Of the 181 food manufacturing firms that are listed in the Kenya Association of Manufacturers directory, 130 companies that strictly dealt with food processing or manufacture, were chosen for the study where the response rate was 73.8 percent. The questionnaire was the main data collection instrument and was subjected to both the reliability and validity tests. Collected data was analysed using descriptive and inferential statistics and through the application of factor analysis. The five hypotheses were presented and tested using chi-square and hierarchical multiple regression analysis and accepted at the 95 percent confidence interval. The results of this research indicated that there was a strong and significant relationship between the adoption of green supply chain practices and firm competitiveness in Kenya's food manufacturing sector. It was noted that there was a disparity between the adoption and the practice of reverse logistics and the study recommends that measures to facilitate collection of used packaging and expired products should be instituted within the country. Furthermore green supply chain drivers do have a statistically significant moderating effect on the relationship between green supply chain practices and the competitiveness of Kenya's food manufacturing firms. Firms that prepare and issue periodical voluntary environmental reporting to the public and environmental bodies were found to have adopted green supply chain practices to a larger extent than those that did not. It was also the recommendation of this study that more firms should embrace voluntary periodical environmental reporting. Firms should also hold seminars to sensitize both their employees and suppliers on the benefits of environmental sustainability as this will make it easier to adopt green practices. The government should also carry out public awareness campaigns on the importance of environmental sustainability.This study recommends that studies that relate GSCM to the integration of economic, environmental and social performance should be carried out in Kenya.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

The supply chain consists of the movement of information and material from the supplier, through a manufacturing company, to the final customer. The flow of material was traditionally considered only from an operational level, which is no longer adequate. Today it is important for businesses to manage their supply chains so as to improve customer service and achieve a balance between costs and services, thus gaining a competitive advantage. Stock & Boyer (2009) defined a supply chain as a network of organizations that interact to transform raw material into finished products for customers. The supply chain has also been defined as a system of services that manufactures raw materials, transforms them into intermediate goods and final products, then delivers these goods to customers through a distribution system (Shukla, Garg & Agarwal, 2011). The supply chain is thus used to describe the entire production line from sourcing of raw materials to final product delivery to the final consumer which is the definition that will hold throughout this study.

As business rivalry expands, the way an organization deals with its supply chain network has received greater importance. Increase in competition has moved from between associations to competition between supply chains as an incorporated supply chain has been shown to have a stronger competitive advantage (Fabbe-Costes, Roussat & Colin, 2011). Therefore, chain-chain competition has taken over enterprise-enterprise competition albeit many enterprise-enterprise competitions do still exist in countries less developed countries such as Kenya. Businesses that find themselves in cut-throat competitions have to collaborate, share information and knowledge with their suppliers, customers and even competitors with the aim of creating a collaborative supply chain capable of competing if not leading in that particular industry. This has brought about improvements in the production networks including logistical practices, to an integration of horizontal processes aimed at providing value to both intermediate and final customers (McCormack, Ladeira & de Oliveira, 2008). This has led to supply chain management (SCM) a concept that was initiated by recognizing the fact that the process of changing raw materials into

finished products and delivering the same to the final consumers was becoming very complex. It thus became apparent that analysing and subsequent improvement of a single supply chain component did not necessarily lead to the improvement of the entire supply chain (Olugu & Wong, 2009).

Emphasis has not been limited to increasing the internal proficiency of organizations, but has now been increased to incorporate techniques of reducing waste and adding value across the entire supply chain. SCM is the process of planning, implementing and controlling the operations of the supply chain in an efficient way. SCM spans all movements and storage of raw materials, work-in-process inventory, and finished goods from the point-of-origin to the point-of-consumption (Melo, Nickel & Saldanha-da-Gama, 2009). Firms should strategically undertake sustainable SCM in order to achieve higher economic performance (Carter & Rogers, 2008) and find new areas of competitive advantage. This should be possible by creating "win-win" strategies so as to realize profits and market share objectives and at the same time lower their environmental impact, while increasing their environmental efficiency (Cheruiyot, Rotich & Mburu, 2014).

The global manufacturing scene has experienced rapid changes and in the midst of those changes, environmental and social issues have become significant as management issues (Cheruiyot *et al.*, 2014). This has resulted into the Green supply chain management (GSCM) a business approach meant to improve products and the supply chain according to the environmental regulation requirements (Hsu & Hu, 2009). Of great concern for manufacturing firms, globally and locally, is the increased global warming (IPCC, 2012), which has caused firms to check their carbon emissions and embrace eco- friendly practices. This has impacted greatly on supply chains as businesses today are reorganizing and streamlining their supply chains so as to better face strategic challenges (Fabbe-Costes et *al.*, 2011).

1.1.1 Supply Chain Management

Supply chain management (SCM) is a blend of practices that successfully integrates suppliers, manufacturers, distributors and customers to improve the long-term performance of an individual firm and the supply chain as a whole in a cohesive and high-performing business model. Supply chain management can thus be defined as the process of planning, executing and controlling the

activities and operations of the supply chain to effectively meet planned objectives (Melo *et al.*, 2009). The design of a supply chain is considered as a strategic goal aimed at determining the number, location and capacities of manufacturing plants and distribution centres, the set of suppliers to select and the effective flow of material throughout the supply chain (Simchi-levi, Kaminsky & Simchi-Levi, 2008; Chopra & Meindl, 2012). The concept of SCM should thus be commonly applied in businesses for the mutual benefit of all enterprises in the supply chain (from the organization extracting the basic raw material to the final customer). One of the main concerns in a supply chain design is to select those chain members that are imperative in achieving the long-term broad organisational objectives and superior sustainability goals.

SCM and related strategies are crucially important to the success of a manufacturing firm. This is because the cost and quality of goods and services sold are directly related to the cost and quality of goods and services purchased. SCM does enhance the efficiency and productivity of manufacturing firms, as it helps reduce overall operating costs (Simchi-levi *et al*., 2008). Integration of internal processes of the organization with the suppliers and customers is the whole idea behind SCM. Therefore, supply chain procedures such as procurement and lean practices that improve the internal processes of an organization in line with the principles of just in time (JIT) have an important role in SCM (Fabbe-Costes *et al.*, 2011).

1.1.2 Green Supply Chain

Green Supply Chain Management (GSCM) is a relatively new concept that is becoming popular among manufacturers as both environmental and social issues are being increasingly recognized as management issues (Luthra, Kumar, Kumar & Haleem, 2011). According to Cheruiyot *et al.* (2014) environmental and social issues have become important in the management of any business due to the rapid change in the global manufacturing scene. Green Supply Chain Management has been defined by various researchers in different ways. Hervani, Helms, & Sarkis (2005) define Green Supply Chain Management as "green procurement + green manufacturing + green distribution + reverse logistics" (p. 334). Sarkis, Zhu & Lai (2011) define Green supply Chain as the integration of environmental concerns into the inter-organizational practices of SCM including reverse logistics. Toke, Gupta & Dandekar, (2010) define GSCM as the integration of environmental thinking into supply chain management, including product

design, material sourcing and selection, manufacturing processes, delivery of the final product to the consumers, and end-of-life management of the product after its useful life. Accordingly there are four functional areas of a green supply chain and they relate to purchasing, production, distribution and reverse logistics (Toke *et al.,* 2010). In line with the above definitions of GSCM, it can be considered as applying environmentally friendly practices such as cleaner production thereby improving the environment. The idea behind GSCM is to eliminate or minimize waste (energy, emissions, and chemical/hazardous, solid wastes) along the supply chain.

In the last decade or so, governments have directed companies to have strategic environmental plans as part of government initiatives towards environmental regulations. According to Zhu, Sarkis & Lai (2008) pressures to implement GSCM practices do not only come from governments but also from other third party organizations and consumers who are environmentally aware (Liu, Tang & Xue 2012; Yang, 2013). Studies done in Canada, Japan, South Korea, Switzerland, and Taiwan indicate that companies that have gone green have employees who highly esteem them and often have a higher performance level than other company's employees (Zhu *et al.,* 2008). Other studies in the US and Japan, indicate that customers may make purchasing decisions based on products that are manufactured by companies that have gone green while boycotting those products of companies that have not gone green (Dheeraj &Vishal, 2012; Amemba, 2013). Organizations therefore may have different motives for introducing GSCM practices. The reasons may either be ethical – to ease their guilt, or business-related – to increase their stakeholders value. Whatever the motive for adopting GSCM practices, they enable companies to gain a possible competitive advantage.

As environmental concerns increase, the integration of environmental issues into the supply chain studies have become a thriving subfield (Sarkis, 2012). Studies carried out in the Chinese Electronics industry emphasize that the implementation of GSCM practices does enhance firm performance (Zhu & Sarkis, 2007). Other studies highlighted that there has to be a trade-off between economic activities and their negative effects on the environment (Choi, 2011). Studies done in the Indian automobile industry highlighted the importance of GSCM and the factors necessary for their implementation (Luthra, Manju, Kumar, & Haleem, 2010). However for companies to fully adopt GSCM practices they have to overcome certain barriers (Luthra *et al*.,

2011). Some authors have argued that there are certain success factors necessary for the implementation of GSCM practices (Rozar, Mahmood, Ibrahim & Razik, 2015).

Researchers of GSCM have previously focused principally on ISO (International Organization for Standardization) 14001 certified manufacturing companies (Choi, 2011) as these are deemed to show a commitment to environmental management (Murphy, 2012). The ISO 14000 series, published in 1996, is related to the implementation of environmental management systems and is widely accepted as the global environmental management standard (Kinoti, 2012). Comparative studies on GSCM practices have been carried out in Africa in the construction industry (Ojo, Mbohwa, & Akinlabi, 2013). This study revealed that for the construction sector to remain competitive it had to adopt GSCM practices.

In Kenya, green supply chain practices have been adopted by many manufacturing firms albeit on an ad hoc basis (Okemba & Namusonge, 2014). According to the Kenya Association of Manufacturers (KAM, 2012) an investor in Kenya, is required to give an Environment Impact Assessment (EIA) report before investing. In this report the investor is required to give details on the type and scope of operations, its environmental impact and the likely benefits to the country and community in which the project is located. National Environmental Management Authority (NEMA) gives approval on the EIA as a pre-condition for the industrial activities to be carried out (KAM, 2012).

Previous studies done indicate that green manufacturing has been adopted by organizations such as Bamburi Cement Limited. The material and processes used in the manufacture of cement undergo strict environmental checks and the installation of an emission filter has greatly reduced emission of toxic gases to a level below the Kenya draft emission standard. In addition to planting over 2.5 million trees around its factory and quarries, measures have been put in place to reduce spillages and other pollutants, which has ensured pollution prevention (Kinoti, 2012). This research was a case study and the company in question had been influenced greatly by the parent company Lafarge. The study did not consider other aspects of GSCM such as green purchasing.

Green purchasing has been adopted by the public sector and certain companies such as Kenya Airways. To be able to integrate green purchasing in procurement the organization has to a great extent embraced the dissemination of information on green purchasing to various stakeholders, thus enabling buyers to make informed decisions (Lagat, 2013). Other green practices include use and sale of unleaded petroleum products by oil companies which is environmentally friendly, an initiative supported by Shell Kenya Limited. This company has also engaged in environmental initiatives such as carrying out major rehabilitation of the Nairobi Arboretum Park and the conservation of endangered species by supporting a sea turtle conservation project at the coast (Eco-profiles, 2014). A study carried out in Kenya's textile industries revealed that GSCM practices were adopted specially to comply with government regulations (Okemba & Namusonge, 2014). All the above studies were case studies that examined single aspects of green supply chain management practices and with none investigating the combined effect of GSCM practices. This research, therefore, is intended to provide a more holistic approach to the study of green supply chain by combining four of the most common aspects that have previously been studied individually and find their combined effect on food manufacturing firms.

1.1.3 Kenyan Food Manufacturing Scene

The manufacturing industry in Kenya has expanded greatly in the last decade as a result of political stability and better government policies which have encouraged entrepreneurship (Cheruiyot *et al*., 2014). The manufacturing sector contributes about 10 percent to GDP (Kenya Institute for Public Policy Research and Analysis, KIPPRA, 2013) and is one of the major pillars that is expected to maintain Kenya as a middle income economy. This sector is mainly agro based and plays an important role in adding value to agricultural output by providing forward and backward linkages with agricultural sector. Recently there has been a shift towards export oriented manufacturing as the main thrust of Kenya's industrial policy as the country aims to raise the share of products in the regional market from 7% to 15 % and develop niche products for existing and new markets (ibid).

However not many Kenyan companies have the supply chain as a fully staffed department, but in many it is an extension of planning and supply department (Otieno, Ondiek & Odera, 2012). Consequently the notion of sustainable supply chain management has not been successfully

adopted by many organizations. Therefore the supply chain management practices used do not give much emphasis to environmental or social issues such as consumer health and safety concerns (Kinoti, Arasa, Wiatitu & Guyo, 2013) even though there has been a growing concern about preserving Kenya's environment for posterity.

The food manufacturing industry in Kenya is the single largest subsector and consists of 1,200 small and large scale businesses (Businge *et al*., 2011). It makes up 24 percent of the entire manufacturing industry. This industry is grouped into diverse parts: Juices and Alcoholic, Bakers and Millers, Cocoa, Chocolate and Sugar, Dairy, Tobacco, Vegetable oils and Slaughtering, Preparation and Preservation of meat sector (KAM, 2014). Every part has a distinctive supply network procedure necessitated because of the diverse progress included (Okello & Were, 2014) emerging from item stockpiling to transport plans giving the food supply network its unique qualities. Members in the Kenyan food supply chain have been facing long term difficulties identified with the nature of the items and coordination in the different markets. Supply is not well organized into collection, grading and packing facilities, which has resulted in a complicated supply chain that has posed enormous challenges and high risks to the food industry (ibid).

Food manufacturers confront firm rivalry from the imported food stuffs from abroad which has resulted into poor performance. Entry of substandard and fake items at cheaper costs has unreasonably diminished the market share for locally manufactured food products. Counterfeit trade has also discouraged innovation efforts and reduced the revenue base for food manufacturers (RoK, 2012). It is therefore apparent that the local food manufacturers risk losing their market share, leaving Kenya with no option but to import food products and incur high unemployment rates. Organizations that face aggressive competition and community pressures should strive to attain harmony between economic and environmental performance. This can be done by implementing strategies that reduce the environmental impact of their products while remaining competitive. In order to take up environmental responsibility, organizations are increasingly being urged to reuse, remanufacture and recycle products so as to reduce harmful effects on the environment (Chung & Wee, 2010).

1.1.4 Firm Competitiveness

The core focus of competitiveness of a firm is price and cost developments of production factors that can potentially affect economic growth, market shares and other performances of companies in the targeted sectors (Testa, 2010). Competitiveness is identical to a firm's long-run economic performance. Economic performance of a firm determines its ability to compensate its employees and provide superior returns to its owners. Meeting the economic performance goals remains the primary objective of firms. If a firm does fail to meet high levels of operational and business priorities in a highly competitive world then its very survival is short-lived. Economic performance goals include all features of a firm's economic interactions. They examine how the financial status of the stakeholders changes as a result of the organization's activities. Economic performance indicators include market share, sales growth and profitability (Yang, 2013).

Market competitiveness refers to the ability of a firm to sell and supply goods and services to a particular market and its performance in that market in relation to other markets. The geographical area in which a firm competes is an important aspect of firm competitiveness. At the international level competition can be stiffer for manufacturing firms than at the local level necessitating companies to acquire competitive edges. For instance, Testa, Iraldo & Johnstone (2009) found that GSCM activities are increasingly being entrenched in business operations as a result of which firms benefit from improved firm reputation. Improved firm reputation in turn increases market share of a company. Further research done by Molina-Azorin, Claver-Cortes, Pereira-Moliner, Tar (2009) suggested that practical environmental management through GSCM activities improves the organization's performance at the market level. According to this therefore a firm's competitiveness can be indicated by the degree of market share (market competitiveness), degree of profitability (economic) and the price of its goods relative to competitors. To remain competitive in today's world firms need to show speed and reliability in offering services such as repairing defective goods, calling back sub-standard or defective goods and disposing off product waste. These services would also add customer value by providing a clean environment without any extra cost to the consumer.

Studies done on green supply chains in Kenya, have recognized a positive relationship between green marketing and organizational performance in ISO 14001 certified companies (Kinoti,

2012). Studies have also been done on green purchasing/procurement in the public sector (Nasiche & Ngugi, 2014) and in the aviation industry (Lagat, 2013). Both were case studies and showed that despite Kenya having the Procurement and Disposal Act (2005), many companies still have to incorporate green purchasing which can be done by appreciating environmental issues and inculcating the same to their employees and suppliers. However, there has been no study that has ethicized whether or not the adoption of green supply chain management practices enhances market share and firm competitiveness of food manufacturers.

1.2 Statement of the Problem

Manufacturing firms are perceived to play an important role in the implementation of sustainable options. Studies done in other parts of the world such as the UK and Asia have shown that Green Supply Chain Management (GSCM) are practices that can be used by companies to re-examine their purposes and create a favourable environmental image. Despite its increasing popularity in industrialized countries, GSCM is a relatively new concept in developing countries, Kenya included. Notwithstanding a number of manufacturing firms have already begun to implement these practices as demonstrated by the increasing number of local studies. Though GSCM Practices have been implemented by various food manufacturers on an ad hoc basis, there is scarcity of literature as well as a lack of empirical evidence on how these practices have affected firm competitiveness in the Kenyan setup. This research sought to ascertain whether there was a relationship between the adoption of green supply chain practices and firm competitiveness in Kenya's food manufacturing sector.

Previous studies indicate that GSCM studies have been carried out in various industries such as the automobile, electrical and electronics industry, the construction industry and among ISO 14001 companies in the UK, Malaysia, Nigeria, South Africa and Kenya. By neglecting companies with different ISO certifications it has prevented a holistic approach to environmental management. This study sought to fill this contextual gap by considering firms in the food manufacturing sector that have other ISO certifications other than 14001.

Previous studies done in Kenya have either adopted a case study approach or examined a single aspect of GSCM practices such as green marketing practices, which has limited the application of their findings. This research applied a cross- sectional survey method in addition to using four of the aspects of GSCM practices and how they enhance firm competitiveness so as to make the study findings more generalizable thus filling a methodological gap.

1.3 Purpose of the Study

The general purpose of this study was to analyse the relationship between Green Supply Chain Management practices and their effect on the competitiveness of food manufacturing firms in Kenya.

1.4 Specific Objectives of the Study

The specific objectives of this study were to:

i. Evaluate the effect of green purchasing on the competitiveness of food manufacturing firms in Kenya
ii. Analyse the effect of green production on the competitiveness of food manufacturing firms in Kenya
iii. Assess green distribution practices and their influence on the competitiveness of food manufacturing firms in Kenya
iv. Analyse the effect of reverse logistics on the competitiveness of food manufacturing firms in Kenya
v. Explore the moderating effect of green supply chain drivers on the relationship between green supply chain practices and the competitiveness of food manufacturing firms in Kenya

1.5 Research Hypothesis

H_{0_1} : Green purchasing has no statistically significant influence on the competitiveness of food manufacturing firms in Kenya

H_{0_2} : Green production has no statistically significant influence on the competitiveness among food manufacturing firms in Kenya

H_{0_3} : Green distribution practices do not have a statistically significant effect on the competitiveness of food manufacturing firms in Kenya

H_{0_4} : Reverse logistics do not have a statistically significant effect on the competitiveness of food manufacturing firms in Kenya

H_{0_5} : Green supply chain management drivers have no statistically significant effect on the relationship between green supply chain practices and the competitiveness of food manufacturing firms

1.6 Significance of the Study

A study of this kind is expected to make practical, policy and theoretical contributions to the food manufacturing industry and the country as a whole. This study comes at a time when Kenya is pursuing Vision 2030 and has just attained middle income status. The manufacturing sector is expected to play a major role to maintain this income status hence its growth is crucial as the country's trade deficit would be reduced. However due to the stiff competition faced from inferior cheap imports, the food industry needs to develop a competitive advantage. This research will offer an understanding on the importance of adopting GSCM practices thus offering competitive advantage to food manufacturing firms in Kenya. It also provides an understanding of firm attributes that enhance green supply chain adoption. Several practices on green supply chain and their effects will be discussed for the benefit of the managers. This will help the practitioners in the food manufacturing industry become more competitive and equip them to face the stiff competition they are subjected to. At the same time the country will be able to conserve its environment even as it pursues economic development and growth.

As the scope of the supply chain widens, firms often face challenges of managing supplier relationships and environmental compliance. The changing and multifaceted business environment has given firms the impetus to become green in their supply chain. Through a descriptive research, this study contributes to the literature by addressing how manufacturing firms cooperate with external partners, especially suppliers, on environmental innovation thus

enhancing its competitiveness. This will add to the body of knowledge already existing and which can be used by academicians, scholars and researchers. It will also be a source of secondary data on the GSCM practices that are carried out in Kenya's food manufacturing firms. In addition, it will equip scholars and academicians with an understanding of the effect of GSCM practices and their relationship to the competitiveness of food manufacturing firms in Kenya.

The understanding of the GSCM practices adopted by food manufacturing companies in Kenya will help policy makers – governments and other stakeholders – to design targeted policies and programs that will actively stimulate the growth and competitiveness of the food manufacturing companies in the country. Moreover, it will aid policy makers to support, encourage, and promote the establishment of appropriate policies to guide the firms. Regulatory bodies such as KAM and NEMA can use the study findings to improve on the regulation framework.

1.7 Delimitations of the Study

This study had several delimitations. The sector chosen for this study was the food manufacturing sector. Of the food manufacturing companies found in Kenya, only those food manufacturing companies that were listed in the KAM business directory 2014 were considered.

The study variables included firm competitiveness as a dependant variable. This was measured by operational, market and financial indicators. The operational indicators were cost and a flexible delivery schedule engaged by the firm. Market share and the growth of sales represented the market indicator while the gross profit and sales turnover represented the financial indicator.

The independent variables were the various green supply chain practices adopted by various firms. Whereas literature reveals that there are many green supply chain management practices this study focused on the four aspects that were common to many authors. The green supply chain practices under consideration were, green purchasing, green manufacturing, green distribution and reverse logistics. The moderating variables are the green supply chain enablers that firms are subjected to in order to adopt GSCM practices. These drivers have been categorized into regulatory pressures, technological attributes, firm attributes and management attributes.

1.8 Limitations of the Study

The study encountered various limitations that did hinder access to information. This study was confined to the major food manufacturing companies listed in KAM directory. Scheduling appointments with the company managers and employees was a challenge since some of them were held up in their places of work. To avoid this problem, the researcher had informed the company managers of the intended interview beforehand. In addition, there were difficulties in obtaining relevant information from the respondents since some of them shied away from giving information regarding their companies. The researcher handled the problem by carrying an introduction letter from the University and assured them that the information they gave would be treated with confidentiality and would only be used purely for academic purposes.

1.9 Assumptions of the Study

The study assumed that the food manufacturing firms listed in the KAM Directory 2014 had all adopted green supply chain management practices. It is with this in mind that the study was carried out to find whether or not these practices had contributed to the competitiveness of the food manufacturing firms.

The study also assumed that all food manufacturing firms had a managing director and a financial manager who were conversant with the GSCM practices applied in their firms. The managers were the main respondents and it was assumed that they were honest, cooperative, factual (objective) and trustworthy in their response to the research instruments and would be available to respond to the research instruments in time. It was also the assumption of the study that the various company heads of selected companies would grant the required permission to collect data from the respondents. The study further made the assumption that there was no serious change in the composition of the target population that affected the effectiveness of the study sample.

1.10 Operational Definitions of Significant Terms

Green Supply Chain Management: This is a business concern that focuses on improving both the supply chain and the products at the end of the chain while bearing in mind environmental regulations. This is the definition that holds for this study.

Green Purchasing: Green Purchasing refers to the procurement of products and services that have a reduced effect on the environment when compared with competing products or services that serve the same purpose. According to this definition it involves the purchase of environmentally friendly products and services, the selection of contractors and the setting of environmental requirements in a contract which is the definition that will hold for this research.

Green Manufacturing: This can be defined as a process that seeks to minimize the impact of the manufacturing process on the environment at every stage. It not only involves pollution prevention but also the transformation of raw material and output processes. Green manufacturing thus consists of pollution prevention and the use of bio-degradable energy.

Green Distribution: This refers to any form of carriage of goods between the retailer and the client that has the lowest possible impact on the ecological environment. It includes the whole distribution process from the warehouse, packaging, improving vehicle loadings, and delivering to the customer or purchaser on time.

ISO 14000: The ISO 14000 series of standards is related to the implementation of environmental management systems. It was published in 1996 and has been accepted by firms throughout the world as a commitment towards environmental responsibility (Kinoti, 2012).

Reverse Logistics: This involves planning, implementing, and controlling a proficient, cost effective flow of resources, work in progress, finished products and associated information from the consumers end to the manufacturer the idea being to recapture value and have proper disposal. In this document it also includes any form of product recovery and re-use that different food manufacturing firms may put into place.

Supply Chain Management: This is defined as a process of creating finished products from raw materials and delivering the same to the final consumer. It also includes managing the disposal and recycling process of a company's products.

Firm Competitiveness: This is the ability of an organization to produce products that are of a higher quality and at the same time cheaper than its domestic or international competitors. It can be measured by its price relative to competitors, market share and degree of profitability over a relevant period of time. To effectively measure competitiveness, both a firm's financial and non-financial indicators will be considered in this study.

1.11 Chapter Summary

This study chapter has introduced the background of the study, stated the problem and highlighted research objectives and hypothesis in relation to the topic of the study. It has also brought out the significance, limitations and assumptions of the study in addition to defining the significant terms used in the study.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

A number of studies have been carried out on various Green Supply Chain Management (GSCM) practices in other countries and in Kenya. This chapter will provide literature on the theoretical framework underpinning this work followed by a discussion on the empirical and conceptual items in the conceptual framework on which the research will be made after contextualizing the research. This will be followed by a summary of the literature review to illustrate the gaps.

2.2 Green Supply Chain Theories

Green supply chain management is based on several theories. These theories are Complexity theory, Ecological Modernization theory, Information Theory (information asymmetry and signalling theory), Resource Dependence Theory, the Resource Based Theory, the Social Network theory, the Institutional theory, Transaction Cost Economics theory and the Stakeholder theory (Sarkis, Gonzalez-Torre, & Adenso-Diaz, 2010).

Complexity theory posits that it is important for organizations to be sensitive and responsive (Crozier & Thoenig, 1976) as they operate in environments that are both orderly and disorderly (Prigogine, 1984). Complexity in an organization stems from the interactions that an organization has with its customers, suppliers, the government and any technological advancements that there may be in the industry. As these interactions increase so do the intricacies and it becomes challenging for firms to forecast their organizational actions such as the execution of GSCM practices.

Ecological Modernization Theory (Spaargaren & Mol, 1992) has its foundations in sociology and is geared towards achieving industrial development and environmental protection through innovation and technological development (Jänicke, 2008). It is widely used to expound ecological planning by government administrations and the reorganization of production activities by major manufacturers. GSCM practices are consistent with the concept of environmental innovation from the aspect of ecological modernization theory. Subsequently, to stimulate GSCM practices there needs to be appropriate institutional measures and legal frameworks by governments. According to this theory, manufacturers apply GSCM through various technological innovations such as cleaner production equipment or increased supplier collaboration in eco-design (Zhu, Sarkis & Lai, 2010).

Information asymmetry and signalling theory (Akerlof, 1970), postulates that companies may seek to share their environmental performance to external stakeholders, but are unable to as they do not have full knowledge of the various products and materials that flow through their supply chains. Suppliers, naturally, hold more information about their environmental performance and the impact experienced by customers a situation known as information asymmetry. Information asymmetry can be increased by distance between supply chain partners (Simpson, Power & Samson, 2007) or when issues of asset specificity are considered (Delmas & Montiel, 2009). However greater interaction does reduce information asymmetry (Simpson, 2010). The main advantage of greening supply chains comes from the capability of an organization to market and sell green products. Such capability potentially develops new products and helps build competitive advantages for enterprises (Sarkis *et al.,* 2010).

Resource Dependence Theory (Pfeffer & Salancik, 1978) suggests that supply chain members should be dependent and should collaborate to seek higher performance gains. According to this theory, firms are interdependent and in order to have sustained growth and there is need to carefully manage this reliance with other firms (Ulrich & Barney, 1984). In GSCM, eco-design of products and materials recovery are typical organizational resources that require supply chain partnerships to generate performance benefits (Shang, Lu & Li, 2010). The interdependency and collaboration of supply chain partners should not be ignored as it determines the success and effectiveness of implementing GSCM (Zhu *et al*., 2010).

Transaction Cost Economics (Williamson, 1981) is another theory and at the centre of this theory is the effort and cost required for any two entities to complete a transaction. The cost of these activities goes beyond the cost of a product or service that is to be exchanged. Transactions generally include aspects of risk, transaction frequency, and asset specificity such as site specificity, physical asset specificity, and human resource specificity. The incorporation of environmental technology across supply chains can be described by the role of asset specificity and inter-organizational relationships. This theory has been used to explain the use of asset specificity and organizational actions in relation to GSCM (Delmas & Montiel, 2009).

Resource-Based Theory (Penrose, 1959) suggests how valuable, rare and inimitable resources can become the basis for competitive advantage of firms. Resources refer to assets, capabilities, competencies, processes and knowledge which are controlled by a firm to implement strategies and improve competitiveness. Hart (1995) introduces the natural resource based view of organisations, highlighting the sustainability risks and opportunities, and discusses how environmentally and socially sustainable economic activities can build competitiveness for organisations. GSCM is positively linked to quality, flexibility and environmental performance while partnership with suppliers is linked to better delivery performance (Sarkis *et al.*, 2010).

Institutional theory (DiMaggio & Powell, 1983) describes how institutions such as governments, media and public associations use pressure to impact organisational behaviour and decision-making. This pressure gradually creates institutional rules (Varsei, Soosay, Fahimnia & Sarkis, 2014; Sarkis *et al.*, 2010) which are important for an organization's survival and legitimacy in a society. This theory is used to explain how external drivers encourage firms to adopt GSCM practices.

Stakeholder theory (Freeman, 1984) is a theory used to describe how a firm will only address the needs and wishes of the four main parties in its activities: investors, employees, suppliers, and customers. Stakeholders do influence firms to follow certain activities including GSCM initiatives and voluntary integration of GSCM practices into business operations (Russo & Perrini, 2010).

Social network theory (Rowley, 1997) is used to explain the interdependence of various players in a network such as the supply chain and how their position influences their opportunities, constraints and behaviours. GSCM studies on buyer-supplier relationships for performance improvement is explainable through the social network theory (Sarkis *et al*., 2010)

2.3 Theoretical Framework

The theories underpinning this study are the Resource Based Theory (RBT) of the firm (Penrose, 1959), the Institutional theory (DiMaggio & Powell, 1983), the Stakeholder theory (Freeman, 1984) and the Social network theory (Barnes, 1954). These four theories have complementing characteristics that will provide support for a multi-dimensional strategic perspective for green supply chain management. A number of competitive pressures are suggested by the institutional theory and the response to multiple external and internal stakeholders (stakeholder theory), while RBT supports that the combination of resources can span across firms in addressing these competitive pressures. Such resources are subject to the interdependencies, linkages and rotational relations between firms (social network theory) so as to realize sustainable outcomes and competitive advantage. Consequently, the association between these four theoretical perceptions with their coinciding and corresponding views does provide a case for profound understanding into the necessity and purpose of multifaceted performance appraisal for green supply chain management. These theories will help in identifying the moderators that motivate the adoption of green supply chain management practices and how this adoption influences firm competitiveness.

2.3.1 Resource based theory

The Resource Based Theory (RBT), (Penrose, 1959) states that firms compete based on their resources and capabilities. Resources are both tangible and intangible and refer to assets, processes and knowledge that are within the control of a firm and enable it acquire sustainable competitive advantage (Peteraf & Barney, 2003). Every firm controls a heterogeneous bundle of resources that is rare, imitable and valuable. RBT in general supply chain management research has been recently advanced. Previously there has been criticism of whether or not the RBT is applicable to SCM and purchasing (Hunt & Davis, 2008). However this criticism has only fuelled support for utilising the RBT within the SCM with Barney (2012), stipulating that

strategic factor market theory or the attributes of RBT fit within the use of supply chain management as a competitive weapon (Barney, 2012). Priem & Swink (2012), further argued that the issue of supply chain resources should also be considered from the demand (downside) perspective. This way the resources would play a vital role in creating competitive advantage for a company (Varsei *et al.*, 2014). RBT thus presents a vantage point of evaluating sustainability resources in SCM and several researchers have grounded their studies on this theory linking GSCM practices to firm performance.

The development of resources and capabilities may be exemplified through improvements in various organizational performance metrics. The RBT has been positively used to link quality and firm flexibility to environmental performance while partnership with suppliers was associated with better delivery performance. Operational capabilities built through greening of supply chains further supports the value, rarity, inimitability, and non-substitutability aspects of the RBT (Förstl , Reuter, Hartmann & Blome, 2010). Studies and conceptualizations have found and argued for the improvement of reputation and image, which is considered a significant resource overall (Barney, 2012), and is evident in the business value of GSCM (Förstl *et al.*, 2010; Sarkis, 2009). The values associated with greening the supply chain and the competitive advantages gained are not essentially found in the supplier management stages of the supply chain but they could even be larger in the customer stages with green marketing capabilities and resources (Shang *et al.*, 2010) which would therefore increase a firm's market share.

In the context of green manufacturing, RBT proposes that firms apply strategic resources and capabilities to create rare and inimitable practices that are difficult to imitate while at the same time reducing the environmental impact of their production activities (Kirchoff, 2011). For example, it is difficult to substitute and imitate training which is an important investment in internal capabilities that allow organizations to respond to various supply chain pressures. Alternatively, a lack of capabilities and resources make the implementation of environmentally-oriented reverse logistics practices difficult (González-Torre *et al.*, 2009).

In this study the RBT will be used to evaluate green supply chain management practices. Every firm has its own bundle of resources that are unique to it and valuable. These bundles of resources are heterogeneous and the process through which individual firms acquire them leads

to competitive advantages for the firm. Individual firms have different manufacturing capabilities and competencies as well as managers who have different levels of knowledge concerning green supply chain practices. Each firm will seek to use these unique capabilities and resources as a source of sustainable competitive advantage. This is in resonance with Sarkis *et al*. (2010), who suggest that these resources contribute to a sustainable competitive advantage of the firm. This study will use the RBT to link GSCM practices to firm competitiveness. The motive behind the adoption of GSCM practices is to enhance supply chain competitiveness and create value for the firm in question.

An important aspect of RBT is the implementation of the unique bundle of resources both within and without the firm. The aspects of green purchasing, green manufacturing, green distribution and reverse logistics can all find their foundations in the RBT. This research further supports the suggestion that these resources are difficult to come by and thus may be strategically advantageous to firms that have implemented these GSCM practices. The firms that have incorporated strategic resources linked to green practices in their operations are in a position to improve their competitiveness. Thus GSCM practices will be regarded as bundles of organizational resources that enable a firm to attain higher competitiveness.

2.3.2 Institutional theory

Institutional theory (DiMaggio & Powell, 1983) posits that organizations respond to influence from the society and governments so as to gain legitimacy. In seeking legitimacy institutions will adopt those characteristics of the organizations that they consider to be more successful. Institutional theory may explain how external moderators promote GSCM practices. However, there are still some remaining questions. Clemens & Douglas (2006), indicate that both external drivers and internal resources drive environmental management practices but it is unclear how external and internal factors interactively promote GSCM practices. Governmental regulations can be key moderators for enterprises to implement GSCM practices. Studies done in Canada and England show that normative pressures drive enterprises to be more environmentally aware, but there is needed to understand how organizations respond to environmental issues (Ball & Craig, 2010). Environmentally-oriented reverse logistics dimensions of greening supply chains have also seen investigation of how internal organizational resources mediate the relationship to external forces (institutional forces) (Sarkis *et al*., 2010).

With the development of global supply chains, mimetic pressures provide opportunities for encouraging cooperation among enterprises from different countries operating under the same supply chain (Daniels & Perez, 2007), but the diffusion mechanism for such cooperation needs further research. Finally, there are issues related to the linkage of external pressures from institutional theory to internal capabilities such as those proposed by the resource based-view that need to be further investigated in GSCM (Sarkis *et al*., 2010). When a firm complies with the set standards, legislations and societal norms then the likelihood of its strategic survival is enhanced. Some firms may choose to imitate other firms that have already adopted green supply chains in order to survive. Such a firm will be protected from any possible consequences of environmental and social misconduct such as, protests, campaigns and sanctions (Peters, Hofstetter & Hoffmann, 2011).

According to the institutional theory, therefore, firms operate in certain ways so as to gain social legitimacy. Consequently social obligations become the most influential pressure if firms are to adopt certain practices such as GSCM. Institutional theory will thus be used in this study to explain the moderating variables of both external and internal pressures such as employees' knowledge, and their influence on a company towards adoption of GSCM practices. Compliance with the government and industrial regulations increases the survival of firms which is explained by the institutional theory. Using the institutional theory, this research will examine how firms respond to powerful pressures from the government and industrial regulators thus gain social legitimacy. This theory should also help us expound how the internal capabilities, suggested by the RBT, such as firm attributes, influence its adoption of green practices, objective five in this study. The theory will thus provide the rationale for examining the moderating variables as they enhance the adoption of GSCM practices.

2.3.3 Stakeholder theory

Stakeholder theory (Freeman, 1984), postulates that a firm will adopt certain characteristics and behaviours so as to govern its production, investments and pricing decisions. The theory further goes on to say that managers adopt certain practices in order to improve firm performance (Clarkson, Deck, & Shiner, 1992). Björklund (2010), states that this theory is usually used as an explanation for the adoption of GSCM practices. Stakeholder analysis for GSCM is especially pertinent as there are views that not all GSCM practices are conducive for generating

competitive advantages for enterprises and are absolutely necessary due to pressures from stakeholders. Specific stakeholder influences on green purchasing (Björklund, 2010); life cycle analysis in the supply chain (Matos & Hall, 2007); environmentally-oriented reverse logistics (Sarkis *et al*., 2010); 'closing the loop' for greening supply chains (Zhu *et al*., 2008), and general GSCM or green logistics practices have received research attention (Chien & Shih, 2007). Identifying and investigating the roles of various stakeholders within GSCM practices has also been an application approach by researchers utilizing stakeholder theory (de Brito *et al.*, 2008).

Studies done by González-Benito & González-Benito (2006) investigated the role of stakeholder pressure in the implementation of environmental practices at the supply chain level and concluded that only non-governmental pressure could explain the execution of environmental practices. In addition, Sarkis *et al.* (2010) investigated the relationship between stakeholder pressure and the adoption of environmental practices within the Spanish automotive industry and proposed a theoretical framework based on the integration of stakeholder theory and RBT.

The stakeholder and the institutional theories can be integrated. Both theories are deemed to influence the question of why organizations do what they do. The only difference being that the institutional theory basically considers factors outside an organizations' control while the stakeholder theory considers factors that are largely within the control of a firm such as customers, management and employees. This research seeks to use the stakeholder theory to explain some of the moderating variables such as how employees' knowledge on green supply chain practices, as well as pressure from customers can influence adoption of GSCM by the firm. This would further enhance profitability and market share and thus meet the obligations of the main stakeholders. With increasing environmental concerns by various stakeholders, the theory will be used to investigate how employees and managers implement environmental practices at the supply chain level thus increasing firm competitiveness.

2.3.4 Social network theory

Social network theory (Rowley, 1997), is a theory that applies to a variety of levels of analysis from small groups to entire global systems. The social network theory (SNT) is important when examining the structure of inter-organizational relationships in a supply chain which has been brought about by the increased interlinked decision making approaches (Carter, Ellram, & Tate,

2007). The SNT is one that measures the number of ties in a network that links actors together. It also measures the position of an individual firm in relation to the flow of information (Okemba & Namusonge, 2014). As network centrality increases however, the organization's ability to resist external pressures also increases (Zhu & Liu, 2010). Accordingly, if an organization has many branches, customers and suppliers, and there is a general awareness in the public, it is likely to be under greater pressure to adopt GSCM practices. The adoption of GSCM practices for such a firm will thus be more or less reactive (Maignan & Mcalister, 2003 as cited in Sarkis *et al*., 2010).

Although it could be argued that constructs of SNT can largely help analysts explore relationships between supply chain members at both levels, there have been very few studies that employ this theory in the supply chain management context (Carter *et al*., 2007; Sarkis *et al.*, 2011; Varsei *et al.*, 2014). Social networks enable efficient application of sustainability practices in which a firm can benefit from its central position to champion and monitor green supply chain initiatives (Vurro, Russo, & Perrini, 2009) through both "hard" material/money flow and "soft" alliances and sharing-of-information types of ties (Borgatti & Li, 2009, p.19). Social networks being multidimensional enable organizations to achieve higher environmental success when they cooperate with suppliers (Sarkis *et al*., 2010). A firm that desires to review its supply chain should consider having information sharing mechanisms that will increase its supply chain density as well as enable it undertake GSCM initiatives (Varsei *et al.*, 2014).

GSCM studies on buyer-supplier relationships for performance improvement can be explained using the SNT. Studies done to relate the relationship between GSCM to its environment indicate that there is an environmental dimension between customers and suppliers. Different organizations have different attributes and thus using the notion of centrality, this study will seek to show that organizations can control the products they buy which have the effect of greening the whole supply chain leaving the choices of adoption more in the control of the organization. The theory will thus be used to explain the reason why firms purchase the materials they purchase.

2.4 Hypothesis Development

The stakeholder theory posits that firms have a binding duty to put the needs of the stakeholders first. Consequently firms will only address the needs of four parties: shareholders, customers, suppliers and employees. Ashby, Leat, & Hudson-Smith (2012), characterized green purchasing as a conscious effort that addresses sustainability in a philanthropic manner. Usually a firm is able to save costs by preventing waste than treating the waste at the end of the supply chain (Amemba, 2013). In order to eliminate waste, firms should integrate environmental requirements into their purchasing activity (Lagat, 2013). Suppliers should therefore consider the final disposition of the components that enter the firm. Customers too influence the environmental management and purchasing functions of a firm. Consumers' awareness about environmental protection advances a firm's implementation of GSCM practices (Yang & Zhang, 2012). Green procurement is thus a solution for an environmentally concerned and economically conservative business, and a concept of acquiring products and services that minimize the environmental impact (Salam, 2008) while taking into account the stakeholders' views. This study therefore hypothesises that

H_{0_1} : Green purchasing has no statistically significant influence on the competitiveness of food manufacturing firms in Kenya

Production systems that meet the increasing demand for goods and services are linked to adverse environmental impact (Baines, Brown, Benedettini, & Ball, 2012). Consequently many governments have pressurized manufacturing industries to incorporate environmental programs in their activities (Murphy, 2012). Green productions seek to improve efficiency through operations that reduce waste at the source rather than at the end of pipe (Kirchoff, 2011). As the world's population increases, and emerging economies expand, the earth's environment and resources are experiencing tremendous challenges causing green production to rapidly grow in importance (Industry Today, 2010). The Resource Based Theory proposes that when a firm employees GSCM practices it will enhance competitiveness. The impact of GSCM practices can be measured through efficiency, market indicators and through financial indicators such as gross profits. This study thus hypothesises that

H_{0_2} : Green production has no statistically significant influence on the competitiveness among food manufacturing firms in Kenya

According to Muma, Nyaoga, Matwere & Nyambega (2014) green distribution consists of green packaging and logistics. A study done by Hasan (2013) concludes that green distribution has an important part to play in the link between environmental innovation and competitive advantage. 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 (Delmas & Montiel, 2009). This study therefore proposes that

H_{0_3} : Green distribution practices do not have a statistically significant effect on the competitiveness of food manufacturing firms in Kenya

The social network theory proposes that the position of a firm in the social network enables it to control the flow of information. The centrality of the firm in question, gives it room to proactively adopt GSCM practices. A firm that has a greater number of locations and customers is also likely to be under greater pressure to adopt GSCM practices (Okemba & Namusonge 2014). Reverse logistics "closes the loop" of a typical forward supply chain and includes reuse, remanufacturing, and/or recycling of materials into new materials or other products with value in the marketplace. The idea is to eliminate or minimize waste such as solid wastes (Ashby *et al*., 2012). Choi & Zhang (2011) conducted a study on green logistics and business performance in China and found that some organizations have found a match between environmental considerations and profitability. Studies done by Ashby *et al.* (2012) further indicate that management of wastes in reverse logistics and waste exchange can lead to cost savings and enhanced competitiveness as a firm's environmental efficiency is enhanced. This study has thus hypothesised that

H_{0_4} : Reverse logistics do not have a statistically significant effect on the competitiveness of food manufacturing firms in Kenya

The institutional theory proposes that the environment in which a firm operates affects that firm's adoption of certain practices such as the adoption of GSCM (Yang, 2013).from the external environment, there are external pressures exerted on the firm. These external pressures are the most influential factors that cause firms to consider implementing GSCM practices (Seuring & Muller, 2008). Companies that do not meet both government and industrial regulations are likely to be charged with costly lawsuits which causes them to lose their public image thus their customers (Sarkis et al., 2010). Internal pressures arise from a firm's attributes such as the Vision and Mission statements, technological attributes of a firm and the employees' knowledge. These internal pressures enable firms to go beyond mere compliance with the laws by enhancing information relationships (Yang, 2013). Therefore, when higher levels of internal and external pressures are exerted on firms, they experience a positive influence towards the adoption of GSCM practices. Therefore it is hypothesized that

H_{05} : Green supply chain management drivers have no statistically significant effect on the relationship between green supply chain practices and the competitiveness of food manufacturing firms.

2.5 Empirical Evidence

2.5.1 Green supply chain management moderators

According to the theories earlier discussed, certain moderators can be considered that stimulate GSCM practices and build a case for greening supply chains. From the external business environment there are institutional pressures that further influence businesses and their supply chains to embrace better social and environmentally responsible practices. Zhu *et al.* (2013) and Varsei *et al.* (2014), identify that institutional pressures would originate from government regulations, industrial self-regulation, monitoring organisations such as NGOs. Institutional investors and the media, Business publications and education, trade or employer associations, and formal processes of stakeholder engagement have also been found to encourage institutional pressures. The two studies used the institutional theory to expound on the moderators of GSCM practices between a firm and its supply chain.

The moderators identified by these studies were external drivers only whereas both external and internal moderators do play a vital role in influencing the adoption of GSCM practices. The institutional theory can also be used to explain why firms in different economic settings and in different sectors of the same economy have different adoption rates. None of the studies above looked at the behaviour of the customers or the reaction of competitors when firms apply or do not apply GSCM practices.

A study carried out by Chang, Kenzhekhanuly & Park (2013) identified customers as a source of external pressure equivalent to that which comes from governments. This is because customers have an increased awareness of environmental issues which influences the behaviour of companies positively towards the management of environmental issues. This study only considered customers of those countries where conscious efforts are made towards a sustainable environment. In countries where little is being done towards achieving a sustainable environment, customers may not influence the behaviour of companies towards protection of the environment.

A study carried out by Yang (2013), classified GSCM moderators into three main categories- mimetic, coercive and normative pressures. Businesses tend to mimic other seemingly more successful firms especially when they are facing uncertainties in their business environments (DiMaggio & Powell, 1983). Such pressures mainly come from a firm's main competitors who have adopted certain practices and as a result the original firm's survival is threatened (Liu *et al*., 2012; Yang, 2013). Normative pressures come from NGO's and local communities which encourage firms to address supply chain related environmental problems. Coercive pressures come from government regulations, parent companies and major customers. All these pressures identified by Yang (2013) are external pressures. The researcher only categorized the various types of external pressures but did not discuss any of the internal moderators. However it is important to note that the researcher recognized the role played by customers when they force firms to comply with certain standards.

Other studies done in China indicate that employees play a very significant role in the adoption of green supply chains (Liu *et al.*, 2012). This is because without the necessary learning capacity an organization may not be able to implement GSCM practices no matter the pressures it faces.

Learning capacity is enhanced by self-learning, on-the-job training, and continuous practice of professional skills (Chang *et al.*, 2013). The researcher did not consider the role of managers in the adoption of GSCM practices. Employees may have the relevant knowledge but if the adoption of this practice does not bring enhanced profits for the managers then it will not be adopted.

McFadden *et al*. (2009) indicate that management is the sole driver of adoption of GSCM practices. This finding was disputed by Yang (2013) who found that uncommitted leadership was a major hindrance to change initiatives. Top management support is especially useful for environmental practices such as GSCM. Sarkis (2009), further points out that top management has a significant ability to influence, support the actual formation and implementation of green initiatives across the organization and is thus necessary for any strategic program success. Where firms encourage innovation they also encourage new ideas from all firm employees and these ideas can then be adopted by the management. According to Leire & Mont (2010) for many public and private organizations, the main challenge is inadequate knowledge and expertise for the evaluation of different options in terms of environmental aspects and impacts. This leads to firms being reluctant to prioritize the adoption of green supply chain practices. This research will seek to find out whether or not management contributes to the adoption of GSCM practices in Kenya.

The initial capital outlay required by green methodologies such as green design, green manufacturing and green labelling of packing is too high. Studies carried out by Al Khidir & Zailani (2009), indicated that environmental management involves two types of costs, direct and transaction costs. Both types are high and are more than likely to constitute barriers to the implementation of GSCM. Financial constraints can thus lead to the resistance of implementing green practices. These costs also hinder technological advancement. Resistance of organizations to technological advancement is equivalent to resistance to change. Priem & Swink (2012) identified that organizational assets and processes are necessary in the implementation of GSCM practices. The effective utilization and sharing of these resources between supply chain members is a source of competitive advantage.

What the researchers do not say is how technological attributes, such as maintenance costs, incurred by a firm contributes to competitiveness when a firm adopts GSCM practices. The current study will want to examine whether the technological attributes of a firm contribute to firm competitiveness in the industry. Further none of the studies carried out so far have examined the role of firm attributes such as the firm's vision and mission statements contribute towards the adoption of GSCM practices. In addition none of the studies done so far examined the effect of GSCM practices on the competitiveness of firms in an industry. In addition to government and industrial self-regulations, this study will also include technological attributes, firm and employee attributes to be GSCM moderators.

2.5.2 Green supply chain management practices

Various studies have put forward various practices that can be used to achieve GSCM. Other researchers call them GSCM or activities. Liu *et al.* (2012), note that different organizations may adopt different GSCM practices depending on their operations and characteristics and the industrial sector (Huang, Tan & Ding, 2012). Dheeraj &Vishal (2012) examined four main practices of GSCM: green purchasing, green manufacturing and materials management, green distribution and marketing and reverse logistics. Ninlawan *et al.* (2010) on the other hand considered green procurement, green manufacturing, green distribution, and reverse logistics. Similarly, Amemba *et al*. (2013) discussed green procurement, green manufacturing, green operations, reverse logistics and waste management as the major elements of GSCM. Some researchers have gone on to discuss single aspects of GSCM practices for instance, Baines, Brown, Benedettini, & Ball (2012), examined the green production aspect while Lagat (2013) looked at the aspect of green purchasing. The common GSCM practices in the above studies are green purchasing, green manufacturing, green distribution/marketing and reverse logistics. These are the parameters that have been adopted in this study. None of the studies carried out were done in a food manufacturing firm an area that this research seeks to explore.

Greening of the supply chain starts from the aspect of acquiring/procuring raw materials. Ashby *et al* (2012), in their review of supply chain management and sustainability literature characterize green purchasing as a conscious effort that addresses sustainability in a philanthropic manner. This study used the variables recycling, CSR, reverse logistics, green purchasing, product stewardship, reuse and remanufacturing. Of the variables used, the research identified purchasing

in the context of the environment as the most practicable dimension of the GSCM practices. This is because green purchasing advocates that a focal firm will use its power to demand environmentally improved products from the suppliers upstream.

Studies by Svahn & Westerlund (2009) indicate that as a strategy, green purchasing enables a firm to achieve the best procuring system in a supply network environment. Gold *et al.* (2010) carried out a study using the variables regulations, customers, stakeholders, CSR and communication. In their findings they emphasised that green purchasing was important in building relationships with suppliers. Lagat (2013) carried out a study on the 'factors affecting integration of green purchasing in procurement at Kenya Airways Limited'. The study alleged that procuring firms can wield their authority in the market by awarding the production of greener products thus deriving environmental advantages from green purchasing. This works when a firm exerts pressure on an industry, stimulates a drop in prices of greener goods, and inspires the design, development and production of greener products while at the same time sets a good example. Such a firm can influence the reaction of the other players in the supply chain by offering, advancing and requesting environmental information about a product, both upstream and downstream.

Toke *et al*. (2010) pinpointed a number of ways that can be assimilated into the purchasing function to attain environmental sustainability such as developing a Supplier Environmental Questionnaire, that would help find out a suppliers' stance on Climate Change and related Environmental issues before selecting suppliers. Chang *et al.* (2013) through an extensive literature review, identified the activities involved in green purchasing as supplier selection, material selection, outsourcing, negotiation, delivery, scheduling, inventory, and supplier involvement in design. Studies on this topic have, so far, mainly been executed for the public sector but findings suggest that the potential environmental gains from green purchasing are impressive (Lagat, 2013) and should be extended to Kenya's private sector including the food manufacturing sector.

These studies suggest that green purchasing is a growing practice and the literature available in this area denotes that it is more developed than other aspects of the green supply chain. The purchasing aspect of any single firm can easily be isolated and studied and this could have

contributed to green purchasing being the most developed section of the GSC. In this study green purchasing will include supplier selection, material selection, outsourcing and supplier involvement in design. However, none of the studies have enumerated the benefit of green purchasing in food manufacturing firms and its effect on firm competitiveness a gap that this study seeks to fill.

As population increases and economies grow, the eco-systems and resources are being rapidly depleted (Industry Today, 2010). According to Murphy (2012) manufacturing industries are increasingly being pressurized to have more eco-friendly policies. Consequently, many governments have incorporated environmental policies and regulation frameworks in their administration. As a result more eco-friendly activities are being embraced by various industries such as the integration of design for the environment into their products (Murphy, 2012). Manufacturers therefore must appreciate the requirements and ensure that their products conform to the regulations.

According to Dheeraj & Vishal (2012), green manufacturing involves use of fast, reliable, and energy efficient production equipment aimed at eliminating wastes and improving productivity. Baines *et al.* (2012) in their literature review of green production define it as the use of environmentally and socially responsive practices that reduce the destructive impact of production activities while balancing the goal of economic benefits. Amemba *et al.* (2013) in their desktop research define green manufacturing as a production process that involves the use of inputs with reasonably low environmental impacts, yet highly efficient, and which generates little or no waste or pollution. This study defines green manufacturing as that process which seeks to minimise the impact of production on the environment at every stage of production. Green manufacturing in this study will be inclusive of the use of sustainable sources such as solar, pollution prevention, zero emission strategy adoption and recycling of raw materials.

Firms can effectively practice green manufacturing practices through the use of solar energy, recycling of raw materials and utilizing biodegradable energy sources in their manufacturing operations. Adopting cleaner production technologies is one way that manufacturers can green their production processes. Other methods include dealing with the waste at the end of the production process. As firms go green firm competitiveness is enhanced. Gan (2003) reported

that the aim of applying green concept to automobile manufacturing is to reduce environmental impacts, to enhance market competition, and to complement government regulations (as cited in Cheruiyot *et al*., 2013). Baines *et al.* (2012) conclude that the move to green production by manufacturing firms has a number of benefits such as increased market opportunities and potential cost savings. Murphy (2012) concludes that green production has the effect of minimizing both the waste of energy and raw materials. This goes to show that it is not only the automobile industry that gains when GSCM practices are implemented but other manufacturing firms can also gain.

In a study conducted by Chien & Shih (2007), on implementation of green supply chain management practices in the electrical and electronic industry and their relation to organizational performances, it was evident that green procurement and green manufacturing can generate favourable environmental performance. Further studies by Green Jr. *et al*. (2012) developed a GSCM model focusing on GSCM practices implemented by manufacturing organizations. They wanted to see whether the adoption of GSCM practices would improve environmental performance. In their findings, it was evident that GSCM had a positive contribution to environmental performance.

Once goods are manufactured they have to get to the market and the market has to be informed about the product attributes. This involves a proper distribution system. According to Muma *et al.* (2014) green distribution consists of green packaging and logistics. This study which adopted a correlational research design was carried out to determine the effect of GSCM on environmental performance. The findings of this study indicated a positive relationship between green distribution and environmental performance. However this study did not examine the relationship between other aspects of GSCM practices and firm competitiveness. Moreover, this study was carried out among tea processing firms where the product has an established market. On the other hand food manufacturers have to curve a niche in the market for their products

The chief advantage of greening a supply chain comes from the ability to market and sell green products. A study done by Hasan (2013) concludes that green distribution has an important part to play in the link between environmental innovation and competitive advantage. The study however, did not specify whether operational performance enhanced firm competitiveness or

increased market share. However, the competence 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 (Delmas & Montiel, 2009). In order for firms to fully implement and realize potential gains of green distribution, they need to control and access their distribution patterns to gain a competitive advantage. The above studies were case studies which limits the generalizability of their findings.

Green distribution consists of green packaging. Packaging features such as size and materials used, influence distribution because of their effect on the transportation features of the product. 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 vendors to standardize packaging, encourage and adopt returnable packaging methods, promote recycling and reuse of packaging materials. Studies done by Amemba *et al.* (2013) suggest that better packaging and rearranged loading patterns reduces use of materials, warehouse and trailers are better utilized, and the amount of handling required is reduced. 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. There are challenges associated with green distribution such as the high start–up investments associated with employees training and environmental auditing/limited financial resources, the attitude that firm's strong environmental commitment results in added costs which put the firm at an economic disadvantage as compared with other less environmentally responsible firms, and reduction of the pool of qualified suppliers due to stricter environmental standards (Kinoti, 2012).

Several countries, Kenya included, have instituted programs with an aim of minimizing the amount of packaging materials that enter into the waste system so as to tackle the environmental impact of packaging. In a green distribution system, the required parameters include the type of transport, company infrastructure and the use of biodegradable materials such as packing materials and fuels. These constraints and the dynamics that connect them, determine the environmental impact generated in the distribution phase of the supply chain. In this research the

parameters for green distribution will include packaging and packaging materials, vehicle loadings, warehouse utilization and the channels of distribution used.

Reverse logistics can be defined as the return of products by customers to the original company with the purpose of recovering and potentially generating value from any unused products or components. Murphy (2012) defines it as the process of planning, implementing, and controlling the efficient, cost effective flow of raw materials, in-process inventory, finished goods, and related information from the point of consumption to the point of origin for the purpose of recapturing or creating value or proper disposal. Reverse logistics "closes the loop" of a typical forward supply chain and includes reuse, remanufacturing, and/or recycling of materials into new materials or other products with value in the marketplace. The idea is to eliminate or minimize waste such as energy, emissions, chemical or hazardous and solid wastes (Ashby *et al*., 2012). When suppliers are encouraged to take back packaging materials it is a form of reverse logistics that is capable of greening the supply chain (Hasan, 2013) and thus reduces the amount of packaging materials that enters into the waste system.

Choi & Zhang (2011) conducted a study on green logistics and business performance in China and found that some organizations have found a match between environmental considerations and profitability. Studies done by Ashby *et al*. (2012) further indicate that management of wastes in reverse logistics and waste exchange can lead to cost savings and enhanced competitiveness as a firm's environmental efficiency is enhanced. They further point out that reverse logistics provides the maximum utilisation of used products, where every output is returned to natural systems or becomes an input for manufacturing another product. In so doing reverse distribution aggressively targets at reducing materials and resources in the forward system so that as less materials flow back, reuse is possible, recycling facilitated and the environment preserved.

The above studies agree on the fact that reverse logistics lead to cost savings which enhances firm competitiveness. However none of the studies was carried out in a food manufacturing industry where re-use and recycling may not be possible. The various researches also concurred on the parameters of reverse logistics which parameters were used in this study. These

parameters are waste product recycling, reuse of parts and components, remanufacturing and product reuse.

The immediate objectives of GSCM are basically meant to increase productivity and reduce inventory and lead time thus improve the operations from procurement of raw materials to producing and distributing the final products (Andersen, & Skjoet-Larsen, 2009). The long-term objectives would be to increase the market share by integrating all members of the supply chain thus enhancing the competitiveness of a firm. The above studies have been done on two or less aspects of GSCM practices. Examining the combined effect of at least different aspects of GSCM is a study that has not been empirically investigated. Many organizations have also adopted certain aspects of GSCM yet there is need to adopt GSCM practices that consider the whole supply chain (Chang *et al.,* 2013). Otago (2009) argued in his findings on green supply management that GSCM helps reduce the ecological impacts of industrial activities thereby enhancing environmental performance. Green *et al.* (2012) developed a GSCM model focusing on GSCM practices implemented by manufacturing organizations to see whether the adoption of GSCM practices does improve environmental performance. In their findings, it was evident that GSCM had a positive contribution to environmental performance. Liu *et al.* (2012) in their study of green supply chain management in China found out a positive relationship between GSCM practices and environmental performances in all the three cases they studied. The studies above have also found a strong link between profitability and environmental considerations but there is no link that has been established between GSCM practices and firm competitiveness. Firm competitiveness will consider the economic aspect of the firm - the market share, the gross profits and the operational efficiency. When a firm is profitable it does not necessary mean that it is competitive in that industry in terms of the market share. As a firm's operations are improved and market share is increased, then that firm should be able to report healthier financial indicators and becomes more competitive. The firm will also be found to have taken better care of its environment which should further enhance the market share and competitiveness.

2.5.3 Firm competitiveness

Competitiveness is a multi-faceted word that signifies the ability of a firm or product to compete and be more successful than others. Firm competitiveness would thus relate to the ability of an

organization to provide goods and services in a particular market, and be able to do better than comparable firms in sales, market shares, or profitability (Liargovas & Skandalis, 2008). A firm can be said to be competitive when it adapts to changes in its environment and still generate profits. Firm competitiveness thus requires a continual harmonisation of activities in accordance with changes in its immediate environment (Chikán & Gelei, 2010). Generally, competitiveness is considered synonymous with success. In very simple terms, success can be intended as achievement of a company's intentions of improving their position in relation to that of their competitors. In this study, firms' competitiveness will consist of firm performance in terms of sales, market share, profitability (Lalinsky, 2012) and operational efficiency in terms of cost and delivery flexibility.

Golicic & Smith (2013) carried out a study on the effect of environmental supply chain practices on firm performance. The results of the study indicated that any environmental supply chain practice impacts on operational efficiency and effectiveness positively. However, they indicated that individual production practices should be examined separately in order to evaluate their effectiveness following implementation of environmental production practices. A green supply chain is expected to improve the levels of productivity, stability and competence of the chain (Schaltegger & Burritt, 2014) something that this study seeks to accomplish. In addition this study seeks to examine Kenya's food manufacturing industry in particular thus further narrowing the geographical area.

Hubbard (2009) proposed that evaluating performance will become more complex as various stakeholders anticipate differently about companies' economic, environmental, and social obligations. Today, beyond financial or market-based indicators, measures of competitiveness increasingly include other variables such as innovativeness, quality, and social variables such as ethical standing, social responsibility and the working conditions of employees. Measurement of firm competitiveness will thus consist of understanding the key aspects of GSCM which improve value and the applicable scales of measurement.

For this research, three categories of firm performance that are most frequently used in business as well as supply chain research will be used. These are market-based, operational-based and accounting-based performance indicators (Golicic & Smith, 2013; Hult, Ketchun, Adams &

Mena, 2008a; Hult *et* al., 2008b). Accounting and market based indicators are widely accepted as adequate measures of a firm's financial performance (Gentry & Shen, 2010). These indicators also represent a distinct dimension of a firm's financial performance. The addition of operational based indicators will bring out the competitive aspect.

Market-based performance focuses on financial indicators that reflect market goals with respect to meeting customer needs. The variables that are mainly used include market share, competitive advantage, customer loyalty and brand equity. Market based indicators are mainly drawn from marketing literature and relate to how GSCM practices have enhanced the market share for a firm and thus a source of competitive advantage. When a firm appreciates its target clients and is able to provide products of a superior value to them, then it is able to easily increase its sales and market share. When a firm is said to be in a profit-maximizing state, its marginal cost is lower in relation to that of its competitors. This leads the firm to having a larger market share other things being constant thus increasing its profits. Market share therefore reflects productivity advantages. For the purposes of this research, market performance will be indicated by sales turnover and market share of the organizations' products.

Operational-based performance focuses on aspects related to operational efficiency, such as costs, quality, flexibility and speed (Golicic & Smith, 2013; Kristal *et al.*, 2010; Yang, 2013). Operational performance is highly linked to the effectiveness of GSCM as a major source of competitive advantage for a firm. For a firm to achieve operational performance it must involve its competitive capabilities. Competitive capabilities are the manufacturer's competitive or realized strengths relative to that of their primary competitors. Studies done by Hult *et al.* (2008a) indicate that speed, quality, cost and flexibility are directly tied to supply chains. Baines *et al.* (2012), indicated that environmental protection was related to cost savings and efficiency. Hence operational based performance indicators become an important indicator of sustainability in the adoption of GSCM practices. For the purposes of this study operational performance indicators will be: cost, delivery and flexibility.

Accounting-based performance refers to overall profitability as indicated by return ratios, earnings and profit. Companies have been identified as important players in the drive for sustainability as a result of which they have to examine their supply chains so as to enhance their

sustainability levels without compromising their profits. Financial performance in this study will involve the profitability aspect of a firm. Profitability ratios are the most important and popular measures used in financial analysis. In this study the financial returns will be measured by Gross Profit (GP) and Annual sales turnover (Kristal *et al.*, 2010; Yang, 2013). GP is the preliminary measure of profitability before operating expenses. GP determines a firm's ability to meet its overhead costs, as well as illustrating the financial success of a product. In this study companies with higher a gross profit will be deemed to have a competitive edge over their rivals.

Company sales are important as they bridge the gap between a potential customer's needs and the products offered by the company that are able to fulfil their needs. The volume of sales thus generated indicates that a company's goods or services are important to consumers or organizational buyers. The volume of sales that a company generates is an indicator of the relative success of the company as the annual sales measure the total amount of revenue generated by a business within one year. An organization's effectiveness can be based on sales, market share, and profits, relative to competition (Cravens, 2011). In this study therefore higher sales turnover will be an indicator of a firms' competitiveness.

These three dimensions capture the primary criteria from popular measurement standards such as the balanced scorecard (customers, internal processes and financial) as well as addresses the primary supply chain stakeholders (shareholders — financial, suppliers — operational, competitors — market and customers — market).

2. 6 Nexus between Manufacturing and the Environment

Firms found in the manufacturing and extractive industries are said to be the leading culprits in environmental degradation. This is because they are the focal points of supply chains, as large volumes of products originate and flow through them (Okemba & Namusonge, 2014). Kenya's manufacturing sector is among the key productive sectors identified to deliver the 10 percent annual growth rate for economic growth and development because of its immense potential for wealth, employment creation and poverty alleviation. It is expected to play a major role in the economic growth of the country. In 2012 alone, Kenya's manufacturing sector contributed about Ksh 316.7 billion towards the GDP (KIPPRA, 2013). This proves the influence of manufacturing firms on their supply chains, hence the need to green. This sector comprises of large

multinationals as well as small, and medium enterprises (SMEs) and informal manufacturing activities. The country's vision for the manufacturing sector is to expand it by producing more and higher quality goods as well as to make it more competitive. As manufacturing activities increase there is need to safeguard the environment. Consequently businesses need to go green so as to enhance economic development that would generate wealth, meet the needs of the current generation and safeguard the environment for future generations (Daft, 2008).

Given that the manufacturing sector's sustained double-digit growth rate is key to directly meeting the objectives of Vision 2030, it is expected to come under pressure to reclaim its fast diminishing influence. It is therefore important to ensure that the imminent increased manufacturing activity does not aggravate environmental degradation. One way of ensuring that the environment is protected is when an organization conforms to the ISO 14001. This standard is aimed at improving environmental protection and is adopted throughout the world to show that companies are environmentally friendly. Once endorsed a firm is able to follow, monitor and report its environmental impact (Yang, 2013). Managing the environment has become very important as firms continually pursue sustainability and is viewed as a way of improving manufacturing efficiency, obtain access to new markets and improve financial performance (Darnall, Jolley & Handfield 2008).

In Kenya, a number of industries are increasingly relying on diesel-powered generators so as to meet production targets. Yet there is consensus among the scientific community that fossil fuel burning is responsible for emitting the largest proportion of greenhouse gases (GHGs) that are liable for climate change and variability (Intergovernmental Panel on Climate Change, IPCC, 2007 as cited in Varsei *et al.,* 2014). The suspended particulate matter from fossil fuel burning compromises the quality of air and causes diseases such as asthma and chronic bronchitis (Businge *et al.,* 2011).

Although all the fuel that is sold in the country is unleaded, lead emissions from industrial processes (such as paint and battery manufacturing) contaminate crops and raise the risks of hypertension, heart attacks and strokes (ibid). In addition, a number of manufacturing entities pump untreated effluent into the country's rivers which is largely being held responsible for the high pollution levels in the Nairobi and Ngong Rivers (United Nations Environment Programme

(UNEP), 2007 as cited in Businge *et al.*, 2011). These toxic and heavy metal-laden effluents alter the chemical composition of the rivers, giving off pungent smells which negatively affect human health. They also lead to loss of freshwater biodiversity and adversely affect the capacity of these watercourses to provide their traditional ecosystem services.

Increased manufacturing activity has been associated with the increased use of plastic bags as these are often used to package manufactured goods and groceries. Not only are plastic bags a source of aesthetic pollution but they are also a threat to biodiversity. Even though the ban enforcement on the manufacture, importation and distribution of plastic carrier bags with gauges of less than 30 microns by both NEMA and the Kenya Bureau of Standards (KEBS) has helped lessen the use of flimsy plastic bags, it has done little to encourage the recycling, reuse or proper disposal of the thicker plastic bags that are permitted by the law or even the use of the more readily biodegradable paper bags or conventional bags (Businge *et al.*, 2011). The manufacturing sector should, under the auspices of its umbrella KAM, be encouraged to adopt production techniques that minimize waste, prevent pollution and encourage environmental sustainability. There is therefore need for the manufacturing sector to implement strategies that will reduce the environmental impact of the goods that they offer.

Table 2. 1: Summary of literature reviewed and research gaps

Authors	Year	Research title	Variables used	Methodology	Findings	Gaps	Focus
Gold, Seuring and Beseke	2010	Sustainable supply chain management and inter-organizational resources: a literature review	Regulations, customers, stakeholders, CSR and communication	Content analysis based on published case studies	Supply chain collaboration is important in ensuring social, economic and environmental performance	Empirical investigation on GSCM practices and their effects on firm competitiveness	Empirical investigation of how firms generate competitive advantage through adoption of GSCM practices
Toke, Gupta and Dandekar	2010	Green Supply Chain Management; Critical Research and Practices	Purchasing and inbound logistics, production, outbound logistics, reverse logistics	Literature review	Generalizable knowledge and theory development is almost non-existence	Empirical investigation	Empirical investigation
Kirchoff, J.F.	2011	A resource-based perspective on green supply chain management and firm Performance	Environmental orientation, supply chain orientation, cost efficiency, customer effectiveness, environmental differentiation, GSCM, firm performance	Structural equation modeling (SEM)	Challenged the theoretical and operationalization of the green supply chain management construct	Role of employee knowledge, technological attributes on the adoption of GSCM practices	Role of firm attributes such as employee knowledge and technological attributes to enhance adoption of GSCM
Ashby, Leat and	2012	Making connections: a review of supply chain	Recycling, CSR, reverse logistics,	Structured literature	More research has been done	Focused on environmental	Economic dimension of

Hudson-Smith		management and sustainability literature	green purchasing, product stewardship, reuse, remanufacturing,	review	on the environmental dimension than on the social dimension	and social sustainability within supply chains without explicit Consideration of the economic dimension.	the effect of GSCM practices
Baines, Brown, Benedettini and Ball	2012	Examining green production and its role within the competitive strategy of manufacturers	Green manufacturing, Corporate acceptance, customer relations, competitive strategy	Literature review	The existing knowledge on Green production operations is not enough to support the growth of green producers	Production centred issues that can impact the growth of green manufacturers	Green production as it influences competitiveness
Authors	**Year**	**Research title**	**Variables used**	**Methodology**	**Findings**	**Gaps**	**Focus**
Hasan M.	2012	Sustainable Supply Chain Management Practices and Operational Performance	Environmental management practices within the organization, sustainable supply chain practices relating to suppliers and customers, product and process design, environmental performance, operational performance	Case-study	Sustainable Supply Chain Management practices have a considerable effect on the environmental and operation performance of organi-zations.	Empirical study	Food manufacturing firms, firm competitiveness , green supply chain practices
Yang	2013	Developing a Focal Firm's Sustainable Supply Chain Framework: Drivers, Orientation, Practices and Performance Outcomes	Sustainability drivers, strategic sustainability orientation, sustainability practices, sustainable performance	Structural equation modelling (SEM)	Higher strategic sustainability orientation enables a firm to implement sustainable supply chain activites	Role of firm technological attributes on the adoption of GSCM practices,	Effect of GSCM practices on firm competitiveness , role of technological attributes on the adoption of GSCM practices
Yang, and Zhang.	2012	Research on factors of green purchasing practices of Chinese	Waste separation activities, green management costs, supplier and consumer pressures, laws and regulations, leadership support, green purchasing practice	Factor analysis by SPSS	A leader's support enhances green purchasing practices while the cost of environmental mangement hinders green purchasing	Mutual interaction between the key factors that enhance purchasing	The interaction of Green purchasing, green manufacturing, green distribution , reverse logistics and their effect on firm competitiveness
AmembaNyaboke, Osoro and Mburu	2013	Elements of Green Supply Chain Management	Green design, green procurement, green operations and reverse logistics, green manufacturing and waste management	Desktop research, hospitality industry	Green Supply Chain elements should be implemented as a continuous process to achieve sustainability	Empirical review on GSCM practices and firm competitiveness	Green purchasing, green manufacturing, green distribution reverse logistics
Authors	**Year**	**Research title**	**Variables used**	**Methodology**	**Findings**	**Gaps**	**Focus**
Chang, Kenzhekhanuly, and	2013	A study on green supply chain management practices	Firm's corporate image, market share, efficiency	Questionnaire based survey using likert-	Both external and internal pressures	Relationship among GSCM practices and	Relationship among GSCM practices and

Park,			gains, green purchasing, green manufacturing and outbound logistics	scale, principal component factoring method with varimax rotation, regression analysis	have no influence on the implementation of GSCM practices in Korea	environmnetal and economic performance	economic performance
Golicic and Smith	2013	A meta-analysis of environmentally sustainable supply chain management practices and firm performance	Environmental supply chain practices, firm size, economic conditions, geographical size, firm performance	Meta-analysis,	Positive and significant relationship between environmental supply chain practices and firm performance	GSCM practices, empirical investigations firm competitiveness	Empirical investigation of how firms generate competitive advantage through adoption of GSCM practices
Lagat	2013	Factors affecting integration of green purchasing in procurement at Kenya Airways Limited	Volume of purchase, information tools Management strategy, cost of green purchasing	Case-study of Kenya Airways,	Positive and significant relationship between the integration of green purchasing and the variables under study.	Reverse logistics, green distribution, market indicators	Effect of GSCM practices on firm competitiveness, including market share

Source: Researcher, 2014

2.7 Conceptual framework

Figure 2.1 shows the conceptual framework underlying this research. It shows the interrelationships between the green supply chain management practices and firm competitiveness. This conceptual framework is based on four theoretical models including the stakeholder theory, the Resource Based View, the institutional theory and the social network theory. The institutional theory will be used to show how the GSC drivers moderate between an organization's application of GSCM practices and its competitiveness. Stakeholder theory will be used to illustrate how firm competitiveness is increased by the use of green supply chain practices as it meets the main stakeholders' expectations. The social network theory will be used to establish the relationship between reverse logistics and the operational costs of a firm. The RBT will be used to prove that a firm is able to increase its competitiveness when it applies the GSCM practices.

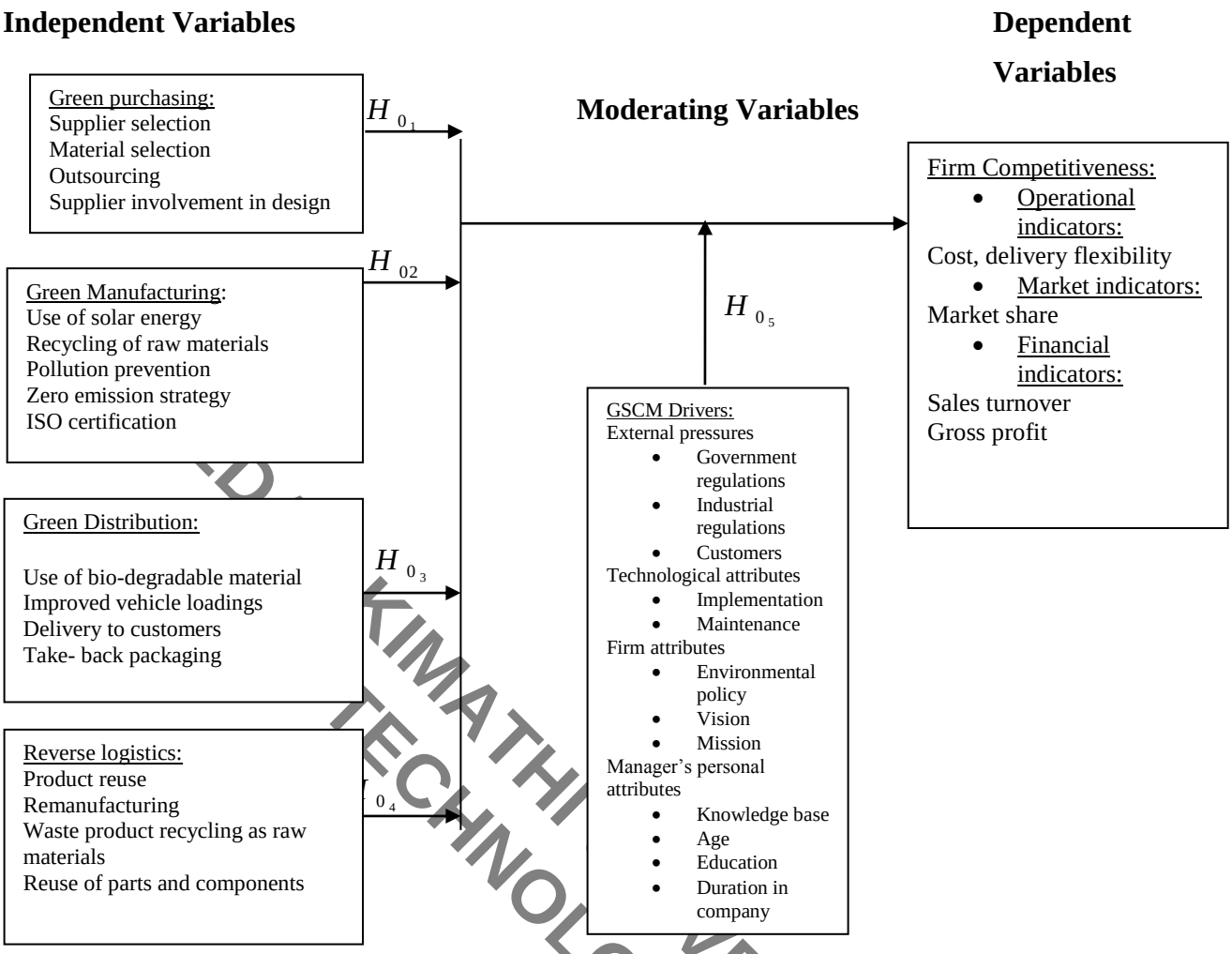

Figure 2.1: Conceptual Framework (Researcher, 2014)

It is discernable from Figure 2.1, that the primary dependent variable is firm competitiveness. This will be measured by three economic indicators which are market, operational and financial indicators. GSCM practices are the independent variables while green supply chain drivers is the moderating variable between firm competitiveness and GSCM.

2.8 Empirical model review

Kinoti (2012) carried out a study on Green Marketing Practices, Corporate image, Organizational characteristics and Performance of ISO 9000 and 14000 Certified Organizations in Kenya. The variables used in this study were green marketing, organizational characteristics, and corporate image as they affect firm performance. This study used Pearson correlation coefficient technique to analyze the data. A correlational research investigates one or more characteristics of a group to

discover the extent to which the characteristics vary together (Simon, 2011). A correlation coefficient (r) of between .81 and 1.0 are considered to be very strong; between .61 to .80 strong; between .41 to .60 moderate; between .21 to .40 weak; and between .00 to .20 no relationship (Kinoti, 2012). This current study will also use correlation to examine the relationships between the various variables.

In addition, Kinoti (2012), incorporated regression analysis in the study. Regression analysis is a statistical process for estimating the relationships among variables. It includes many techniques for modelling and analyzing several variables, when the focus is on the relationship between a dependent variable and one or more independent variables. Usually the investigator seeks to ascertain the causal effect of one variable upon another. Both correlation and regression analysis are associated in the sense that both deal with relationships among variables. This study will use hierarchical multiple regression analysis. Hierarchical multiple regression is used to assess the effects of a moderating variable. In this study green supply chain drivers are the moderating variable. To test moderation, the interaction effect between green supply chain practices and the green supply chain drivers and whether or not they have any significant effect in predicting firm competitiveness will be examined.

A fit as moderation perspective indicates that the impact of an independent variable on a dependent variable is affected by interaction between an independent variable and a third additional variable, or the moderating variable (Kroes and Ghosh, 2010; Yang, 2013). This approach is suitable for this study as its focus will be to examine the interaction effect between an independent variable and a third variable on a dependent variable.

The study done by Kinoti (2012) was descriptive in nature. Descriptive studies attempt to obtain a complete and accurate description of situations, persons or events. Descriptive studies are usually the best methods for collecting information that will demonstrate relationships and describe a situation as it exists. This study will also be descriptive in nature as it will attempt to describe firm competitiveness in relation to the adoption of GSCM practices in the food manufacturing sector.

Studies done by Chang *et al.* (2013) used a questionnaire based survey as an instrument to collect data each item being measured on a five point Likert- scale. The study further used

Principal component factoring method with varimax rotation to identify how and to what extent items were related with their underlying factors. Principal component analysis is used when one would like to reduce the redundancy of variables probably because they were related or measured the same construct. Yang & Zhang (2012) used factor analysis to identify the main factors or drivers that encourage firms to adopt green purchasing. They were also able to clarify and simplify the analysis of the problem. The current study will use Principal component factor analysis with Varimax rotation to reduce the number of explanatory variables and provide information on the pressure sources from the moderating variables that enable food manufacturing firms in Kenya to adopt GSCM practices.

Yang (2013) used a cross sectional study since different US manufacturing firms were surveyed during the same time period. A cross sectional study provides a quick snapshot of what is going on in the field of study. This study will adopt a cross sectional survey as data will be collected from different food manufacturing firms at the same time frame. This method will provide the researcher with a picture of GSCM practices and firm competitiveness in the different food manufacturing firms.

Kirchoff (2011) and Yang (2013) used Structural Equation Modelling (SEM) as the main statistical analysis tool to purify the measurement items for each of the variables used in the study. SEM is a powerful statistical tool that combines a measurement model (exploratory and confirmatory factor analysis) with a structural model (path analysis) into a simultaneous statistical test (Garver & Mentzer 1999). SEM is also used as it is able to handle multiple relationships simultaneously and efficiently. However, in comparison to regression and factor analysis, SEM is a relatively young field, having its roots in papers that appeared only in the late 1960s. This study does not consist of any exploratory or confirmatory factor analysis and consequently SEM will not be used.

Golicic & Smith (2013) used meta-analysis to test their hypothesis as the approach not only combines the effects of multiple independent studies but also sheds light on empirical generalizability of previous findings and can determine whether different moderators affect the associations found. Meta- analysis is a statistical technique for combining the findings from different independent studies in the hope of identifying a common pattern among them (Crombie

& Davies, 2009). Meta-analysis will not be used in this study for it is an independent study examining the effect of GSCM practices on firm competitiveness among food manufacturers in Kenya.

2.9 Chapter Summary

This chapter has discussed the relevant literature concerning green supply chain management, the moderators and firm competitiveness. From the literature the green supply chain is a broadened approach of the traditional supply chain that takes into consideration the environmental aspect. It is evident from the theory and empirical literature that green supply chain management is influenced by certain moderators which in turn influence firm competitiveness. The moderators of adoption studied have not included the role of technology, management or firm attributes. The literature shows that firms adopt different aspects of GSCM practices to enhance firm performance. Based on the literature firm performance has only included the accounting ratios or the market-share but not both. Further no studies have shown whether firms that have adopted all the green supply chain variables so discussed have become more competitive in their areas of operation. To fill these gaps this study intends to provide a more holistic approach on the GSCM practices and how their adoption is influenced by firm attributes, technological costs and employee knowledge and how this adoption enhances firm competitiveness. The current study will also empirically investigate the relationships depicted in Figure 2.1 and presented in the five hypotheses.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents the methodology, which was used to understand green supply chain practices on a firm's competitiveness. The chapter describes the research philosophy, design, type and source of data, the target population and sampling methods and the statistical techniques that were used to select the sample size. It also describes how data was collected and analysed.

3.2 Research philosophy and approach

Supply chain management studies can be undertaken with several research paradigms shaping the research design. The present study was located in the area of positivism as discussed by Lincoln & Guba (2000).

3.2.1 Positivism philosophy

This study used the positivism philosophy which observes the world as 'factual' and where the reality can be identified and apprehended (Pasutham, 2012). Research findings conducted under this philosophy are perceived to be 'true', and knowledge is seen to be unbiased. The research took place in a regulated setting where hypotheses could be proved through quantifiable methods. Such results are believed to be either true or false. In positivism studies the role of the researcher is limited to data collection and interpretation through objective approach and the research findings are usually observable and quantifiable.

Positivism studies are based on facts and assume the world to be external and objective. This study used questionnaires to get the facts of how individual firms engage in green supply chain practices. The research was thus purely objective as the researcher had minimal interaction with the respondents. The questionnaires were issued through the pick and drop method which further enhanced minimal interaction with the research participants (Wilson, 2010). This research also tested the hypotheses that had been postulated which could only be tested through quantifiable methods.

The data collected by the researcher was both quantitative and qualitative in nature. From a positivist perspective, quantitative studies are used to verify the truth and the researcher's opinion is insignificant. These studies according to Denzin & Lincoln (2005), place an emphasis on the measurement and analysis of casual relationships between variables (Pasutham, 2012). In so doing, quantitative studies set out to measure the associations among different variables thus fully comprehending the phenomenon under study. Researchers conceive quantitative approaches as methods of randomised experiments, quasi-experiments, multivariate statistical analyses and sample surveys (Cook & Reichardt, 1979). This research sought to understand whether the combined GSCM practices have any effect on firm competitiveness. The study used stepwise statistical analyses which positivists believe can be used to establish causal connections between two or more variables.

This study used a deductive approach. Crowther & Lancaster (2008) inform that as a general rule, positivist studies usually adopt deductive approach. Deductive approaches consist of development of theory that is subjected to rigorous testing through the measurement of observable social realities (Flowers, 2009). Dobson (2002) as quoted by Saunders *et al* (2007) lists five sequential stages through which deductive research progresses namely, deducing a hypothesis, expressing the hypothesis in operational terms, testing this operational hypothesis, examining the specific outcome of the inquiry and if necessary modifying the theory in the light of the findings. The main purpose of this study was to find out how GSCM practices among food manufacturers in Kenya enhances firm competitiveness. To carry out this research five hypotheses were operationalised and needed to be tested in light of the four theories earlier discussed.

The positivism approach acknowledges that knowledge comes from human experience (Collins, 2010). One of the objectives of this study was to establish the moderation effect of green supply chain drivers on the relationship between green supply chain practices and firm competitiveness. A component of the drivers is the employees' knowledge about green supply chain practices and how this knowledge enables a firm to adopt green supply chain practices. From a positivist viewpoint, in order for a firm to adopt any green supply chain practices there must be enough people who have the knowledge within the firm.

The F- test, and Chi-square statistics mainly deal with rejecting the null hypothesis of no effect. Viewed from a positivist point of view, statistics play the role of negating the null hypothesis, which is the assumption that the data in the dependent variable are not affected by the data in the independent variable or variables. Since each theoretical hypothesis is the exact opposite of its null hypothesis by predicting a difference in the dependent variable, it follows logically that if the null hypothesis is rejected, then presumably the theory is supported. Positivists consider that measurement is imperfect. Accordingly, statistics test the probability that the results could have been obtained due to randomness in the data given the nature of the sample. It is based on this probability that the null hypothesis is rejected and by implication that the theoretical hypothesis is supported (Collins, 2010).

3.3 Research Design

This study in particular adopted a descriptive cross-sectional survey research design which can be used to collect data and make deductions about a population at a given time (Lavrakas, 2008). A cross sectional descriptive survey enables a researcher to make observations about a particular phenomenon of a sample or entire population of the study (Babbie, 2010). Lavrakas (2008) further states that, cross sectional descriptive studies form a bridge between simple descriptive studies such as case studies and those that can be used to test hypothesis.

Cross- sectional studies attempt to describe situations, people or events as accurately as possible. These studies are used to describe behaviours and attributes that are observed and measured, rather than tested with an experiment. Cross- sectional studies describe the existing distribution of variables without establishing a causal relationship among them. Cross-sectional designs are used when the objective is to provide a methodical picture that is as accurate and precise as possible. Cross-sectional research has a very clear place in management and business (Saunders *et al.*, 2007). The current study has its place in business management as it seeks to find out whether or not GSCM practices do enhance competitiveness of firms. Descriptive statistics were used to describe the various companies.

This study considered cross-sectional survey as appropriate as it allows a description of a phenomenon as well as data collection from a sizeable population in the most economical way. It is also possible to collect quantitative data which will be analysed using descriptive and

inferential statistics. In addition the data collected using a cross-sectional survey is used to suggest possible reasons for particular relationships and associations between variables and to produce models of these relationships. Cross-sectional survey methodology studies are an attractive method of data collection as they have the potential to provide the researcher with a large amount of information that can be analysed to test relationships between variables (Yang, 2013). These present a chance to validate the researcher's measurement scales thus increasing the generalizability of the findings beyond that of a case study or structured interview methods (Dobrzykowski, 2010). The researchers' instruments were validated using a pilot test.

3.4 Target Population

The total number of food manufacturing industries in Kenya is one thousand two hundred and thirty two (1,232) of which one hundred and eighty one companies are registered with the KAM (KAM, 2013). These comprised the unit of analysis.

Of the food manufacturers registered with KAM, 60 percent are mainly SMEs and include companies such as the Association of tea growers, exporters, retailers, distributors among others. Companies dealing in wines and spirits, exporters, retailers, distributors and the Association of tea growers were not be included in this study. Bottlers and the tobacco leaf processing company were also not part of the study. The food manufacturing companies that were included in this study consisted of those that were listed in the KAM directory 2014 and were strictly food processors or manufacturers. Thus of the one hundred and eighty one registered companies only one hundred and thirty companies were food manufacturers or processors and these made the target population.

3.4.1 Sample Framework

This study used a census survey approach for data collection. For populations of less than 1000 it is often necessary to conduct a census so as to achieve a high degree of statistical confidence in the survey results (Zhang, 2009). Of the one hundred and eighty one food manufacturing companies that are registered with KAM only those food manufacturing companies that strictly manufactured or processed food were considered. Thus the sample size was one hundred and thirty companies. Companies that are involved in alcohol, tobacco leaf processing, bottlers or the manufacture of bottles were not considered in this study.

For each of the companies that participated in the study, the researcher got one respondent per company. This was either the financial manager or the managing director or their appointee. It was deemed that these respondents were conversant with the GSCM practices in their companies. The table below shows how the questionnaires were distributed in each company.

Table 3. 1: Summary of Respondents

Respondent's group	Respondents	Number of respondents
Top management or Finance Department	Managing director or Finance manager or their appointee	1 in each company
	Number of respondents	130 respondents

3.5 Methods of Data Collection and Instruments

The study used both primary and secondary sources of data. Secondary data was collected from the various financial reports of the companies as well as from the various organization's websites, journals and periodicals and other relevant sources that were available to the researcher using a check list.

Primary data was collected using semi-structured questionnaire. The questionnaire is deemed as the most appropriate instrument due to its ability to collect a large amount of information in a reasonably quick span of time. It guarantees confidentiality of the source of information through anonymity while ensuring standardization of the information (Yang, 2013). It is for these reasons that the questionnaire was chosen as an appropriate instrument for this study. The questionnaire administered contained Likert type questions as well as both open and closed ended questions so as to provide enough and accurate information in line with the objectives of the study. They also gave the respondents a chance to give their views freely without any limitations.

The questionnaire items were carefully structured and phrased keeping them simple, specific and concise. The questionnaire was divided into five sections (Appendix II) each relating to the different objectives of the study. Information was collected from the managing director or the

finance manager or their appointee. These respondents were deemed to have knowledge on the Green supply chain practices taking place within their organizations. The questionnaire were administered by the researcher with the help of trained research assistants through a drop and pick later method. To increase the response rate a letter of introduction from the university, explaining the purpose of the data and assuring the respondent that the information would be kept confidential accompanied the questionnaire. Telephone calls were also made to the various managers to book appointments which increased the response rate.

3.5.1 Validity of Research Instrument

A pilot study was conducted which enabled the researcher to make the alterations and improve the questionnaire thus validating the instrument. Based on the analysis of the pre-test, the researcher made corrections, adjustments and additions to the research instruments and made it valid to accurately measure what it was intended to measure (Sullivan, 2011).

3.5.2 Reliability of research instruments

Reliability refers to the consistency of measurement result and the extent to which they are accurate, error free and stable. In order to test the reliability of the instruments, internal consistency techniques were applied using Cronbach's Alpha. Upon analysis of this data, where a Cronbach's Alpha of at least 0.7 was obtained, it showed a strong acceptable level of internal reliability (Bryman, 2008; Sekaran & Bougie, 2010). Reliable measurement results are reproducible and generalizable to other measurement occasions. However, the pilot data was not included in the actual study.

3.5.3 Item Generation

Items were constructed to test the hypothesized relationships in Figure 2.1. To generate items for each construct previous relevant literature was reviewed and a list of essential items was compiled. Thus this study developed measures for green purchasing, green manufacturing, green distribution, reverse logistics and firm competitiveness. Content Validity is an important requirement which indicates that the instrument have covered the major domains of an instrument (Yang, 2013). The design of the questionnaire items was developed based on an existing body of earlier conceptual and empirical studies. These studies contributed information on the green supply chain management and firm competitiveness. To achieve the content validity

for the moderators, previous literature in institutional theory was reviewed (DiMaggio & Power, 1983; Liu *et al.*, 2010; Sarkis *et al.*, 2010; Yang, 2013). The operational definitions of the constructs are clarified as shown in Table 3.1.

Table 3. 2 Construct development and Likert Scale Questionnaire Item, number and type

Construct	Description	Measurement unit	
Green Purchasing	X_1 supplier selection	1= green materials, image, green products and environmental efficiency 2= technological and green design capability 3= quality 4= pollution prevention and control 5= price	Likert scale
	X_2 Material selection	1= quality 2= technical expertise 3= proximity 4= environment 5= price	Likert scale
	X_3 Outsourcing	1= yes 2=no	Binary
	X_4Supplier involvement in design	1= Yes 2= No	Binary
Green Manufacturing	X_5 use of biodegradable energy	1= none 2= solar 3= wind 4= biogas 5= water	Likert scale
	X_6 Recycling of raw materials	1=yes 2=no	Binary
	X_7 Green environmental strategies	1= waste minimization or treatment 2=equipment modification 3= product redesign 4=procedure modifications 5= substitution of raw materials	Likert scale
	X_8 ISO certification	1= yes 2= no	Binary
Green Distribution	X_9 Biodegradable packaging materials	1=yes 2=no	Binary
	X_{10}Improved vehicle loadings	1=yes 2=no	Binary
	X_{11} environmental distribution strategies	1= powering with bio-degradable energy 2=use of alternative distribution fuel or method 3= building distribution centres close to where goods are delivered 4=forming partnerships	Likert scale

		with local distributors 5= labelling of green products	
	X_{12} Improved warehouse utilization	1=yes 2=no	Binary
Reverse Logistics	X_{13}product reuse/take back	1= packaging materials 2=containers 3=unsold products 4=end of life products 5=none	Likert scale
	X_{14} remanufacturing /product recovery	1= repairing 2= refurbishing 3=remanufacturing/ recycling 4=cannibalizing 5= none	Likert scale
	X_{15} waste product recycling	1= yes 2=no	Binary
	X_{16} reuse of parts and components	1= assembles re-use 2= components reuse 3= raw materials reuse 4= systems reuse 5= none	Likert scale

Source: Researcher

To measure green purchasing the following constructs were used; supplier selection, material selection, outsourcing and supplier involvement in design. Supplier selection has become a strategic consideration in directly improving supplier and manufacturing performance (Narasimhan *et al.,* 2008; Yang *et al.,* 2010). Firms have increasingly recognized the importance of incorporating their major suppliers when when evaluating the environment (Bai & Sarkis, 2010; Yang, 2013). Supplier appraisal is important as it is used to assess the supplier's environmental impact. This will thus enable a firm to partner with their suppliers which is considered a major criteria for most companies (Cheruiyot et al., 2014). Material selection and outsourcing are considered ways of integrating environmental thinking into the supply chain (Murphy, 2012). Outsourcing is mainly used to enable a company focus on its core activities. Consequently outsourcing some of its functions enables a firm shift the risk to third parties thus saving significantly on equipment and infrastructure costs (Chang *et al.,* 2013). The green purchasing constructs were derived from Chang *et al*.'s (2013) study on the green supply chain management practices in Korea.

Green manufacturing was measured by the following constructs; use of bio-degradable energy, recycling of raw materials, green environmental strategies and ISO certification. When

companies are ISO 14001 certified, they are viewed to have started taking responsibility of their environments. ISO 14001 is widely accepted by governments and NGO's as a measure of environmental performance (Yang, 2013). Green manufacturing aims to reduce the environmental impact by using materials that generate minimum or no waste at all (Amemba, 2013). Use of bio-degradable energy reduces the cost of production and improves on the quality of goods (Dheeraj & Vishal, 2012). Green environmental strategies are those activities that help reduce pollution and improve efficiency throughout the supply chain and not just at the 'end of the pipe' (Yang, 2013). Green manufacturing constructs were derived from Dheeraj & Vishal (2012).

Green distribution had use of bio-degradable packaging materials, improved vehicle loadings, improved warehouse utilization and environmental distribution strategies to form the construct. These constructs were informed by two studies: Muma *et al.* (2014) and Hasan (2013). Both studies indicated that firms need to control their distribution patterns so as to realize the gains of green distribution. Companies that have adopted green distribution activities have successfully improved their business and environmental performance on many levels (Dheeraj & Vishal, 2012).

Reverse logistics is a system that considers various aspects needed to establish a proper disposal system for end of life goods: collection, disassembly, recycle, market for reclaimed materials, and final disposal. Redesigning logistics networks to accommodate product returns and remanufacturing and re-use of such parts and components can often be profitable and is assuming greater importance in business as well as in research The physical location of facilities and transportation links need to be chosen to convey used products from their former users to a producer and to future markets again (Amemba, 2013). Reverse logistics constructs were informed by Choi & Zhang (2011).

Firm competitiveness was a dependent variable in this study. It consisted of sales turnover and gross profit to represent the financial indicators. Operational indicators were cost of production and flexibility of delivery while the market indicators were market share as indicated by the respondents. This data had to be normalized in order to have the same range of values for each of the inputs. Data normalization is usually done when seeking for relations. For instance in regression and multivariate analysis where relationships are of interest, data is normalized to

reach a linear, more robust relationship (Wang *et al.,* 2012). Thus, normalization was done to be able to compare and analyse the relationship between GSCM practices and firm competitiveness.

3.5.4 Data Collection Procedures

Structured questionnaire were administered by both the researcher and the research .assistants on the day of data collection and the respondents were given time to indicate their responses. This process is referred as "drop and pick". However, the researcher or the research assistants were available to provide assistant to the respondents where necessary. The respondents were assumed to be literate. This is considered more appropriate since it gave respondents adequate time to read and respond to the research questions without excessive pressure. The questionnaire were accompanied by an introduction letter informing the respondents of the research being undertaken and assuring them about the confidentiality of all the responses they made.

Table 3. 3: Operationalization and Measurement of variables

Variable	Indicators	Measurement tool	Data analysis
Dependent: firm Competitiveness	Financial indicators: Market indicators: Operational indicators:	Sales turnover Gross Profit Market share, sale growth Cost and flexibility of delivery of goods	Descriptive Normalization of categorical data
Independent: Green purchasing	Green purchasing aspects	Supplier Selection Material selection Outsourcing Supplier involvement in design	Inferential: Chi-Square and regression model (i)
Independent: Green manufacturing/production	Green production aspects	Use of bio-degradable energy Recycling of raw materials Green environmental strategies ISO certification	Inferential: Chi-Square and regression model (ii)
Independent: Green distribution	Green distribution aspects	Use of bio-degradable packaging material Improved vehicle loadings Green distribution strategies Improved warehouse utilization	Inferential: Chi-Square and regression model (iii)
Independent: Reverse logistics	Reverse logistics aspects	Product re-use/take- back packaging Remanufacturing/ product recovery Waste product recycling Re-use of parts and components	Inferential: Chi-Square and regression model (iv)
Moderating: GSCM drivers	External pressures Technological attributes	Government and Industrial regulations Implementation and Maintenance expenses	Inferential: regression model (v)

	Firm attributes Manager personal attributes	Mission, Vision and Environmental policy Knowledge base, education level and duration in company	

Source: Researcher, 2014

3.6 Method of data analysis

The study mainly collected primary data which was largely quantitative, using questionnaire. Data obtained from the field was cleaned, coded, and analysed using the Statistical Package for Social Sciences (SPSS-20) to generate the required summary statistics. The researcher used both descriptive and inferential statistics to analyse the data. Descriptive analysis was used to initially to explain the key characteristics of the data such as to compute counts, means, percentages and standard deviations. Frequency distribution tables and graphs were used to present the data while inferential statistics such as chi-square, regression and correlational analysis were used to answer the research questions. Factor analysis was utilized to reduce the variables by grouping those with similar characteristics together thus describing the items using a much smaller number of underlying concepts than the original individual items (Murphy, 2012). Inferential statistics were also used in particular Pearson chi-square test, bivariate and multivariate linear regression to determine the relationship between each of the four independent variables and firm competitiveness and the role of the moderator variable. The hypothesis was accepted at the 95 percent level of confidence after which the null was rejected.

3.6.1 Regression model

Regression analysis was conducted to show how the adoption of GSCM practices has influenced the competitiveness of food manufacturers.

Table 3. 4: Regression models for the study

Research objective	Hypothesis	Analytical model
Objective 1 Evaluate the effect of green purchasing on the competitiveness of food manufacturing firms in Kenya	**Hypothesis 1** Green purchasing has no statistically significant influence on the competitiveness of food manufacturing firms in Kenya	**Bivariate Regression Analysis** Firm competitiveness= f(green purchasing) FC = $\beta 0 + \beta_1 \chi_1 + \varepsilon$ Where FC is firm competitiveness $\beta 0, \beta_1$ are coefficients χ_1 = Aggregate mean of Green Purchasing constructs ε=Error term
Objective 2. Analyse the effect of green production on the competitiveness of food manufacturing firms in Kenya	**Hypothesis 2** Green production has no statistically significant influence on the competitiveness of food manufacturing firms in Kenya	**Bivariate Regression Analysis** Firm competitiveness = f(green production) FC= $\beta_0 + \beta_2 \chi_2 + \varepsilon$ Where FC is firm competitiveness $\beta_0 \beta_2$, are coefficients χ_2 = Aggregate mean of green production constructs ε =Error term
Objective 3 Assess green distribution practices and their influence on the competitiveness of food manufacturing firms in Kenya	**Hypothesis 3** Green distribution practices do not positively influence the competitiveness of food manufacturing firms in Kenya	**Bivariate Regression Analysis** Firm competitiveness = f(green distribution) FC= $\beta + \beta_3 \chi_3 + \varepsilon$ Where FC is firm competitiveness β_0, β_3 are coefficients χ_3 = Aggregate mean of green distribution constructs ε =Error term
Objective 4 Analyse the effect of reverse logistics on the competitiveness of food manufacturing firms in Kenya	**Hypothesis 4** Reverse logistics do not positively influence the competitiveness of food manufacturing firms in Kenya	**Bivariate Regression Analysis** Firm competitiveness = f(reverse logistics) FC = $\beta 0 + \beta_4 \chi_4 + \varepsilon$ Where FC is firm competitiveness β_0, β_4 are coefficients χ_4 = Aggregate mean of reverse logistics ε=Error term
Objective 5 Explore the moderating effect of green supply chain drivers on the relationship between green	**Hypothesis 5** Green supply chain management drivers have no statistically significant effect on the relationship	**Multivariate Regression Analysis** Firm competitiveness = f(green purchasing +green production + green distribution + reverse logistics* model moderator) FC = $\beta_0 + \beta_1 \chi_1 + \beta_2 \chi_2 + \beta_3 \chi_3 + \beta_4 \chi_4 + \beta_5 M + \varepsilon$

supply chain practices and the competitiveness of food manufacturing firms in Kenya	between green supply chain practices and the competitiveness of food manufacturing firms	β_0 = Constant χ_1 = Aggregate mean of Green purchasing constructs χ_2 = Aggregate mean of Green production constructs χ_3 = Aggregate mean of Green distribution constructs χ_4 = Aggregate mean of Reverse logistics M_1 = Model moderator index ε = Error term retain β_i = The coefficient associated with χ_i $(i = 1, 2.....5)$

Source: Researcher (2014)

3.7 Ethical Consideration

The main ethical issue pertaining to this research was the confidentiality and the protection of participant interests. The researcher played a non-partisan role in the research study to avoid any bias by displaying and upholding high integrity, professionalism and ensuring total confidentiality of accessed information pertaining to the study. The researcher also kindly requested the respondents to take time off their busy schedules to fill in the questionnaire. The respondents were assured of total confidentiality in a bid to dispel fears while responding.

An introductory letter was sought from the School of Business, Dedan Kimathi University of Technology. Permission was also sought from the government which further assured the respondents of confidentiality and that the information was required only for study purposes. This enabled the researcher to carry out the research with ease and boosted the respondent's sense of honesty. The researcher used data collected for the intended purpose only.

3.8 Chapter Summary

This chapter described the research methodology that was used to conduct the study. Specifically, it discussed the research philosophy, research design, target population of the study, data collection instruments, as well as the reliability and validity of the research instruments. It also operationalized the study variables and outlined the techniques that were used to later analyse the data

CHAPTER FOUR

FINDINGS AND DISCUSSIONS

4.1 Introduction

This chapter was confined to the findings of the study based on the research objectives. The chapter only concentrated on presenting the collected data in a meaningful way to aid the discussion, which was presented in chapter five. It was organized in two broad parts. Part one presents the demographic characteristics of the organizations studied while the other part contains the research results on green supply chain management practices and firm competitiveness. Tables and diagrams were utilized. This chapter also included analysis of instrument reliability and presented results of the tests of the hypothesis of the study which were carried out using stepwise regression analysis. Stepwise regression was used to give appropriate models on each of the hypothesis tested. Finally, the summary of this chapter was given.

4.2 Response Rate

The research findings were based on ninety-six (73.8 percent) respondents out of the original target population of one hundred and thirty KAM registered food manufacturing companies in Kenya who responded to the questionnaires. This is a higher response rate than those of similar studies conducted in Kenya by Munyoki (2007) 51 percent, Kidombo (2007) 64 percent, Meru (2009) 62.3 percent, Gachunga (2010) 62 percent and Kinoti (2012) 67.5 percent and elsewhere, Murphy (2012) 33.1 percent. The drop and pick up later method, follow ups by phone calls and several visits to the respondents substantially improved the response rate.

4.3 Analysis of Instrument Reliability

Internal reliability of the responses was established using Cronbach's Alpha reliability test. This measurement scale showed that green purchasing practices which had eight test items attained a Cronbach's Alpha value of 0.866, green production with eight test items attained a value of 0.800, green distribution processes with 15 test items attained 0.931, reverse logistics with ten test items had a value of 0.779 and green supply chain management drivers with 28 items attained Cronbach's Alpha value of 0.966. This Cronbach's Alpha values showed a strong

acceptable level of internal reliability (Bryman, 2008) being above 0.70 therefore, the measurement scale had a high level of internal consistency. This is presented in Table 4.1.

Table 4. 1: Cronbach Alpha Results

Measurement scale	Number of items	N	Cronbach's Alpha value
Green purchasing	8	10	0.866
Green manufacturing	12	10	0.800
Green distribution	15	10	0.931
Reverse logistics	10	10	0.779
Green supply chain management drivers	28	10	0.966
Firm competitiveness	31	10	0.979

Source: Primary data

4.4 Company Demographics

In the sampled population, most of the organizations (79.2%) were privately/locally owned companies. 3.1% were Parastatals while 1.0% was a Public Company. Majority of the organizations, 50.0% were labour intensive while 30.2% were capital intensive. Most, 24.0%, of these companies were ISO 22001 – 2 certified and 22.9% were ISO 9001 certified as shown in Table 4.2 which shows the demographics of the various companies.

TABLE 4. 2: Demographic information of the companies (n = 96)

Demographic information	f	%
Type of organization		
Private/Locally owned	76	79.2
Parastatal	3	3.1
Multinational	13	13.5
Public company	1	1.0
None committal	3	3.1
Organization's production system		
Labour intensive	48	50.0
Capital intensive	29	30.2
None committal	19	19.8
ISO Certification of the company		
ISO 14001	13	20.3
ISO 22001-2	23	24.0
ISO 28000	6	6.3
ISO 9001	22	22.9
Non- committal	32	33.3

Source: Primary Data

According to Table 4.2 all types of companies were represented in the study. Public companies were fewer because many turned away the researcher and the research assistants. Of the respondents 24 percent were ISO 22001-2 certified. ISO 22000:2005 is a Food safety management systems which is a requirement for any organization in the food chain. ISO 9001 is a Quality management systems requirement. 22.9 percent of the respondents had this certification. ISO 28000 certification is a requirement for security management systems of the supply chain. Only six companies of the respondent 96 were ISO 28000. This shows that not many had their supply chains certified. ISO 14001 is a set of standards regarding environmental management. Surprisingly not all the respondents were ISO 14001 certified. This means that their management of the environment had not yet met certain standards. However, this enabled the study to fill the contextual gap by considering firms that have other ISO certifications other than ISO 14001. A large percentage of the respondents were non- committal as they were not conversant with the ISO certifications of their companies.

4.4.1 Existence of the organizations

Previous studies have indicated that the age of a firm is closely related to its performance (Kinoti, 2012) and hence its competitiveness. According to the research findings, organizations in this study had been in existence for an average of 20.91 years with a standard deviation of 18.94 years. Majority, 20.8% of the organizations had been in existence for 11 – 15 years, with 16.7% having existed for more than 30 years while 17.7% had only existed for less than 5 years. This is shown in Table 4.3 which displays the number of years that the various organizations had been in existence.

TABLE 4. 3: How long the organization has existed (n = 96)

Duration of existence of organization	f	%
Below 5 years	17	17.7
5 – 10 years	9	9.4
11 – 15 years	20	20.8
16 – 20 years	12	12.5
21 – 25 years	4	4.2
26 – 30 years	8	8.3
Above 30 years	16	16.7
Mean	20.91	
Std. deviation	18.94	

Source: Primary Data

These results are close to the findings of Kinoti (2012) who found that the average age of firms in Kenya was 34 years. This indicates that many firms in Kenya were started after independence in 1963. Further 62 percent of the respondents were in operation for 11 years and more. This is a clear indication of the political goodwill of the country towards industrialization.

4.4.2 Number of employees in the organizations

The average number of the employees in these organizations was 175 employees with a standard deviation of 341.9.The minimum number of employees was 2 while the maximum number was 2019 employees. Private/locally owned companies had a total of 6920 employees, Parastatals had a total of 399, multinationals had a total of 4597 employees whereas the only one public organization had a total of 60 employees in permanent employment as depicted in Table 4.4.

TABLE 4. 4: Number of employees in the organizations

Organization	Number of employees						
	Permanent	Contract	Casual	Mean	Standard deviation	Minimum	Maximum
Private/Locally owned	6,920	3,012	5,701	123.6	209.9	2	1000
Parastatal	399	356	480	133	149	44	305
Multinational	4,597	694	3,471	417.9	703.2	12	2019
Public company	60	20	89	60	-	60	10

Source: Primary Data

Large firms in developing countries such as Kenya employ 100 employees and above. Accordingly all the respondents were mainly large firms when the number of employees is considered as indicated in Table 4.4.

4.4.3 The terms of service of the employees in the Organizations

In these organizations, a total of 11,976 employees were on permanent employment, 4,082 employees on contract and 9,741 employees on casual terms of employment. This indicated that majority of the employees were on permanent basis and not on contract or casual employment as shown in Figure 4.1.

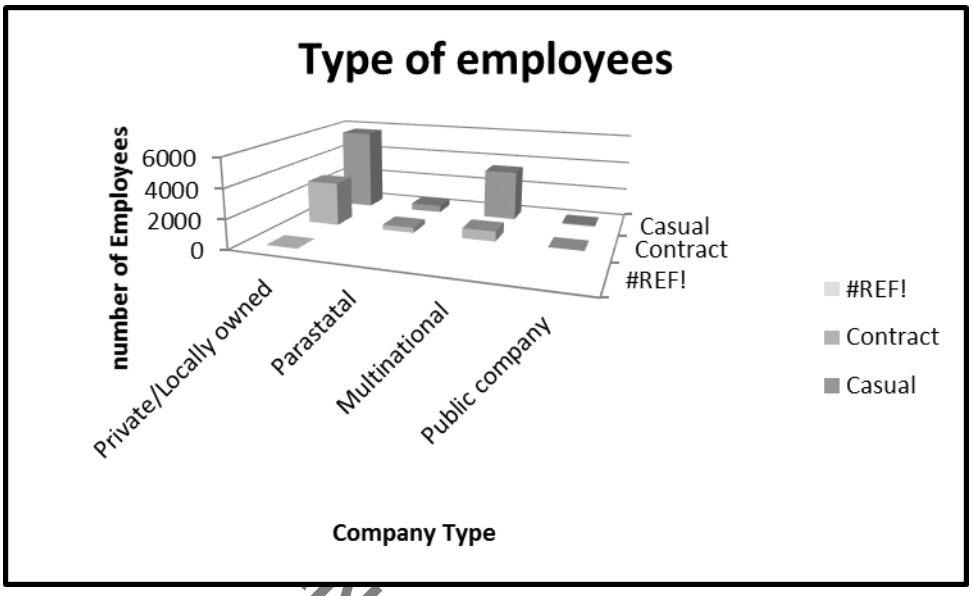

Figure 4. 1: Terms of Service (Source: **Primary Data)**

An analysis of variance was used to evaluate the number of employees in the four kinds of organizations (Private, parastatal, Multinational and Public companies). The result showed that, there was no significant difference in the number of permanent employees in the various type of organizations (F = 2.449, P = 0.071). However there was a significant difference in the number of employees on contract in the various organizations (F = 0.521, P = 0.669) and in the number of employees on casual terms (F = 1.429, P = 0.243) as depicted in Figure 4.1 on the terms of service of various employees.

4.4.4 Company ISO certifications

Most of the respondents, 24.0%, noted that their organizations had attained 22001-2 certification standards (Food Safety Management system). 22.9% stated that their organizations had attained ISO 9001 (Standard on quality Management System) certification whereas 6.3% of them noted that their companies had attained ISO 28000 (Security Management System for the Supply Chain) Certifications. Of the respondents only 14 percent had attained ISO 14000 (Environmental Management) certification. 33.3% of the Companies had not attained any ISO certifications. Figure 4.2 shows the various ISO certifications attained by the various companies.

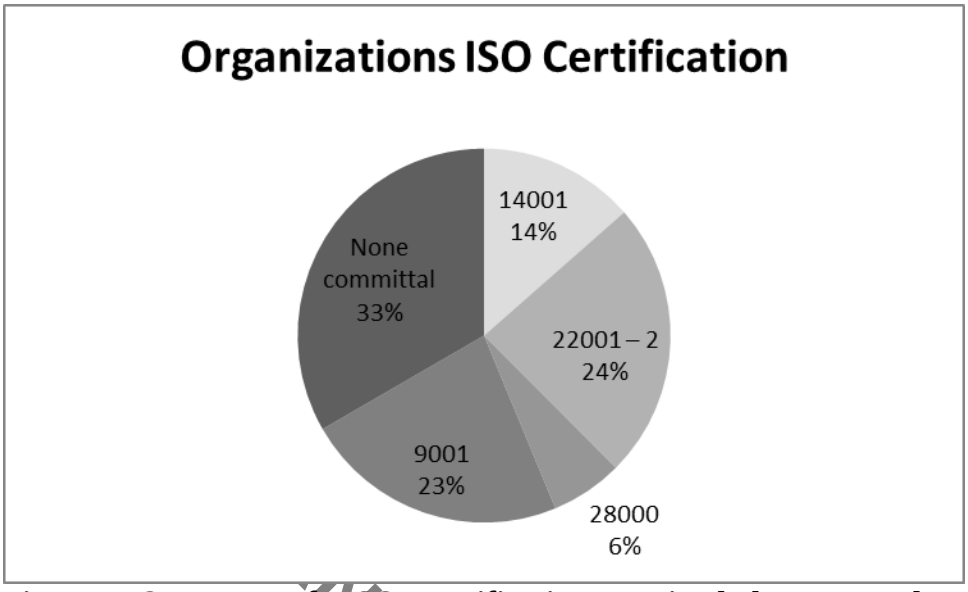

Figure 4.2: Type of ISO certification attained by respondent organizations Source: Primary Data

Many of the respondents were not aware of the certifications that their companies had received while others were working on their certifications, hence the large number non- committal respondents.

4.4.5 Type of the organizations and the ISO standards they attained

Using a cross tabulation analysis to establish the type of ISO standards the organizations had attained, the report showed that majority of the respondents in privately and locally owned organizations attained ISO 22001-2 while most of the Parastatals, (66.7%) attained ISO 14001, 50 percent of the multinationals, attained ISO 9001 while the public company attained ISO 9001. This is depicted in Table 4.5

TABLE 4. 5: Type of ISO Certifications

Organization	ISO 14001	ISO 22001-2	ISO 28000	ISO 9001	Total
Private/locally owned	10 (20.0%)	18 (36.0%)	6 (12.0%)	16 (32.0%)	50
Parastatal	2 (66.7%)	1 (33.3%)	0 (0.0%)	0 (0.0%)	3
Multinational	1 (12.5%)	3 (37.5%)	0 (0.0%)	4 (50.0%)	8
Public company	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (100%)	1

Source: Primary Data

Being owned by the government the parastatals are more conscious of the effect of their production activities on the environment than other organizations. Privately owned companies were also beginning to take steps towards environmental sustainability. The public company visited was only concerned about the standards of management and were not aware of the environmental concerns as yet.

4.4.6 Bio-data of the respondents

The gender, ages and the respondents' level of education were established in the study. Most of the respondents, 66.7% were male respondents whereas 30.2% were female respondents as depicted in Table 4.6.

TABLE 4. 6: Bio-data information of the respondents

Bio-data	F	%
Gender		
Male	58	66.7
Female	29	30.2
None specified	9	9.4
Respondents' ages (years)		
Below 30	12	12.5
30 – 35	31	32.3
35 – 40	25	26.0
40 – 50	9	9.4
Above 50	8	8.3
Non- committal	5	5.2
Level of formal education		
Secondary	8	8.3
Diploma Holder	24	25.0
Undergraduate	28	29.2
Postgraduate/Masters' degree	31	32.3
None committal	5	5.2

Source: Primary Data:

From Table 4.6 the respondents, 70% of the respondents were below 40 years of age, 26.0% were between 40 – 45 years of age whereas 12.5% were below the age of 30 years. Only 8.3% of the respondents were above the age of 50 years. Being young there was a vitality that had been brought into the various firms. Further the respondents were mainly Masters' degree holders (32.3%). However, 29.2% had a first degree and 25.0% were diploma holders.

4.4.7 Length of continuous service with the organization

In their respective organizations, the respondents had continuously served for an average of 8.08 years with a standard deviation of 10.9 years. The minimum time the respondents had served in their organization was 1 year while the maximum duration of service was 19 years. This is depicted in Table 4.7

TABLE 4. 7: Respondents' Length of continuous service with the organization

Organization	Mean length of service	Standard deviation
Privately/Locally owned	6.6a	6.3
Parastatal	12.0a	2.6
Multinational	14.0a	23.2
Public company	-	-

*Mean values in same column denoted by similar letters are not significantly different at $P \leq 0.05$
Source: Primary Data:

When establishing the duration of the respondents service to the organizations, One-Way ANOVA was used to calculate and get the significant variation in services in various organizations. The result showed that there was no significant difference in duration of service to the organizations ($F = 2.962$, $P = 0.057$). However, respondents from Multinational organization had served continuously in the organization for a slightly longer time, an average of 14.00 years. Those in Parastatals had served for an average of 12.0 years while those in the private/local owned companies had served continuously for an average of 6.6 years.

4.4.8 Positions held by the respondents in the Organization

In the organizations, the sampled respondents were in all categories of professions, being; Accountants, Administrators, Managers, CEOs, Human resource persons, Customer care, quality assurance personnel, supervisors, sales persons, technicians or workers. They held different

positions in the organizations. This was beneficial as all the different aspects of the questionnaire were adequately filled.

4.4.9 Proportion of Market share the company commands

Majority of the respondents, 27.1%, indicated that their companies command 11 to 20% proportion of market share. Twenty six percent of the respondents stated that their companies' command between 21 to 30% of the market share. This is depicted in Figure 4.3

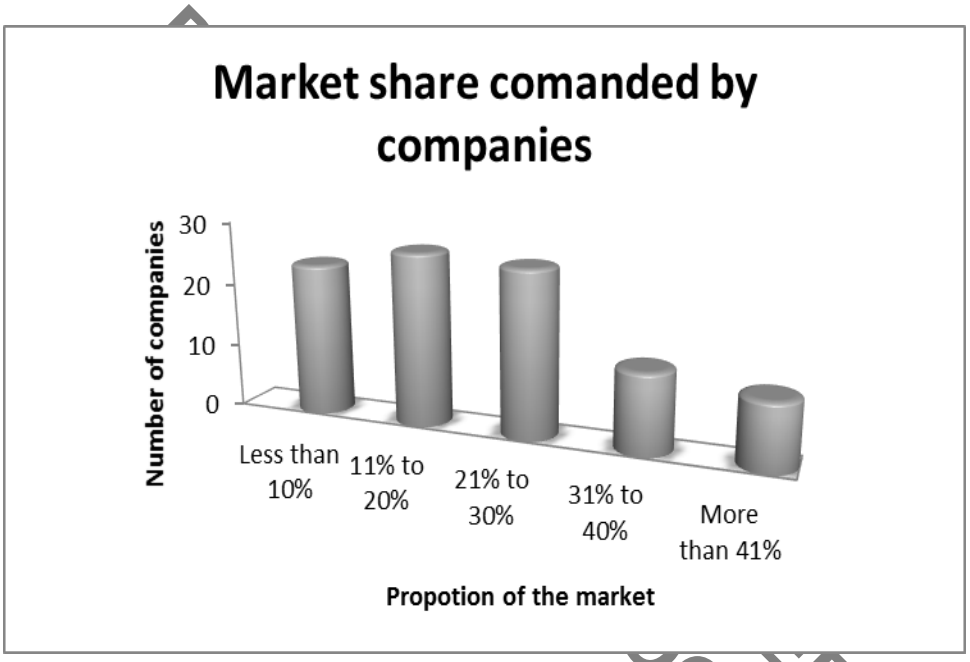

Figure 4 3: Proportion of market share commanded by companies Source: **Primary Data:**

According to Figure 4.3, 24.0% of the respondents commanded less than 10% of the market share while 10.4% commanded more than 41% of the market share. Information about the market share was obtained from secondary data that the respondents had from surveys they had previously carried out.

Table 4.8 below shows the proportion of market share that each company attributed to the adoption of green marketing practices.

TABLE 4. 8: Proportion of market share attributed to adoption of green marketing practices.

Proportion Company commands	F	%
Less than 5%	30	31.3
6% to 10%	26	27.1
11% to 20%	20	20.8
21% to 30%	9	9.4
More than 31%	11	11.5

Source: Primary Data:

According to Table 4.8, majority of the respondents 31.3 % attributed the adoption of green marketing practices to only less than 5% of the market share. However, 27.1% of the companies attributed 6 – 10% of the market share to green marketing practices while 11.5% of the respondents attributed more than 30% of the market share to green marketing practices.

4.5 Green Supply Chain Management Practices (GSCM)

To select their main suppliers 69.8% of the companies used quality, 7.3% of the companies used technological capability, 8.3% of them used green materials and recording, 4.2% used green design capability while others used other practices as indicated in Figure 4.4.

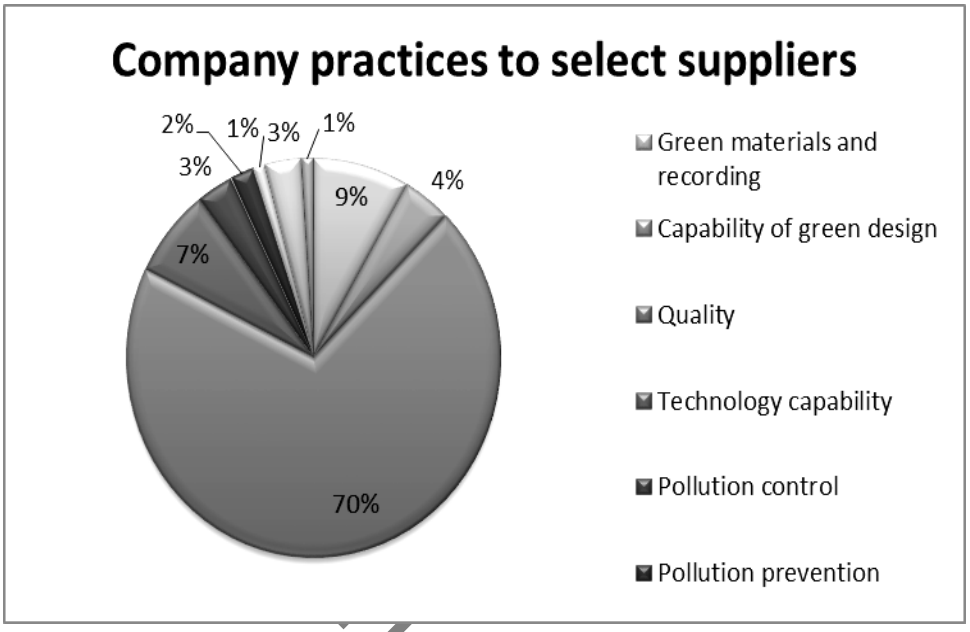

Figure 4. 4: Company practices in supplier selection Source: **Primary Data**

Unlike other studies in developed countries, this study established that the Kenyan manufacturer still uses quality as a standard practice in supplier selection. Environmental efficiency was a consideration that was least considered as it was only considered by 1% of the respondents.

This study further established that 57.3% of the respondents felt that their companies did not use environmentally certified suppliers while 39.60% of the companies used certified suppliers. This is displayed by Figure 4.5.

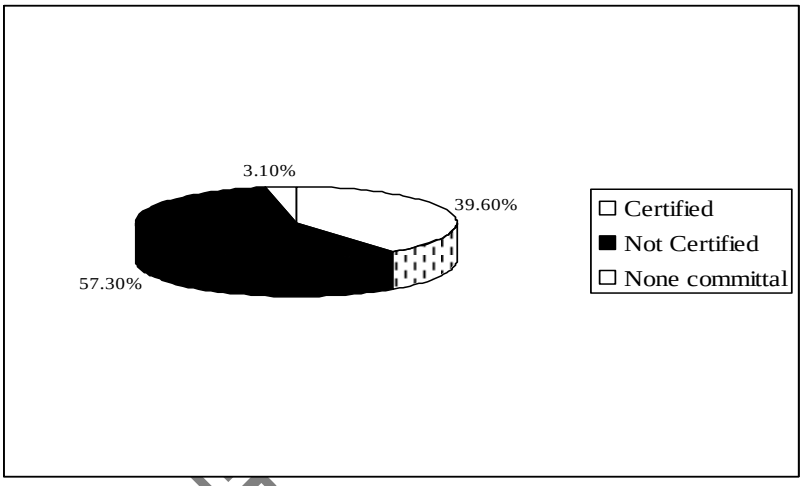

Figure 4. 5: **Companies using environmentally certified suppliers.** Source: **Primary Data**

The ISO certifications of the various suppliers was obtained and the results are displayed in Table 4.9.

TABLE 4. 9: ISO Certification of the suppliers

ISO Certification	F	%
ISO 14001	27	30.3
ISO 9001	45	49.5
ISO 22000	18	20.2

Source: Primary Data:

The respondents stated that their suppliers were mainly ISO certified with; ISO 14001(Environmental Management), ISO 9001:2000, ISO 9000 (Quality Management Systems), ISO 22001 – 2 and ISO 22000(Food Safety Management System). The respondents felt that the certification of their suppliers was mainly based on quality, persistence, time keeping, and meeting the terms of NEMA as well as food safety management. Table 4.9 displays that majority (50%) of the companies had their suppliers ISO 9001 certified while 30.3% of the companies had their suppliers ISO 14001 certified.

To develop cleaner technology and processes, 29.2% of the organizations jointly collaborate with their main suppliers. Majority, 68.8%, of the companies, however, do not team up with their suppliers. Figure 4.6 shows the percentage of companies that collaborated with their suppliers.

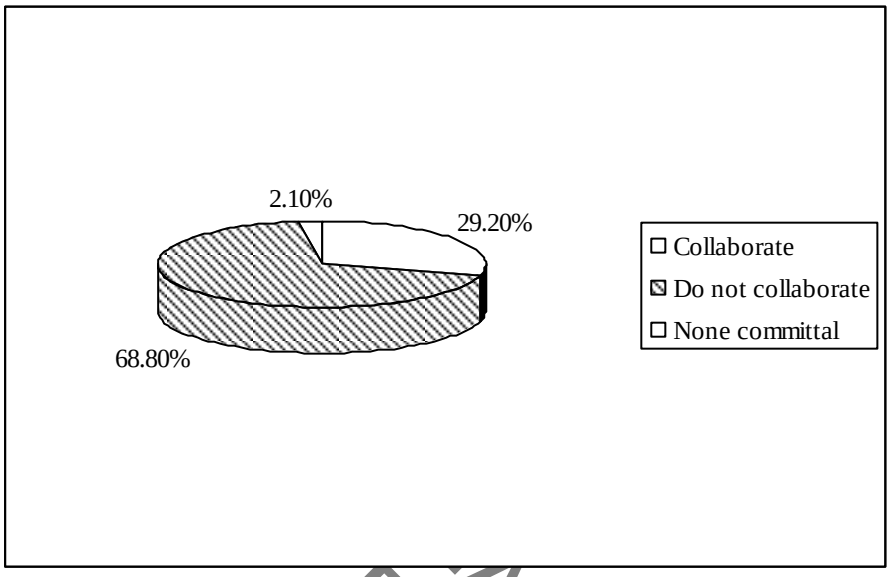

Figure 4. 6: Organizations that collaborate with their main suppliers Source: Primary Data

4.5.1 Areas of collaboration

Companies that collaborated with their suppliers did so in different areas as shown in Table 4.10.

TABLE 4. 10: Areas of collaboration within the companies

Company	**Area of Collaboration**
Agro chemical	Yeast testing, slow milling process
Farmers choice	Machines to make quality products
Buhler	Connect supply and modification of equipment
Europack industries Ltd , Bungoma Papers	Packaging
Platinum packaging company	Packaging size
	To ensure quality of supplies is good
Ndovu Baking	Machine use in manufacturing cakes

Source: Primary Data

However the collaborations differed in the respective companies. In most of the companies, the collaboration was mainly in the areas of packaging and equipment modifications as shown by the above Table 4.10. Collaboration of firms with their suppliers is a continuous process from low to high levels of collaboration. These results show that there is a growing number of companies that have demonstrated buyer- supplier collaboration in tandem with the findings of Lagat (2013).

4.5.2 Companies' main suppliers

Companies' main suppliers were found both locally and abroad. However, none of the companies received relied only on supplies from abroad as shown in Figure 4.7.

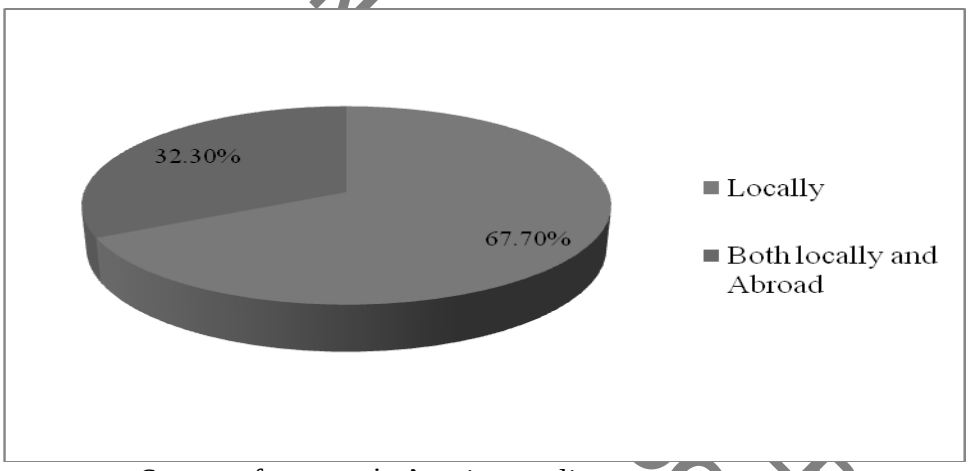

Figure 4. 7: Source of companies' main suppliers Source: Primary Data

4.5.3 Selection of raw materials for production

The criteria that the various companies used to select their raw materials was obtained and the results are depicted in Figure 4.8

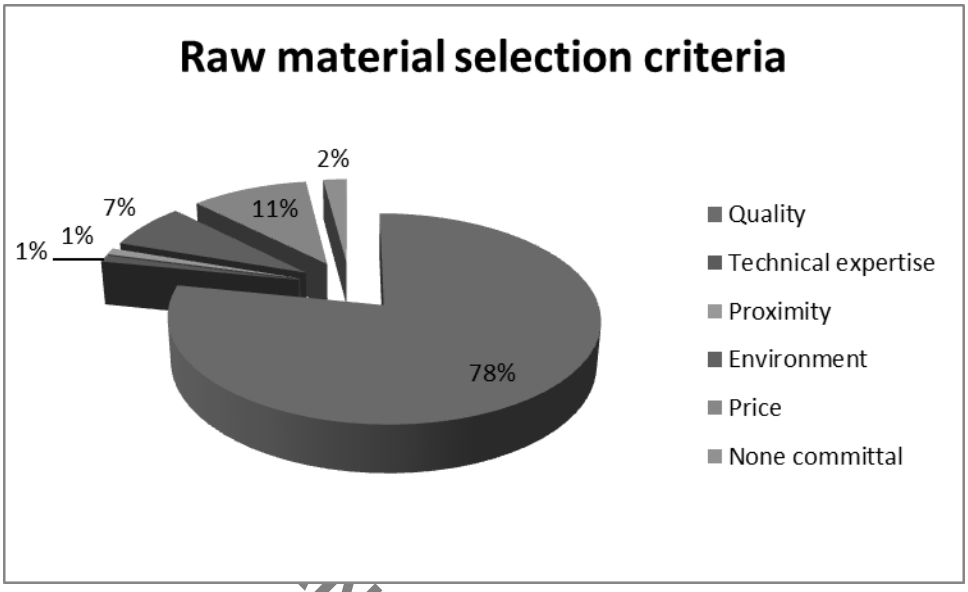

Figure 4. 8: Raw material selection criteria **Source:** Primary Data

To select the raw materials for the production of their goods, majority of the companies (78.1%) used quality based criteria. 10.4% of the companies selected their raw materials based on the price while 7.3% of the companies selected their materials based on the environment. From the above figure 78% used quality criterion while only 7% considered the environment. This indicated that firms are moving slowly towards the adoption of green purchasing. These results correspond to Kinoti (2012) who found that lack of an environmental manger caused organizations not to address environmental issues.

4.5.4 Environmental audit

Environmental audits are important as they enable a firm to monitor supplier compliance to environmental standards and requirements. The researcher thus sought to find out how often the firms carried out environmental audits and the results are portrayed in Table 4.11.

TABLE 4. 11: Organizations conducting supplier environmental audits

Conducting audits	F	%
Yes	50	52.1
No	41	42.7
Non- committal	5	5.2

Source: Primary Data:

The results indicated that 52.1% of the organizations conducted supplier environmental audit so as to monitor supplier compliance to the environmental standards and requirements. This environmental audit was not conducted in 42.7% of the organizations. Environmental audits of suppliers which is key in integration of the supply chain (Lagat, 2013).

Table 4.12 indicates that the environmental audits were mainly conducted annually in 40.6% of the organization, every 2 years in 12.5% of the organizations, after 3 years in 2.1% of the organizations and after 4 years in 2.1% of the organizations. In 41.7% of the organizations, the environmental audits were possibly not conducted, hence the non-commitment of the respondents.

TABLE 4. 12: Conducting of the environmental Audits

How often the Audit was conducted	F	%
Annually	39	40.6
After 2 years	12	12.5
After 3 years	2	2.1
After 4 years	1	1.0
After 5 years	2	2.1
None committal	40	41.7

Source: Primary Data:

4.5.5 Outsourcing

The result showed that 52.1% of the companies involved themselves in obtaining products or services from other companies. However, 45.8% of the companies did not involve themselves in any form of outsourcing. The product or services outsourced included; supply and transportation of raw materials, business consulting and technical assistance, delivery of products, manufacturing services especially in days of great orders, buying lorries and taking them to the garage, factory maintenance and packaging. Other services included company audits and security services.

4.6 Green Purchasing on Competitiveness of Kenya's Food Manufacturing Firms

Green purchasing has been identified as the most practicable dimension of the GSCM practices. This is because green purchasing advocates that a firm will use its power to demand environmentally improved products from the suppliers upstream. The green purchasing explanatory variables used in this study are; supplier selection, material selection, outsourcing and supplier involvement in design.

4.6.1 Extent to Which Organizations Practiced Green Purchasing

To establish the extent to which adoption of green purchasing was practiced in the organizations, a likert scale of 1 – 5 (1-strongly disagree, 2-disagree, 3-moderate, 4-agree, 5-strongly agree) was used and the mean response rate from the organizations calculated. The result of this study are presented in Table 4.13.

TABLE 4. 13: Extent to which the organizations have been practicing green purchasing practices

Green purchasing practices	1	2	3	4	5	Mean	SD
Able to improve the quality of its products by providing design specification to suppliers that include environmental requirements when purchasing items	2 (2.1%)	4 (4.2%)	20 (20.8%)	39 (40.6%)	29 (30.2%)	3.9	0.94
The cooperation companies have with suppliers for environmental objectives enables the company to reduce the costs of production	2 (2.1%)	6 (6.3%)	29 (30.2%)	36 (37.5%)	21 (21.9%)	3.7	0.95
Company emphasizes on suppliers who take environmental concerns seriously thus enhancing flexibility	1 (1.0%)	9 (9.4%)	24 (25.0%)	36 (37.5%)	23 (24.0%)	3.8	0.97
Have cooperation with suppliers for green packaging which increases the market share	3 (3.1%)	13 (13.5%)	25 (26.0%)	35 (36.5%)	18 (18.8%)	3.6	1.05
Company carries out environmental audit for supplier's internal management thus enhancing the quality of goods supplied	3 (3.1%)	15 (15.6%)	31 (32.3%)	23 (24.0%)	21 (21.9%)	3.5	1.11
Company demands environmental standards certification from suppliers which has enhanced delivery of goods	-	15 (15.6%)	32 (33.3%)	29 (30.2%)	18 (18.8%)	3.5	0.98
Company uses sustainable sources of raw materials which has improved the profit levels of the company	2 (2.1%)	15 (15.6%)	17 (17.7%)	37 (38.5%)	23 (24.0%)	3.7	1.08
Company outsourcers certain products or services thus reducing operational cost	4 (4.2%)	8 (8.3%)	30 (31.3%)	35 (36.5%)	17 (17.7%)	3.6	1.02

1-strongly disagree, 2-disagree, 3-Moderate, 4-Agree, 5-Strongly agree (Source: Primary Data)

As indicated by Table 4.13, 40.6 % of the companies indicated that by adopting green purchasing practices they were able to improve the quality of their products by providing design specification to suppliers that included environmental requirements when purchasing items (mean response 3.9) with a standard deviation of 0.94. Many companies, 37.5%, emphasized that suppliers who took environmental concerns seriously, enhanced their flexibility (mean response 3.8) with a standard deviation of 0.95. Another 37.5% percent of the responses indicated that companies that cooperated with their suppliers for environmental objectives were able to reduce their costs of production (mean response 3.7) with a standard deviation of 0.97. When a company used sustainable sources of raw materials, the profit levels were improved (mean response 3.7) with a standard deviation of 1.08.

4.6.2 Correlation Analysis on Green Purchasing Items to Company Competitiveness

A Pearson moment correlation analysis was carried out on the test items of green purchasing to establish the extent to which the items influenced firm competitiveness among food manufacturing firms in Kenya as indicated in Table 4.14.

TABLE 4. 14: Green purchasing Influence on firm competitiveness among food manufacturing firms

Green purchasing		Firm competitiveness
1. Company is able to improve the quality of its products by providing design specification to suppliers that include environmental requirements when purchasing an item	r-value	.379(**)
	P-value	.000
2. The cooperation you have with suppliers for environmental objectives enable the company reduce the cost of production	r-value	.321(*)
	P-value	.002
3. Your company emphasizes on suppliers who take environmental concerns seriously thus enhancing flexibility	r-value	.313
	P-value	.002
4. You have cooperation with suppliers for green packaging which increases the market share	r-value	.302
	P-value	.003
5. Company carries out environmental audit for suppliers internal management thus enhancing the quality of good supplied	r-value	.345(*)
	P-value	.001
6. Company demands environmental standards certification from suppliers which has enhanced delivery of goods	r-value	.360(*)
	P-value	.000
7. Company uses sustainable sources of raw materials which has improved the profit levels of the company	r-value	.335(**)
	P-value	.001
8. Company outsources certain products or services thus reducing operational cost	r-value	.105
	P-value	.313
	N	94

Source: Primary Data

According to Table 4.14, firm competitiveness was significantly influenced positively when: companies provided design specification to their suppliers that included environmental requirements (r = 0.379, P = 0.000), when the companies demanded environmental standards certification (r = 0.360, P = 0.000), companies carried out environmental audits of their suppliers which further enhanced the quality of their goods (r = 0.345, P = 0.001), item 7 which is the use of sustainable raw materials (r = 0.335, P = 0.001) and companies cooperation with suppliers for environmental objectives which enabled them to reduce their costs of production (r = 0.321, P = 0.002). However outsourcing of products to reduce costs did not significantly influence firm competitiveness (r = .105, P= .313). The results indicate that the green purchasing items and have a weak but significant relationship with firm competitiveness. Thus for a firm to be more competitive it had to practice more of the test items.

4.7 Green Production

This study defined green production /green manufacturing as that process which sought to minimise the impact of production on the environment at every stage of production. In this study the explanatory variables for green production/ manufacturing include: use of bio-degradable energy, recycling of raw materials, green environmental strategies and ISO certification

4.7.1 Green production activities

Raw material recycling enhances minimization of waste. This study sought to find out whether food manufacturers engaged in any form of raw material recycling. The results are indicated in Figure 4.9.

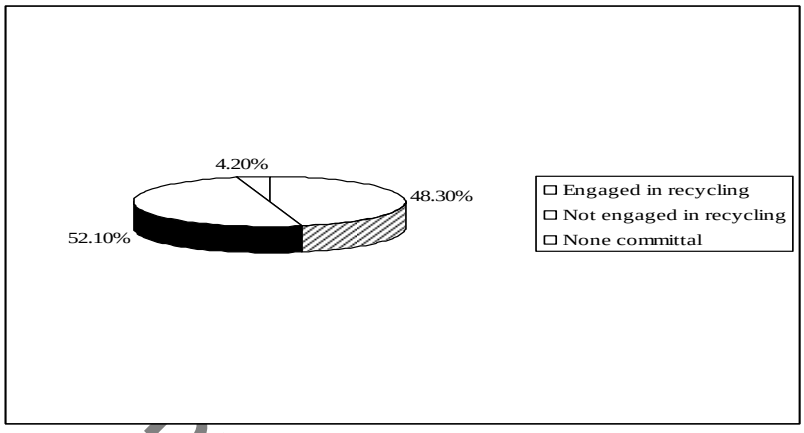

Figure 4. 9: Companies engaged in some raw material recycling

Figure 4.9 shows that raw material recycling was only noted in 43.7% of the companies who stated that they engaged in some form of raw material recycling. 52.1% of the companies did not engage in any raw material recycling and 4.2% of the companies were non- committal.

The study went further to find out the extent of use of recycled raw materials. Figure 4.10 reveals the extent of recycled raw material use.

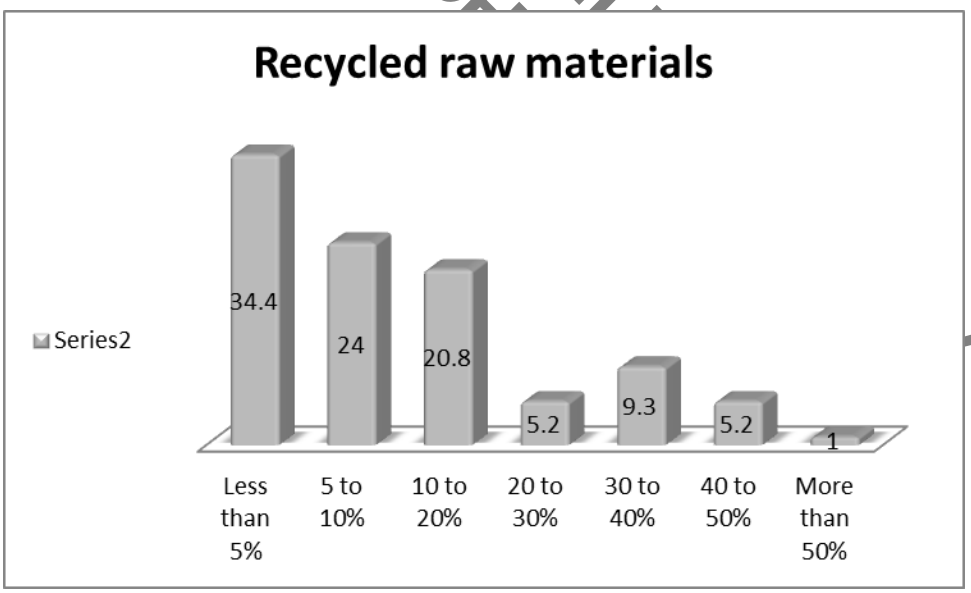

Figure 4. 10: Extent of recycled raw materials. Source: Primary data

Use of the recycled materials was minimal in most of the companies. According to Figure 4.10, 10.4% of the companies used recycled materials to a degree of less than 5%, 13.5% of the companies used recycled materials to an extent of between 5 to 10%, 14.6% of the companies

use recycled materials to an extent of 10 to 20% whereas only 1.0% of the companies use recycled materials to an extent of more than 50%.

Use of bio-degradable energy is an eco-friendly practice which enhances green manufacturing. Consequently this study sought to find out which of the bio-degradable energy sources were most frequently used and the results are indicated in Figure 4.11.

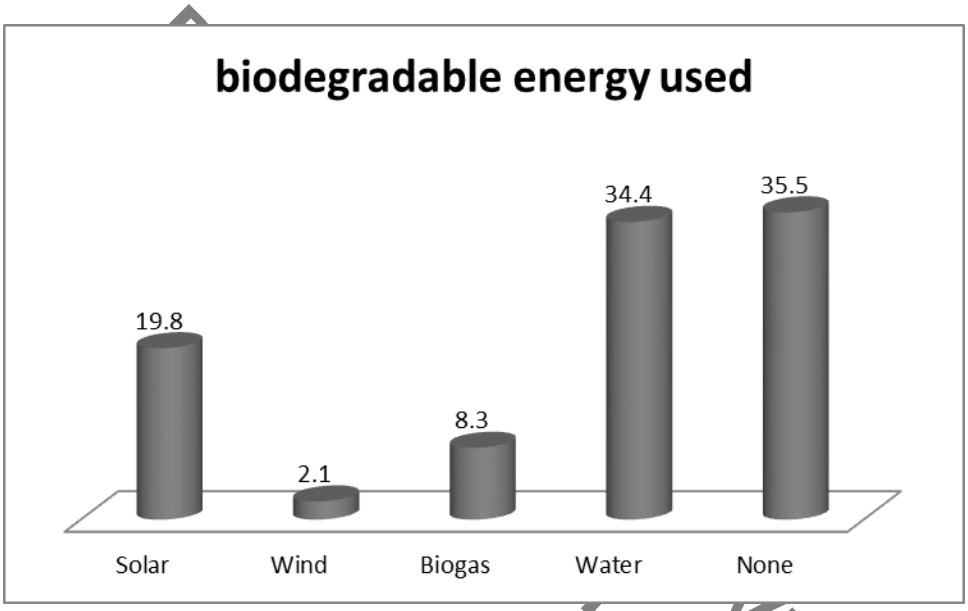

Figure 4. 11: Types of biodegradable energy used. Source: Primary data

Water was the most frequently used energy source by 34.4% of the companies. This was followed by solar energy (19.8%), biogas (8.3%) and wind energy (2.1%). However, 35.5% of the companies did not use any bio-degradable energy as depicted in Figure 4.11.

Green environmental strategies adopted by food manufacturers were analyzed. Some of the green environmental strategies that the study sought to find out whether they are practiced in Kenya or not were: Waste minimization, equipment modification, product redesign, procedure modifications, raw material substitution and waste treatment. The results are shown in Figure 4.12.

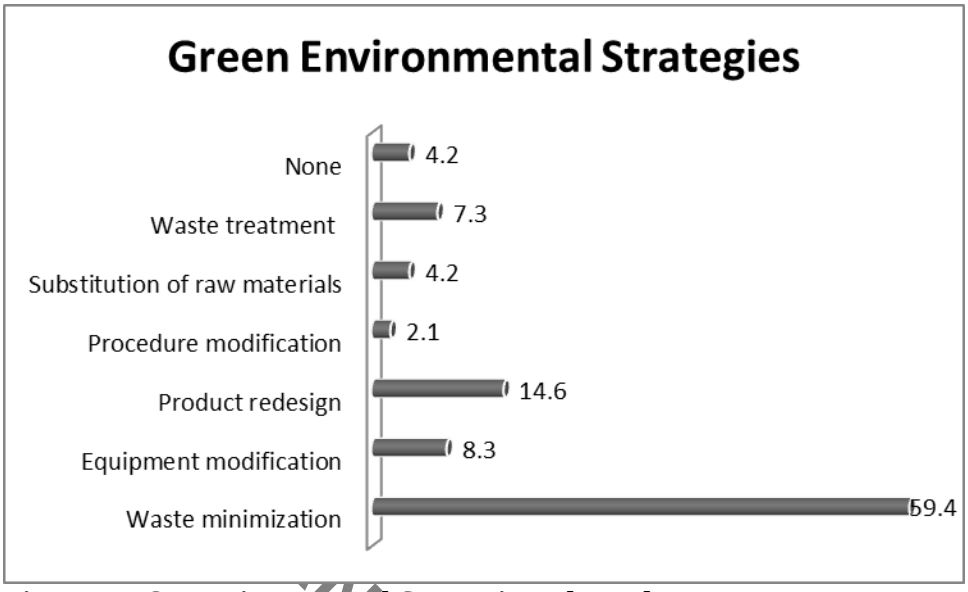

Figure 4. 12: Environmental Strategies adopted. Source: **Primary data**

Most of the respondents 59.4%, according to Figure 4.12, adopted waste minimization as their green environmental strategy. Product redesign was adopted by 14.6% of the companies, 8.3% adopted equipment modification, 7.3% adopted waste treatment, 4.2% adopted raw material substitution and 2.1% adopted procedure modification strategy. However, another 4.2 % of the companies did not adopt any green environmental strategies.

This study went further to investigate what influenced companies adoption of green practices in Kenya's food manufacturing sector. The results are displayed in Figure 4.13.

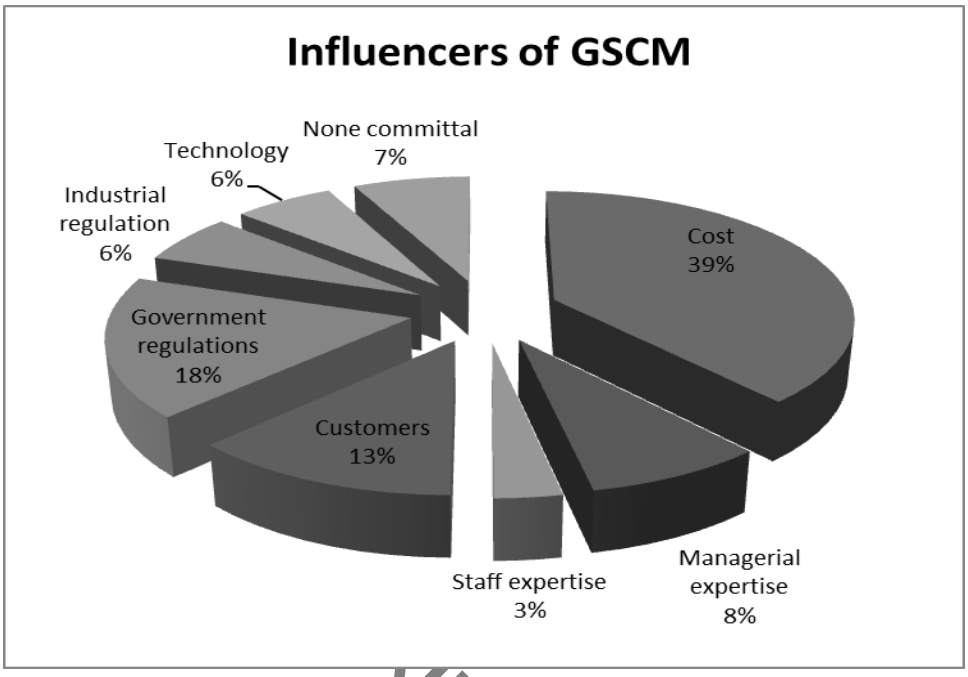

Figure 4. 13: GSCM influencers. Source: Primary data

Figure 4.13 above shows that the adoption of green supply chain management in a company is mainly influenced by cost, 38.5%, government regulations, 17.7%, customers, 12.5% while managerial expertise influences 8.3% of the companies. However 7% of the companies were non-committal probably an indicator of non-adoption of green supply chain management. This shows that food manufacturers have realized the cost benefits of adopting GSCM practices as observed by Baines *et al.* (2012) and have also complemented the government regulations (Cheruiyot *et al.*, 2013).

Adoption of GSCM practices does lead to equipment modification as firms change the technology used. The new technology adopted requires maintenance. This study went on to find out the number of respondents that actually maintained the technology and the results are displayed in Figure 4.14.

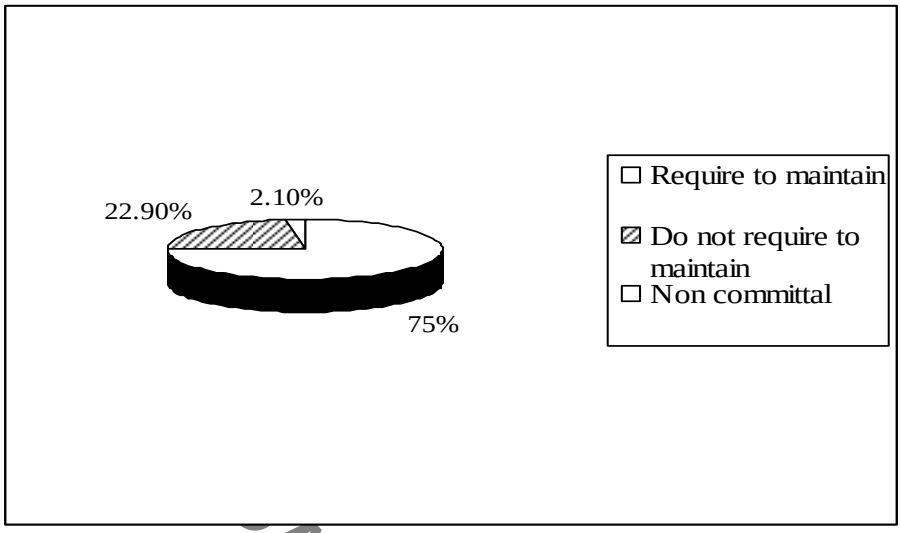

Figure 4. 14: Companies requiring maintaining the technology Source: **Primary data**

Once installed, 22.9% of the companies indicated that the technology adopted did not require maintenance. However, majority of the respondents, 75.0%, indicated that the technology adopted required maintenance, while 2.1% were non-committal as shown in Figure 4.14. This generally indicated that the technology has to be maintained.

As the companies maintained the green technology, they incurred costs. In 34.4% of the companies, less than 5% of their total costs went towards maintaining the clean technologies. In 20.8% of the organizations 5 to 10 % of their total cost went towards maintaining the clean technologies while 16.7% incurred 21 to 25% of their total cost towards maintaining clean technologies as depicted in Figure 4.15.

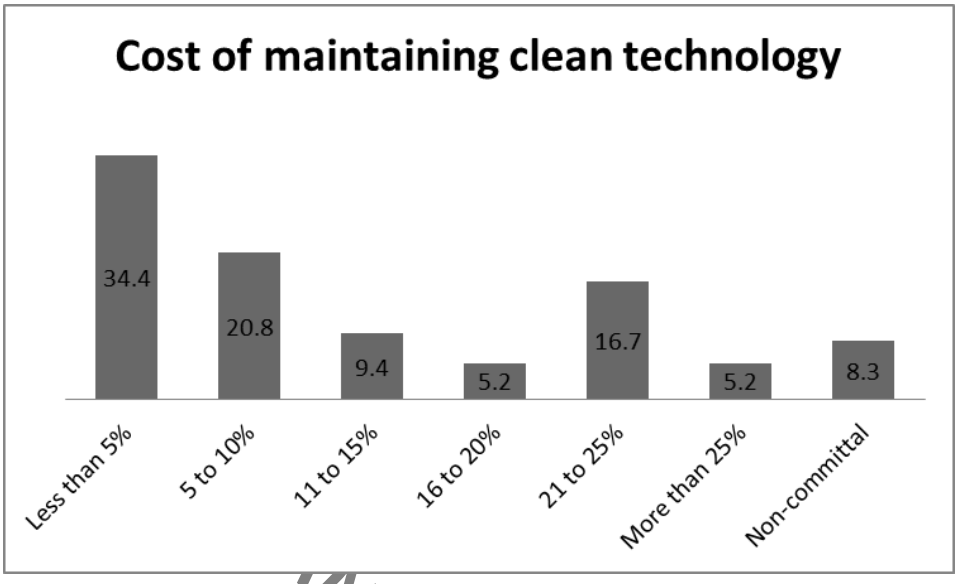

Figure 4. 15: Percentage cost of maintaining clean technologies. Source: **Primary data**

4.7.2 Organizations Practice of Green Manufacturing

To establish the extent to which adoption of green manufacturing was practiced in the organizations, a likert scale of 1 – 5 (1-strongly disagree, 2-disagree, 3-moderate, 4-agree, 5-strongly agree) was used and the mean response from the organizations calculated. Table 4.15 indicates the responses that were obtained.

TABLE 4. 15: Organization practicing Green manufacturing/production

Green manufacturing	1	2	3	4	5	Mean	SE
Company pollution prevention strategy has led to increased market share	6 (6.3%)	4 (4.2%)	27 (28.1%)	35 (36.5%)	21 (21.9%)	3.66	1.08
Company's attainment of ISO 14001 certification on the environmental maintenance has led to increase in sales	12 (12.5%)	17 (17.7%)	15 (15.6%)	35 (36.5%)	14 (14.6%)	3.24	1.28
The company has complied with particular regulations such as emissions, and other zero emission strategies thus reducing cost of production	3 (3.1%)	4 (4.2%)	28 (29.2%)	41 (42.7%)	19 (19.8%)	3.73	0.94
The company controls its pollution at the end of the pipe by treating its effluents and/ or installation of dust collectors thus increasing market share	2 (2.1%)	11 (11.5%)	27 (28.1%)	41 (42.7%)	14 (14.6%)	3.57	0.95
The quality of products produced is improved when the organization organizes regular environmental training courses for management and the employees	2 (2.1%)	8 (8.3%)	35 (36.5%)	32 (33.3%)	17 (17.7%)	3.57	0.96
The organization uses employees incentives programs to encourage green activities/suggestions thus enhancing flexibility of production	2 (2.1%)	19 (19.8%)	25 (26.0%)	33 (34.4%)	16 (16.7%)	3.44	1.06
company's use of sustainable sources of energy such as solar and wind has led to reduce cost of production	7 (7.3%)	21 (21.9%)	19 (19.8%)	28 (29.2%)	19 (19.8%)	3.33	1.24
The company's use of products that are safe for disposal (which rot natural) which has led to an increase in market share	4 (4.2%)	7 (7.3%)	33 (34.4%)	24 (25.0%)	27 (28.1%)	3.66	1.10
Company has improved the quality of products by providing goods that can be re-consumed or used for an extended period of time in service provision	1 (1.0%)	6 (6.3%)	36 (37.5%)	34 (35.4%)	18 (18.8%)	3.65	0.90
Your company use of cleaner technologies in its manufacturing activities has led to increased profits for the organization	1 (1.0%)	7 (7.3%)	33 (34.4%)	30 (31.3%)	23 (24.0%)	3.71	0.96
The company organizes green supply chain seminars and workshop which helps to improve the quality of products produced	3 (3.1%)	16 (16.7%)	26 (27.1%)	30 (31.3%)	20 (20.8%)	3.51	1.10
Company makes use of recycled raw materials which reduces cost of production	7 (7.3%)	13 (13.5%)	28 (29.2%)	32 (33.3%)	15 (15.6%)	3.37	1.13

1-strongly disagree, 2-disagree, 3-Moderate, 4-Agree, 5-Strongly agree (**Source:** Primary data 2015)

Table 4.15 indicated that by adopting green production practices 42.7 % of the companies were able to reduce their costs of production when they complied with particular regulations such as emissions, and other zero emission strategies (mean response 3.73) with a standard deviation of 0.94. Increased profits were reported in 34.4 percent of the companies that used cleaner technologies in their manufacturing activities (mean response 3.71) with a standard deviation of 0.96. Market share was increased for companies (36.5%) that had a pollution prevention strategy (mean response 3.66) with a standard deviation of 1.08 and for companies (34.4%) that used products that were safe for disposal (mean response rate 3.66) with a standard deviation of 1.10. The findings particularly on the use of sustainable sources of energy such as solar are consistent with the existing literature which contends that although solar power is a highly viable alternative source of energy in developing countries such as Kenya its use has been quite low (Kinoti, 2012).

4.7.3 Correlation Analysis Results of Green Production Items on the Competitiveness of Food Manufacturing Firms

Pearson moment correlation analysis was similarly carried out on the test items of green manufacturing practices to establish the extent to which the items influenced firm competitiveness. The results are displayed in Table 4.16

TABLE 4. 16: Green manufacturing Influence on competitiveness among food manufacturing firms

Green manufacturing		Firm competitiveness
1. Company's attainment of ISO 14001 certification on the environmental maintenance has led to increase in sales	r-value	.500(**)
	P-value	.000
2. Company has improved the quality of products by providing goods that can be re-consumed or used for an extended period of time in service provision	r-value	.045(**)
	P-value	.666
3.The company's pollution prevention strategy has led to increased market share	r-value	.500(**)
	P-value	.000
4. The company has complied with particular regulations such as emissions, and other zero emission strategies thus reducing cost of production	r-value	.458(**)
	P-value	.000
5. The company controls its pollution at the end of the pipe by treating its effluents and/ or installation of dust collectors thus increasing market share	r-value	.314(**)
	P-value	.002
6. The quality of products produced is improved when the organization organises regular environmental training courses for management and the employees	r-value	.456(**)
	P-value	.000
7. The organization uses employees incentives programs to encourage green activities/suggestions thus enhancing flexibility of production	r-value	.461**
	P-value	.000
8. The company's use of sustainable sources of energy such as solar and wind has led to reduce cost of production	r-value	.496**
	P-value	.000
9.The company's use of products that are safe for disposal (which rot naturally) has led to an increase in market share	r-value	.492**
	P-value	.000
10. Your company use of cleaner technologies in its manufacturing activities has led to increased profits for the organization	r-value	.638**
	P-value	.000
11. The company organizes green supply chain seminars and workshop which helps to improve the quality of products produced	r-value	.435**
	P-value	.000
12. The company makes use of recycled raw materials which reduces cost of production	r-value	.368**
	P-value	.000
	N	96

. Correlation is significant at the 0.01 level (2-tailed). **Source: Primary data

Table 4.16 indicates that firm competitiveness was significantly influenced positively by all the constructs of green manufacturing. The attainment of ISO 14001 certification (r = 0.500, P = 0.000), the company's pollution prevention strategy (r= .500, P= .000) and complying with particular regulations (r= .458, P= .000) showed a moderate positive relationship. All the other relationships between the practice of green manufacturing and firm competitiveness were weak (Kinoti, 2012).

4.8 Green Distribution on the Competitiveness of Kenya's Food Manufacturing Firms

The main advantage of a green supply chain comes from the ability to sell and market a firm's products. Indeed distribution is one of the first functions targeted to minimize environmental costs. Environmental concerns has broadened the scope of distribution and logistics as well as influenced the way distribution and logistics managers do their jobs. In this research the parameters for green distribution included packaging and packaging materials, vehicle loadings, warehouse utilization and the channels of distribution used.

4.8.1 Green Distribution Channels

This study found out the green distribution channels used by the food manufacturers. The results are displayed in Figure 4.16.

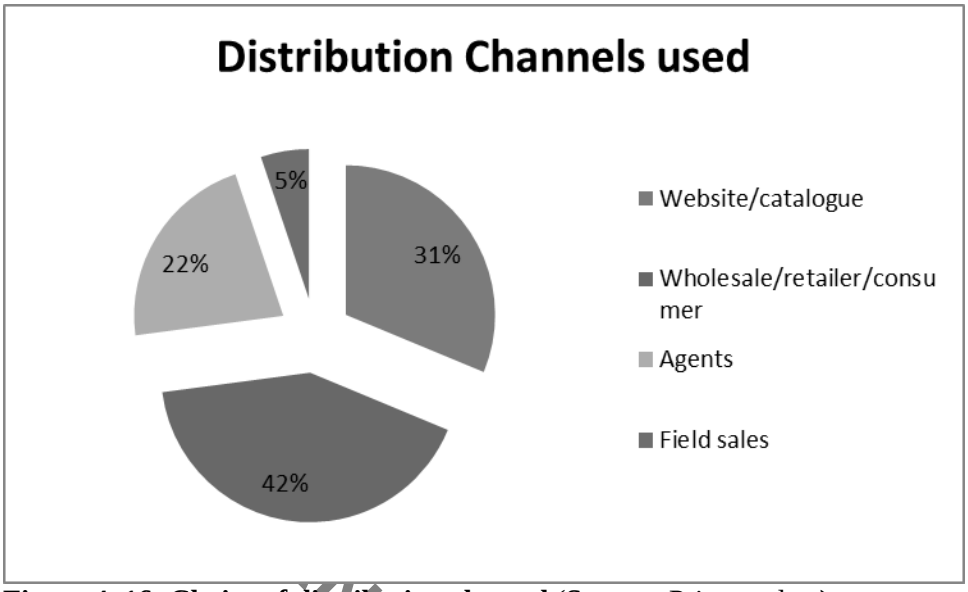

Figure 4. 16: Choice of distribution channel (**Source:** Primary data**)**

The most common channel of distribution used by majority of the companies, 41.7%, was the wholesale → retail → consumer channel of distribution. The Website/Catalogue channel was used by 31.3% of the companies, 21.9% used agents for distribution whereas 5.2% used field sales for distribution as shown in Figure 4.16.

The study further sought to find out the percentage costs that were attributed to green distribution practices. Figure 4.17 shows the proportion of total costs that the various companies attributed towards green distribution.

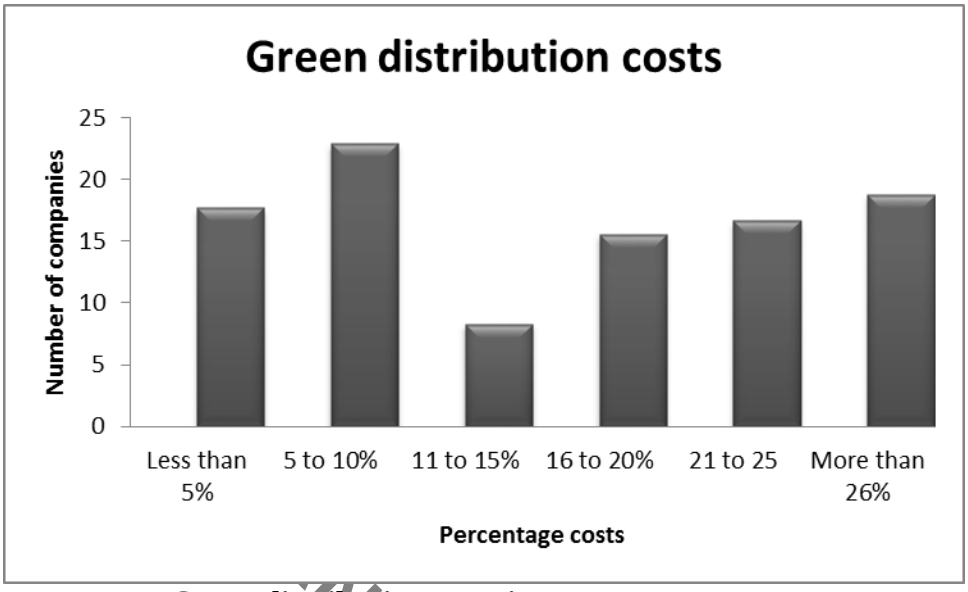

Figure 4. 16: Green distribution costs in percentage (**Source:** Primary data**)**

Out of the total costs incurred by the company, most of the companies, 22.9%, attributed 5 to 10% of their costs to green distribution strategies while 18.9% of the companies attributed more than 26% of their total costs to green distribution strategies. Of the respondents, 16.7% attributed less than 5% of their total costs to green distribution strategies, another 16.7% assigned 21 to 25% while 15.6% of the companies attached 16 to 20% of their total costs towards green distribution strategies.

There being many different types of green environmental distribution strategies the study sought to find out which of them is more commonly used by the food manufacturers in Kenya. To find out this a cross tabulation was done between the different types of companies and the various green distribution methods. The results are shown in Table 4. 17.

Table 4. 17: Cross tabulation of the various types of green distribution practices

Type of organization			Which of the following green environmental distribution strategies does your organization use						Total
			Powering warehouses with hydro, wind or solar power	Employing fleets run by alternative fuels	Using alternative distribution method such as rail	Building distribution centres close to where goods are deliv	Forming partnership with local distributors to reduce the mi	Labelling of green products	
Is your organization	Privately/ locally owned	Count	7	11	2	19	26	6	71
		% of Total	8.0%	12.5%	2.3%	21.6%	29.5%	6.8%	80.7%
	Parastatal	Count	0	1	0	1	0	1	3
		% of Total	0.0%	1.1%	0.0%	1.1%	0.0%	1.1%	3.4%
	Multinational	Count	2	1	0	3	5	2	13
		% of Total	2.3%	1.1%	0.0%	3.4%	5.7%	2.3%	14.8%
	Public company	Count	0	1	0	0	0	0	1
		% of Total	0.0%	1.1%	0.0%	0.0%	0.0%	0.0%	1.1%
Total		Count	9	14	2	23	31	9	88
		% of Total	10.2%	15.9%	2.3%	26.1%	35.2%	10.2%	100.0 %

Source: Primary data

According to Table 4.17, 29.5% of the privately locally owned firms formed partnerships with local distributors so as to reduce the miles driven. Parastatals and public companies used fleets that were run on alternative fuels instead of petroleum. Privately owned companies and multinationals powered their warehouses with alternative sources of power not just electricity. Only 2.3% of the companies used alternative distribution methods such as rail. The results showed that there was no significant difference between the various green distribution methods adopted by the various types of companies ($\chi^2 = 10.902$, P = .759).

The study also sought to find out the type of sales that companies made whether there were business to business or business to consumers. The findings are displayed in Figure 4.18.

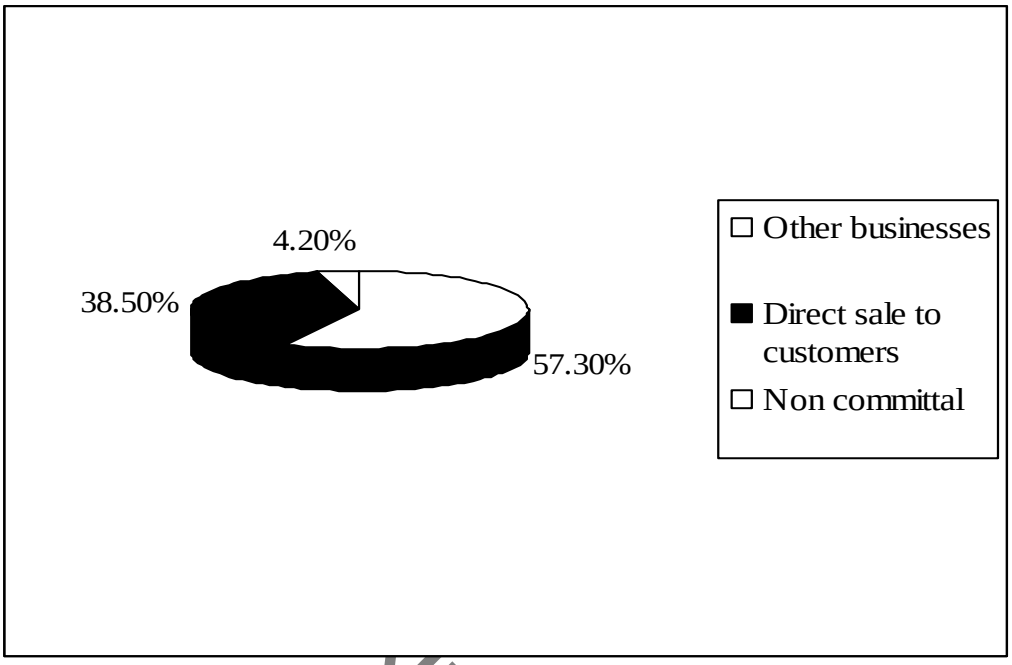

Figure 4. 18: Companies major customers (Source: **Primary data)**

Majority of the companies sampled (57.3%) engaged in business to business sales and only 38.5% of the companies relied on direct sales to customers. 4.2% of the respondents were non-committal an indication that they were engaging in both business to business and business to consumer sales.

A cross tabulation was carried out on the type of company and their main customers. The results are shown in Table 4.18.

TABLE 4. 18: Cross tabulation on the type of company and their main customers

	Company major customers		
	Other businesses	**Direct to customers**	Total
Privately/locally owned	44 (60.3%)	29 (39.7%)	73
Parastatal	1 (50.0%)	1 (50.0%)	2
Multinational	8 (61.5%)	5 (31.5%)	13
Public company	1 (100%)	0 (0.0%)	1

Source: Primary data

Table 4.26 shows that the major customers of a company did not significantly differ with the type of organizations (χ^2 = 0.753, P = 0.861). Privately/locally owned, multinational, public companies and/ or Parastatals all had other businesses as their main customers.

The study further sought to find out how often customer satisfaction surveys were carried out by the various respondents. Figure 4.19 displays the results.

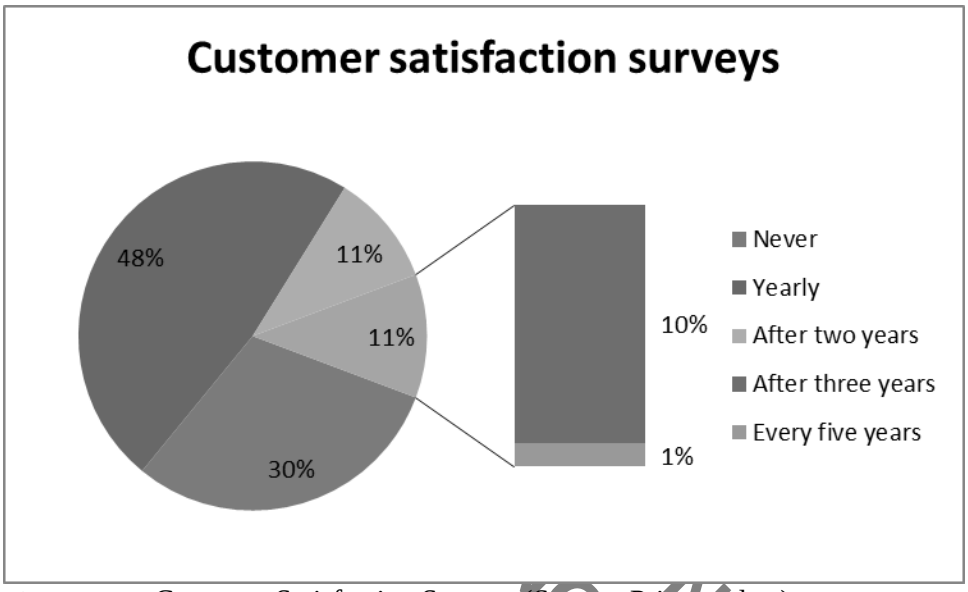

Figure 4. 17: Customer Satisfaction Surveys (Source: Primary data)

Majority of the sampled companies carried out customer satisfaction surveys as shown in Figure 4.19. Of the companies sampled 47.9% carried out their customer satisfaction survey annually, 10.4% carried it out every after two years, while 1.0% carried out the survey every five years. However, 28.1% of the companies never carried out any customer satisfaction survey.

Customer satisfaction survey was mainly carried out in Parastatals, where 66.7% of the companies carried out this survey annually. In privately owned companies, 45.9% carried out customer satisfaction annually, in Multinational Companies, 61.5% carried out the survey annually whereas in Public companies, a survey on customer satisfaction was never done. Customer satisfaction survey analysis was however, not significantly different in the different type of Companies (χ^2 = 10.947, P = 0.533) as depicted in the Table 4.19.

TABLE 4. 19: Frequency of customer satisfaction survey

Company	How often the company carry out customer satisfaction survey's					Total
	Never	Annually	After 2 years	After 3 years	Every 5 years	
Privately/Locally owned	24 (32.4%)	34 (45.9%)	6 (8.1%)	9 (12.2%)	1 (1.4%)	74
Parastatal	0 (0.0%)	2 (66.7%)	1 (33.3%)	0 (0.0%)	0 (0.0%)	3
Multinational	2 (15.4%)	8 (61.5%)	3 (23.1%)	0 (0.0%)	0 (0.0%)	13
Public company	1 (100%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1

Source: Primary data

The study further sought to find out if the respondents used bio-degradable packaging materials. Figure 4.20 depicts the results.

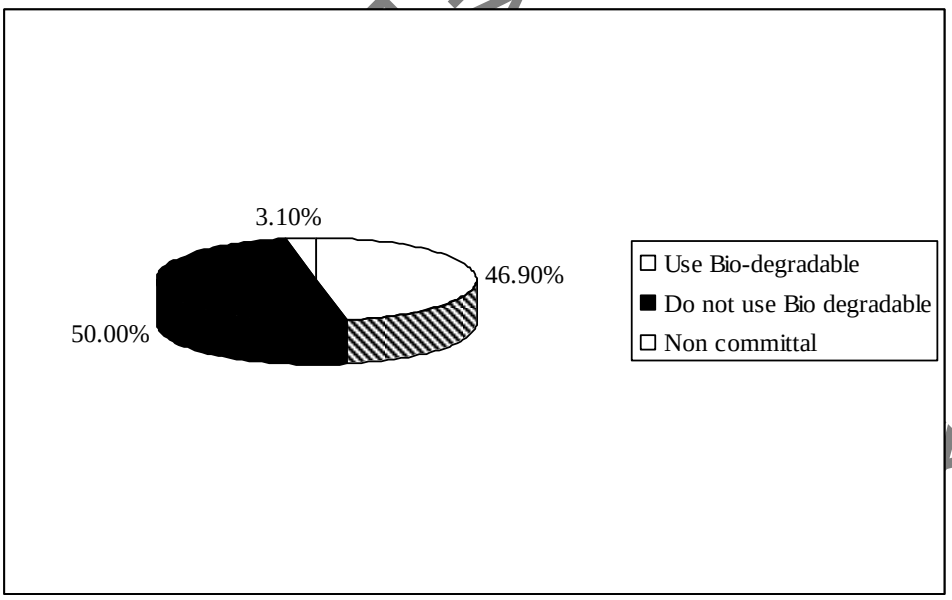

Figure 4. 20: Companies using Bio-degradable packaging materials

(Source: Primary data)

In the distribution of products, 46.9% of the companies used Bio- degradable materials while 50.0 % did not use Bio-degradable materials as shown in Figure 4.20. Consequently most of these companies, 61.5% packaged their goods in both large and small quantities. 31.3% packaged their products only in small quantities while 5.2% packaged only in large quantities.

Companies that used both small and large packaging of their products (64.9%) also used bio degradable packaging materials while those that packaged their goods only in small quantities (76.7%) and those who packaged only in large quantities (75.0%) did not use Bio degradable packaging materials. A cross tabulation was thus carried out to find if there was a significant difference in the packaging of goods in the quantities packed. The results are displayed in Table 4.20.

TABLE 4. 20: Cross tabulation of the Company packaging and the use of Bio degradable packing materials

	Packaging of goods		
	Large quantities	**Small quantities**	**Both**
Use Bio degradable packaging materials	1 (25.0%)	7 (23.3%)	37 (64.9%)
Do not use Bio degradable materials	3 (75.0%)	23 (76.7%)	20 (35.1%)
Total	**4**	**30**	**57**

Source: Primary data

According to the cross tabulation results there was a significant difference in the quantities packed and the use of bio degradable packaging materials ($\chi^2 = 14.594$, $P < 0.001$).

The study sought to find out whether the use of bio-degradable packing increased the number of goods transported in a single trip. Table 4.21 shows the results.

TABLE 4. 21: Number of companies that increased goods transported due to packaging

Company packaging	**f**	**%**
Increased the number of goods	77	80.2
Not increased the number of goods	18	18.8
Non-committal	1	1.0

Source: Primary data

According to Table 4.21, companies were found to package their products in such a way that increased the number of goods that can be transported in a single trip. According to Table 4.21, it was found that in 18.8% of the companies, the packaging did not increase the number of goods that can be transported in a single trip.

Use of bio-degradable packaging materials also improves warehouse utilization. Thus the study sought to find out the extent that food manufacturing companies improved there warehouse utilization as a result of bio-degradable packaging materials and the results are indicated in Table 4.22.

TABLE 4. 22: Extent the vehicle loading and warehouse utilization had improved due to improved packaging

Extent	F	%
Vehicle loading improved		
Less than 10%	28	29.2
10 -15%	22	22.9
15 – 20%	12	12.5
20 – 25%	6	6.3
25 – 30%	11	11.5
More than 30%	8	8.3
Non-committal	9	9.4
Warehouse utilization improved		
Less than 10%	26	27.1
10 – 15%	28	29.2
15 – 20%	14	14.6
20 – 25%	6	6.3
25 – 30%	7	7.3
More than 30%	9	9.4
Non-committal	6	6.3

Source: Primary data

Packaging of products did not improve vehicle loading significantly. According to Table 4.22, in 29.2% of the companies' vehicle loadings improved by less than 10%, while in 22.9% of the companies vehicle loadings improved with a margin of between 10- 15%. It was only in 8.3% of the companies where vehicle loading improved by more than 30%. Warehouse utilization also improved due to improved packaging. In 29.2% of the companies warehouse utilization improved by 10-15% while only in 9.4% was the improvement noted to have improved by more than 30%.

4.8.2 Organizations Practice of Green Distribution

To establish the extent to which adoption of green distribution was practiced in the organizations, a likert scale of 1 – 5 (1-strongly disagree, 2-disagree, 3-moderate, 4-agree, 5-strongly agree) was used and the mean response from the organizations calculated. The results on Table 4.23 revealed the results.

TABLE 4. 23: The extent to which organizations practice green distribution

	Extent to which organization practice						
Green distribution	**1**	**2**	**3**	**4**	**5**	**Mean**	**SD**
Organization uses minimum transportation packaging materials to preserve the natural resources which has reduced the cost of transportation	4 (4.0%)	1 91.0%)	29 (30.2%)	39 (40.6%)	22 (22.9%)	3.8	0.96
Applies packaging made of recyclable materials enhancing quality of goods	6 (6.3%)	11 (11.5%)	27 (28.1%)	34 (35.4%)	17 (17.7%)	3.5	1.11
Profit margins increased when it reduced the material required to offer services to customers	3 (3.1%)	10 (10.4%)	35 (36.5%)	29 (30.2%)	18 (18.8%)	3.5	1.01
Packaging materials are bio-degradable which has increased sales	5 (5.2%)	9 (9.4%)	28 (29.2%)	33 (34.4%)	17 (17.7%)	3.5	1.07
Minimum packaging materials on products to preserve natural resources which increases delivery of goods	3 (3.1%)	6 (6.3%)	33 (34.4%)	35 (36.5%)	18 (18.8%)	3.6	0.97
Organization uses local products to reduce transportation costs	-	6 (6.3%)	32 (33.3%)	32 (33.3%)	20 (20.8%)	3.7	0.88
Warehouse has been rearranged leading to better utilization of space which has led to reduced costs	2 (2.1%)	7 (7.3%)	28 (29.2%)	38 (39.6%)	19 (19.8%)	3.7	0.95
Handling of goods has been minimized to increase flexibility in delivery	2 (2.1%)	8 (8.3%)	35 (36.5%)	37 (38.5%)	13 (13.5%)	3.5	0.91
Org. applies internet as a major channel of distribution reducing distribution costs	10 (10.4%)	10 (10.4%)	25 (26.0%)	29 (30.2%)	20 (20.8%)	3.4	1.24
Use of IT has helped increase flexibility in the distribution of goods	4 (4.2%)	12 (12.5%)	33 (34.4%)	28 (29.2%)	18 (18.8%)	3.5	1.07
Use of IT has helped increase the market share of goods	5 (5.2%)	8 (8.3%)	34 (35.4%)	24 (25.0%)	23 (24.0%)	3.6	1.11
The Company financial position improved due to the use of IT	5 (5.2%)	9 (9.4%)	28 (29.2%)	34 (35.4%)	18 (18.8%)	3.5	1.07
Redesigns logistical system components for greater efficiency in delivery of goods	3 (3.1%)	7 (7.3%)	37 (38.5%)	33 (34.4%)	14 (14.6%)	3.5	0.95
Organization's distribution costs have been greatly reduced per unit	4 (4.2%)	7 (7.3%)	35 (36.5%)	26 (27.1%)	23 (24.0%)	3.6	1.07
Uses green label as an indicator of environmental friendliness thus increasing sales	4 (4.2%)	8 (8.3%)	28 (29.2%)	34 (35.4%)	21 (21.9%)	3.6	1.05

1-strongly disagree, 2-disagree, 3-Moderate, 4-Agree, 5-Strongly agree **Source:** Primary data

According to Table 4.23 when a company used IT, it was able to increase its market share reduce its distribution cost and at the same time improve its financial position. Organizations that used minimum transportation packaging materials to preserve the natural resources had reduced the cost of transportation (mean = 3.8 and standard deviation of 0.96). These organizations used local products to reduce transportation costs (mean 3.7 and a standard deviation of 0.88) and their warehouses had been rearranged leading to better utilization of space which had also led to reduced costs (mean 3.7 and a standard deviation 0f 0.95).

4.8.3 Correlation Analysis Results on Green Distribution to Company Competitiveness

Using Pearson's moment correlation analysis, the extent to which the test items of green distribution on the competitiveness among food manufacturing firms in Kenya was established. The results are displayed in Table 4.24.

TABLE 4.24: Green distribution Influence on firm competitiveness among food manufacturing firms

Green distribution		Firm competitiveness
1.The organization uses local products to reduce transportation costs	r-value	.446(**)
	P-value	.000
2. the organization uses minimum packaging materials on the products to preserve natural resources which increases delivery of goods	r- value P- value	.264** .010
3. Use of IT has helped increase the market share of goods	r-value	.327**
	P-value	.001
4. The company's financial position has improved due to the use of IT	r-value	.451**
	P-value	.000
5.The organization's distribution costs have been greatly reduced per unit	r-value	.228(**)
	P-value	.027
6.The organization uses green label as an indicator of environmental friendliness thus increasing sales	r-value P-value	.393(*) .000
7. The organization applies packaging made of recyclable materials enhancing quality of goods	r-value P-value	.430** .000
8. The organization's profit margins increased when it reduced the material required to offer services to customers (dematerializes)	r-value P-value	.346** .001
9. The organization redesigns logistical system components for greater efficiency in delivery of goods	r-value P-value	.514** .000
10. The organization's warehouse has been rearranged leading to better utilization of space which has led to reduced costs	r-value P-value	.381** .000
	N	96

* Correlation is significant at the 0.05 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).
(Source: Primary data)

According to Table 4.24 the result revealed that firm competitiveness was significantly influenced by use of IT which helped to increase market share, (r = 0.451, P = 0.000), improve the company's financial position (r = 0.451, P = 0.000), and also reduced the distribution costs green distribution (r = 0.228, P = 0.027). An organization's use of local products to reduce transportation costs (r = 0.446, P = 0.000), and the use of green label as an indicator of environmental friendliness (r = .393, P= 0.000) also positively influenced firm competitiveness.

This showed that the relationship between green distribution and firm competitiveness was moderate (Kinoti, 2012) and competitiveness of a firm was enhanced by the company practice of more of the test items.

4.9 Reverse Logistics and Their Effects on Competitiveness of Food Manufacturing Firms

The idea behind reverse logistics is to eliminate waste. Reverse logistics thus "closes the loop" of a typical forward supply chain. According to Ashby *et al.* (2012) reverse logistics provides the maximum utilisation of used products, where every output is returned to natural systems or becomes an input for manufacturing another product. In so doing reverse distribution aggressively targets at reducing materials and resources in the forward system so that as less materials flow back, reuse is possible, recycling facilitated and the environment preserved. It is thus the most complex part of a green supply chain. In this study reverse logistics included waste product recycling, reuse of parts and components, remanufacturing and product reuse all with an aim of reducing waste.

4.9.1 Reverse Logistics Practices

According to Hasan (2013) suppliers should be encouraged to take back packaging materials it is a form of reverse logistics that is capable of greening the supply chain (Hasan, 2013). Consequently this study set to find out which products are taken back by the companies. The results are displayed in Table 4.25.

TABLE 4. 25: Company Reverse Logistics

Company reverse logistics	f	%
Company product take backs		
Packaging materials	20	20.8
Containers	10	10.4
Unsold products	5	5.2
End-of –life products	9	9.4
None	52	54.1
Re-use options engaged in		
Re-use of assemblies	7	7.3
Re-use of components	11	11.5
Re-use of raw materials	22	22.9
System re-use	7	7.3
None	49	51.0
Product recovery practices		
Repairing	10	10.4
Refurbishing	5	5.2
Remanufacturing	8	8.3
Recycling	28	29.2
None	45	46.9

Source: Primary data

The results, as shown in Table 4.25, indicate that the main products taken back by companies were packaging materials 20.8%. Some companies took back containers, 10.4 percent, others 9.4%, took back end-of life products and only 5.2% of the respondents took back unsold products. However majority of the companies, 54.1% did not take back any product from the consumers.

In the re-use option, only 49% of the companies engaged any re-use option. Raw materials were re-used by 22.9% of the companies, components were re-used by 11.5%, and assemblies were re-used by 7.3% while systems were re-used by another 7.3% of the companies. However majority of the companies, 51%, did not engage in any re-use option.

Of the various recovery strategies available to companies recycling was the most common and had been adopted by 29.2% of the companies. Other companies engaged in repair 10.4%, re-manufacturing 8.3% and refurbishing of products 5.2% of the companies.

Use of recycling materials has been considered as an environmentally friendly activity (Kinoti, 2012). Waste product recycling also contributes to cost savings. This study thus sought to find out the extent of cost savings that waste product recycling contributed. The results are depicted in Figure 4.21.

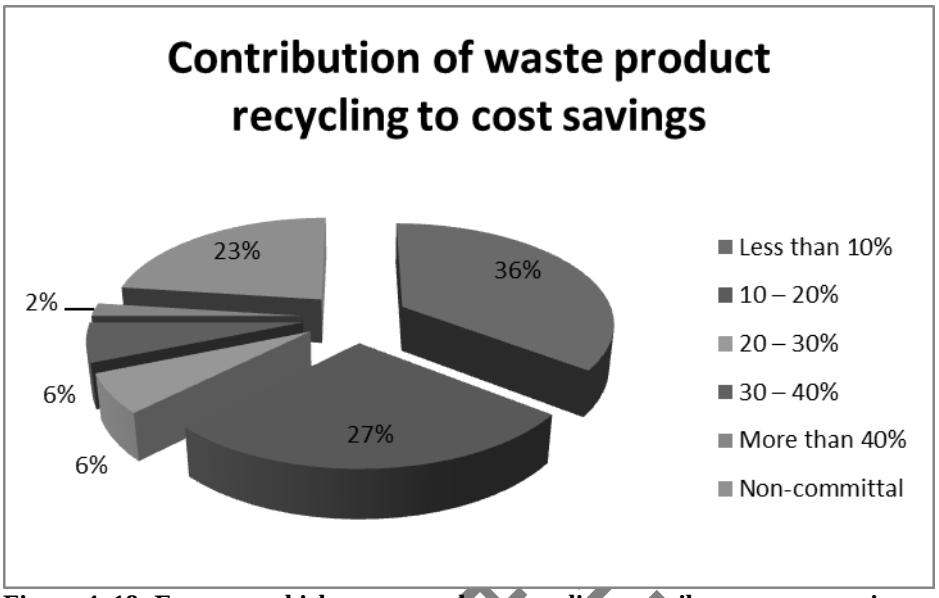

Figure 4. 18: Extent to which waste product recycling contributes to cost savings
Source: Primary data

According to the results of the companies that practiced waste product recycling, 35.4%, experienced minimal savings on their production costs, less than 10% while 27.1% saved to an extent of between 10 – 20%. Figure 4.21 also shows that of the sampled companies 22.9%, could not quantify waste product recycling an indicator they were not saving at all on the cost of production maybe due to the fact that they were not practicing waste product recycling.

Waste product recycling is encouraged by having collection points close to consumers. This study therefore sought to find out whether the companies had any collection points. The results are displayed in Table 4.26.

Table 4. 26 Companies which had collection points

	The company have collection points to encourage consumers to bring back old and unused goods/ products		
Organization	**Yes**	**No**	**Total**
Private/locally owned	15 (20.3%)	59 (79.7%)	74
Parastatal	3 (100%)	0 (0.0%)	3
Multinational	4 (30.8%)	9 (69.2%)	13
Public company	0 (0.0%)	1 (100%)	1

Source: Primary data

All the public organizations, 79.7% of the privately owned companies and 69.2% of the Multinational companies did not have any collection points that encourage consumers to bring back old and unused goods. However, all the Parastatals had collection points as displayed in Table 4.26.

In order to encourage consumers, collection points have to be conveniently located. Consequently the study sought to find out the convenience of the collection points to both the consumers and the manufacturers. The results are displayed in Table 4.27.

Table 4. 15: Convenience of the collection points to the consumers and to the companies

Convenience of the collection points	**F**	**%**
To the Consumers		
Very convenience	17	17.7
Moderately convenient	8	8.3
To the Companies		
Very convenient	21	21.9
Moderately convenient	4	4.2

Source: Primary data

The collection points were generally inconvenient to the consumers in nearly all the companies. Only 17.7% of the companies had the collection points very convenient to the consumers while in 8.3% of the companies, their collection points were moderately convenient to the consumers. The situation was however different in relation to the companies. According to Table 4.27 the

collection points were very convenient to 21.9% of the companies whereas in 4.2% of them the points were moderately convenient.

Collection points that would encourage consumers to bring back old and unused goods were subjected to a chi-square test against the various types of companies. Table 4.28 indicates the results.

Table 4. 28:Chi-Square Tests

Value	df	Asymp. Sig. (2-sided)
10.652[a]	3	.014
10.005	3	.019
1.090	1	.297
91		

a. 5 cells (62.5%) have expected count less than 5. The minimum expected count is .24.

Source: Primary data

The findings in Table 4.28 revealed that, there was a significant difference in the various Companies (χ^2 = 10.652, P = 0.014). Majority of the companies, 74.0%, did not have any collection points that would encourage consumers to bring back old and unused goods.

Figure 4.22 shows that in more than 50% of the companies the use of reverse logistics had led to a reduction of costs in acquiring new/virgin raw materials. In 30.2% of the companies, costs had reduced by less than 10%, in 16.7% of the companies, there was a reduction of costs by 10 – 15% while in 11.5% of the companies costs had reduced by 15 – 20%.

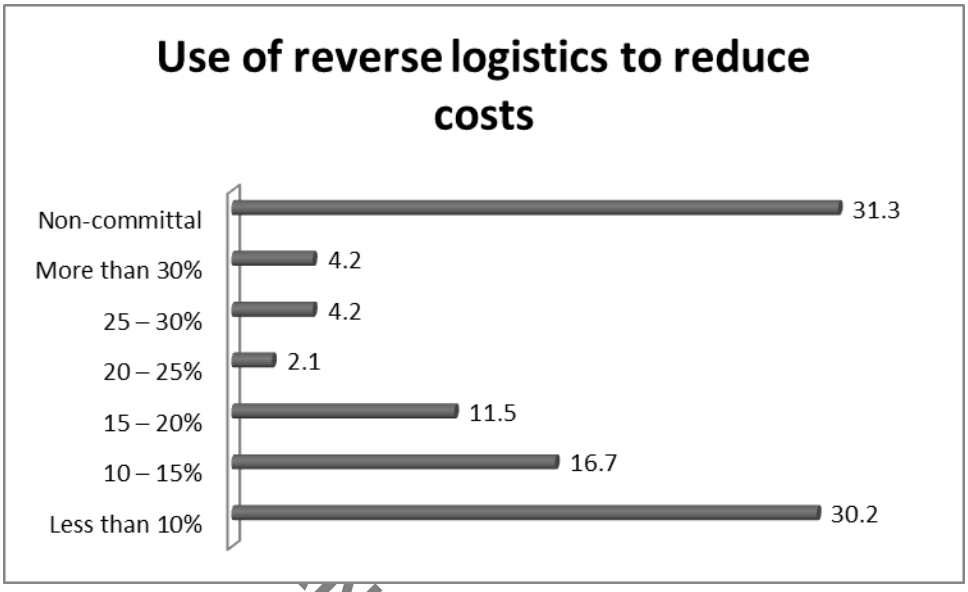

Figure 4. 19: Contributions of reverse logistics to cost reduction. Source: **Primary data**

4.9.2 Reverse Logistics on the Competitiveness of Kenya's Food Manufacturing Firms

In this objective the extent to which organizations practiced reverse logistics was established. Ten items were tested and the responses in a five point likert scale of 1 – 5 (1-Strongly disagree, 2-disagree, 3-moderate, 4-Agree, 5-Strongly agree) was used. Table 4.29 shows the results.

Table 4.29: Organizations extent of reverse logistics practices

	Extent to which organization practice						
Reverse Logistics	**1**	**2**	**3**	**4**	**5**	**Mean**	**SD**
Company has an active recycling program for materials in all sections which has contributed to reduced cost of production	9 (9.4%)	15 (15.6%)	18 (18.8%)	25 (26.0%)	26 (27.1%)	3.47	1.32
Company makes use of recycled raw materials to improve quality of goods	7 (7.3%)	17 (17.7%)	24 (25.0%)	29 (30.2%)	16 (16.7%)	3.32	1.18
The company manages reverse flow of material, environment - packaging and distribution increasing sales	4 (4.2%)	14 (14.6%)	31 (32.3%)	25 (26.0%)	18 (18.8%)	3.42	1.10
The company controls environmental risk associated with suppliers operation increasing sales	2 (2.1%)	14 (14.6%)	28 (29.1%)	29 (30.2%)	19 (19.8%)	3.86	3.25
The company assures proper utilization of materials by customers enhancing market share	5 (5.2%)	13 (13.5%)	25 (26.0%)	37 (38.5%)	12 (12.5%)	3.41	1.06
The company buys repairable products increasing market share	7 (7.3%)	15 (15.6%)	31 (32.3%)	24 (25.0%)	15 (15.6%)	3.27	1.15
The company applies reverse channel systems to allow the consumers to return the used products or packaging materials	6 (6.3%)	24 (25.0%)	26 (27.1%)	26 (27.1%)	11 (11.5%)	3.13	1.13
The company redesigns logistical system component for greater environmental efficiency and improved delivery services	7 (7.3%)	12 (12.5%)	36 (37.5%)	24 (25.0%)	14 (14.6%)	3.28	1.11
The company has integrated suppliers in the supply chain in order to reduce costs and improve customer services	2 (2.1%)	10 (10.4%)	30 (31.3%)	36 (37.5%)	15 (15.6%)	3.56	0.96
The company's financial performance has improved due to reverse logistic	2 (2.1%)	12 (12.5%)	34 (35.4%)	31 (32.3%)	14 (14.6%)	3.46	0.97

1-strongly disagree, 2-disagree, 3-Moderate, 4-Agree, 5-Strongly agree

Source: Primary data

According to Table 4.29, majority of the organizations had been practicing reverse logistics by controlling the environmental risk associated with supplier' operations which lead to an increase in sales (mean 3.86) with a standard deviation of 3.25. The companies had thus integrated suppliers in their supply chains so as to reduce costs and improve customer services (mean 3.56)

with a standard deviation of 0.96. Companies which had active recycling programs for materials in all sections experienced a reduction in the cost of production (mean 3.47) with a standard deviation of 1.32.

4.9.3 Correlation Analysis Results on Reverse Logistics Items to the Competitiveness of Food Manufacturing Firms

Using Pearson's moment correlation analysis, the extent to which the test items of reverse logistics influence the competitiveness of food manufacturing firms was established. The result are shown in Table 4.30.

Table 4.30: Reverse logistics Influence on firm competitiveness among food manufacturing firms

Reverse logistics		Firm competitiveness
1. Reverse logistics and outbound logistics: the company has an active recycling program for materials in all sections which has contributed to reduced cost of production	r-value P-value	.483(**) .000
2.The company makes use of recycled raw materials to improve quality of goods	r-value P-value	.531(**) .000
3. The company manages reverse flow of material, environment -packaging and distribution increasing sales	r-value P-value	.697(**) .000
4. The company assures proper utilization of materials by customers enhancing market share	r-value P-value	.590(**) .000
5. The company buys repairable products increasing market share	r-value P-value	.545(**) .000
6. The company applies reverse channel systems to allow the consumers to return the used products or packaging materials back to the company increasing flexibility	r-value P-value	.400(**) .000
7. The company redesigns logistical system component for greater environmental efficiency and improved delivery services	r-value P-value	.483(**) .000
8. The company has integrated suppliers in the supply chain in order to reduce costs and improve customer services	r-value P-value	.590(**) .000
9. The company's financial performance has improved due to reverse logistics	r-value P-value N	.478(**) .000 93

* Correlation is significant at the 0.05 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).
(Source: Primary data)

Table 4.30 indicates that firm competitiveness was strongly and significantly influenced when a company managed the reverse flow of materials, environmental packaging and distribution (r = 0.697, P = 0.000). Other aspects of reverse logistics had a moderate significant influence and included a company's integration of suppliers into the supply chain (r = .590, P= 0.000), a company's assurance of proper utilization of raw materials (r = .590, P = 0.000), when companies bought repairable products (r= .545, P = 0.000) and when companies made use of recycled raw materials (r =.531, P= 0.000). Firm competitiveness was moderately influenced by a company's active recycling program (r = 0.483, P = 0.000), a company's redesign of logistical systems (r = 0.483, P = 0.000) and the application of reverse channels allowing customers to return the products (r = 0.400, P = 0.000). As Table 4.38 indicates when a company practiced more of the test items its firm competitiveness increased.

4.10 Moderation Effect of Green Supply Chain Drivers on the Relationship between Green Supply Chain Practices and Firm Competitiveness

This objective established the extent to which the organizations were influenced by green supply chain management drivers. 28 items were tested and the responses were in a five point Likert scale of 1 – 5 (1-Strongly disagree, 2-disagree, 3-moderate, 4-Agree, 5-Strongly agree) was used. Table 4.31 illustrates that the major reasons that led to organizations' adoption of green supply chain supply practices.

Table 4. 31: Organizational drivers for green supply chain practices

	Extent to which organization practice						
Green supply chain drivers	**1**	**2**	**3**	**4**	**5**	**Mean**	**SD**
Government regulations have greatly influenced the organization's adoption of green supply chain practices	5 (5.2%)	3 (3.1%)	27 (28.1%)	34 (35.4%)	26 (27.1%)	3.77	1.06
Government regulations obligate us to comply with environmental preservation	4 (4.2%)	9 (9.4%)	32 (33.3%)	36 (37.5%)	14 (14.6%)	3.49	0.99
Industrial regulations obligate us to comply with environmental preservation	1 (1.0%)	16 (16.7%)	31 (32.3%)	28 (29.2%)	18 (18.8%)	3.49	1.02
Industrial regulations have greatly influenced the organization adoption of green supply chain practices	2 (2.1%)	12 (12.5%)	34 (35.4%)	25 (26.0%)	22 (22.9%)	3.56	1.04
Our competitors have greatly influenced the organization's adoption of green supply chain practices	1 (1.0%)	15 (15.6%)	26 (27.1%)	26 (27.1%)	27 (28.1%)	3.66	1.09
Our customers have greatly influenced the organization 's adoption of green supply chain practices	3 (3.1%)	10 (10.4%)	31 (32.3%)	30 (31.3%)	21 (21.9%)	3.59	1.05
When our competitors adopt quality management or productivity improvement programs they are perceive favorably by customers	1 (1.0%)	19 (19.8%)	34 (35.4%)	23 (24.0%)	18 (18.8%)	3.40	1.05
When our competitors adopt recycling or pollution control program they are more competitive	1 (1.0%)	22 (22.9%)	28 (29.2%)	26 (27.1%)	18 (18.8%)	3.44	1.01
Implementing cleaner production technology enhanced the adoption of green supply chain practices	3 (3.1%)	7 (7.3%)	39 (40.6%)	25 (26.0%)	21 (21.9%)	3.40	1.08
Implementing cleaner production technology has increase the profit level of the company	2 (2.1%)	22 (22.9%)	29 (30.2%)	20 (20.8%)	22 (22.9%)	3.57	1.02
Maintenance of cleaner production technologies has been cost effective	2 (2.1%)	10 (10.4%)	29 (30.2%)	34 (35.4%)	20 (20.8%)	3.40	1.14
Maintenance of cleaner production technologies has improved the financial position of the company	2 (2.1%)	15 (15.6%)	28 (29.2%)	28 (29.2%)	22 (22.9%)	3.36	0.99
Quality management and productivity improvement program has been greatly influenced by employees	-	8 (8.3%)	41 (42.7%)	26 (27.1%)	19 (19.8%)	3.63	1.00
Improved vehicle loading programs have been widely influenced by employee suggestions	2 (2.1%)	18 (18.8%)	33 (34.4%)	25 (26.0%)	16 (16.7%)	3.56	1.08
Waste management programs have been widely influenced by employee suggestions	4 (4.2%)	17 (17.7%)	36 (37.5%)	24 (25.0%)	13 (13.5%)	3.27	1.05

1-strongly disagree, 2-disagree, 3-Moderate, 4-Agree, 5-Strongly agree

Source: Primary data 2015

In relation to Table 4.31 the major reasons that led to company's adoption of GSCM were; Government regulations (mean response 3.77 with a standard deviation of 1.06), competitors influence (mean response 3.66 and a standard deviation of 1.09), and employee influence through quality management and productivity improvement program (mean 3.63) with a standard

deviation of 1.00. According to these results government regulation plays a very important role towards company's adoption of green supply chain practices. This is consistent with literature where Bhool & Narwal (2013) indicate that government rules & legislations are a major driver towards company's environmental management. This is because regulations increase the threats of penalties and thus this driver is most helpful for implementing GSCM in manufacturing Industries. The effects of firm attributes on the relationship between GSCM and firm competitiveness was further analyzed and the results displayed in Table 4.32.

Table 4. 32: Influence of firm attributes on green supply chain practices

	Extent to which organization practice						
Green supply chain drivers	**1**	**2**	**3**	**4**	**5**	**Mean**	**SD**
The company prepares and issues periodical voluntary environmental reporting to the public and environmental bodies	3 (3.1 %)	15 (15.6 %)	38 (39.6 %)	22 (22.9 %)	17 (17.7%)	3.60	0.91
The company has clearly stated its environmental objectives and action plans	3 (3.1 %)	12 (12.5 %)	31 (32.5 %)	32 (33.3 %)	17 (17.7%)	3.51	1.03
The company has included environmental issues in its mission statement and core values	2 (2.1 %)	9 (9.4%)	35 (36.5 %)	34 (35.4 %)	15 (15.6%)	3.54	0.94
The company has included environmental issues in its vision statement	-	17 (17.7 %)	30 (31.3 %)	26 (27.1 %)	20 (20.8%)	3.53	1.03
The company champions industry environmental initiatives/ effort	3 (3.1 %)	6 (6.3%)	40 (41.7 %)	29 (30.2 %)	15 (15.6%)	3.51	0.95
The company's employees are knowledgeable on green practices	3 (3.1 %)	8 (8.3%)	34 (35.4 %)	28 (29.2 %)	20 (20.8%)	3.58	1.02
The company uses employees incentive programs to encourage green activities/ suggestions	3 (3.1 %)	14 (14.6 %)	27 (28.1 %)	34 (35.4 %)	17 (17.7%)	3.51	1.05
The company organizes regular environmental training courses for management and all the employees	2 (2.1 %)	12 (12.5 %)	33 (34.4 %)	27 (28.1 %)	21 (21.9%)	3.56	1.04
The company hires environmentally conscious personnel	2 (2.1 %)	9 (9.4%)	41 (42.7 %)	28 (29.2 %)	15 (15.6%)	3.57	0.94
The capital outlay required by the company has been high to allow green labeling of packaging	2 (2.1 %)	13 (13.5 %)	32 (33.3 %)	33 (34.4 %)	15 (15.6%)	3.48	0.99
The company has set a budget for green research	7 (7.3 %)	13 (13.5 %)	34 (35.4 %)	25 (26.0 %)	16 (16.7%)	3.32	1.13

1-strongly disagree, 2-disagree, 3-Moderate, 4-Agree, 5-Strongly agree
Source: Primary data

Of the firm attributes analyzed, those companies that prepared and issued periodical and voluntary environmental reporting to the public and environmental bodies (mean response 3.60) with a standard deviation of 0.91, were the ones that practiced green supply chain to the largest extent. Setting a budget for green research was not practiced by many companies as they did not view it necessary to achieve firm competitiveness (mean response 3.32 and a standard deviation of 1.13).

4.10.1 Correlation Analysis Results on Green Supply Chain Drivers Items to Competitiveness of Food Manufacturing Firms

Using Pearson's moment correlation analysis, the extent to which the test items of green supply chain drivers affected firm competitiveness among food manufacturing firms was established. The results are displayed in Table 4.33.

Table 4. 33: Influence of External Green supply chain management drivers on firm competitiveness

Green supply chain management drivers		Firm competitiveness
1.Industrial regulations have greatly influenced the organization's adoption of green supply chain practices	r-value P-value	.565(**) .000
2. Government regulations obligate us to comply with environmental preservation	r-value P-value	.385(*) .000
3. Our competitors have greatly influenced the organization's adoption of GSCM	r-value P-value	.543(**) .000
4. when our competitors adopt recycling or pollution prevention they are perceived favorably by consumers	r-value P-value	.463(**) .000
5 Implementation of cleaner production technologies was greatly influenced by the companies employees	r-value P-value	.444(**) .000
6. Quality management and productivity improvement program has been greatly influenced by employees	r-value P-value	.559(**) .000
7. The company has included environmental issues in its mission statement and core values	r-value P-value	.574(**) .000
8. The company uses employees incentive programs to encourage green activities/ suggestions	r-value P-value	.508(**) .000
9. The company's employees are knowledgeable on green practices	r-value P-value	.557(**) .000
10. The company champions industry environmental initiatives/ effort	r-value P-value	.609(**) .000
11. The company hires environmentally conscious personnel	r-value P-value	.511(**) .000
12. The capital outlay required by the company has been high to allow green labeling of packaging	r-value P-value	.650(*) .000
	N	95

Source: Primary data

According to Table 4.33 firm competitiveness was strongly influenced by the high capital outlay required by a company to allow green labelling of packaging (r = 0.650, P = 0.000) and when the company champions industry environmental initiatives/ effort (r = .609, P = 0.000). Firm competitiveness is moderately influenced by implementation of cleaner production technologies which greatly influences a company's employees (r = .444, P= 0.000) customers perception of competitors when they adopt recycling or pollution control programs, or adopt quality management and improvement programs (r =.463, P= 0.000). This shows that for a firm to be competitive it should not ignore the regulators, the competitors or the employees.

4.11 Company Financial Reports

Profit is a critical measure of organization competitiveness. In the last four years, more companies recorded an annual gross profit of less than 250 million shillings. In year 2009, more companies 49.0% had annual gross profit of less than Ksh. 250 million while in 2010, 44.8% of the companies had a gross annual profit of less than 250 million shillings. Annual gross profit of more than 1 billion shillings was recorded in 7.3% of the companies in the year 2013 as illustrated in Table 4.34.

Table 4. 34: Annual gross profit in the last four years

Annual gross profit	Year 2009	Year 2010	Year 2011	Year 2012	Year 2013
Less than 250 million	47 (49.0%)	43 (44.8%)	40 (41.7%)	44 (45.8%)	40 (41.7%)
250-500 million	22 (22.9%)	22 (22.9%)	22 (22.9%)	23 (24.0%)	27 (28.1%)
501 to 750 million	9 (9.4%)	14 (14.6%)	13 (13.5%)	10 (10.4%)	12 (12.5%)
750 to 1 billion	1 (1.0%)	3 (3.1%)	8 (8.3%)	11 (11.5%)	5 (5.2%)
More than 1billion	5 (5.2%)	5 (5.2%)	5 (5.2%)	4 (4.2%)	7 (7.3%)
Non-committal	12 (12.5%)	9 (9.4%)	8 (8.3%)	4 (4.2%)	5 (5.2%)

Source: Primary data

Based on the companies' annual gross profit, majority of the companies, 40.6%, in the year 2009, and in the year 2012, apportioned less than 10% of their annual gross profit to the adoption of green marketing practices. In the year 2013, fewer companies 5.2% allotted more than 50% of their gross profit to green marketing practices. These results are shown in Table 4.35. Some companies were however non-committal an indicator that those companies probably did not adopt any green marketing practices.

Table 4. 35: Proportion of gross profit attributed to adoption of green marketing practices

Proportion of gross profit	Year 2009	Year 2010	Year 2011	Year 2012	Year 2013
Less than 10%	39 (40.6%)	35 (36.5%)	38 (39.6%)	39 (40.6%)	36 (37.5%)
11 – 20%	28 (29.2%)	27 (28.1%)	20 (20.8%)	21 (21.9%)	19 (19.8%)
21 – 30%	9 (9.4%)	29 (19.8%)	17 (17.7%)	11 (11.5%)	16 (16.7%)
31 – 40%	6 (6.3%)	4 (4.2%)	9 (9.4%)	15 (15.6%)	7 (7.3%)
41 – 50%	--	1 (1.0%)	3 (3.1%)	3 (3.1%)	5 (5.2%)
More than 50%	2 (2.1%)	2 (2.1%)	2 (2.1%)	2 (2.1%)	5 (5.2%)
Non-committal	12 (12.5%)	8 (9.4%)	7 (7.3%)	5 (5.2%)	8 (8.3%)

Source: Primary Data

Sales turnover is a traditional measure of firm competitiveness. In this regard respondents were asked to indicate their annual sales for the previous five years. In the year 2009, 46.9% of the companies had an annual sales turnover of less than 250 million shillings. This was also recorded in the year 2013 where 46.7% of the companies recorded less than 250 million shillings.

Annual sales turnover of the companies was coded in a scale of 1 – 5 (1-less than 250 million, 2-250-500 million, 3-501 to 750 million, 4-750 to 1 billion, 5-more than 1 billion). The researcher established the average annual sales per year. The result shown in Table 4.36.

Table 4.36 Companies annual sales turnover in last four years

Annual Sales Turnover	Year 2009	Year 2010	Year 2011	Year 2012	Year 2013
Less than 250 million	45 (46.9%)	40 (41.7%)	41 (42.7%)	41 (42.7%)	42 (46.7%)
250-500 million	22 (22.9%)	25 (26.0%)	21 (21.9%)	21 (21.9%)	22 (24.4%)
501 to 750 million	5 (5.2%)	10 (10.4%)	13 (13.5%)	12 (12.5%)	10 (10.4%)
750 to 1 billion	3 (3.1%)	3 (3.1%)	6 (6.3%)	9 (9.4%)	9 (9.4%)
More than 1billion	7 (7.3%)	7 (7.3%)	6 (6.3%)	7 (7.3%)	7 (7.3%)
Non-committal	14 (14.6%)	11 (11.5%)	9 (9.4%)	6 (6.3%)	6 (6.3%)
Mean	1.84	1.96	2.25	2.11	2.08
SD	1.23	1.22	2.47	1.30	1.30

Source: Primary Data

According to Table 4.36 indicate that on average the annual sales increased from the year 2011 (average 2.25). This was followed by annual sales in year 2012 where the average was 2.11, and year 2013 with an average of 2.08.

The researcher went on to find out the proportion of annual sales that were attributed to GSCM practices. Table 4.37 shows the results.

TABLE 4. 37: Proportion of annual sales attributed to green marketing practices based on annual sales turnover

Proportion of gross profit	Year 2009	Year 2010	Year 2011	Year 2012	Year 2013
Less than 10%	38 (39.6%)	36 (37.5%)	36 (37.5%)	38 (39.6%)	37 (38.5%)
11 – 20%	29 (30.2%)	27 (28.1%)	25 (26.0%)	21 (21.9%)	22 (22.9%)
21 – 30%	9 (9.4%)	16 (16.7%)	15 (15.6%)	13 (14.6%)	17 (17.7%)
31 – 40%	5 (5.2%)	6 (6.3%)	9 (9.4%)	10 (10.4%)	4 (4.2%)
41 – 50%	1 (1.0%)	1 (1.0%)	3 (3.1%)	5 (5.2%)	7 (7.3%)
More than 50%	3 (3.1%)	2 (2.1%)	3 (3.1%)	4 (4.2%)	5 (5.2%)
Non-committal	11 (11.5%)	8 (8.3%)	5 (5.2%)	4 (4.2%)	4 (4.2%)
Mean	1.95	2.03	2.20	2.29	2.32
SD	1.21	1.16	1.33	1.46	1.50

Source: Primary Data

In the year 2009, 39.6% of the companies attributed less than 10% of their annual sales to green marketing practices. In the years 2010 and 2011, the number of companies that attributed less than 10 percent of their sales to GSCM practices declined to 37.5%, but increased in the year 2012 to, 39.6%. However, there has been a gradual increase of the number of companies that attribute more than 50% of their annual sales to green marketing practices as depicted in Table 4.37.

Proportion of annual sales attributed to green marketing practices in the companies were coded in a scale of 1 – 6 (1-less than 10%, 2-11 – 20%, 3-21 – 30%, 4-31 – 40%, 5-41 – 50%, 6- more than 50%). The researcher therefore established the average proportion of annual sales attributed to green marketing per year. The findings in this study showed that the average proportion of sales attributed to green marketing practices was higher in the year 2013 (mean 1.50 i.e. average of 11 – 20%) than in any other year 2012 (mean 1.46), year 2011 (mean 1.33), year 2009 (mean 1.21) and year 2010 (mean 1.16). This is evident from Table 4.37.

4.12 Testing for Normality of Data

The collected data was tested for normality before analysis. The particular hypotheses being tested was:

H_0 : The data is from a normal distribution.

H_a : The data is NOT from a normal distribution.

The frequency distribution obtained was tested for normality using Kolmogorov-Smirnov displayed in Table 4.38. The sample size was 96 which is larger than 50, and the Kolmogorov-Smirnov test is used to test for normality in data for larger samples (Mooi and Sarstedt, 2011).

Table 4. 38: Testing for normality

	Kolmogorov-Smirnov[a]		
	Statistic	df	Sig.
Green Purchasing	.082	91	.169
Green Manufacturing	.067	91	.200*
Green Distribution	.073	86	.200*
Reverse Logistics	.075	89	.200*
Green supply chain management drivers	.092	91	.143

a. Lilliefors Significance Correction
*. This is a lower bound of the true significance.
Source: Primary data

Table 4.38 indicates that the data was collected from a normal distribution. Since the significance level in the Kolmogorov-Smirnov test is greater than 0.05 for all the major variables, there was insufficient evidence to suggest that the distribution was not normal.

4.13 Analysis and Results

Chi-square tests were carried out to find whether the test items were statistically significant or not. The particular hypothesis being tested was:

H_0: The variables are statistically significant

H_a: The variables are not statistically significant

4.13.1 Chi-square analysis of Green purchasing factors

Green purchasing test items were subjected to chi-square analysis to verify whether the test items were statistically significant. The results are displayed in Table 4.39.

Table 4. 39: Test Statistics for Green Purchasing Factors

Variable constructs	Mean	Kendall's Rank	Chi-Square	Asymp. Sig.	N
Your company is able to improve the quality of its products by providing design specification to suppliers that include environmental requirements when purchasing an item	3.9468	1	53.979[a]	.000	94
he cooperation you have with suppliers for environmental objectives enable the company reduce the cost of production	3.7234	2	45.255	.000	94
Your company emphasizes on suppliers who take environmental concerns seriously thus enhancing flexibility	3.7634	5	40.495	.000	93
you have cooperation with suppliers for green packaging which increases the market share	3.5532	7	131.106	.000	94
your company carries out environmental audit for suppliers internal management thus enhancing the quality of good supplied	3.4731	6	23.398	.000	93
Your company demands environmental standards certification from suppliers which has enhanced delivery of goods	3.5319	4	8.723	.033	94
Your company uses sustainable sources of raw materials which has improved the profit levels of the company	3.6809	3	34.511	.000	94
your company outsources certain products or services thus reducing operational cost	3.5638	8	38.660	.000	94

According to Table 4.39 the Pearson chi-square goodness-of-fit test found all eight test items to be statistically significant with $p < .05$. The test thus failed to demonstrate that the test items were not equally significant. The test items were also ranked using Kendall's Ranking of Concordance.

4.13.1.2 Chi-square analysis of Green production/manufacturing factors

Green manufacturing test items were subjected to chi-square analysis to verify whether they were statistically significant. The results are displayed in Table 4.40.

Table 4. 40: Test Statistics for Green Manufacturing Factors

Variable Constructs	Mean	Kendall's Rank	Chi-square	Asymp. Sig.	N
The company's pollution prevention strategy has led to increased market share	3.6559	1	38.559	.000	93
The company's attainment of ISO 14001 certification on the environmental maintenance has led to increase in sales	3.2366	3	18.774	.001	93
The company has complied with particular regulations such as emissions, and other zero emission strategies thus reducing cost of production	3.7263	9	55.053	.000	95
The company controls its pollution at the end of the pipe by treating its effluents and/ or installation of dust collectors thus increasing market share	3.5684	12	48.737	.000	95
The quality of products produced is improved when the organization organises regular environmental training courses for management and the employees	3.5745	6	44.617	.000	94
The organization uses employees incentives programs to encourage green activities/suggestions thus enhancing flexibility of production	3.4421	8	27.895	.000	95
The company's use of sustainable sources of energy such as solar and wind has led to reduce cost of production	3.3298	4	12.170	.016	94
The company's use of products that are safe for disposal (which rot naturally) which has led to an increase in market share	3.6632	5	34.421	.000	95
Your company has improved the quality of products by providing goods that can be re-consumed or used for an extended period of time in service provision	3.9684	11	78.242	.000	95
Your company use of cleaner technologies in its manufacturing activities has led to increased profits for the organization	3.7128	2	42.596	.000	94
The company organizes green supply chain seminars and workshop which helps to improve the quality of products produced	3.5053	7	22.947	.000	95
The company makes use of recycled raw materials which reduces cost of production	3.3684	10	23.474	.000	95

According to Table 4.40 the Pearson chi-square goodness-of-fit test found all twelve test items to be statistically significant with $p < .05$. The test thus failed to demonstrate that the test items were not equally significant. The test items were also ranked using Kendall's Ranking of Concordance.

4.13.1.3 Chi-square analysis of Green distribution factors

Green distribution test items were subjected to chi-square analysis to verify whether the test items were statistically significant. The results are displayed in Table 4.41.

Table 4. 41: Test Statistics for Green Distribution Factors

Variable Constructs	Mean	Kendall's Rank	Chi-square	Asymp. Sig.	N
The organization uses minimum transportation packaging materials to preserve the natural resources which has reduced the cost of transportation	3.7789	1	55.684	.000	95
The organization applies packaging made of recyclable materials enhancing quality of goods	3.4737	7	27.684	.000	95
The organization's profit margins increased when it reduced the material required to offer services to customers (dematerializes	3.5158	7	36.526	.000	95
The organization packaging materials are bio-degradable which has increased sales	3.5217	15	31.261	.000	92
The organization uses minimum packaging materials on the products to preserve the natural resources which increases delivery of goods	3.6211	14	46.211	.000	95
The organization uses local products to reduce transportation costs	3.7333	9	20.400	.000	90
The organization's warehouse has been rearranged leading to better utilization of space which has led to reduced costs	3.6915	11	46.532	.000	94
The amount of handling of goods has been minimised to increase flexibility in delivery	3.5368	5	54.000	.000	95
The organization applies the internet as a major channel of distribution reducing distribution costs	3.4149	13	15.894	.003	94
Use of IT has helped increase flexibility in the distribution of goods	3.4632	10	29.053	.000	95
Use of IT has helped increase the market share of goods	3.5532	12	31.000	.000	94
The company's financial position has improved due to the use of IT	3.5426	2	32.064	.000	94
The organization redesigns logistical system components for greater efficiency in delivery of goods	3.5106	3	50.255	.000	94
The organization's distribution costs have been greatly reduced per unit	3.6000	4	36.316	.000	95
The organization uses green label as an indicator of environmental friendliness thus increasing sales	3.6316	6	34.526	.000	95

According to Table 4.41 the Pearson chi-square goodness-of-fit test found all fifteen test items to be statistically significant with $p < .05$. The test thus failed to demonstrate that the test items were not equally significant. The test items were also ranked using Kendall's Ranking of Concordance.

4.13.1.4 Chi-square analysis of reverse logistics factors

Reverse logistics test items were subjected to chi-square analysis to verify whether the test items were statistically significant. The results are displayed in Table 4.42.

Table 4. 42: Test Statistics for Reverse Logistics Factors

	Mean	Kendall's Rank	Chi-square	Asymp. Sig	N
Reverse logistics and outbound logistics: the company has an active recycling program for materials in all sections which has contributed to reduced cost of production	3.4731	1	10.817	.029	93
The company makes use of recycled raw materials to improve quality of goods	3.3226	2	15.118	.004	93
The company manages reverse flow of material, environment -packaging and distribution increasing sales	3.4239	3	23.326	.000	92
The company controls environmental risk associated with suppliers operation increasing sales	3.8681	5	46.077	.000	91
The company assures proper utilization of materials by customers enhancing market share	3.4130	6	34.739	.000	92
The company buys repairable products increasing market share	3.2717	7	18.652	.001	92
The company applies reverse channel systems to allow the consumers to return the used products or packaging materials back to the company increasing flexibility	3.1290	9	19.097	.001	93
The company redesigns logistical system component for greater environmental efficiency and improved delivery services	3.2796	4	28.559	.000	93
The company has integrated suppliers in the supply chain in order to reduce costs and improve customer services	3.5591	10	42.753	.000	93
The company's financial performance has improved due to reverse logistic	3.4624	8	39.312	.000	93

According to Table 4.42 the Pearson chi-square goodness-of-fit test found all ten test items to be statistically significant with $p < .05$. The test thus failed to demonstrate that the test items were not equally significant.

From the chi-square results all the test items were statistically significant with *a p* value <.05. However due to the limitations of the chi-square test of statistical significance such as being sensitive to the sample size, the researcher went on to carry out principal component factor analysis. Using principal component analysis (PCA), the data was used to find a small set of linear combinations of the covariates which are uncorrelated with each other. This way the multicollinearity problem was avoided (Murphy, 2012). PCA is used to produce factors considering the relations of a large set of items and these produced factors can describe the items using a much smaller number of underlying concepts than the original individual items. The inter-correlated items can be better interpreted through the extracted factors produces. Those variables above cut off of 0.5 are used to explain the inter-correlated factors. Those variables that do not meet the threshold were deleted since their impact is not felt.

4.13.2 Interpretation of factors analysis on Green purchasing attributes

Before extraction of the factors, a number of tests should be utilized to measure the suitability of data collected from the respondents for factor analysis. These tests comprise Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy, and Bartlett's Test of Sphericity (Williams *et al*., 2010). The KMO measure of Sampling Adequacy index varies from 0 and 1, with 0.50 regarded appropriate for factor analysis (Tabachnick & Fidell, 2007). Table 4.43 presents the KMO and Bartlett's test for green purchasing attributes.

Table 4. 43: KMO and Bartlett's Test for green purchasing

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.846
Bartlett's Test of Sphericity	Approx. Chi-Square	289.761
	df	28
	Sig.	.000

The KMO value for this study was approximately 0.85 as can be seen from Table 4.43. This is above the suggested minimum of 0.5. This implies that the study sample was good for factor analysis procedure as recommended by Tabachnick and Fidell (2007).

4.13.2.1 Correlation Matrix

Bartlett's Test of Sphericity was used to test the null hypothesis that the correlation matrix upon which the factor analysis was based is an identity matrix. In the event that the correlation matrix is indeed an identical one, then it is not possible to proceed to factor analysis. An identity matrix is one in which all of the diagonal elements are 1 and all off diagonal elements are 0. According to Table 4.43, an approximate Chi-Square value of 289.76 and Sig value =0.000 was obtained. The Null Hypothesis that the Correlation matrix is an identity matrix was consequently rejected while the alternate hypothesis accepted that indeed, the factor analysis procedure was based on a correlation matrix that is not identical in nature and that there are significant correlations among at least several variables. Additionally, the probability associated with the Bartlett's Test of Sphericity is <0.001 which satisfies the requirement that the probability associated with the Bartlett's Test of Sphericity should be less than the level of significance.

4.13.2.2 Factor Extraction

The Total Variance Explained section (Table 4.44) shows the number of common factors extracted, the Eigenvalues associated with these factors, the percentage of total variance accounted for by each factor, and the cumulative percentage of total variance accounted for by the factors. Using the criterion of retaining only factors with Eigenvalues of 1 or greater, one factor was retained for rotation. This factor accounted for 52.258% of the total variance. The scree plot, suggested a single factor solution of eigenvalues of 1 or greater (Appendix 1 - Figure A-1).

The results of the rotated component matrix are presented in Table 4.44.

Table 4. 44: Rotated Component Matrix[a] (Green Purchasing)

Variable constructs	Component
	1
Your company demands environmental standards certification from suppliers which has enhanced delivery of goods	.810
The cooperation you have with suppliers for environmental objectives enable the company reduce the cost of production	.798
Your company uses sustainable sources of raw materials which has improved the profit levels of the company	.770
you have cooperation with suppliers for green packaging which increases the market share	.733
Your company emphasizes on suppliers who take environmental concerns seriously thus enhancing flexibility	.712
your company carries out environmental audit for suppliers internal management thus enhancing the quality of good supplied	.676
Your company is able to improve the quality of its products by providing design specification to suppliers that include environmental requirements when purchasing an item	.670
your company outsources certain products or services thus reducing operational cost	.587
Total Variance Explained	52.258

Extraction Method: Principal Component Analysis.
a. 1 components extracted.
Source: Primary data

Table 4.44 shows that the purchasing items are related to suppliers being integrated into a firm's supply chain. The green purchasing items have also been shown to affect firm competitiveness in all aspects. The results showed that by adopting green purchasing practices, companies were able to improve the quality of their products, save on costs of production and increase their flexibility which further enhanced their competitiveness. These findings are consistent with Amemba *et al.* (2013) who argue that green purchasing can help save more on cost as it is the main starting point of waste minimization in a supply chain.

4.13.3 Interpretation of factors analysis on Green production

The KMO value for this study was approximately 0.84 as can be seen from Table 4.45 which is above the suggested minimum of 0.5. This implies that the green production sample was good for factor analysis.

4.13.3.1 Correlation Matrix

Bartlett's Test of Sphericity was used to test the null hypothesis that the correlation matrix upon which the factor analysis was based is an identity matrix. In the event that the correlation matrix is indeed an identical one, then it is not possible to proceed to factor analysis. An identity matrix is one in which all of the diagonal elements are 1 and all off diagonal elements are 0. According to Table 4.45, the sphericity chi square test designed by Bartlett gives 443.409, $p < 0.001$ therefore Bartlett‘s test is significant in that correlations are sufficiently large to admit factor analysis. The Null Hypothesis that the Correlation matrix is an identity matrix was consequently rejected while the alternate hypothesis accepted that indeed, the factor analysis procedure was based on a correlation matrix that is not identical in nature and that there are significant correlations among at least several variables. Additionally, the probability associated with the Bartlett's Test of Sphericity is $p < 0.001$ which satisfies the requirement that the probability associated with the Bartlett's Test of Sphericity should be less than the level of significance.

4.13.3.2 Factor Extraction

Factor analysis was used to compress the green production items by putting together interrelated variables and generate a smaller number of variables (Appendix I Table A-2).

The Total Variance Explained section shows the number of common factors extracted, the Eigen values associated with these factors, the percentage of total variance accounted for by each factor, and the cumulative percentage of total variance accounted for by the factors. Using the criterion of retaining only factors with eigenvalues of 1 or greater, two factors were retained for rotation. These two factors (Table 4.45) accounted for 54.466% of the total variance, respectively. The scree plot, suggested a two factor solution of eigenvalues of 1 or greater which

were used in further analysis (Appendix I Figure A-2). The Rotated Component Matrix (Table 4.45) presents the two factors after Varimax rotation.

Table 4. 45: Rotated Component Matrix (Green manufacturing)

Variable Constructs KMO= .840; Bartlett's sig =.000	Component	
	1	2
The company organizes green supply chain seminars and workshop which helps to improve the quality of products produced	.771	
The company's pollution prevention strategy has led to increased market share	.751	
The company's use of sustainable sources of energy such as solar and wind has led to reduce cost of production	.750	
The organization uses employees incentives programs to encourage green activities/suggestions thus enhancing flexibility of production	.744	
Your company use of cleaner technologies in its manufacturing activities has led to increased profits for the organization	.729	
The company's use of products that are safe for disposal (which rot naturally) which has led to an increase in market share	.684	
The company's attainment of ISO 14001 certification on the environmental maintenance has led to increase in sales	.674	
The company makes use of recycled raw materials which reduces cost of production	.669	
The company has complied with particular regulations such as emissions, and other zero emission strategies thus reducing cost of production	.643	
The company controls its pollution at the end of the pipe by treating its effluents and/ or installation of dust collectors thus increasing market share	.624	
The quality of products produced is improved when the organization organises regular environmental training courses for management and the employees	.578	
Your company has improved the quality of products by providing goods that can be re-consumed or used for an extended period of time in service provision		.881
Bartlett's Test of Sphericity: Approx. Chi-Square	443.409	
Total Variance Explained	54.466	

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 3 iterations.

The Rotated Component Matrix (Table 4.45) presents the two factors after Varimax rotation. Varimax rotation was applied since the conceptual model used previous studies. To identify the representation of these factors it was important to consider the items that loaded on each of the two factors. Eleven items loaded on Factor 1 and can be broadly classified into pollution prevent strategies employed by the firms and use of sustainable resources. The pollution prevention strategies comprised of use of cleaner technologies, company's attainment of ISO 14001 certification, controlling pollution at the 'end of the pipe', and complying with regulations on pollution such as zero emissions. Use of sustainable resources, use of products that are safe for recycling and use of sustainable sources of energy as well as making use of recycled raw materials also loaded onto Factor 1. Role of employees is also equally important as can be seen from Table 4.45 for when a company organizes green supply seminars and organizes regular environmental training courses for their employees the quality of the products produced is improved. One item also loaded on Factor 2 and consisted of improved the quality of products when companies provided goods that can be re-consumed or used for an extended period of time in service provision.

The findings particularly on the use of sustainable sources of energy such as solar are consistent with the existing literature which contends that although solar power is a highly viable alternative source of energy in developing countries such as Kenya its use has been quite low (Kinoti, 2012).

4.13.4 Interpretation of factors analysis on Green distribution

The KMO value for this study was approximately 0.824 as can be seen from Table 4.46 which is above the suggested minimum of 0.5. This indicates that there is sufficient inter-correlation between variables, thus the data is adequate for the purpose of factor analysis.

14.13.4.1 Correlation Matrix

Bartlett's Test of Sphericity was used to test the null hypothesis that the correlation matrix upon which the factor analysis was based is an identity matrix. In the event that the correlation matrix is indeed an identity one, then it is not possible to proceed to factor analysis. An identity matrix

is one in which all of the diagonal elements are 1 and all off diagonal elements are 0. According to Table 4.46, an approximate Chi-Square value of 740.847 and Bartlett's Test of Sphericity is $p < 0.001$ which satisfies the requirement that the probability associated with the Bartlett's Test of Sphericity should be less than the level of significance was obtained. The Null Hypothesis that the Correlation matrix is an identity matrix was consequently rejected while the alternative hypothesis accepted that indeed, the factor analysis procedure was based on a correlation matrix not identical in nature and that there are significant correlations among at least several variables.

14.13.4.2 Factor Extraction

Factor analysis was used to compress the green distribution items by putting together interrelated variables and generate a small number of variables (Appendix I Table A-3). Table 4.46 presents the Total Variance Explained for green distribution.

The Total Variance Explained section shows the number of common factors extracted, the Eigenvalues associated with these factors, the percentage of total variance accounted for by each factor, and the cumulative percentage of total variance accounted for by the factors. Using the criterion of retaining only factors with eigenvalues of 1 or greater, three factors were retained for rotation. These three factors accounted for 49.77%, 9.89% and 8.14%, of the total variance, respectively, for a total of 67.81%. The scree plot, suggested a three factor solution of eigenvalues of 1 or greater (Appendix I Figure A-3).

Table 4.46 presents the Rotated Component Matrix for Green distribution.

Table 4. 46:**Rotated Component Matrix[a] (Green Distribution)**

Variable Construct KMO= .824; Bartlett's sig =.000	Component		
	1	2	3
The organization packaging materials are bio-degradable which has increased sales	.823		
The organization uses minimum packaging materials on the products to preserve the natural resources which increases delivery of goods	.823		
The organization uses green label as an indicator of environmental friendliness thus increasing sales	.696		
The organization applies packaging made of recyclable materials enhancing quality of goods	.689		
The organization's profit margins increased when it reduced the material required to offer services to customers (dematerializes	.557		
The amount of handling of goods has been minimised to increase flexibility in delivery		.762	
The organization's warehouse has been rearranged leading to better utilization of space which has led to reduced costs		.738	
The organization uses minimum transportation packaging materials to preserve the natural resources which has reduced the cost of transportation		.704	
The organization redesigns logistical system components for greater efficiency in delivery of goods		.702	
The organization uses local products to reduce transportation costs		.691	
Use of IT has helped increase the market share of goods			.820
The organization applies the internet as a major channel of distribution reducing distribution costs			.785
The company's financial position has improved due to the use of IT			.739
Use of IT has helped increase flexibility in the distribution of goods			.723
Bartlett's Test of Sphericity: Approx. Chi-Square	740.847		
Total Variance Explained	67.811		

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 6 iterations.
Source: Primary data

Table 4.46 presents the Rotated Component Matrix which shows the three factors after Varimax rotation. To identify the representation of these factors, it was important to consider the items that loaded on each of the three factors. During factor analysis, only absolute values of more than 0.50 were considered significant. Five items loaded on Factor 1 and consisted of bio-degradable packaging materials, use of minimum packaging materials, use of recyclable packaging

materials, and use of the green label as an indicator of environmental friendliness and dematerializing which improved the profit margins of the company. This indicates that manufacturers consider packaging reuse and recyclability as important aspects towards environmental sustainability. This finding concurs with Murphy (2012) who indicates that packaging and reuse implies a firm's commitment to its products even after it has been sold either as a final consumer product or a component of a further manufactured product.

Five items loaded on Factor 2 and comprised of minimum handling of goods, better utilization of the ware house, use of minimum packaging products to preserve the environment, use of local products to reduce costs and redesigning of logistical systems components for greater efficiency in delivery. This finding is in harmony with Ninlawan *et al.* (2010) and Amemba *et al.* (2013) who indicate that green packaging involves use of packing the goods into smaller units thus reducing the amount of space and materials used which in turn affects the transport characteristics of a product. Dheeraj & Vishal (2012) contend that companies that have adopted green distribution activities have successfully improved their business on many levels as these activities imply improved efficiency.

Factor 3 loadings were composed of the use of the internet as a major channel of distribution. This is seen as the internet helped increase the market share, flexibility in the distribution of goods and improved the company's financial position. These results indicate that green logistics activities were mainly related to the use of the internet in the distribution of goods. Use of IT greatly reduced distribution costs even as the flexibility of distribution and market share were increased thus increasing firm competitiveness.

4.13.5. Interpretation of factors analysis on Reverse logistics

The KMO test of Sampling Adequacy, and Bartlett's Test of Sphericity were carried out and the KMO value for reverse logistics in this study was approximately 0.821 as can be seen from Table 4.47 which is above the suggested minimum of 0.5. This indicates that there is sufficient inter-correlation between variables, thus the data is adequate for the purpose of factor analysis.

14.13.4.1 Correlation Matrix

Bartlett's Test of Sphericity was used to test the null hypothesis that the correlation matrix upon which the factor analysis was based is an identity matrix. In the event that the correlation matrix is indeed an identity one, then it is not possible to proceed to factor analysis. An identity matrix is one in which all of the diagonal elements are 1 and all off diagonal elements are 0. According to Table 4.47, an approximate Chi-Square value of 346.250 and Sig value $p< 0.001$ were obtained. The Null Hypothesis that the Correlation matrix is an identity matrix was consequently rejected while the alternate hypothesis was accepted that indeed, the factor analysis procedure was based on a correlation matrix that was not identical in nature and that there are significant correlations among at least several variables.

14.13.4.2 Factor Extraction

Factor analysis was used to compress the reverse logistics items by putting together interrelated variables and generate a small number of variables (Appendix I Table A-4). Using the criterion of retaining only factors with eigenvalues of 1 or greater, only two factors were retained for rotation. These two factors accounted for 47.66% and 13.87%, of the total variance, respectively, for a total of 61.54%. The scree plot, suggested a two factor solution of eigenvalues of 1 or greater (Appendix I Figure A-4). Table 4.47 shows the total variance explained and the Rotated Component Matrix for Green reverse logistics.

Table 4. 47: **Rotated Component Matrix[a] (Reverse logistics)**

Variable Constructs. KMO= .821; Bartlett's sig =.000	Component	
	1	2
The company redesigns logistical system component for greater environmental efficiency and improved delivery services	.787	
The company's financial performance has improved due to reverse logistic	.761	
The company buys repairable products increasing market share	.755	
The company assures proper utilization of materials by customers enhancing market share	.749	
The company has integrated suppliers in the supply chain in order to reduce costs and improve customer services	.745	
The company applies reverse channel systems to allow the consumers to return the used products or packaging materials back to the company increasing flexibility	.674	
Reverse logistics and outbound logistics: the company has an active recycling program for materials in all sections which has contributed to reduced cost of production		.766
The company controls environmental risk associated with suppliers operation increasing sales		.732
The company makes use of recycled raw materials to improve quality of goods		.713
Bartlett's Test of Sphericity: Approx. Chi-Square	346.250	
Total Variance Explained	61.536	

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 3 iterations.
Source: Primary Data

Table 4.47 presents the Rotated Component Matrix which shows the two factors after Varimax rotation. To identify the representation of these factors, it was important to consider the items that loaded on each of the two factors. During factor analysis, only absolute values of more than 0.50 were considered significant.

Six items loaded on Factor 1 and consisted of a company's redesigning the logistical systems for greater environmental efficiency, improved financial performance due to reverse logistics, buying repairable products thus increasing the market share, assuring proper utilization by customers, integrating suppliers into the supply chain to reduce costs and improve customers services as well as allowing consumers to return used products and packaging materials. Three items loaded on Factor 2 and comprised of companies having active recycling program,

company's control of the environmental risk associated with suppliers operation and companies' use of raw materials.

4.13.6. Interpretation of factors analysis on Moderator variable

The KMO test of Sampling Adequacy, and Bartlett's Test of Sphericity were carried out and the KMO value for the moderator variables in this study was approximately 0.900 as can be seen from Table 4.49 which is above the suggested minimum of 0.5. This indicates that there is sufficient inter-correlation between variables, thus the data is adequate for the purpose of factor analysis.

14.13.5.1 Correlation Matrix

Bartlett's Test of Sphericity was used to test the null hypothesis that the correlation matrix upon which the factor analysis was based is an identity matrix. In the event that the correlation matrix is indeed an identity one, then it is not possible to proceed to factor analysis. An identity matrix is one in which all of the diagonal elements are 1 and all off diagonal elements are 0. According to Table 4.49, an approximate Chi-Square value of 1380.635 and p <0.001 were obtained. The Null Hypothesis that the Correlation matrix is an identity matrix was consequently rejected while the alternate hypothesis was accepted that indeed, the factor analysis procedure was based on a correlation matrix that was not identical in nature and that there are significant correlations among at least several variables.

14.13.5.2 Factor Extraction

Factor analysis was used to compress the moderation items by putting together interrelated variables and generate a small number of variables (Appendix I Table A-5). Table 4.48 presents the Total Variance Explained for moderation variable.

Table 4. 48:Total Variance Explained for the moderator Variable

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	11.336	53.980	53.980	11.336	53.980	53.980	5.617	26.749	26.749
2	1.422	6.773	60.753	1.422	6.773	60.753	3.278	15.607	42.357
3	1.238	5.897	66.650	1.238	5.897	66.650	3.189	15.187	57.544
4	1.042	4.961	71.610	1.042	4.961	71.610	2.954	14.066	71.610
5	.702	3.345	74.955						
6	.683	3.251	78.206						
7	.604	2.875	81.081						
8	.525	2.499	83.580						
9	.491	2.339	85.919						
10	.483	2.300	88.219						
11	.385	1.833	90.052						
12	.368	1.751	91.803						
13	.328	1.560	93.362						
14	.283	1.346	94.709						
15	.252	1.202	95.911						
16	.196	.934	96.844						
17	.184	.878	97.722						
18	.150	.717	98.439						
19	.128	.610	99.049						
20	.112	.534	99.583						
21	.088	.417	100.000						

Extraction Method: Principal Component Analysis.

Source: Primary data.

Table 4.48 shows The Total Variance Explained section and the number of common factors extracted, the Eigenvalues associated with these factors, the percentage of total variance accounted for by each factor, and the cumulative percentage of total variance accounted for by the factors. Using the criterion of retaining only factors with eigenvalues of 1 or greater, four factors were retained for rotation. These four factors accounted for 53.98%, 6.77%, 5.88% and 4.96%, of the total variance, respectively, for a total of 71.61%. The scree plot, suggested a four factor solution of eigenvalues of 1 or greater (Appendix I Figure A-5).

The Rotated Component Matrix for moderator variable is presented in Table 4.49.

Table 4. 49:**Rotated Component Matrix[a] (Moderating Variable)**

Variable Constructs KMO= .900; Bartlett's sig =.000	Component			
	1	2	3	4
The company's employees are knowledgeable on green practices	.777			
The company has clearly stated its environmental objectives and action plans	.760			
The company has included environmental issues in its mission statement and core values	.735			
The company uses employees incentive programs to encourage green activities/ suggestions	.714			
The company champions industry environmental initiatives/ effort	.695		.491	
The company hires environmentally conscious personnel	.655			
The capital outlay required by the company has been high to allow green labelling of packaging	.653			
The company has included environmental issues in its vision statement	.647			
The company organizes regular environmental training courses for management and all the employees	.498			.473
General supply chain management drivers: Government regulations have greatly influenced the organization's adoption of green supply chain practices		.781		
Government regulations obligate us to comply with environmental preservation		.776		
Industrial regulations obligate us to comply with environmental preservation		.732		
Industrial regulations have greatly influenced the organization's adoption of green supply chain practices	.451	.698		
Our competitors have greatly influenced the organization's adoption of green supply chain practices			.836	
Our customers have greatly influenced the organization 's adoption of green supply chain practices			.711	
When our competitors adopt quality management or productivity improvement programs they are perceive favourably by customers	.468		.689	
Implementation of cleaner production technologies has greatly influenced the companies employees				.798
Quality management and productivity improvement program has been greatly influenced by employees				.788
Improved vehicle loading programs have been widely influenced by employee suggestions	.491			.628
Waste management program have been widely influenced by employee suggestions			.451	.478
The company prepares and issues periodical voluntary environmental reporting to the public and environmental bodies	.421		.405	.435
Bartlett's Test of Sphericity: Approx. Chi-Square	1380.635			
Total Variance Explained	71.60			

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 7 iterations.
Source: Primary data

Table 4.49 presents the Rotated Component Matrix which shows the four factors after Varimax rotation. To identify the representation of these factors, it was important to consider the items

that loaded on each of the four factors. During factor analysis, only absolute values of more than 0.50 were considered significant.

Nine items loaded on Factor 1 and can be categorized into having employees who are knowledgeable about green practices and when a company is clear about its environmental obligations. For a company to have employees who are knowledgeable about green practices it makes a conscious effort to hire green personnel (.655), train existing personnel on green practices (.498) and use employee suggestions to encourage green practices (.714). For a company to be clear on its environmental obligations it had clearly stated environmental objectives, included environmental issues in its mission and vision statements, championed industrial environmental initiatives and was ready to spend to allow for green labeling of products. This factor further suggests that for a firm to have a strategic environmental vision, it should be reflected by specific actions in the area of human resource management (training and employee involvement). This agrees with the findings of Murphy (2012) who prescribes that for management to be fully engaged in environmental improvement they need to have in place appropriate activities towards the reduction of environmental impact such as those mentioned above.

Four items loaded on Factor 2 and comprised of government and industrial regulations. This shows that regulations whether government or industrial play a very important part for companies to adopt green practices. It also suggests that the government is the key determinant of green supply chain practices adoption in the manufacturing sector in Kenya (Kinoti, 2012).

Six items loaded on Factor 3 and can be broadly classified as various aspects of the public. They consisted of competitor's perceptions, customers' perception, employee perception and the general public at large. Four factors loaded on Factor 4 and they consisted of implementation of cleaner technology, quality management and productivity improvement programs, improved vehicle loading, and waste management program all influenced by employees.

4.14 Hypothesis Testing

To test the relationship between GSCM practices and Firm competitiveness the Pearson chi-square goodness of fit test statistic was used as the dependent variable was categorical in nature.

The independent variables were not categorical in nature and thus a multivariate linear regression method was used to investigate the relationship between firm competitiveness (dependent variable) and green supply chain management variables (independent variables), as well as the effect of the moderating variable and to test the proposed hypotheses. The results for each hypothesis are presented based on the coefficient of determination (R^2), the change in the coefficient of determination, beta coefficient, F- test and significance values.

4.14.1 Hypothesis 1

The first hypothesis to be tested was:

H_{01}; Green purchasing has no statistically significant influence on firm competitiveness among food manufacturing firms in Kenya.

Green purchasing items were measured using 8 items Table 4. 39 while firm competitiveness was measured using an index of market share, sales turnover, gross profit, cost and delivery flexibility of the goods.

Thus the relationship between green purchasing and firm competitiveness was tested using the Pearson chi-square goodness of fit test and the results are displayed in Table 4.50.

Table 4. 50: Green Purchasing Chi- Square results

		Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square		1783.757[a]	1672	.029
Likelihood Ratio		527.517	1672	1.000
Linear-by-Linear Association		30.058	1	.000
Nominal by Nominal	Phi	4.333		.029
	Cramer's V	.924		.029
N of Valid Cases		95		

a. 1771 cells (100.0%) have expected count less than 5. The minimum expected count is .01.

A Pearson chi-square test was conducted to examine whether there was a relationship between green purchasing and firm competitiveness. The results revealed that there was a significant relationship between the two variables (Chi-square 0.029, df 1672, $P < .05$).

Phi and Cramer's V are both tests of the strength of association. From Table 4.50 above the strength of association between the variables is strong ($P < .05$).

4.14.1.1 Empirical Sub-model

Regression analysis were then used to examine whether green purchasing can be used to explain firm competitiveness. Green purchasing practices were the independent variable and they were not categorical in nature hence the use of regression for further analysis. The aggregate mean score of green purchasing attributes was regressed against firm competitiveness index. To test this hypothesis the following regression model was used:

$$FC = \beta_0 + \beta_1 GP + \varepsilon$$

Where FC is firm competitiveness

β, $\beta 1$ are coefficients

GP= Aggregate mean of green purchasing constructs

ε= Error term

Table 4.51 shows the results of this regression.

Table 4. 51: Regression Results of Green Purchasing on Firm Competitiveness

a) **Coefficients[a]**

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	1.045	.294		3.550	.001
green purchasing	.066	.010	.565	6.612	.000
F-statistics					43.717
R^2					..320
Adjusted R^2					.312

a. Dependent Variable: Y dependent

The model fitness found that 32% of a firm's competitiveness is explained by green purchasing (R^2 =.320, Adjusted R^2 = .312). Using the ANOVA Table the study established that the significance of the regression model. In the model $F_{(1, 93)} = 43.72, p < .001$ which shows a significant relationship.

The results thus do indicate that the equation for establishing whether green purchasing has a statistically significant effect on firm competitiveness when confined to the standardized coefficient was

FC= 1.045+ 0.565GP

FC represents Firm competitiveness, GP represents green purchasing. This model shows that when firms practice green purchasing it would lead to a 56.5% increase in firm competitiveness.

The impact of green purchasing on firm competitiveness is thus statistically significant at a significance level of $\alpha = 0.05$ since $p<0.05$, t =6.612. This means that there is a statistically significant relationship between the computed green purchasing practices and firm competitiveness.

Hypothesis 1 Conclusion: Based on the research findings, green purchasing therefore has a statistically significant influence on the competitiveness of food manufacturing firms. The H_0 is therefore rejected while H_a is accepted that, "Green purchasing has a statistically significant influence on the competitiveness of food manufacturing firms".

The results showed that by adopting green purchasing practices, companies were able to improve the quality of their products, save on costs of production and increase their flexibility which further enhanced their competitiveness. These findings are consistent with Amemba *et al.* (2013) who argue that green purchasing can help save more on cost as it is the main starting point of waste minimization in a supply chain. For the country to move towards a more sustainable environment, manufacturers and the society in general have to be willing to make purchasing decisions based on the criteria of sustainability such as value of use in society thus moving away from traditional criteria of quality and price.

The findings are also in harmony with those of Lagat (2013) who maintains that the use of green procurement is a driver in the creation of markets. He also argues that procuring firms can exercise their authority in the market by offering, advancing and requesting environmental information both upstream and downstream. This has been supported by this study when the highest factor loadings were 'Your company demands environmental standards certification from suppliers which has enhanced delivery of goods' and 'the cooperation you have with suppliers for environmental objectives enable the company reduce the cost of production'. These results indicate that green purchasing is mainly hinged on suppliers who take environmental concerns seriously which is consistent with the findings of Gold *et al.* (2010), and Chang *et al.* (2013). Supplier involvement in GSCM is therefore a critical activity involved in green purchasing a finding that is in resonance with Murphy (2012). Support for the green purchasing and firm competitiveness relationship indicates that mangers have recognized that the potential environmental gains from green purchasing are impressive (Lagat, 2013) and there is the ability to impact more positively on stock availability and order fulfilment (Kirchoff, 2011). Green purchasing therefore significantly influences firm competitiveness of food manufacturers contrary to the postulated hypothesis.

4.14.2 Hypothesis 2

The next hypothesis to be tested was**:**

H_{02}; Green production has no statistically significant influence on the competitiveness of food manufacturing firms in Kenya.

This relationship between green production and firm competitiveness was tested using the Pearson chi-square goodness of fit test and the results are displayed in Table 4.52.

Table 4.52: Green Manufacturing Chi -square results

Tests		Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square		3126.424[a]	2925	.005
Likelihood Ratio		605.851	2925	1.000
Linear-by-Linear Association		29.632	1	.000
Nominal by Nominal	Phi		5.737	.005
	Cramer's V		.919	.005
N of Valid Cases		95		

a. 3040 cells (100.0%) have expected count less than 5. The minimum expected count is .01.

A Pearson chi-square test was conducted to examine whether there was a significant relationship between green production and firm competitiveness. The results revealed that there was a significant relationship between the two variables (Chi-square .005, df 2925, $P < .05$).

Further analysis were carried out to find the strength of the association. Phi and Cramer's V are both tests of the strength of association. From Table 4.60 (b) above the strength of association between the variables is strong ($P < .05$).

4.14.2.1 Empirical Sub-model

Regression analysis were then used to examine whether green manufacturing can be used to explain firm competitiveness. Green production practices were the independent variable and they were not categorical in nature hence the use of regression for further analysis. The aggregate mean score of green production attributes was regressed against firm competitiveness index and the aggregate mean score of the moderator to find out if there was any interaction effect. To test this hypothesis the following model was used:

$FC = \beta + \beta 2\, GM + \varepsilon$

Where FC is firm competitiveness

β, $\beta 2$ are coefficients

GM = Aggregate mean of green production constructs

ε =Error term

Table 4.53 shows the results of this regression.

Table 4. 53: Regression Results of Green Production on Firm Competitiveness

a) Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
	(Constant)	1.085	.307		3.533	.001
	green manufacturing	.044	.007	.543	6.230	.000
	F-Statistics				38.808	.000
	R^2				.294	
	Adjusted R^2				.287	

a. Dependent Variable: Y dependent

The model fitness found that 29.4% of a firm's competitiveness is explained by green manufacturing (R^2 =.294 Adjusted R^2 = .287). Using the ANOVA Table the study established the significance of the regression model. The model 1, $F_{(1, 93)} = 38.81, p < .001$ shows a significant relationship between green manufacturing and firm competitiveness.

The results thus do indicate that the equation for establishing whether green manufacturing has a statistically significant effect on firm competitiveness when confined to the standardized coefficient was:

FC= 1.085+ 0.543GM

FC represents Firm competitiveness, GM represents green manufacturing. This model shows that when firms practice green manufacturing it would lead to a 54.3% increase in firm competitiveness. The impact of green production /manufacturing on firm competitiveness is thus statistically significant at a significance level of $\alpha = 0.05$ since $p<0.05$ and t= *6.230.* This means that there is a statistically significant relationship between the computed green production/ manufacturing practices and firm competitiveness.

Hypothesis 2 conclusion: Based on this findings the H_0 that green production has no statistically significant effect on firm competitiveness is therefore rejected and the H_a: is accepted that green production has a statistically significant effect on firm competitiveness.

The result of this study showed that by adopting green production practices companies were able to reduce their costs of production when they complied with particular regulations such as zero emission and other environmental strategies. These findings are consistent with literature that as a result of the move towards green production firms are able to reduce their resource consumption and minimize waste thus saving on costs.

The results also indicate that companies that used cleaner technologies in their manufacturing activities experienced increased profits for the organization while market share was increased for companies that had a green environmental strategy. Baines *et al.* (2012) and Cheruiyot *et al*. (2014) also reason that in addition to cost savings, the market opportunities available for companies that incorporate green production are many. Companies' attainment of ISO 14000 standards leads to increased sales a finding that is consistent with Carter & Rogers (2008) who contend that attainment of these standards endears a company to customers.

Green manufacturing/ production on the other hand was found to negatively influence firm competitiveness when applied together with other GSCM practices. Baines *et al.* (2012) argue that there are various motivations for a company to make a move towards green production including regulatory pressures, market opportunities and potential cost savings in the long-run. Accordingly the effect of green production can only be felt after some time due to the cost implications. From the findings of this study green production when combined with other GSCM practices does not enhance competitiveness maybe due to financial constraints in the short run a finding that has been collaborated by Baines *et al.* (2012). Murphy (2012) also suggests that for cleaner production to be effective, both consumers and producers have to take responsibility with producers taking responsibility for a product beyond the post-consumer stage of a product's life cycle. In Kenya, citizens are yet to take conscious steps towards sustainability which has been a deterrent to many a food manufacturer. Green production therefore significantly influences firm competitiveness which is contrary to the proposed hypothesis.

4.14.3 Hypothesis 3

The third hypothesis to be tested was;

H_{03} Green distribution practices do not positively influence firm competitiveness among food manufacturing firms in Kenya.

This relationship between green distribution practices and firm competitiveness was tested using the Pearson chi-square goodness of fit test and the results are displayed in Table 4.54.

Table 4.54: Green Distribution Chi-Square Tests

Tests	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	2899.333[a]	2812	.123
Likelihood Ratio	609.881	2812	1.000
Linear-by-Linear Association	37.408	1	.000
Nominal by Nominal	Phi	5.496	.123
	Cramer's V	.903	.123
N of Valid Cases	96		

a. 2926 cells (100.0%) have expected count less than 5. The minimum expected count is .01.

A Pearson chi-square test was conducted to examine whether there was a relationship between green distribution practices and firm competitiveness. The results, Table 4.54, revealed that there was no significant relationship between the two variables (Chi-square .123, df 2812, *P<.05*). Further analysis were carried out to find the strength of the association. Phi and Cramer's V tests of association were carried out to find the strength of the association. From Table 4.54 the strength of association between the variables is weak (*P* >.05).

4.14.3.1 Empirical Sub-model

Regression analysis were then used to examine whether green distribution practices can be used to explain firm competitiveness. Green distribution practices were the independent variable and they were not categorical in nature hence the use of regression for further analysis. The aggregate mean score of green distribution practices was regressed against firm competitiveness index and the aggregate mean score of the moderator to find out if there was any interaction effect. To test this hypothesis the following model was used:

FC= $\beta 0 \quad + \beta 3\, GD + \varepsilon$

Where FC is firm competitiveness

β0, β3 are coefficients

GD= Aggregate mean of green distribution constructs

ε =Error term

Table 4.55 shows the results of this regression

Table 4. 55: Regression Results of Green Distribution on Firm Competitiveness

a) Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	.884	.271		3.264	.002
green distribution	.039	.005	.628	7.814	.000
F-statistics					61.057
R^2					.394
Adjusted R^2					.387

a. Dependent Variable: Y dependent

The model fitness found that 39.4% of a firm's competitiveness is explained by green distribution (R^2 =.394, Adjusted R^2 = .387). Using the ANOVA Table the study established the significance of the regression model. In model 1 $F_{(1, 94)} = 61.057$, $p < .05$ shows a significant relationship.

The results indicate that the equation for establishing whether green distribution has a statistically significant effect on firm competitiveness when confined to the standardized coefficient was:

FC = .884 + 0 .628GD

FC represents Firm competitiveness, Green distribution represents green distribution. This model shows that when firms practice green manufacturing it would lead to a 62.8% increase in firm competitiveness. The impact of green distribution on firm competitiveness is thus statistically significant at a significance level of $\alpha = 0.05$ since $p<0.05$ t = 7.814. This means that there is a statistically significant relationship between collective green distribution practices and firm competitiveness.

Hypothesis 3 conclusion: Based on the research findings, green distribution therefore has a statistically significant influence on the competitiveness of food manufacturing firms. The H_0 is therefore rejected while H_a is accepted that, "Green distribution has a statistically significant influence on the competitiveness of food manufacturing firms".

Green distribution activities were divided into green packaging and green logistics in accordance to Muma *et al.* (2014). The findings of green distribution indicate that green packaging such as the use of green packaging materials and bio-degradable packaging materials leads to an increase in sales, quality and delivery of goods as well as reducing the transport costs which increases the profit margins. Ninlawan *et al.* (2010) and Olga (2012) maintain that companies that align their distribution networks experience load and thus transportation efficiency. Toke *et al.* (2010) argue that easy access to information greatly saves on operating costs by cutting down on storage and retrieval movements.

The findings indicate that technology has influenced distribution techniques with more firms using the internet as a distribution channel. This is in resonance with Okello & Were's (2014) finding that technology affects food manufacturing companies to a high extent. Support for green distribution indicates that managers are willing to embrace green distribution by taking control of their own distribution pattern thus reducing the costs of production (Hasan, 2013). This finding is consistent with Muma *et al.* (2014) who indicated a positive relationship between green distribution and environmental performance. Green distribution therefore significantly influences firm competitiveness a finding which concurs with Hasan (2013) who concludes that green distribution has a positive link between environmental innovation and competitive advantage. This finding thus negates the proposed hypothesis that green distribution does not significantly influence firm competitiveness.

4.14.4 Hypothesis 4

The fourth hypothesis to be tested was;

H_{04}; Reverse logistics do not positively influence firm competitiveness among food manufacturing firms in Kenya.

This relationship between reverse logistics and firm competitiveness was tested using the Pearson chi-square goodness of fit test and the results are displayed in Table 4.56

Table 4. 56: Reverse Logistics Chi-Square Tests

Tests		Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square		2399.089[a]	2400	.501
Likelihood Ratio		573.356	2400	1.000
Linear-by-Linear Association		41.753	1	.000
Nominal by Nominal	Phi	5.052		.501
	Cramer's V	.893		.501
N of Valid Cases		94		

a. 2508 cells (100.0%) have expected count less than 5. The minimum expected count is .01.

A Pearson chi-square test was conducted to examine whether there was a relationship between reverse logistic practices and firm competitiveness. The results revealed that there was no significant relationship between the two variables (Chi-square .501, df 2400, *P<.05*). Further analysis were carried out to find the strength of the association. Phi and Cramer's V are both tests of the strength of association. From Table 4.56 the strength of association between the variables is weak (*P* >.05).

4.14.3.1 Empirical Sub-model

Regression analysis was then used to examine whether reverse logistics practices can be used to explain firm competitiveness. Reverse logistics practices were the independent variable and they were not categorical in nature hence the use of regression for further analysis. The aggregate

mean score of reverse logistics practices was regressed against firm competitiveness index. To test this hypothesis the following model was used:

FC = $\beta_4 + \beta 4\, RL + \varepsilon$

Where FC is firm competitiveness

$\beta_4, \beta 4$ are coefficients

RL= Aggregate mean of reverse logistics

ε =Error term

Table 4. 57: Regression Results of Reverse Logistics on Firm Competitiveness

a) Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	1.092	.222		4.915	.000
Reverse logistics	.055	.006	.670	8.658	.000
F-statistics					74.956
R^2					.449
Adjusted R^2					.443

a. Dependent Variable: Y dependent

The model fitness found that 44.9% of a firm's competitiveness is explained by reverse logistics (R^2 =.449 Adjusted R^2 = .443). Using the ANOVA Table the study established the significance of the regression model. The model, $F_{(1, 92)} = 74.956, p < .05$ shows a significant relationship.

The results indicate that the equation for establishing whether reverse logistics have a statistically and positive significant effect on firm competitiveness when confined to the standardized coefficient was:

FC = 1.092 + 0.670RL

FC represents Firm competitiveness, RL represents reverse logistics. This model shows that when firms practice reverse logistics, it would lead to a 67% increase in firm competitiveness. The impact of reverse logistics on firm competitiveness is thus statistically significant at a

significance level of $\alpha = 0.05$ since $p<0.05$, t= *8.658*. This means that there is a statistically significant relationship between collective reverse logistics practices and firm competitiveness.

Hypothesis 4 conclusion: Results from this research finding indicate that reverse logistics therefore has a statistically significant influence on the competitiveness of food manufacturing firms. The H_0 is therefore rejected while H_a is accepted that, "Reverse logistics has a statistically significant positive influence on the competitiveness of food manufacturing firms".

The results indicate that majority of the organizations practiced reverse logistics by controlling the environmental risk, associated with supplier' operations and this lead to an increase in sales. Li *et al,* (2006) argues that the long term objective of GSCM is to integrate all suppliers into the supply chain even as the market share increases. Consequently a chi-square test was done on market share and supplier integration and the results of the test did not demonstrate that the integration of suppliers into the supply chain would cause an increase in the market share: $\chi^2(16) = 21.124$, $p = .174$.

Many of the companies, however, did not have any collection points that encourage consumers to bring back old and unused goods. Those that had collection points also had active recycling programs for materials in all sections and experienced a reduction in the cost of production by reducing the amount of new/ virgin materials outsourced. This finding is parallel to Ashby *et al.* (2012) who point out that waste management leads to maximum utilization of used products. Waste management also leads to cost saving and enhances competitiveness a finding that has been collaborated in this study. One way of persuading both the producers and the consumers to reuse their waste is by encouraging firms to have collection points convenient to consumers that will help them to bring back old and unused products.

Support for reverse logistics and firm competitiveness indicates that managers have realised that having collection schemes to collect products could lead to reduced cost of producing new ones. This also indicates that mangers who had collection points had realised the hidden value and the positive financial effect of reverse logistics strategies. This is a finding that has been supported by Cheruiyot *et al*. (2014) and Hu & Hsu (2010) who further suggest that collection schemes should be classified according to where the material is separated, whether at source by the

consumer or by the producer as mixed waste. According to Hu & Hsu, (2010) GSCM issue is very significant and relevant as recent studies show that reverse logistics is gaining momentum in manufacturing. Reverse logistics therefore significantly influences firm competitiveness. This finding thus negates the proposed hypothesis that reverse logistics do not positively influence firm competitiveness.

4.14.3.2. Complete Empirical model

This study further investigated the combined effect of green supply chain management practices on firm competitiveness. The hypothesis that was tested is:

H_0 : Green supply chain management practices do not positively influence firm competitiveness among food manufacturing firms in Kenya.

Results of the regression analysis are presented in Table 4.66 below which illustrates the model fitness of the regression equation that was used to explain the relationship between GSCM practices and firm competitiveness. To test this hypothesis the following model was used:

$$FC = \beta_0 + \beta_1 \chi_1 + \beta_2 \chi_2 + \beta_3 \chi_3 + \beta_4 \chi_4 + \varepsilon$$

Where: β_0 = Constant

χ_1 = Aggregate mean of Green purchasing constructs

χ_2 = Aggregate mean of Green production constructs

χ_3 = Aggregate mean of Green distribution constructs

χ_4 = Aggregate mean of Reverse logistics

ε = Error term retain

β_i = The coefficient associated with $\chi_i \ (i = 1, 2.....5)$

Table 4. 58: Regression Results of Green Supply Chain Management practices on firm competitiveness

a) Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.765[a]	.586	.567	.49324

a. Predictors: (Constant), Reverse logistics, green purchasing, green distribution, green manufacturing

The model fitness found that 58.6% of a firm's competitiveness is explained by combined green supply chain practices (R^2 =.586 Adjusted R^2 = .567).

b) ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
	Regression	29.916	4	7.479	30.741	.000[b]
	Residual	21.166	87	.243		
	Total	51.082	91			

a. Dependent Variable: Y dependent
b. Predictors: (Constant), Reverse logistics, green purchasing, green distribution, green manufacturing

Using the ANOVA Table the study established the significance of the regression model. The model, $F_{(4, 87)} = 30.741, p < .05$ shows a significant relationship.

The column labelled *F* in the table above gives the overall *F*-test of the hypothesis that;

H_0: $\beta_1 = \beta_2 = \beta_3 = \beta_4 = 0$ versus;

H_a: at least one of $\beta_1 = \beta_2 = \beta_3 = \beta_4 = 0$ does not equal to zero where $\beta_1 = \beta_2 = \beta_3 = \beta_4$ are coefficients of X_1, X_2, X_3 and X_4 respectively.

The prediction model is statistically significant, $F_{(4, 87)} = 30.741$, and has the associated *p*-value of 0.000. Since 0.000 *is < 0.05*, we reject H_0 at significance level 0.05. This is to say that at least none of the regressor coefficients are equal to zero.

c) Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	-.006	.287		-.021	.984
green purchasing	.029	.013	.221	2.193	.031
green manufacturing	-.001	.009	-.014	-.124	.902
green distribution	.018	.008	.265	2.344	.021
Reverse logistics	.036	.008	.413	4.485	.000

a. Dependent Variable: Y dependent

The results indicate that the equation for establishing whether green supply chain practices have a statistically and positive significant effect on firm competitiveness when confined to the standardized coefficient was:

$FC = -0.006 + 0.221X_1 - 0.014X_2 + 0.265X_3 + 0.413X_4$

FC represents Firm competitiveness, X_1 represents green purchasing, X_2 represents green manufacturing, X_3 represents green distribution and X_4 represents reverse logistics. This model shows that holding all factors constant firm competitiveness is - 0.006. However when firms practice green purchasing firm competitiveness is increased by 22.1% holding other factors constant. Holding other factors constant green manufacturing if employed, would further decrease firm competitiveness. Green distribution would increase firm competitiveness by 26.5% if used by a firm holding other factors constant whereas reverse logistics would lead to a 41.3 % increase in firm competitiveness holding other factors constant. The impact of green purchasing, green distribution and reverse logistics have a statistically significant influence on firm competitiveness at a significance level of $\alpha = 0.05$ since $p<0.05$. This means that there is a statistically significant positive relationship between collective GSCM practices and firm competitiveness.

4.14.5 Hypothesis 5

The final hypothesis to be tested was:

H_{05}; Green supply chain management drivers have no effect on the relationship between green supply chain practices and firm competitiveness.

A moderator variable changes the strength of an effect or relationship between two variables. Moderators indicate when or under what conditions a particular effect can be expected. A moderator may increase the strength of a relationship, decrease the strength of a relationship, or change the direction of a relationship. In the classic case, a relationship between two variables is significant (non-zero) under one level of the moderator and zero under the other level of the moderator. The hierarchical multiple regression appears to be the preferred statistical method for examining moderator effects when either the predictor or the moderator variable (or both) is measured on a continuous or ordinal scale (Frazier, Tix, and Barron, 2004). In this study all the independent variables and the moderator were measured on a likert scale.

Results of the regression analysis are presented in Table 4.59 which illustrates the model fitness of the regression equation that was used to explain the relationship. An aggregate mean score of green purchasing, green production, green manufacturing and reverse logistics was regressed against the composite index of firm competitiveness and the moderator. To test the above hypothesis the following model was used:

$$Y = \beta_0 + \beta_i X_i + \beta_5 M + \varepsilon$$

Where: Y = Firm Competitiveness

β_0= Constant Term

X_i = composite index of all the independent variables

M = model moderator

ε = Error term

Table 4. 59: Regression Results of the Moderating Effects of Green Supply Chain Drivers on the Relationship between Green Supply Chain Practices and Firm Competitiveness

a) Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.753[a]	.567	.562	.49577	.567	117.826	1	90	.000
2	.788[b]	.621	.612	.46656	.054	12.625	1	89	.001

a. Predictors: (Constant), GSCMP
b. Predictors: (Constant), GSCMP, moderating variable (Z)

The model fitness found that before moderation the effect of green supply chain practices on firm competitiveness was 56.7% as explained by the composite index of green supply chain practices (R^2 =.567 Adjusted R^2 = .562). Model 2 shows that with the interaction of the moderator, green supply chain practices accounted for significantly more variance on firm competitiveness (R^2 change = .054, Adjusted R^2 = .612, $p < .05$). In addition the moderating variables improved the strength of the relationship between green supply chain practices and firm performance as shown by the positive change of R and Adjusted R^2 (R from .753 to .788; Adjusted R^2 from .562 to .612). The percentage increase in the variation explained by the addition of the interaction term was 5.4%.

b) ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	28.961	1	28.961	117.826	.000[b]
	Residual	22.121	90	.246		
	Total	51.082	91			
2	Regression	31.709	2	15.854	72.835	.000[c]
	Residual	19.373	89	.218		
	Total	51.082	91			

a. Dependent Variable: Y dependent
b. Predictors: (Constant), GSCMP
c. Predictors: (Constant), GSCMP, moderating variable (Z)

Using the Anova table the study established the significance of the regression model. In model 1 $F_{(1, 90)} = 117.83$, $p < .001$ shows a significant relationship without the interaction variable. Model 2 with the interaction term is also significant for $F_{(2, 89)} = 72.84$ and has a p value < $.000$. The study used ANOVA to establish the significance of the regression model from which an F-significance value of $p<0.001$ was established. This shows that the regression model has a less than 0.001 chance of giving a wrong prediction.

c) Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.057	.282		-.203	.839
	GSCMP	.848	.078	.753	10.855	.000
2	(Constant)	-.172	.267		-.644	.521
	GSCMP	.457	.132	.406	3.459	.001
	moderating variable	.015	.004	.417	3.553	.001

a. Dependent Variable: Y dependent

The results indicate that the equation for establishing that green supply chain management drivers have no effect on the relationship between green supply chain practices and firm competitiveness when confined to the standardized coefficient was:

$Y = -1.72 + 0.406X_i + 0.417M$

Y represents firm competitiveness, X_1 represents GSCM practices index, and M the model moderator. The overall model was significant $R^2 = 0.567$, $F_{(2, 89)} = 72.84$, $p=0.000$ and a significance level of a=.000.

The model illustrates that when all the variables are held at zero, the value of firm competitiveness would be – 1.72. However, holding other factors constant, a unit increase in any of the green purchasing practice would lead to a .406 increase in firm competitiveness. This

shows that there is a positive and significant relationship between firm competitiveness and green supply chain practices. Model 2 shows that the relationship between green supply chain practices and firm competitiveness is moderated by the green supply chain drivers.

Conclusion -hypothesis 5: The result in this research indicated that, green supply chain management drivers have a statistically significant effect on the relationship between green supply chain practices and firm competitiveness. The researcher therefore rejects the null hypothesis "Green supply chain management drivers have no statistically significant effect on the relationship between green supply chain practices and the competitiveness of food manufacturing firms" while H_a is accepted that, "Green Supply Chain practices have a statistically significant positive influence on the competitiveness of food manufacturing firms".

According to these results industrial regulation plays a more important role than government regulations towards a company's adoption of green supply chain practices. These findings are contradict those of Zhu *et al*. (2008) and Varsei *et al.* (2014), who state that governments try to mitigate environmental issues by enacting tighter environmental regulatory legislations thus leading the way in greening the supply chains. These researchers indicate that the pressure on enterprises to adopt green supply chain management practices mainly comes from the government environmental regulations factors.

According to the results posted in this study, competitors are more influential than customers towards a company's adoption of green supply chain practices. This finding contradicts many other researchers who argue that customers are more influential than competitors (Simchi-Levi *et al.*, 2008; Chopra & Meindl, 2012; and Varsei *et al*, 2014). For instance, Chopra & Meindl, (2012) indicate that customers have a larger effect on enterprises' adoption of green supply chain management practices than suppliers or customers. However this finding is similar to Chang *et al.* (2013) who found that customers do not influence companies to adopt GSCM practices.

Internal pressures consisted of technology, firm attributes such as the vision, mission statement as well as employee influence. Of these, employee influence and technology are more influential towards adoption of GSCM practices by a company. Both employees and technology are

resources according to the resource base viewpoint, and firms need to ensure that they have the potential to implement GSCM in terms of cost, quality and culture (Varsei *et al*, 2014). Of the two, according to this study, employees are a greater strength than technology. This finding supports that found by Liu *et al.* (2012) who indicated that employees play a very significant role in the adoption of GSCM practices. It was also interesting to note that the firms which practised GSCM to a larger extent also prepared and issued periodical and voluntary environmental reporting to the public and environmental bodies. This can be attributed to the fact that these organizations are more aware of the benefits of GSCM practices as revealed through an in-depth interview.

4.12 Chapter summary

This chapter presented the results of the study. The background of the respondents was examined. Hierarchical multiple regression analysis was carried out on the four attributes of green supply chain management perspectives. A regression model was then carried out to find out which of the four variables had a significant impact on firm competitiveness. This model picked out green purchasing (t = 2.193, *p =0.031)*, reverse logistics (t = 4.485, *p =0.000*) and green distribution (t =2.344, *p*= .021) while green production (t = -.124, *p*= .902) was found not to have a significant effect on firm competitiveness. The overall model explained 61.9 percent of variance in overall firm competitiveness was statistically significant, $F_{(4, 87)} = 30.741$, $p < .05$. The result of the tests of the five hypotheses was presented and tested using the *F*-test.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

The purpose of this study was to examine the green supply chain management practices and their effect on the competitiveness of food manufacturing firms in Kenya. Specifically the researcher wanted to examine which of the GSCM practices best influences firm competitiveness. The main aim of this chapter was to present the summary, conclusions and recommendations for the effect of GSCM practices on firm competitiveness, and to suggest studies for future research with regards to the results of the study. The content of this chapter is based on the research questions, research objectives and the hypotheses of the study.

5.2 Summary of Findings

This section presents the research findings.

5.2.1 Relationship between green purchasing and firm competitiveness.

The first objective was to examine the extent to which green purchasing influences the competitiveness of Kenya's food manufacturing firms. To achieve this objective respondents were asked to indicate their level of agreement to various green purchasing activities. These activities included supplier selection, material selection, out-sourcing and supplier involvement in design. The study hypothesized that there was no statistically significant relationship between green purchasing and firm competitiveness. The results showed that there was a significant relationship between green purchasing and firm competitiveness. As shown in Table 5.1 the null hypothesis was rejected and the alternative hypothesis accepted. Using the standardized coefficient green purchasing had a beta value of .221 with a t value of 2.193 and p=.031. Since p is < 0.05, we reject H_0 at significance level 0.05.

5.2.2 Relationship between green production and firm competitiveness

This objective analyzed the degree to which green production affects the competitiveness of Kenya's food manufacturing firms. To achieve this objective respondents were asked to indicate their level of agreement to various green production activities. Green production/ manufacturing

activities included the use of bio-degradable energy, recycling of raw materials, green environmental strategies and ISO certification. The study hypothesized that there was no statistically significant relationship between green production and firm competitiveness. The results showed that there was a significant relationship between green production and firm competitiveness. As shown in Table 5.1 the null hypothesis was rejected and the alternative hypothesis accepted. Using the chi-square results there was a significant relationship between green production and firm competitiveness (Chi-square .005, df 2925, $P< .05$). Since p is < 0.05, we reject H_0 at significance level 0.05.

5.2.3 Relationship between green distribution and firm competitiveness

The third objective was to assess the extent to which green distribution practices impels the competitiveness of Kenya's food manufacturing firms. To achieve this objective respondents were asked to indicate their level of agreement to various green distribution activities. The study hypothesized that there was no statistically significant relationship between green distribution and firm competitiveness. The results showed that there was a significant relationship between green distribution and firm competitiveness. As shown in Table 5.1 the null hypothesis was rejected and the alternative hypothesis accepted. Using the chi-square results there was a significant relationship between green distribution and firm competitiveness (Chi-square .123, df 2812, $P<.05$). Since p is < 0.05, we reject H_0 at significance level 0.05.

5.2.4 Relationship between reverse logistics and firm competitiveness

This objective examined how reverse logistics contribute towards the competitiveness of Kenya's food manufacturing firms. To achieve this particular objective, respondents were asked to indicate their level of agreement to various reverse logistics activities. Reverse logistics was divided into Product reuse/ take back packaging, remanufacturing/product recovery, and recycling of materials. The study hypothesized that there was no statistically significant relationship between reverse logistics and firm competitiveness. The results showed that there was a significant relationship between reverse logistics and firm competitiveness holding other factors constant. As shown in Table 5.1 the null hypothesis was rejected and the alternative

hypothesis accepted. Using the standardized coefficient reverse logistics had a beta value of .413 with a t value of 4.485 and p=.000. Since p is < 0.05, we reject H_0 at significance level 0.05.

5.2.5 Moderation effect of green supply chain management drivers on the relationship between green supply chain practices and firm competitiveness.

The final objective was to investigate the moderation effect of green supply chain drivers on the relationship between green supply chain practices and firm competitiveness. To achieve this objective the moderating variable was divided into two large themes and the respondents were asked to indicate their level of agreement in response to the activities mentioned. The two themes were external pressures and internal pressures. The study hypothesized that green supply chain management drivers have no statistically significant effect on the relationship between green supply chain practices and firm competitiveness. The results showed that the moderating variables improved the strength of the relationship between green supply chain practices and firm performance. As shown in Table 5.1 the null hypothesis was rejected and the alternative hypothesis accepted that, "Green Supply Chain practices have a statistically significant positive influence on the competitiveness of food manufacturing firms". Using the standardized coefficient green supply chain drivers had a beta value of .417 with a t value of 3.553 and p=.001. Since p is < 0.05, we reject H_0 at significance level 0.05.

A summary of the research findings are presented in Table 5.1

Table 5. 1: Summary of research findings

Research objective	Hypothesis	Results of hypothesis test
Objective 1 Examine the extent to which green purchasing influences the competitiveness of food manufacturing firms in Kenya	**Hypothesis 1** Green purchasing has no statistically significant influence on the competitiveness of food manufacturing firms in Kenya	**Rejected**
Objective 2. Analyze the degree to which green production affects the competitiveness of food manufacturing firms in Kenya	**Hypothesis 2** Green production has no statistically significant influence on the competitiveness of food manufacturing firms in Kenya	**Rejected**
Objective 3 Assess the extent to which green distribution practices impels the competitiveness of food manufacturing firms in Kenya	**Hypothesis 3** Green distribution practices do not positively influence the competitiveness of food manufacturing firms in Kenya	**Rejected**
Objective 4 Examine how reverse logistics contribute towards the competitiveness of food manufacturing firms in Kenya	**Hypothesis 4** Reverse logistics do not positively influence the competitiveness of food manufacturing firms in Kenya	**Rejected**
Objective 5 Investigate the moderation effect of green supply chain drivers on the relationship between green supply chain practices and the competitiveness of food manufacturing firms in Kenya	**Hypothesis 5** Green supply chain management drivers have no statistically significant effect on the relationship between green supply chain practices and the competitiveness of food manufacturing firms	**Rejected**

Source: Researcher 2015

5.3 Conclusions of the Study

The study sought to analyse the relationship between Green Supply Chain Management practices and the competitiveness of Kenya's food manufacturing firms. This study concludes that green purchasing affects firm competitiveness positively. With a *p*-value of *031* it indicates that the results are significant at α= 5%. The most significant aspect of green purchasing was "company demands environmental standards certification from suppliers which enhanced delivery of

goods". This had a factor loading of .810 which was very significant. Holding other factors constant, green purchasing contributes 2.9% to firm competitiveness.

This study further concludes that there was a significant relationship between green production and firm competitiveness. The chi-square results revealed that there was a significant relationship between the two variables (Chi-square .005, df 2925, $p < .05$). Phi and Cramer's V tests of strength of association revealed that the association between the variables was strong ($P < .05$).

Additionally this study deduced that holding all other factors constant green distribution influences firm competitiveness by 26.5%. With a *p* value of *.021* it indicates that the results are significant at $\alpha = 5\%$. Use of IT went a long way to reduce the distribution costs and enhance firm competitiveness as seen from the factor loading which were all above .70. Packaging reuse and recyclability were also seen to enhance firm competitiveness and should therefore be encouraged to enhance sustainability.

Based on the research findings the study concluded that there is a significant positive relationship between reverse logistics and firm competitiveness. Holding all other factors constant reverse logistics contribute about 41.3 % towards firm competitiveness with a *p*-value *<0.000.* When companies used recycled raw materials, the quality of their products was improved and so did the integration of suppliers into the supply chain. Not many companies had collection points through which customers would drop off old or unused products something that needs to be addressed either through regulations, public awareness programs or otherwise. Remanufacturing and re-use of parts and components were the most significant aspects of reverse logistics that food manufacturing firms used to enhance firm competitiveness.

This study further concluded that of all the aspects of GSCM practices, green purchasing (t = 2.193), green distribution (t = 2.344) and reverse logistics (t = 4.485) were the most important influencers of firm competitiveness all with a *p*-value *< 0.05.* This indicates that the results are significant at $\alpha = 5\%$. This shows that the three attributes of GSCM can be used as a starting point for firms that would want to go green thus increasing their competitiveness.

5.4 Implications of Research Findings on Practice

Every study findings has certain implications either on practice or theory or both. This study has certain implications on practice both policy and managerial aspects.

5.4.1 Managerial Implications

The research results showed that green supply chain practices significantly influenced firm competitiveness in general. Specifically the study recommends:

Food manufacturing firms should incorporate environmental efficiency as a best practice in supplier selection. Currently 18% of the food manufacturers consider use of green materials, pollution control and prevention, green design and environmental efficiency of their suppliers. Enhanced collaboration between manufacturers and suppliers for environmental objectives will reduce the environmental impact manufacturing firms and will go a long way in reducing the greenhouse gas effect.

Managerial and staff expertise were found to contribute a total of 11% towards the adoption of GSCM practices. Additionally 34% of the companies used employee incentive programs to encourage green activities. Consequently it is the recommendation of this study that organizational mangers should use more employee incentives as a means of encouraging the adoption of green activities. Managers can also appreciate environmental issues by embracing voluntary periodical reporting to environmental bodies and the general public. This will enhancing self-governance of the various organizations and will also enhance cost saving, lower prices and increased market share and firm competitiveness as was noted by 39% of the firms that embraced voluntary periodical reporting. Publishing environmental reports enhances communication between a firm and its stakeholders and translates into improved profits for the shareholders and enhance a win-win situation for all the stakeholders.

Green manufacturing/ production included the use of bio-degradable energy, recycling of raw materials, and adoption of green environmental strategies such as pollution control and prevention. This study noted that only 43.7% of the companies engaged in raw material recycling and 65% engaged the use of biodegradable energy. Yet organizations that adopted the use of

cleaner technologies in their manufacturing activities experienced increased profits, 24% and reduced costs of production, 62%. This study thus recommends organizations to act proactively so as to improve the operational efficiency of production as competition has become more competitive.

This study found that 46% of the companies engaged in "product take backs" and of these companies 49% of them engaged in any re-use option. It was also noted that many firms did not have collection points that encouraged consumers to bring back old or unused products. There was thus no connection between the adoption and the practice of reverse logistics as many firms did not even have collection points to facilitate collection of used packaging from their customers. This study recommends that measures to facilitate collection of used packaging and expired products should be instituted within the country. This can be done by having collection points where customers could drop off used containers and expired products. These measures would complete the reverse logistics loop fully, thereby reducing the firms' negative environmental impact.

Where firms had employees that were knowledgeable about green supply chain practices, these adopted GSCM practices to a great extent (r= .508, P= .000). Active involvement of employees will lead to continual improvement of environmental performance by organizations. This study recommends that employees should be trained on environmental issues and when employing, employees should be knowledgeable about green practices as those that had employed environmentally conscious employees were found to have adopted GSCM practices to a larger extent.

5.4.2 Policy Implications

To be able to control environmental degradation and enhance sustainability the government and relevant industrial policy makers should come up with incentives that would encourage the adoption of GSCM practices by all manufacturing firms within the country and not only food manufacturers. However government regulations influenced adoption weakly (r=.385, p= .000) as compared to industrial regulations (r= .565, p= .000). It was therefore the recommendation of

this study that industrial policy makers should more strongly enhance the adoption of GSCM practices of the industries under their watch.

Customers' influence of GSCM practices was noted as significant as 50% influenced a firms' adoption of GSCM practices. The government should be encouraged to continue with public awareness campaigns on the importance of environmental conservation. This will encourage the locals to consume goods that are environmentally friendly. As a result consumers will become active drivers towards the adoption of GSCM practices by the various firms as is experienced in other industrialized countries. This will go a long way in eliminating the challenge that companies have towards the adoption of reverse logistics. Legislative regulations should be enacted urgently if reverse supply chain management is to be fully and successfully implemented. This should be done in addition to public campaigns on the benefits of product recovery activities.

5.4.3 Contributions to Knowledge

This study sought to contribute to the social network theory. Using the notion of centrality, the study showed that organizations can control the products they take- back for re-use from their customers thus reducing harmful effects on the environment. A firm in the social network is also able to control the flow of information both into and out of the organization. This is proved by the claim that many firms had adopted reverse logistics but they did not have collection points that were convenient to the consumers.

This study further supported the RBT by indicating that those firms that had adopted voluntary environmental reporting exhibited more adoption of GSCM practices. Voluntary periodical reporting proved to be a strategic resource that linked firms to green practices in their operations. This study further sought to fill a contextual gap by including food manufacturing firms that had other ISO certifications and not only ISO 14001. This gap was filled and the study found that food manufacturing firms in general did practice some form of GSCM in a bid to enhance environmental sustainability.

This study has contributed to the literature available on GSCM practices in Kenya as well as providing empirical evidence. For instance, unlike other industries like automobile and electronics where reverse logistics were found to reduce costs, food manufacturing firms in Kenya had not adopted reverse logistic practices. Food manufacturing firms in Kenya need to be more competitive and one way of reducing costs is by adopting reverse logistics such as containers. This study has not only used regression as a method of analysing the relationship between GSCM practices and firm competitiveness but in addition Chi-square has been used to show whether or not there is a relationship between the two variables.

5.5 Limitations of the Study

Like all other studies this one too had certain limitations. The study did not attain 100% response rate due to the unwillingness and unavailability of some of the targeted respondents. This study only focused on those food manufacturing firms that were listed in the KAM directory based on the assumption that they were the most likely to be knowledgeable about GSCM. This assumption could have been wrong as other food manufacturing firms not listed in the KAM directory may also have this knowledge.

This research relied on the perceptions of the people within the organization especially the marketing and the financial managers. Nonetheless this constraint may not be applicable to all the variables of this research study for, as Baker and Sinkula (2005) argue, subjective performance measures are highly correlated with objective measures (López-Rodríguez, 2009). These limitations did not negatively affect the quality of the study. Thus the study has made a significant contribution to the existing body of knowledge found in Kenya.

5.6 Recommendations for Further Study

The areas of further study that were identified in this study include studies that relate GSCM to the integration of economic, environmental and social performance; the supporting role of organizational culture in the adoption of GSCM and a similar study should be carried out based on people outside the various companies such as a company's suppliers. Other manufacturing sectors in Kenya should also be studied in respect to GSCM practices to verify that the findings are generalizable.

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APPENDICIES

APPENDIX I: RESEARCH QUESTIONNAIRE

STATEMENT OF CONFIDENTIALITY

The questionnaire is designed to collect data on green supply chain management practices, in Kenya. The data will be used for academic purposes only and will be treated with strict confidence. I will therefore be grateful if you take a few minutes of your busy time to respond to the questions/statements presented in the questionnaire.

Section 1: DEMOGRAPHIC AND RESPONDENTS PROFILE

Q1. Name of the Respondent (optional) ……

- Gender: Male [ ] Female [ ]
- What is your age in years?

  Below 30 ☐ 30-35 years ☐ 35- 40 years ☐ 40-45 years ☐ 45-50 years ☐

  Above 50 years ☐
- What is your level of formal education?

  Secondary school leaver ☐ Diploma holder ☐ Undergraduate ☐

  Postgraduate/ Master's degree ☐
- Name of the organization and town where located

  _____
- What products does your organization produce?

  _____

  _____
- What type of production system does your organization have?

  Labour intensive ☐ Capital intensive ☐
- For how long has your organization been in existence? _____ Years
- Length of continuous service with the organization? _____ Years

- Please indicate your position in the organization

  _____

- Please indicate the total number of employees in this organization :

  Permanent _____Contract _____ Casual _____

- Is your organization:

  Privately/ locally owned ☐ Parastatal ☐

  Multinational ☐ Public company ☐

  Other (please specify)

  _____

- What ISO certifications has your company attained?

14001 ☐ 22001-2 ☐ 28000 ☐ 3676 ☐ 9001 ☐

10004 ☐

Any other please specify

_____

_____

Q2 (a) Please indicate the approximate proportion of market share that your company commands in the industry by ticking appropriately (one tick):

Less than 10% ☐ 11 to 20% ☐

21 to 30% ☐ 31 to 40% ☐

More than 41% ☐

b). Based on the market share indicated in Q2 (a) above, what proportion of the market share can you attribute to your adoption of green marketing practices:

Less than 5 % ☐ 6 to 10% ☐

11 to 20% ☐ 21 to 30% ☐

More than 31% ☐

Section 2: GREEN SUPPLY CHAIN MANAGEMENT PRACTICES (GSCM)

The following section relates to questions about green supply chain practices that your organization may have adopted.

Part A: Green purchasing

Q3. Which of the following practices does your company use to select its main suppliers?

Green materials coding & recording ☐ Capability of green design ☐ Quality ☐

Technology capability ☐ Pollution control ☐ Pollution prevention ☐

Environmental efficiency ☐ Green image ☐ Green products ☐

Price ☐

Any other please specify _____

Qb. Does the company use environmentally certified suppliers? Yes ☐ No ☐

If so, what is the ISO certification of the main suppliers?

_____

_____

_____

_____

_____

Qc. Does your organization jointly collaborate with its main suppliers to develop cleaner technologies and processes? Yes ☐ No ☐

Qd. If your answer to question 'c' is yes name the areas where there is collaboration

Company	Type of collaboration

Qe. Where are the company's main suppliers found?

Locally ☐ Abroad ☐ Both ☐

Qf. What criteria does your company use to select the raw materials for the production of its goods?

Quality ☐ Technical expertise ☐ Proximity ☐ Environment ☐

Price ☐

Any other please specify

_____

Qg. Does your organization conduct supplier environmental audits so as to monitor supplier compliance to environmental standards and requirements? Yes ☐ No ☐

Qh. If so how often are the environmental audits conducted?

Annually ☐ after 2years ☐ after 3 years ☐

After 4 years ☐ after 5 years ☐

Qi. Does the company involve itself in obtaining products or services from other companies?

Yes ☐ No ☐

Qj. If your answer to the above question is 'yes' kindly indicate the type of products or services that your company outsources.

_____
_____
_____
_____
_____

Please indicate with a tick (√) the extent to which your organization has been practicing the following green purchasing practices. Use the scale to tick the most appropriate response where: **5) Strongly agree 4) Agree 3) Moderate extent 2) Disagree 1) Strongly disagree**

Green purchasing	**5**	**4**	**3**	**2**	**1**
Your company is able to improve the quality of its products by providing design specification to suppliers that include environmental requirements when purchasing an item					
The cooperation you have with suppliers for environmental objectives enables the company reduce the costs of production					
Your company emphasizes on suppliers who take environmental concerns seriously thus enhancing flexibility					
You have cooperation with suppliers for green packaging which increases the market share					

Your company carries out environmental audit for suppliers' internal management thus enhancing the quality of goods supplied					
Your company demands environmental standards certification from suppliers which has enhanced delivery of goods					
Your company uses sustainable sources of raw materials which has improved the profit levels of the company					
Your company outsources certain products or/ and services thus reducing operational costs					

PART B: GREEN MANUFACTURING

Q4. Does your company engage in any form of raw material recycling? Yes ☐ No ☐

Qb. If your answer to the question above(Q4) is 'yes' to what extent does your company use recycled raw materials

Less than 5% ☐ 5 to 10% ☐ 10 to 20 % ☐

20 to 30% ☐ 30 to 40% ☐ 40 to 50% ☐

More than 50% ☐

Qc. Which type of bio-degradable energy named below is used by your company.

None ☐ Solar ☐ Wind ☐ Biogas ☐ Water ☐

Any other please specify

_____

Qd. What are the green environmental strategies adopted by your company?

Waste minimization ☐ Equipment modifications ☐ Product redesign ☐

Procedure modifications ☐ Substitution of raw materials ☐ Waste treatment ☐

Any other please specify

_____

_____

Qe. Which of the following influences the adoption of Green Supply Chain Management in your organization?

Cost ☐ Managerial expertise ☐ Staff expertise ☐ customers ☐

government regulations ☐ Industrial regulations ☐

Any other please specify_____

Qf. Once installed does the company require to maintain the technology?

Yes ☐ No ☐

Qg. What percentage of the total costs incurred goes towards maintaining the clean technologies in the company?

Less than 5% ☐ 5 to 10% ☐ 11 to 15% ☐

16 to 20% ☐ 21 to 25 % ☐ more than 26% ☐

Please indicate with a tick (√) the extent to which your organization has been practicing the following green manufacturing. Use the scale to tick the most appropriate response where: **5) Strongly agree 4) Agree 3) Moderate extent 2) Disagree 1) Strongly disagree**

Green Manufacturing/ Production	**5**	**4**	**3**	**2**	**1**
The company's pollution prevention strategy has led to increased market share					
The company's attainment of ISO 14001 certification on the environmental maintenance has led to increase in sales					
The company has complied with particular regulations such as emissions, and other zero emission strategies thus reducing cost of production					
The company controls its pollution at the end of the pipe by treating its effluents and/or installation of dust collectors thus increasing market share					
The quality of products produced is improved when the organization organises regular environmental training courses for management and all the employees					
The organization uses employees incentive programs to encourage green activities/suggestions thus enhancing flexibility of production					
The company's use of sustainable sources of energy such as solar and wind has led to reduced costs of production					
The company's use of products that are safe for disposal(which rot naturally) which has led to an increase in market share					
Your company has improved the quality of products by providing goods that can be re-consumed or used for an extended period of					

time in service provision					
Your company use of cleaner technologies in its manufacturing activities has led to increased profits for the organization					
The company organizes green supply chain seminars and workshops which helps to improve the quality of products produced					
The company makes use of recycled raw materials which reduces cost of production					

PART C: GREEN DISTRIBUTION

Q5. Which of the following channels of distribution does your company use?

Website/catalogue ☐ Wholesaler/Retailer/consumer ☐ Agents ☐ Telemarketing ☐

Field Sales team ☐

Any other please specify

_____

_____

Qb. What percentage of the total costs incurred goes towards distribution?

Less than 5% ☐ 5 to 10% ☐ 11 to 15% ☐

16 to 20% ☐ more than 21% ☐ ☐

Qc. Which of the following green environmental distribution strategies does your organization use

Powering warehouses with hydro, wind or solar power ☐

Employing fleets run by alternative fuels ☐

Using alternative distribution methods such as rail ☐

Building distribution centres close to where goods are delivered ☐

Forming partnerships with local distributors to reduce the miles driven ☐

Labelling of green products ☐

Qd. Of the total costs incurred by the company, what percentage of these costs is attributed to the green distribution strategies named above?

Less than 5% ☐ 10 to 15% ☐ 16 to 20% ☐

21 to 25% ☐ more than 25% ☐

Qe. Who are the company's major customers?
Other businesses ☐ sell direct to customers ☐

Qf. How often does the company carry out customer satisfaction survey's
Never ☐ Yearly ☐ after two years ☐ After three years ☐ every five years ☐

Qg. In its distribution of products does the company use any bio-degradable packaging material? Yes ☐ No ☐

Qh. Does the company package goods in: large quantities ☐ Small quantities ☐

or Both ☐

Qi. Has the company's packaging of products increased the number of goods that can be transported in a single trip? Yes ☐ No ☐

If the answer to the above question is 'yes' then answer the following two questions

Qi1. To what extent have the vehicle loadings improved?

Less than 5% ☐ 10 to 15% ☐ 16 to 20% ☐

21 to 25% ☐ more than 25% ☐

Qi2. To what extent has the warehouse utilization improved due to improved packaging?

Less than 5% ☐ 5% to 10% ☐ 11 to 15% ☐

16 to 20% ☐ more than 20% ☐

Please indicate with a tick (√) the extent to which your organization has been practicing the following green distribution practices. Use the scale to tick the most appropriate response where: **5) Strongly agree 4) Agree 3) Moderate extent 2) Disagree 1) Strongly disagree**

Green Distribution	**5**	**4**	**3**	**2**	**1**
The organization uses minimum transportation packaging materials to preserve the natural resources which has reduced the costs of transportation					
The organization applies packaging made of recyclable materials					

enhancing quality of goods					
	5	**4**	**3**	**2**	**1**
The organization's profit margins increased when it reduced the material required to offer services to customers (dematerializes)					
The organization packaging materials are bio-degradable which has increased sales					
The organization uses minimum packaging materials on the products to preserve the natural resources which increases delivery of goods					
The organization uses local products to reduce transportation costs					
The organization's warehouse has been rearranged leading to better utilization of space which has led to reduced costs					
The amount of handling of goods has been minimised to increase flexibility in delivery					
The organization applies the internet as a major channel of distribution reducing distribution costs					
Use of IT has helped increase flexibility in the distribution of goods					
Use of IT has helped increase the market share of goods					
The company's financial position has improved due to the use of IT					
The organization redesigns logistical system components for greater efficiency in delivery of goods					
The organization's distribution costs have been greatly reduced per unit					
The organization uses green label as an indicator of environmental friendliness thus increasing sales					

PART D: REVERSE LOGISTICS

Q6. Which of the following products does your company take back from the consumers?

Packaging materials/wrappings ☐ Containers ☐ unsold products ☐

End-of-life products ☐

Qb. Which of the following re-use options does your company engage in?

Reuse of assemblies ☐ Reuse of components ☐

Reuse of raw materials ☐ System reuse ☐ None ☐

Qd. Which of the following options of product recovery does your company engage in?

Repairing ☐ Refurbishing ☐ Remanufacturing ☐

Cannibalizing ☐ Recycling ☐ None ☐

any other specify _____

Qe. To what extent does the waste product recycling save on costs of production?

Less than 10% ☐ 10 to 20% ☐ 20 to 30% ☐

30 to 40% ☐ more than 40% ☐

Qf. Does the company have any collection points to encourage consumers to bring back old and unused goods/products? Yes ☐ No ☐

Qg. How convenient are the collection points to;

i) The consumers:
Very convenient ☐ moderately convenient ☐ inconvenient ☐

ii) The company
Very convenient ☐ moderately convenient ☐ inconvenient ☐

Qh. To what extent has the use of reverse logistics described above led to the reduction of costs in acquiring new/ virgin raw materials?

Less than 5% ☐ 6 to 10% ☐ 11 to 15% ☐

16 to 20% ☐ more than 20% ☐

Please indicate with a tick (√) the extent to which your organization has been practicing the following reverse logistics practices. Use the scale to tick the most appropriate response where:
5) Strongly agree 4) Agree 3) Moderate extent 2) Disagree 1) Strongly disagree

Reverse logistics and outbound logistics	**5**	**4**	**3**	**2**	**1**
The company has an active recycling program for materials in all sections which has contributed to reduced cost of production					
The company reuses parts and components to improve quality of goods					
The company manages reverse flow of material, environment-					

packaging and distribution increasing sales					
The company controls environmental risk associated with suppliers operations increasing sales					
The company assures proper utilization of materials by customers enhancing market share					
The company buys repairable products increasing market share					
The company applies reverse channel systems to allow the consumers to return the used products or packaging materials back to the company increasing flexibility					
The company redesigns logistical system components for greater environmental efficiency and improved delivery services					
The company has integrated suppliers in the supply chain in order to remanufacture and recover products thus reduce costs and improve customer service					
The company's financial performance has improved due to reverse logistics					

Section 4: Green supply chain drivers

The following section relates to statements that describe the reasons that have led to your organization's adoption green supply chain practices. Please tick in the appropriate box to indicate the extent to which you agree or disagree with each statement.

Green supply chain management Drivers	**5**	**4**	**3**	**2**	**1**
Government regulations have greatly influenced the organization's adoption of green supply chain practices					
Government regulations obligate us to comply with environmental preservation					
Industrial regulations obligate us to comply with environmental preservation					
Industrial regulations have greatly influenced the organization's adoption of green supply chain practices					
Our competitors have greatly influenced the organization's adoption of green supply chain practices					
Our customers have greatly influenced the organization's adoption of green supply chain practices.					
When our competitors adopt quality management or productivity improvement programs they are perceived favourably by customers					
When our competitors adopt recycling or pollution control program they are perceived favourably by customers					
When our competitors adopt recycling or pollution control program they are more competitive					
Implementing cleaner production technologies enhanced the adoption of green supply chain practices					
Implementing cleaner production technologies has increased the					

profit levels of the company					
Implementation of cleaner production technologies has been greatly influenced by the company's employees					
Maintenance of cleaner production technologies has been cost effective					
Maintenance of cleaner production technologies has improved the financial position of the company					
Quality management and productivity improvement programs has been greatly influenced by employees					
Improved vehicle loading programs have been widely influenced by employee suggestions					
Waste management programs have been widely influenced by employee suggestions					
Firm Attributes	**5**	**4**	**3**	**2**	**1**
The company prepares and issues periodical voluntary environmental reporting to the public and environmental bodies					
The company has clearly stated its environmental objectives and action plans					
The company has included environmental issues in its mission statement and core values					
The company has included environmental issues in its vision statement					
The company champions industry environmental initiatives/efforts					
The company's employees are knowledgeable on green practices					
The company uses employees incentive programs to encourage green activities/suggestions					
The company organizes regular environmental training courses for management and all the employees					
The company hires environmentally conscious personnel					
The capital outlay required by the company has been high to allow green labelling of packaging					
The company has set a budget for green research					

Section 5: General information on the organization.

Q7. Indicate the approximate annual gross profit of your company in the last four years

Year	Less than 250 million	250 to 500 million	501 to 750 million	750 to 1 billion	More than 1 billion
2009					
2010					
2011					
2012					

2013					

b) Based on annual gross profit indicated in 7(a) above, what proportion of it can you attribute to adoption of green marketing practices?

Year / %	2009	2010	2011	2012	2013
Less than 10%					
11% -20%					
21%- 30%					
31%- 40%					
More than 40%					

Q8. Indicate the approximate annual sales turnover of your company in the last four years

Year	Less than 250 million	250 to 500 million	500 to 750 million	750 to 1 billion	More than 1 billion
2009					
2010					
2011					
2012					
2013					

b). Based on annual sales turnover indicated in Q8 (a) above, what proportion can you associate with green marketing practices

Year / %	**2009**	**2010**	**2011**	**2012**	**2013**
Less than 10%					
11% -20%					
21%- 30%					
31%- 40%					
More than 40%					

THANK YOU VERY MUCH FOR YOUR COOPERATION

APPENDIX II: Additional Factor Analysis

Table A-1: Green Purchasing (Extracted factor loadings)

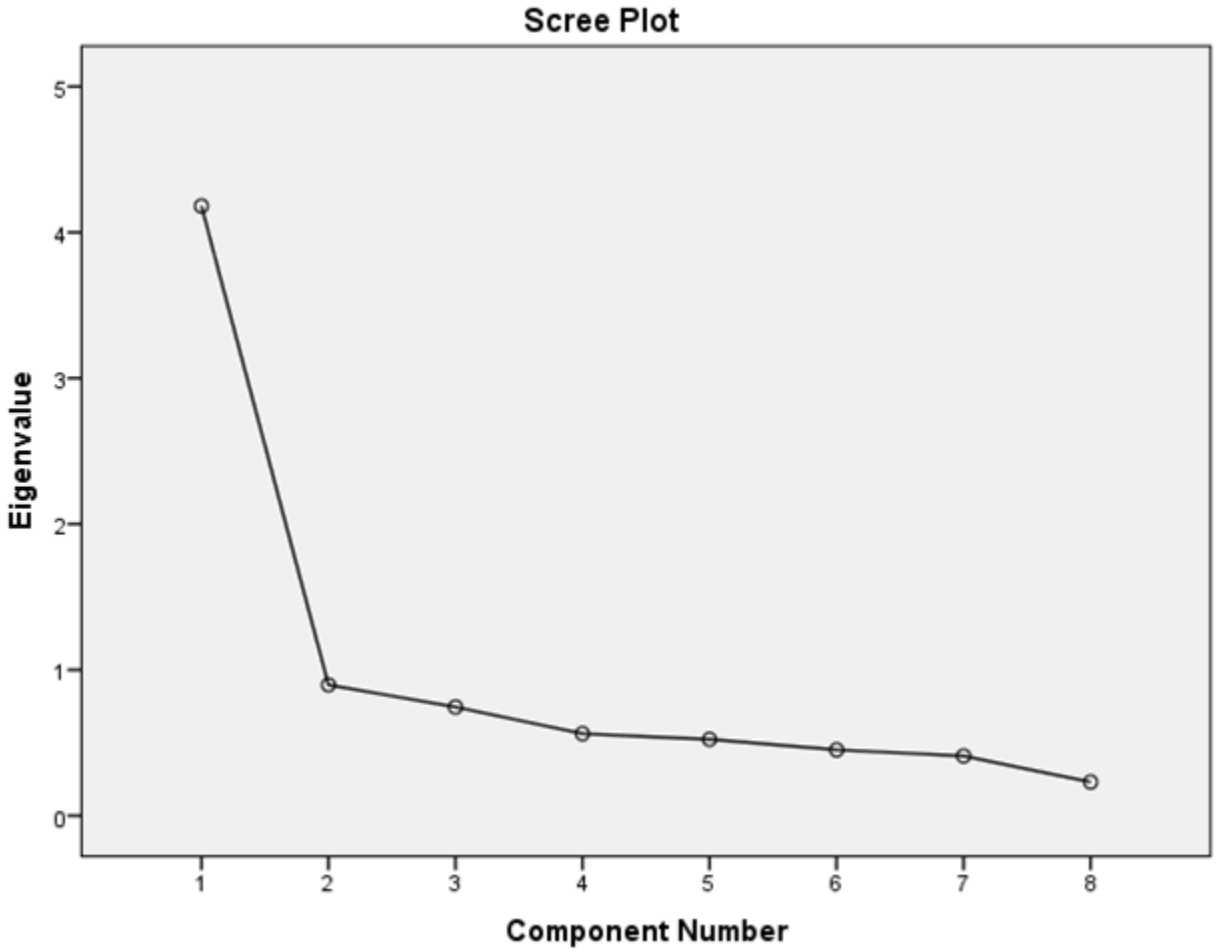
Communalities

	Initial	Extraction
Your company is able to improve the quality of its products by providing design specification to suppliers that include environmental requirements when purchasing an item	1.000	.449
he cooperation you have with suppliers for environmental objectives enable the company reduce the cost of production	1.000	.637
Your company emphasizes on suppliers who take environmental concerns seriously thus enhancing flexibility	1.000	.507
you have cooperation with suppliers for green packaging which increases the market share	1.000	.537
your company carries out environmental audit for suppliers internal management thus enhancing the quality of good supplied	1.000	.457
Your company demands environmental standards certification from suppliers which has enhanced delivery of goods	1.000	.656
Your company uses sustainable sources of raw materials which has improved the profit levels of the company	1.000	.593
your company outsources certain products or services thus reducing operational cost	1.000	.344

Extraction Method: Principal Component Analysis.

Source: Primary data

Figure A- 1: Scree Plot – Green purchasing



Source: Primary data

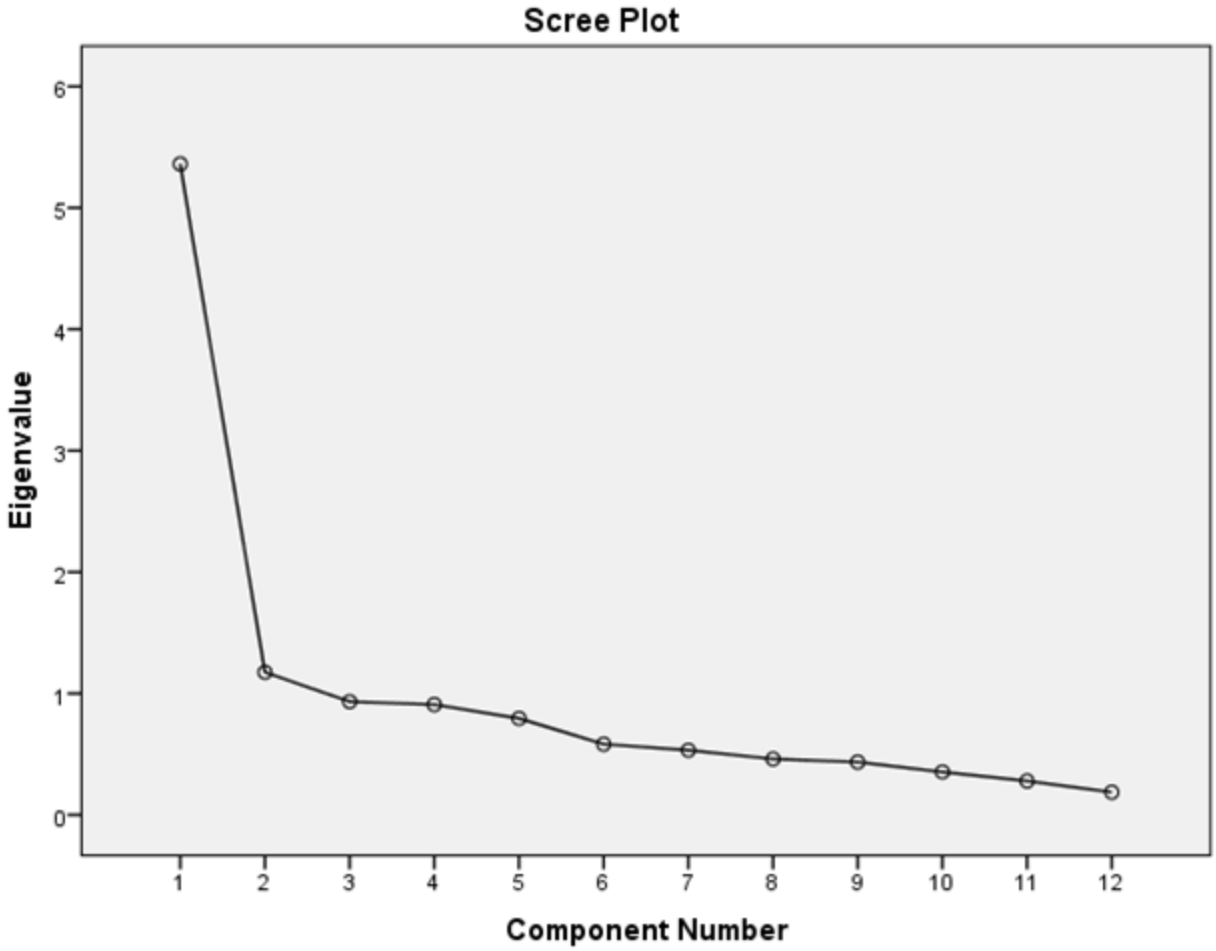
Table A-2: Green Production/Manufacturing (Extracted factor loadings)

Communalities

	Initial	Extraction
The company's pollution prevention strategy has led to increased market share	1.000	.597
The company has complied with particular regulations such as emissions, and other zero emission strategies thus reducing cost of production	1.000	.457
The company controls its pollution at the end of the pipe by treating its effluents and/ or installation of dust collectors thus increasing market share	1.000	.389
The quality of products produced is improved when the organization organises regular environmental training courses for management and the employees	1.000	.489
The organization uses employees incentives programs to encourage green activities/suggestions thus enhancing flexibility of production	1.000	.580
The company's use of sustainable sources of energy such as solar and wind has led to reduce cost of production	1.000	.600
The company's use of products that are safe for disposal (which rot naturall) which has led to an increase in market share	1.000	.530
Your company use of cleaner technologies in its manufacturing activities has led to increased profits for the organization	1.000	.531
The company organizes green supply chain seminars and workshop which helps to improve the quality of products produced	1.000	.649
Your company has improved the quality of products by providing goods that can be re-consumed or used for an extended period of time in service provision	1.000	.799
The company's attainment of ISO 14001 certification on the environmental maintenance has led to increase in sales	1.000	.454
The company makes use of recycled raw materials which reduces cost of production	1.000	.461

Extraction Method: Principal Component Analysis.

Figure A- 2: Scree Plot – Green manufacturing/Production



Source: Primary Data

Table A-3: Green Distribution (Extracted factor loadings)

Communalities

	Initial	Extraction
The organization uses minimum transportation packaging materials to preserve the natural resources which has reduced the cost of transportation	1.000	.543
The organization applies packaging made of recyclable materials enhancing quality of goods	1.000	.662
The organization's profit margins increased when it reduced the material required to offer services to customers (dematerializes	1.000	.470
The organization packaging materials are bio-degradable which has increased sales	1.000	.723
The organization uses minimum packaging materials on the products to preserve the natural resources which increases delivery of goods	1.000	.741
The organization uses local products to reduce transportation costs	1.000	.656
The organization's warehouse has been rearranged leading to better utilization of space which has led to reduced costs	1.000	.644
The amount of handling of goods has been minimised to increase flexibility in delivery	1.000	.702
The organization applies the internet as a major channel of distribution reducing distribution costs	1.000	.719
Use of IT has helped increase flexibility in the distribution of goods	1.000	.743
Use of IT has helped increase the market share of goods	1.000	.757
The company's financial position has improved due to the use of IT	1.000	.738
The organization redesigns logistical system components for greater efficiency in delivery of goods	1.000	.696
The organization uses green label as an indicator of environmental friendliness thus increasing sales	1.000	.701

Extraction Method: Principal Component Analysis.

Source: Primary data

Figure A- 3: Scree Plot – Green Distribution

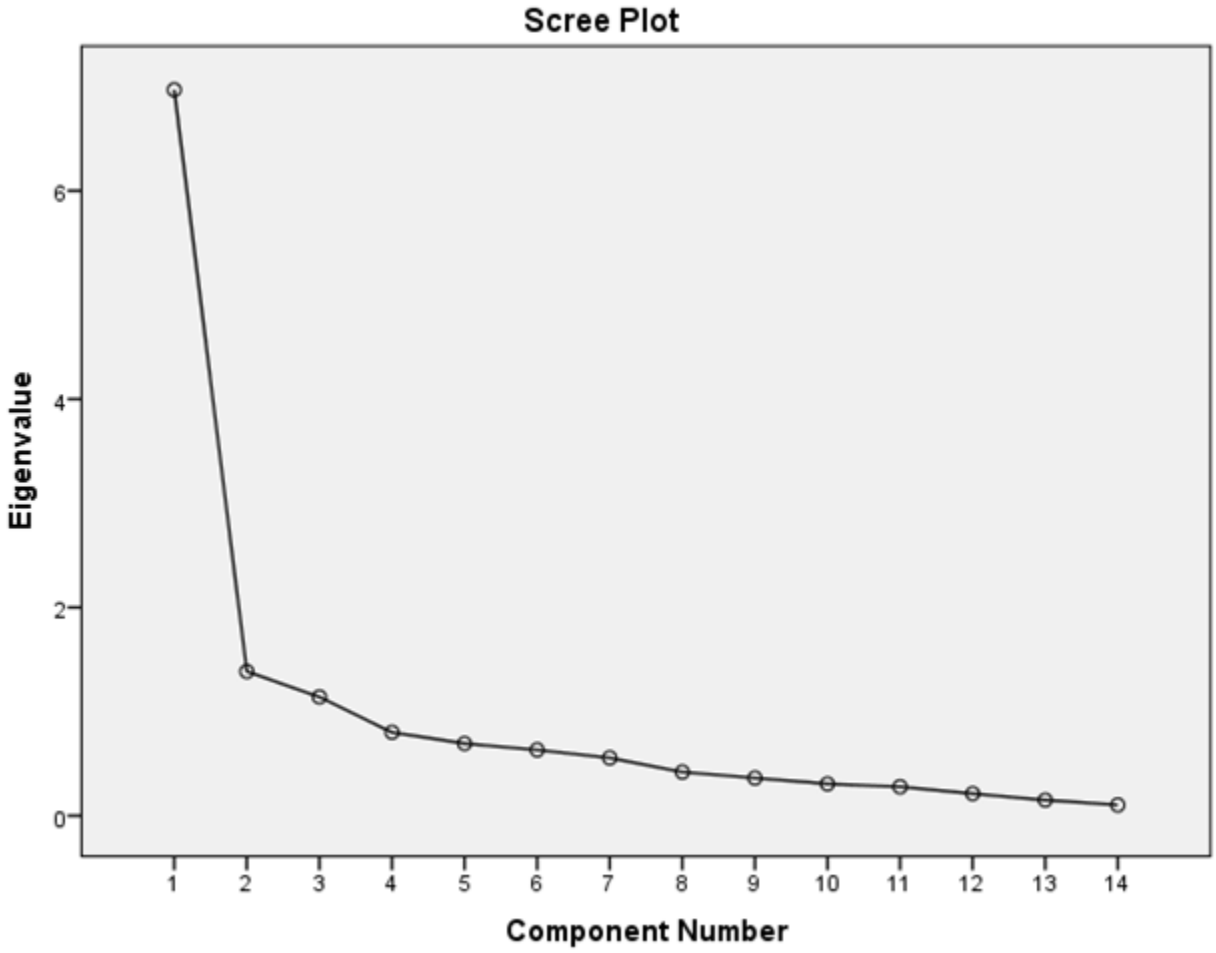


Table A-4: Reverse Logistics (Extracted factor loadings)

Communalities

	Initial	Extraction
Reverse logistics and outbound logistics: the company has an active recycling program for materials in all sections which has contributed to reduced cost of production	1.000	.743
The company makes use of recycled raw materials to improve quality of goods	1.000	.725
The company controls environmental risk associated with suppliers operation increasing sales	1.000	.559
The company assures proper utilization of materials by customers enhancing market share	1.000	.619
The company buys repairable products increasing market share	1.000	.584
The company applies reverse channel systems to allow the consumers to return the used products or packaging materials back to the company increasing flexibility	1.000	.469
The company redesigns logistical system component for greater environmental efficiency and improved delivery services	1.000	.699
The company has integrated suppliers in the supply chain in order to reduce costs and improve customer services	1.000	.556
The company's financial performance has improved due to reverse logistic	1.000	.585

Extraction Method: Principal Component Analysis.

Source: Primary data

Figure A- 4: Scree Plot – Reverse Logistics

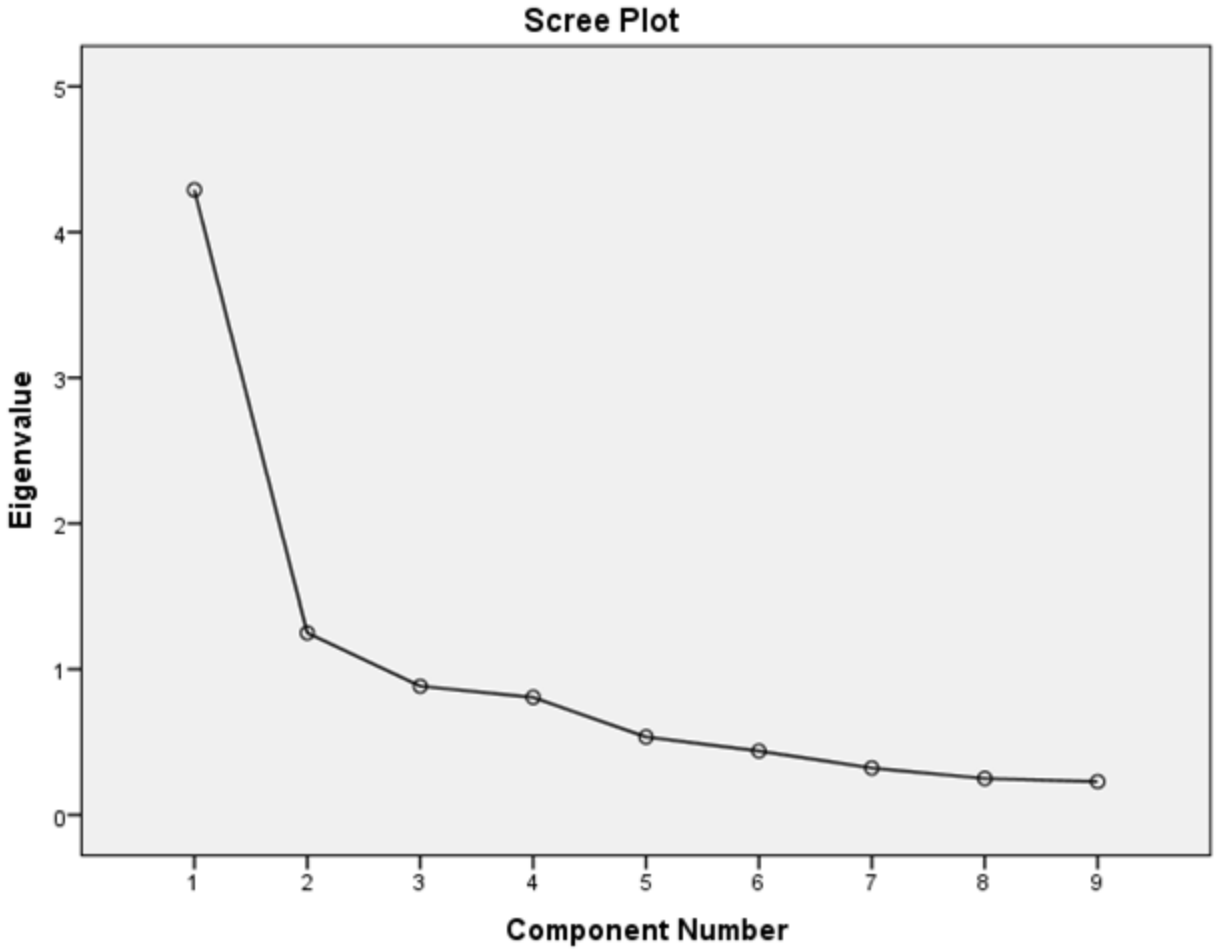


Table A-5: Moderator Variable (Extracted factor loadings)

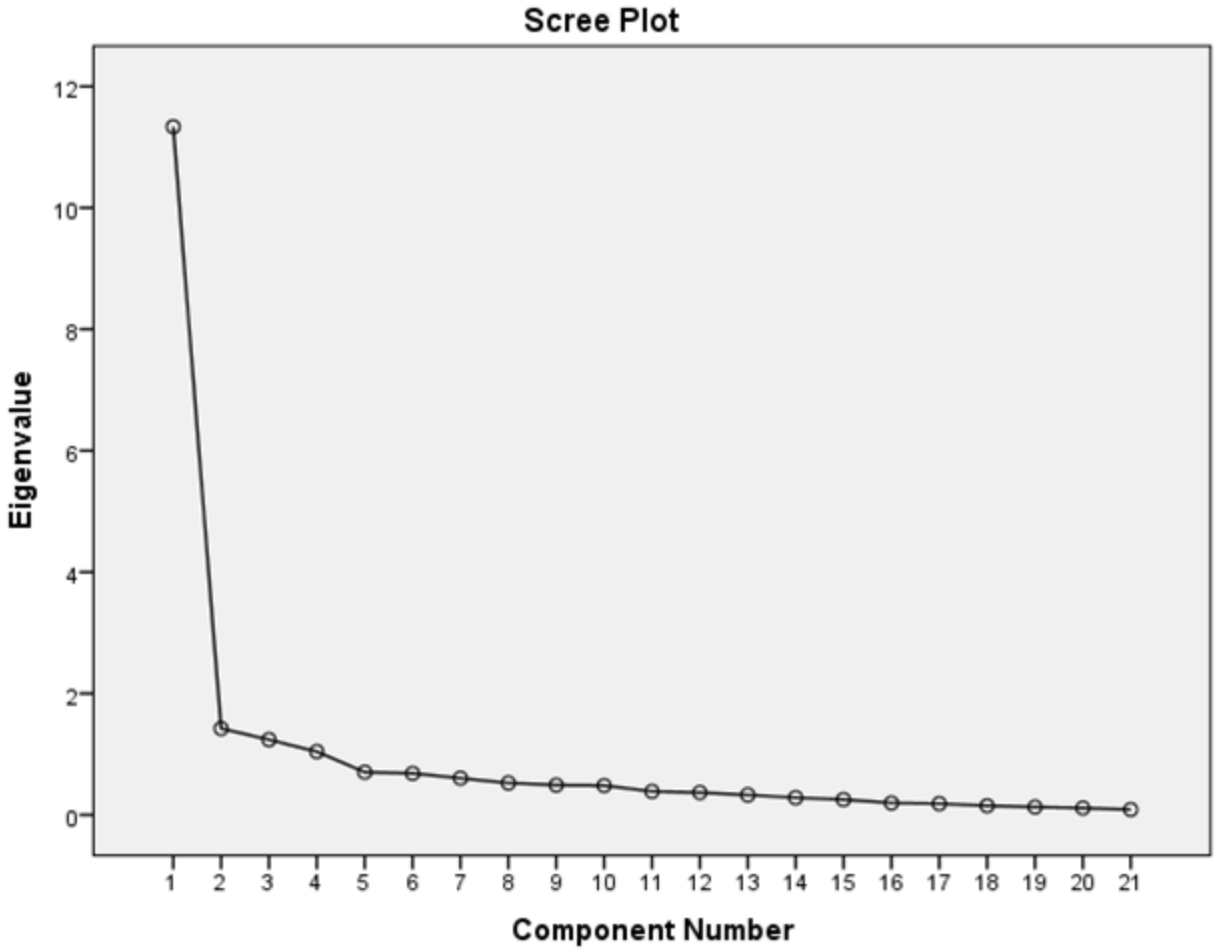
Communalities

	Initial	Extraction
General supply chain management drivers: Government regulations have greatly influenced the organization's adoption of green supply chain practices	1.000	.774
Government regulations obligate us to comply with environmental preservation	1.000	.772
Industrial regulations obligate us to comply with environmental preservation	1.000	.742
Industrial regulations have greatly influenced the organization's adoption of green supply chain practices	1.000	.772
Our competitors have greatly influenced the organization's adoption of green supply chain practices	1.000	.833
Our customers have greatly influenced the organization 's adoption of green supply chain practices	1.000	.723
When our competitors adopt quality management or productivity improvement programs they are perceived favourably by customers	1.000	.733
Implementation of cleaner production technologies has greatly influenced the companies employees	1.000	.704
Quality management and productivity improvement program has been greatly influenced by employees	1.000	.723
Improved vehicle loading programs have been widely influenced by employee suggestions	1.000	.667
Waste management program have been widely influenced by employee suggestions	1.000	.630
The company prepares and issues periodical voluntary environmental reporting to the public and environmental bodies	1.000	.596
The company has clearly stated its environmental objectives and action plans	1.000	.724
The company has included environmental issues in its mission statement and core values	1.000	.684
The company has included environmental issues in its vision statement	1.000	.649
The company champions industry environmental initiatives/ effort	1.000	.797
The company's employees are knowledgeable on green practices	1.000	.776
The company uses employees incentive programs to encourage green activities/ suggestions	1.000	.716
The company organizes regular environmental training courses for management and all the employees	1.000	.702
The company hires environmentally conscious personnel	1.000	.676
The capital outlay required by the company has been high to allow green labelling of packaging	1.000	.645

Extraction Method: Principal Component Analysis.

Source: Primary Data

Figure A-5 Scree Plot: Moderator Variable



APPENDIX III: LIST OF PARTICIPATING FOOD MANUFACTURING COMPANIES

1. Afrimac Nut Company
2. Alfa Foods Ltd
3. Al-Mahra Industries Ltd
4. Alpha Fine Foods Ltd
5. Alpine Coolers Ltd
6. Athi River Meats
7. Bakex Millers Ltd
8. Bidco Oil Refineries Ltd
9. Broadway Bakery Ltd
10. Brookside Dairy Ltd
11. Bunge East Africa
12. Buzeki Dairy Limited
13. C. Dormans Ltd
14. Cadbury Kenya Ltd
15. Candy Kenya Ltd
16. Capwell Industries Limited
17. Crown Beverages ltd
18. Deepa Industries Limited
19. Del Monte Kenya Ltd
20. Diamond Industries
21. DPL Festive Ltd
22. East African Sea Food Ltd
23. Ennsvalley bakery Ltd
24. Erdemann Co. (K) Ltd
25. Europack Industries Limited
26. Excel chemicals Ltd
27. Frigoken Ltd
28. Giloil Company Ltd
29. Glaciers Products
30. Gold Crown Beverages
31. Gold Crown Foods
32. Gonas Best Ltd
33. Green Forest Foods Ltd
34. House of Manji
35. Highlands Canners Ltd
36. Insta Products (EPZ) Ltd
37. Jambo Biscuits (K) Ltd
38. Jamii Millers
39. Jetlak Food Company
40. Kapa Oil Refinerires Limited
41. Kenafric Industries Ltd
42. Kenblest Ltd
43. Kenbro Industries Limited
44. Kenchic Limited
45. Kensalt Ltd
46. Kenya Nut Company
47. Kenya Sweets Ltd
48. Kevian Kenya Ltd
49. Kraft Foods
50. Krish Commodities Ltd
51. Kwality Candies & Sweets Ltd
52. Lay's Potato Crisps
53. Maisha Unga

54. Mama Millers Limited
55. Manji Food Industries Limited
56. Mars Express
57. Milly Fruit Processors Ltd
58. Mini Bakeries (Nbi) Ltd
59. Miritini Kenya Ltd
60. Mombasa Maiza Millers
61. Mzuri Sweets Ltd
62. Nairobi Flour Mills Ltd
63. Neema Farm Products Ltd
64. NesFoods Industries Ltd
65. Nestle Foods Kenya Ltd
66. Nicey Nicey Maize Millers
67. Norda Industries Ltd
68. Palm Oil
69. Pamside Dairies
70. Patco Industries Limited
71. Pepsi
72. Pride Industries Ltd
73. Pwani Oil Products Ltd
74. Re-Suns Spices Limited- Nairobi,
75. Sameer Agriculture & Livestock (Kenya) Ltd
76. Spice World Ltd
77. Sunrise Grain Millers Ltd
78. Sunny Processors Ltd
79. Sweet Rus Limited
80. T.S.S. Grain Millers Limited
81. Thika Milky Maize Millers
82. Tri- Clover Industries (K) Ltd
83. Tropikal Brand (Afrika) Ltd
84. Trufoods Limited
85. Trust Feeds Ltd
86. Umoja Flour Mills Ltd
87. Umoja Maintainance Centre (K) Limited
88. Unga Group Ltd- Nairobi, Industrial Area
89. Unilever East and Southern Africa
90. United Millers Ltd
91. Utamu Maize Millers
92. Valentine Cake House
93. W.E. Tilley (Muthiaga) Ltd
94. Wanainchi Marine Products (K) limited
95. Wanji Foods Industries Limited
96. Wrigley Company (E.A.) Ltd- Nairobi,

APPENDIX IV: Letter of Introduction

DEDAN KIMATHI UNIVERSITY OF TECHNOLOGY

NYERI-MWEIGA ROAD

P.O. BOX 657, 10100- NYERI KENYA.

Phone: 0710127516 EMAIL:

sgsr@dekut.ac.ke

TO WHOM IT MAY CONCERN

Dear Sir/Madam,

RE: INTRODUCTORY LETTER FOR RESEARCH

The bearer of this letter; **ANNE WANJIKU MWAURA** is a bonafied student in the School of Graduate Studies and Research at Dedan Kimathi University of Technology. In fulfilling part of the requirements for a Doctorate Degree in Business Administration and Management, she intends to conduct research in your company.

The university requests for your assistance to the student with the necessary data which forms an integral part of the academic research. The information provided will be used only for this purpose and will be treated with utmost confidentiality. A final copy of the report will be made available to you upon request.

Thank you in advance.

DIRECTOR BPS KIMATHI UNIVERSITY COLLEGE OF TECHNOLOGY

FOR: PROF. MWITA MARWA

CO-ORDINATOR, PHD-SCHOOL OF GRADUATE STUDIES AND RESEARCH

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