GREEN SUPPLY CHAIN MANAGEMENT PRACTICES AND PERFORMANCE OF FOOD AND BEVERAGE PROCESSING SECTOR IN KENYA

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Green Supply Chain Management Practices and Performance of Food and Beverage Processing Sector in Kenya

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DECLARATION

This thesis is my original work and has not been presented for a degree in any other University

Signature…….Date…….

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This thesis has been presented for examination with our approval as the University supervisors.

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OPERATIONAL DEFINITION OF KEY TERMS

Food processing Set of methods and techniques used to transform raw materials into other forms of consumption by humans or animals either at home or by food processing industries (World Bank ESMS implementation hand book 2014).

Green procurement Green procurement focuses on cooperating with suppliers for the purpose of developing products that are environmentally sustainable (Zhu *et al.,* 2008a).

Green manufacturing (GM) is a method for manufacturing that minimizes waste and

pollution for all industries, it slows down the depletion of natural resources as well as lowers the extensive amounts of trash that enter landfills. Further it emphasizes on reducing parts, rationalizing materials, and reusing components, to help in building products more efficiently (Shrivastava, 2017).

Green supply chain (GSC) It is a concept that combines green procurement, environmental management of manufacturing materials, environmental circulation marketing and reverse logistics (Hassan *et al*., 2016).

Green Supply Chain Management (GSCM): A set of managerial practices that

integrate environmental issues into supply chain management to ensure environmental compliance and to foster environmental capability of the entire supply chain (Su-YolLee, 2015). GSCM is referred to as an incorporation of environment- friendly initiatives into every aspect of the supply chain encompassing sourcing, product design and development, manufacturing, transportation, packaging,

storage, retrieval, disposal, and post-sales services including end-of-product life management (Min and Kim 2012; Seok-Beom Choi *et al,* 2017).

Green procurement: Green procurement refers to the development of collaborative actions with suppliers in order to create products and services that are environmental-friendly (Zhu, Sarkis, & Lai, 2008).

Reverse Logistics (RL): The movement of product or materials in the opposite direction for the purpose of creating or recapturing value, or for proper disposal (Ezura *et al.,* 2016). Rogers and Tibben-Lembke (1999) define RL 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 value or proper disposal.

Supply Chain Performance A systematic process of measuring the effectiveness and efficiency of supply chain operations (Anand & Grover, 2015; Veera, 2016).

ABSTRACT

Sustainability, a global issue in today's business world, demands that organizations, in their operations, be mindful of the environment so as to maintain a better image in today's competitive environment. Manufacturing firms ought to give more focus to green supply chain management practices for a better sustainable environment. The key concern however, is whether the implementation of these practices leads to better performance. The primary objective of this study was to determine the effect of green supply chain management practices on the performance of food and beverage processing firms in Kenya. The specific objectives were to determine the effect of green procurement, green manufacturing, reverse logistics, green packaging and legislations' moderating effect, on the performance of food and beverage processing firms in Kenya. To achieve these objectives five hypotheses were formulated in line with the study objectives, five theories grounded the study: resource-based theory, transaction cost economics theory, institutional theory, theory of reasoned action and diffusion innovation theory. An explanatory research design was adopted. Data was collected from one key respondent per organization working for the 187 food and beverage processing firms that were registered with the Kenya Association of Manufacturers. The departments of interest were production, supply chain and safety and environment. A census survey was carried out using a structured questionnaire. The study's response rate was 86.1 percent. Data analysis was conducted using descriptive statistics and inferential statistics by use of hierarchical moderated multiple regression analysis. The study found a coefficient of determination value of 0.633 signifying that all the green supply chain management practices contribute 63.3 % to the performance of food and beverage processing firms in Kenya with legislations as a moderating variable. It can be concluded that proper implementation of green supply chain management practices leads to better performance in food and beverage processing firms. The study recommends that manufacturing firms should implement environmentally sound practices in all phases of the supply chain, beginning with procurement of raw materials to manufacturing, packaging, distribution and end of life disposal of their produce. The study findings are of essence to regulators to enhance the level of implementation of green supply chain management practices through enforcement of stricter environmental regulations and rewarding firms that implement these practices. In conclusion the study findings provide future researchers with a useful conceptual and methodological reference to carry out studies in this area especially in emerging economies like Africa.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Sustainability is a global issue in today's world of business; firms therefore have to be careful about environmental issues in order to maintain a good image in today's competitive environment (Tang *et al.*,2018; Khan *et al.*,2020). Gotschol *et al.,* (2014) argued that businesses should give more focus to green supply chain management (GSCM) for a better and sustainable environment. Thus, it has become more challenging for firms to deal with several internal and external changes at the same time. GSCM is referred to as an incorporation of environment- friendly initiatives into every aspect of the supply chain encompassing sourcing, product design and development, manufacturing, transportation, packaging, storage, retrieval, disposal, and post-sales services including end-of-product life management (Min & Kim, 2012; Choi *et al.*,2017).

The study sought to establish the effect of green supply chain management practices on the performance of food and beverage processing firms in Kenya. This chapter discusses the background of the study, statement of the problem, objectives of the study- both the general and specific, research hypotheses, justification of the study, scope of the study and the limitations of the study. The predictor variables include green procurement practices, green manufacturing practices, reverse logistics practices, green packaging practices, and legislations as a moderating variable.

The aim of this study was to investigate how green supply chain management (GSCM) practices affects the performance of food and beverage processing firms in Kenya. These practices include: green procurement, green manufacturing, reverse logistics and green packaging; whereas performance constructs include: quality, environmental aspects, cost management, and operational dimensions. The background discusses three essential areas of the study: green supply chain management practices, the food and beverage processing sector and performance of food and beverage processing firms.

1.1.1 Green Supply Chain Management (GSCM) Practices

The importance of GSCM has been growing over years, most organizations are investing in green supply chain initiatives to beat market competition and build brand image. Some of the green supply chain initiatives are green procurement, reverse logistics, customer cooperation on environmental initiatives, investment recovery and eco-design, internal environmental management, environment management system adoption such as ISO 14001, green manufacturing and packaging, environmental participation, green marketing, green suppliers, energy conservation and environmental collaboration with suppliers and customers (Jasneet *et al.,* 2018).

The aspect of supply chain management gained popularity in the 1970s, thereafter green supply chain management captured the attention of all, such that almost every business organization has focused on sustainability irrespective of the size or nature, to the extent of integrating green initiatives into their strategic plans (Jasneet *et al.,*2017). The green supply chain framework involves adoption of green initiatives at different stages of the supply chain right from product design to sourcing, manufacturing, distribution, until product recovery. It is considered as one of the main efforts aiming to integrate environmental parameters within the supply chain management systems (Jasneet *et al.,*2017; Jung 2011).

The goal of green supply chain management is to minimize damage to resources and the environment within which enterprises operate, with regard to the supply chain, while pursuing economic benefits, in order to meet the sustainable development of societies (Wenhao *et al.,*2020). GSCM is referred to as an incorporation of environment- friendly initiatives into every aspect of supply chain activities encompassing sourcing, product design and development, manufacturing, transportation, packaging, storage, retrieval, disposal, and post-sales services, including end-of-product life management (Min & Kim 2012; Choi 2017).

Generally speaking, GSCM is referred to as an incorporation of environment- friendly initiatives into every aspect of supply chain activities encompassing sourcing, product design and development, manufacturing, transportation, packaging, storage, retrieval, disposal, and post-sales services including end-of-product life management (Min & Kim 2012). Based on the empirical study of Chinese manufacturers, Zhu and Sarkis (2004)

found that firms having higher levels (more mature stage) of GSCM practices tended to reap economic benefits in terms of some operational cost savings (e.g. decrease in environmental compliance cost), while increasing other operating costs (e.g. increase in costs of purchasing environment-friendly materials).

The definition of green supply chain management (GSCM) has been debated for some time. Many recognize that most definitions of GSCM incorporate a consideration of at least environmental conceptualizations and operationalization (Sarkis *et al.*,2011; Srivastava 2007; Mohanty & Anand 2014). GSCM is considered as closing the loop as it ranges from green procurement to integrated SC starting from supplier, to manufacturer, to customer and reverse logistics (Zhu & Sarkis 2004; Rakesh *et al,* 2015). There were many definitions exist in the GSCM literature (Ahi & Searcy, 2013). According to Zhu and Sarkis (2007), green supply chain management covers all phases of a product's life cycle from design, production and distribution phases, to the use of products by the end users and its disposal at the end of product's life cycle. GSCM is an approach for improving performance of the processes and products according to the requirements of the environmental regulations (Hsu & Hu, 2008; Rakesh *et al.*,2015).

Studies on green supply chain management practices with respect to performance have been carried out before in a number of countries. Sang *et al.,* (2012) carried out a study on green supply chain management practices and organizational performance in the electronics industry in Korea. From the findings there was a significant indirect relationship between GSCM practice implementation and business performance through mediating variables of operational efficiency and relational efficiency. Other empirical investigations were conducted in China, for instance Green *et al.*,(2012) carried out a study on the impact of GSCM practices on the performance of manufacturing industries. From the findings, it was determined that the adoption of GSCM practices by manufacturing organizations leads to improved environmental performance and economic performance, which in turn have a positive impact on operational performance. Operational performance enhances organizational performance.

Further Rosangela & Leandro (2014), studied the concept of green supply chain management in the Brazilian automotive sector. From the study findings, the practices most valued by companies involve eliminating or reducing the use of hazardous substances. These practices are evaluated in the selection, development, and

environmental performance assessment of suppliers. Operational performance was most valued by companies, with highlighted practices including the amount of products delivered on time, commitment to quality management, delivery time and order compliance rate. Mohanty & Anand (2014) undertook an empirical study of green supply chain management (GSCM) practices in the Micro, small and medium enterprises (MSMEs) in India.

Regionally, within Africa, a study in South Africa by Epoh & Mafini (2018), analysed the relationship between green supply chain management, environmental performance and supply chain performance. The study findings indicated mixed outcomes: no relationships were found between environmental performance and two green supply chain dimensions, namely green procurement and eco-design. However, the remaining dimensions of green supply chain management, namely reverse logistics and legislation and regulation, positively and significantly predicted environmental performance. In turn, environmental performance positively and significantly predicted supply chain performance. Within East Africa, Odock, *et.al.(*2016), carried out an empirical study on Green Supply Chain Management Practices and Performance of ISO 14001 certified manufacturing firms in East Africa whose findings established a statistically significant positive correlation between implementation of GSCM practices and organizational performance.

Environmental consciousness has become increasingly important in everyday life and business practice, hence the effort to reduce the impact of business activities on the environment has been labelled green supply chain management. Supply chain management (SCM) plays a central role in the firm's global competitiveness. A supply chain is a network of buyers and suppliers, Choi and Hong (2002) who focuses on how a firm coordinates its partner organizations' processes, technology, and capabilities to improve its competitive advantage. Previous studies on SCM focused on diverse topics including inventory control, risk management, sustainable supply chain management, supply chain network, among other things. Many researchers and practitioners have attempted to find out the factors that affect SCM either positively or negatively. In particular, green supply chain management (GSCM) has emerged as an important topic within the domain of sustainable supply chain management, which includes environmental management and producing goods or services ethically and fairly, along the supply chain (Walker & Jones 2012).

Green supply chain is a concept that combines green procurement, environmental management of manufacturing materials, environmental circulation marketing and reverse logistics (Yunis *et al.*,2016). Green supply chain management has been defined by Rakani *et al.*, (2010), as the integration of environmental thinking into SCM, including product design, supplier selection, material sourcing, manufacturing processes, product packaging, delivery of product to the consumers and the end life management of the product after its use. It is the extension of the traditional supply chain to include activities that aim at minimizing environmental impacts of a product throughout its entire cycle, such as green design, resource saving, harmful material reduction and product recycle and re-use. On the other hand Srivastava (2007), believes that there's need to integrate Green supply chain management practices across the entire supply chain. GSCM is a multidisciplinary issue that emerges mainly from performing environmental management practices in the context of the supply chains keeping economic criteria in mind (Luthra 2014).

1.1.2 The Food and Beverage Processing Sector in Kenya

The Kenyan food and beverage industry is the largest sector and constitutes 22 percent of the total Kenya Association of Manufacturers membership. It has a number of sub-sectors: dairy products, alcoholic beverages, spirits, juices, bakers and millers, water, cocoa, carbonated soft drinks, chocolate and sugar (KAM 2016). Since the late twentieth century, there has been concern among consumers to adopt a healthy lifestyle of health and sustainability. Earlier studies have recognized that global warming has a substantial impact on social, economic, political, and technological factors and there is need to increase public awareness on this concern (Lee & Kim 2015; Pretel *et al.*, 2016; Unger & Landis 2016; Wang 2016). Consumers are enthusiastic about adopting cleaner technologies as well as reducing greenhouse gas emissions that cause global warming; this is reflected by LOHAS consumer participation in relevant volunteer activities (Wang 2016; Kulak *et al.*, 2016; Lee & Kim 2015).

Following this trend, all major businesses worldwide, including those in the hospitality sector, ought to consider the impact of their operations on the environment. Wang (2016) noted that the food and beverage industry influences the environment in three ways, first services provided in restaurants have direct environmental impacts, including energy

consumption, solid waste generation, air emissions, water emissions, food borne diseases, and refrigerant emissions. Second, the industry has an upstream environmental impact, namely, pollution produced by suppliers, manufacturers, and farms that supply restaurants for instance pesticide residues, animal waste, and food contaminants introduced during production. Third, the industry has a downstream environmental impact, namely, consumer behaviour, including excessive use of disposable tableware and plastic bags. Considering these impacts, it is evident that the food and beverage industry uses massive quantities of energy, water, food materials, and detergents.

World Bank ESMS implementation hand book (2014) notes that food and beverage companies are confronted with a number of significant environmental and social challenges which ought to be effectively addressed and managed lest they hurt the firms' core business operations and profitability. Some of these challenges are increasing energy and raw materials costs, the growing power and influence of environmental and labor regulatory agencies, rapidly evolving consumer awareness and concerns about environmental and social issues as well as the primary risk of failing to manage food safety while building brand and consumer confidence. All of these risks can ultimately have financial consequences (World Bank 2014).

1.1.3 Performance of Firms in the Food and Beverage Processing Sector

Performance measurement is how organizations, public and private, measure the quality of their activities and services, (Sunil *et al.*, 2014). There are different dimensions for measuring firm performance: environmental, operational, organizational, financial, economic, marketing and competitive aspects. Items for measuring firm performance do often overlap which may belong to different dimensions based on perception. Whereas economic performance covers organizational, financial, economic and marketing performance measures, competitiveness covers the operational and competitive dimensions of firm's performance. Other aspects of performance are quality, productivity, efficiency, innovation, cost savings, sales, market share, and penetration of new markets,

acquisition of new customers, organizational profitability and growth (Mitra & Datta 2014).

Environmental performance relates to the ability of firms to reduce air emissions, effluent waste and solid wastes and the ability to decrease consumption of hazardous and toxic materials, reduced frequency for environmental accidents, improved environmental situation of the firm (Zhu *et al.,* 2008a; Odock 2016). Environmental performance is defined in terms of two broad dimensions as proposed by Shi *et al.,* (*2012*). The first dimension is the environmental impact reduction whose measures include reduction in greenhouse gas emissions, water use ratio, waste water, solid waste, hazardous waste and frequency of environmental accidents. The second dimension is environmental cost saving whose measures include: savings in green procurement, environmental technology investment, material recovery, recycling of waste water, bulk transportation, energy and environmental penalties.

Operational performance relates to a firm's ability to achieve competitive advantage over competitors through quality, cost, speed and flexibility (Ketchen *et al.,* 2008; Odock 2016). Organizational performance has been conceptualized as a multidimensional construct depending on the stakeholders, market circumstances and time (Richard *et al.,* 2009; Odock 2016).Performance measurement includes multiple dimensions ranging from financial and non-financial metrics describing costs, capacity, lead times and service levels (Bigliardi & Bottani, 2014; Nyangau, 2017). SCM could be measured at various management or operation levels. Strategic level measures influence top management decisions and also very often reflects investigation of broad-based policies and level of adherence to organisational goals (Chopra *et al.,* 2007; Nyangau, 2017). For any business activity, supply chain has strategic implications on its performance. Identifying the required performance measures on most of the criteria is essential and it should be an integral part of any business strategy (Pandiyan *et al.,*2016; Chia *et al.,*2009). In supply chain management, performance has been defined as a systematic process of measuring the effectiveness and efficiency of supply chain operations (Pandiyan *et al.,* 2016). It promotes the collaborative integration among members of the supply chain in a specific industry.

It is essential for organizations to effectively monitor their performance as it helps place them on the path of financial stability and service excellence (Pandiyan *et al.,* 2016). It

should be noted that for firms to continuously improve their supply chain process, there's need to use a manageable number of metrics in order to enhance business success, since what gets measured gets managed. Supply chain performance refers to the evaluation of supply chain management, and includes both the tangible and intangible factors (Chang *et al.,* 2013). Performance measurement is the process of quantifying the effectiveness and efficiency of action; where measurement is the process of quantification and action leads to performance (Arif-Uz-Zaman *et al.,* 2014).

Effectiveness is the extent to which a customer's requirements are met and efficiency is a measure of how economically a firm's resources are utilized when providing a pre-specified level of customer satisfaction. Performance measurement systems (PMS) are described as the overall set of metrics used to quantify both the efficiency and effectiveness of action (Arif-Uz-Zaman *et al.*,2014). The essence of performance measurement is to identify whether customer needs are met as well as bottlenecks and wastages. It also comes in handy on decision making to ensure that management decisions are based on facts. A number of studies have highlighted that firms have been unable to maximize the potential of their performance primarily due to their inability to integrate the needs of the respective partners (Cadden *et al.,*2013; Gunasekaran *et al.,*2013).

1.2 Statement of the Problem

Manufacturing firms are increasingly implementing green supply chain management practices in response to customers and Government entities demand for environmentally friendly operations (Green *et al.,*2012). Implementation of GSCM practices comes with a number of potential benefits for the organization including enhanced reputation, increased efficiency, effectiveness, differentiation, revenue growth and other economic benefits (Kirchoff *et al.,*2016).

Kenya's manufacturing sector has been performing dismally compared to other sectors. Statistics from the Kenya National Bureau of Statistics- KNBS (2016), revealed that manufacturing posted a growth rate of 3.5 percent, agriculture 4.4 percent, energy 6.5 percent, transport 7.2 percent and building and construction at 9.2 percent. The weak performance can be attributed to high operations cost and wastes in the entire supply chain, which ought to be addressed through adoption of green practices.

Empirical studies on this have been conducted before, the notable ones include; Rao and Holt (2005), Green *et al.*, (2012) and Runala and Zaffar (2015) which found a positive corelation between green supply chain management practices and organizational performance, however studies such as Giovanni and Esposito (2012) and Huang *et. al.*, (2012), which were of the contrary view, found no significant relationships between green supply chain management practices and firm performance. Therefore the primary goal of this study was to investigate whether green supply chain management practices affects the performance of food and beverage processing firms in Kenya.

1.3 Objectives of the Study

1.1.11.3.1 General Objective

The main aim of this study was to find out the relationship between green supply chain management (GSCM) practices and performance of food and beverage processing sector in Kenya.

1.3.2 Specific Objectives

The study was guided by the following specific objectives.

i. To examine the effect of green procurement on the performance of the food and beverage processing sector in Kenya.
ii. To determine the effect of green manufacturing on the performance of the food and beverage processing sector in Kenya.
iii. To investigate the effect of reverse logistics on the performance of the food and beverage processing sector in Kenya.
iv. To examine the effect of green packaging on the performance of the food and beverage processing sector in Kenya.
v. To establish the moderating effect of legislations on the performance of the food and beverage processing sector in Kenya.

1.4 Research Hypotheses

The study was guided by the following hypotheses.

i. $\mathbf{H_{a1}}$: Green procurement has significant effect on the performance of food and beverage processing sector in Kenya.
ii. $\mathbf{H_{a2}}$: Green manufacturing has a significant effect on the performance of food and beverage processing sector in Kenya.
iii. $\mathbf{H_{a3}}$: Reverse logistics has a significant effect on performance of firms in the food and beverage processing sector in Kenya.
iv. $\mathbf{H_{a4}}$: Green packaging has a significant effect on performance of firms in the food and beverage processing sector in Kenya.
v. $\mathbf{H_{a5}}$: Legislation has a significant moderating effect on performance of firms in the food and beverage processing sector in Kenya.

1.5 Justification of the Study

Green supply chain management practices and performance have been research areas of interest over the past few years. Businesses and organizations not only exist to make a profit rather each is responsible for its sustainability in a manner that is environmentally aware and eco-friendly. The relationship between businesses and the environment is one of interdependency, business can be sustained only if the environment is sustained, hence implementation of GSCM practices is expected to improve firm performance. The study findings will be useful to a number of stakeholders.

1.5.1 Food and Beverage Processing Firms

These firms will be the primary beneficiaries of the research findings of the study, since it examines the effect of green supply chain management practices on firms' performance within the food and beverage processing sector. With the findings, the management will be in a position to improve their areas of weakness, enhance capacity utilization, cost containment and sustainable packaging.

1.5.2 Government, Regulatory and Policy Makers

The study findings will be of use to a number of policy makers in the Industry, both in the Ministry of Agriculture, Trade, Industrialization, and the National Treasury for planning purposes. Other players are the Kenya Association of Manufacturers, Kenya National Bureau of Statistics, Kenya Bureau of Standards, Kenya Institute for Public Policy Research & Analysis (KIPPRA), among other stakeholders.

1.5.3 Body of Knowledge, Scholars and Researchers

Research on green supply chain practices has gained interest among scholars and researchers over the last few years. A growing number of theoretical and empirical studies have outlined the importance of GSCM practices and performance. This study will contribute to the existing body of knowledge on GSCM practices and performance by examining its effects on the performance of firms in the food and beverage processing sector in Kenya.

1.6 Scope of the Study

The study was carried out on 187 local food and beverage processing firms in Kenya registered with the Kenya Association of Manufacturers. The food and beverage sector is divided into eight sub-sectors: alcoholic beverages & spirits; bakers & millers; cocoa, chocolate and sugar confectionery; dairy products; juices, waters and carbonated soft drinks; slaughtering, preparation and preservation of meat; tobacco and; vegetable oils (KAM 2016).

The units of analysis for this study were the 187 food and beverage processing firms distributed across the entire country. One respondent was selected per firm; these were senior managers in one of three departments of interest: supply chain, production and safety and environment.

The independent variables were; green procurement, green manufacturing, reverse logistics and green packaging with legislation as a moderator whereas the dependent variable was performance. The study was conducted for a period of Six months, from January to June, 2018.

1.7 Limitations of the Study

This study was subject to various limitations including the fact that green supply chain practices are still a new area of study in developing countries and especially in Kenya. For this reason, some respondents were not cooperative during the study. Secondly the scope of the study was limited by the sample size, sectoral coverage, respondents and the selected location - Kenya. Thirdly, owing to a large number of food and beverage processing firms involved in the study, the researcher had to seek the assistance of research assistants who may not have been very conversant with the study objectives. The fourth challenge came from the firms under study since some were not willing to reveal some information regarding clean production practices.

In mitigation of the mentioned challenges, the study attempted to improve response rate using several ways suggested by studies on survey research (Zhao *et al.*,2006; Wantao *et al.*,2014). Questionnaires were accompanied by a cover letter indicating the purpose of the study and potential contributions; the letter assured respondents of complete confidentiality. Follow up calls were made to encourage completion, return of the questionnaires and to clarify any questions that had potentially risen. Questionnaires were also well constructed to capture the performance measures objectively. Further, the contents of the questionnaires were explained to the respondents during the data collection stage. Lastly, the lead researcher explained the study's objectives to the research assistants and trained them on data collection so as to ensure the data collection process was both efficient and effective.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter covers the theories that were used in the study, review of related literature based on the objectives of the study, the conceptual framework adopted by the study and finally the gaps that were identified by the study. The graphical presentation of the conceptual framework was done and how each variable in the study was measured is indicated. The theories reviewed have also been linked based on their relevance to the study. A summary of critiques to the literature reviewed are also discussed as well as the research gaps identified during the study, based on the objectives. Finally, a summary of the literature reviewed is given at the end.

2.2 Theoretical Review

Theory has been defined as a natural or broad explanation of phenomenon that has been observed and modified over time (Denzin 2017). The main objective of this section is to conceptualize how green supply chain management practices affects performance of firms in the food and beverage processing sector in Kenya. Resource based theory, Transaction cost economics theory, Institutional theory and Theory of reasoned action have been used to ground this study.

2.2.1 Resource Based Theory

The Resource Based Theory (RBT) argues that sustainable competitive advantage accrues from the deployment of firm idiosyncratic resources, which are the strengths and weaknesses of the firm that allow it to achieve its goals and objectives. Firm resources could be in several forms ranging from tangible assets like machines and equipment, to intangible assets like goodwill, organizational attributes, routines, processes, capabilities and knowledge to input, transformation, and output resources (Agyapong et al., 2019). Enterprises strive to undertake environmental Supply Chain practices to gain competitive advantage (Sharfman *et al.*, 2009).

RBT is regarded as one of the most cited and influential theories in the field of management. It considers resources as the prominent source of achieving sustainable competitive advantages in a firm (Namjoo & Keramati 2018). For example, the use green manufacturing and cleaner production strategies often contributes to a competitive advantage and enhanced enterprise performance (Shan et al., 2019; Ashrafi and Mueller 2015). Enterprises strive to undertake environmental- friendly supply chain practices to gain competitive advantage (Sharfman *et al.,* 2009). The theory is useful to investigate how firms' resources affect green practices and firm performance, because firms' strategies rely on their internal competencies and ability to sustain them. According to Tukamuhabwa *et al.* (2015), RBT is the most widely used theory for modelling the resilience regarding supply chain and manufacturing networks.

Natural resource-based view (NRBV) suggests that enterprises can achieve internal competency through their own basic capabilities, such as pollution prevention, product stewardship, and sustainable development. Internal green practices have also been proven to be positively associated with firms' environmental and economic performance (Zhu & Sarkis 2004).

2.2.2 Transaction Cost Economics Theory

Transaction cost economics focuses on minimizing the total transaction costs of producing and distributing a particular good or service. It specifies the conditions under which a firm should manage an economic exchange internally within its boundary or externally through inter organizational arrangement (Lau & Wang 2009). This theory focuses on the organization of transactions that occur whenever a good or service is transferred from a provider to a user, across a technologically separable interface. When transactions occur within an organization, the transaction costs can include managing and monitoring personnel and procuring inputs and capital equipment.

The transaction costs of buying the same good or service from an external provider can include the costs of source selection, contract management, performance measurement and dispute resolution. Thus, the organization of transactions or governance structure, affects transaction costs. Transaction Cost Economics theory which emerged in the 1970's offers a methodology of analysing how the governance of economic organization affects economic value. The concept of transaction costs is of essence to the study of

firms and market organization if we view firms and market as alternative methods of coordinating production.

With no transaction costs parties will cost less bargain to an efficient result whichever way property rights are assigned at the outset. Taken at face value, externalities and frictions of other kinds would vanish. In the context of this study, this theory can be interfaced with green manufacturing, though embracing cleaner production tends to reduce production costs hence improving the firms' performance.

2.2.3 Institutional Theory

Institutional theory examines the influence of external pressures on the firm (Hirsch, 1975; Lee *et al.,* 2013) and how enterprises adopt policies and implement strategies that are legitimate within their organizational fields (Scott & Christensen 1995; Lee *et al.,* 2013). Further organizations consider industry norms, firm tradition and management fads, among other concerns, to formulate their strategies (Lee *et al.*, 2013). Institutional theory offers a useful research framework for the study of GSCM in respect to how external factors force firms to implement certain GSCM practices (Sarkis *et al.,* 2010; Lee *et al.*, 2013).

Tritos *et al*., (2013) states that companies have institutionalized environmental practices owing to pressure from external and internal forces as well as an awareness of the consequences of non-compliance with environmental imperatives. If companies have a legitimate concern for the environment and there is social approval, then environmental practices have to be deployed more rapidly throughout the supply chain (Carter *et al.*,2000; Tritos *et al.*,2013). It is a requirement for manufacturing firms to implement green strategies owing to increased external pressure for sustainability in the form of compulsory environmental regulations that are directly related to GSCM (Lee *et al.,* 2013). Further firms should evaluate their external pressures and prepare counter measures with diverse green supply chain practices that can positively affect environmental performance, economic performance, and supply chain agility and flexibility.

Within the context of GSCM, actors in the supply chain operate in a way that fulfils both customer and legal requirements. Pressure from Government agencies as well as national

and international regulators also have an influence on the adoption of environmentally responsible behaviour (Zailani *et al.*,2012). Narasimhan and Carter (1998), outlined that companies have institutionalized environmental practices because of pressure from external and internal forces as well as an awareness of the consequences of non-compliance with environmental imperatives. If companies have a legitimate concern for the environment and there is social approval, then environmental practices have to be deployed more rapidly throughout the supply chain (Carter *et al.*,2000).

2.2.4 Theory of Reasoned Action (TRA)

TRA suggests that a person's behaviour is determined by his or her intention to perform the behaviour, and that this intention is, in turn, a function of his or her attitude toward the behaviour and his or her subjective norm. The Theory of Reasoned Action delves into people's perceptions of those around them and those that concern them, allowing social tensions to affect behavioural intentions. If a person is concerned with others' perceptions of them, they are more likely to change their attitude toward a behaviour to become more in line with their subjective norm or those around them that are influential (Copeland & Zhao 2020). The stronger the intention to engage in a behaviour, the more likely its performance. Attitude refers to the degree to which a person has a favourable or unfavourable evaluation or appraisal of the behaviour in question (Ajzen, 1991). According to TRA, people's evaluations of, or attitudes toward, behaviour are determined by their accessible beliefs about the behaviour. A belief is defined as the subjective probability that the behaviour will produce a certain outcome (Fishbein & Ajzen, 1975).

Theory of Reasoned Action suggests that, a person's intention is a function of two basic determinants, one personal in nature and the other reflecting social influence. The personal factor is the individual's positive or negative evaluation of performing the behaviour. This factor is termed attitude toward the behaviour (Ajzen & Fishbein, 1980; Lada *et al.*,2009). The second determinant of intention is the person's perception of the social pressure put on him/her to perform or not to perform the behaviour in question. Since it deals with perceived prescriptions, this factor is termed as subjective norm (Ajzen & Fishbein, 1980; Lada *et al.*,2009).

According to the theory, attitudes are a function of beliefs. A person who believes that performing a given behaviour will lead to mostly positive outcomes will hold a

favourable attitude toward performing the behaviour, while a person who believes that performing the behaviour will lead to mostly negative outcomes will hold an un favourable attitude. The beliefs that underlie a person's attitude toward the behaviour are termed behavioural beliefs for instance the act of practicing or not practicing green procurement and other green supply chain management practices.

The TRA model, developed by Ajzen and Fishbein (1980), is a belief-attitude behavioural intention model, which postulates that an individual's perception of what others consider relevant is affected by their intention and that attitude plays a major role in predicting behaviour (Netemeyer *et al.*,1993). In this study, green procurement is related to a firm's intention to buy products, from suppliers, that are less harmful to the environment and the society at large. Vazifehdousta (2013), affirmed that consumers' intention to buy green products is greatly influenced by positive attitude and the perceived green value of the products. Similarly, a study by Rizwan *et al.*, (2013) also found that consumer's attitude impacts his or her green product purchase intention

2.2.5 Diffusion of Innovation Theory

This theory is appropriate for the implementation of GSCM practices by the food and beverage processing firms as it treats environmental management as an innovation for the firm. Diffusion is the process by which an innovation is communicated through certain channels over time among the members of a social system. It is a special type of communication, in that the messages are concerned with new ideas.

Previously scholars have investigated the roles of attributes of environmental management in conjunction with environmental strategy adoption, specific managerial attitudes on the likelihood of adopting environmental strategies and suppliers in facilitating the use of green practices by service firms (Wang *et al.*, 2012).

The innovation-decision process is the process through which the firm's decision-making unit passes from first knowledge of an innovation to forming an attitude toward the innovation, deciding to adopt or reject, implementation of the new idea and confirmation of the decision. This can be conceptualized into five main steps; knowledge, persuasion, decision, implementation, and confirmation. In the context of this study adoption of

GSCM practices is one of the innovative ways of enhancing performance in the current competitive world.

2.3 Conceptual Framework

A conceptual framework is a written visual presentation that explains either graphically or by narration the main things to be studied including the key factors, concepts or variables and presumed relationships among them. Mugenda (2008) defined Conceptual framework as a concise description of the phenomena under study accompanied by a graphical or visual depiction of the major variables of the study. It is a diagrammatic representation that shows the relationships between the dependent and independent variables. In this study, the Conceptual framework has incorporated the following GSCM practices: green procurement, green manufacturing, reverse logistics, green packaging and performance of food and beverage processing firms in Kenya. The conceptualized framework derived from reviewed literature is shown in Figure 2.1.

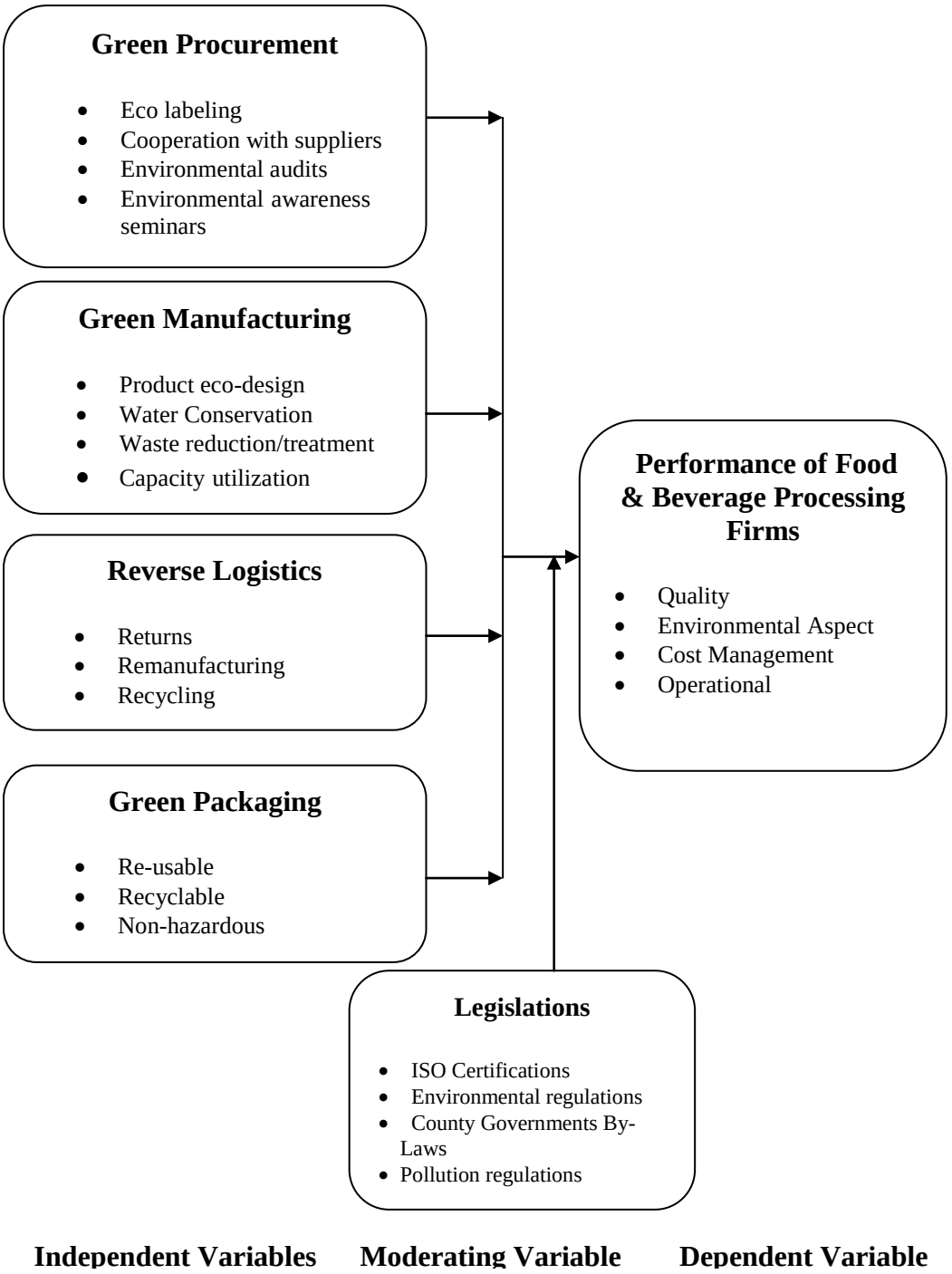

Figure 2.1: Conceptual Framework

2.3.1 Green Procurement

Green supply chain is a concept that combines green procurement, environmental management of manufacturing materials, environmental circulation marketing and reverse logistics (Yunis *et al.*,2016). Green supply chain management practices as defined

by (Rakani *et al.*,2010) is the integration of environmental thinking into SCM, including product design, supplier selection, material sourcing, manufacturing processes, product packaging, delivery of product to the consumers and the end life management of the product after its use. It entails the purchase of products that are designed with environmental objectives and impact in mind. Practice involves cross-functional teams, supplier input, expertise and technology in response to customer demands. Such practices constitute tacit, firm specific and inimitable strategic resources (Kirchoff *et al.*, 2016).

Cooperation with suppliers on environmental initiatives is key to the firm's performance. It is essential to have reliable suppliers in order to continuously provide customers with products and services that are desirable in every aspect, such as quality, price, and environmental impact, and in a timely manner. Environmental audit is a general term that can reflect various types of evaluations intended to identify environmental compliance and management system implementation gaps, along with related corrective actions. In this way they perform an analogous function similar to financial audits. There are generally two different types of environmental audits: compliance audits and management systems audits.

Environmental awareness proves important for several reasons: it fosters a sense of connection to the natural world, promotes sustainable development and encourages conservation of irreplaceable natural resources and vulnerable plant and animal species. Environmental awareness essentially serves as an educational tool, helping people around the world understand the economic, aesthetic and biological importance of preserving resources and reducing or eliminating the harmful impacts of man-made alterations.

2.3.2 Green Manufacturing

A green brand is defined as a brand which offers a significant eco-advantage over its competitors and is able to attract consumers who set a high priority on making green purchases (Grant, 2008). A green brand entails a set of attributes and benefits associated with reduced adverse environmental impact and the creation of a positive impression on consumers by raising their environmental concern (Hartmann & Ibanez 2006; Norazah, 2016). Individuals who spend money to purchase green products and who have a high environmental consciousness and knowledge level, are referred to as green customers (Norazah & Norbayah, 2015b; Norazah 2016).

Conservation is about protecting and keeping natural resources intact or unimpaired. The industrial war on water consumption starts with designing and redesigning processes to use less water to begin with while aiming at doing more with less. A common problem in processing plants is leaky water pipes, fittings, and valves. Often leaks occur because standard proper pipe fitting and plumbing techniques have not been used, such as using incompatible piping material and sealant compounds. Leaks should be repaired and maintained to avoid unnecessary water loss.

In lean manufacturing, waste is often broken down into seven areas, these are: overproduction- manufacturing a product before it is needed for customers or product development purposes; waiting - people, machinery or product waiting unproductively at any point in the production cycle or supply chain; transportation- unnecessary movement of finished products or components; over processing- processing that exceeds customer needs or adds no value; inventory- excess storage of raw materials, components or finished goods; motion- unnecessary or overly complicated movement of people or information during the manufacturing process and; defects- errors that require products to be reworked or scrapped. Manufacturing operations must scour their processes to identify areas that produce waste.

Capacity utilization is an important operational metric for businesses and it's also a key economic indicator when applied to aggregate productive capacity. It is a widely used key performance indicator when applied to aggregate productive capacity. Most industries use it as a strategic capacity for business planning functions. Capacity refers to the quality of output that can be produced in a fixed period of time, given the existing stock of capital.

2.3.3 Reverse Logistics

Reverse logistics (RL) is 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 value or proper disposal. It adds the double intention of creating business and environmental value from reverse logistics processes which is indicative of the debate over the question of whether reverse logistics has an economical benefit. Although disposal aspect in not included in reverse logistics, it is considered as a destination for reverse Logistics flow (Bensalem & Vichara 2019). In contrast, Agrawal and Murtaza

(2015) include disposition in RL activities which are described as composed of product acquisition, gate keeping, collection, inspection, sorting and disposition.

Returns management is a costly exercise for organizations. It is necessitated by products that are expired, recalled, damaged while packaging or delivered incorrectly (Sameer *et al.*,2009; Martin, 2007). Returns handling can be measured in terms of volumes handled to indicate the size of the operation. According to Sameer *et al*., (2009), returned products can be handled up to four times while adding no value to the customer but adding significant cost to the supply chain. The two most common causes of returns in the pharmaceutical industry, for example, are expired drugs and recalls. Most organizations must deal with product returns for various reasons. For instance, customers changing their minds, items being damaged or having quality problems, merchandise not being sold, or products being returned at the end of their usable life.

Investment recovery and re-manufacturing captures value through resell and reuse of used materials. Reverse logistics programs help firms manage product end-of-life and investment recovery processes. Recovery efforts represent strategic resources that require complex coordination efforts with both upstream and downstream supply chain partners (Kirchoff *et al.*,2016). Nowadays recycling has grown in importance in the industrialized world, and for many products Recycling has become more of a rule than an exception. If recycling the product is an option, the end customer may not be the end of the business activity process. After a product has been used as intended, it will be taken care of, which is becoming increasingly common for more and more physical products. The process originally came about due to resource shortage and an effort to avoid a range of wastes such as waste of materials or energy in producing goods from raw materials (Huge *et al.*,2008).

Products recovery and reuse reduces the negative effects on environment, mainly reducing waste disposal, extraction of raw materials as well as transport and distribution emissions. Furthermore, firms can recover value from end-of-life products by reusing components, recycling materials or recovering energy through incineration (Mario *et al.*,2013).

2.3.4 Green Packaging

According to Hellström & Nilsson (2011) Packaging is a coordinated system of preparing goods for transport, distribution, storage, retailing and end-use. It ensures safe delivery of products to the ultimate consumer, in sound condition and at minimum cost, with the aim of minimizing costs of delivery while maximizing sales and hence profits.

Packaging plays a vital role in protecting products as well as wider consumer benefits. It accounts for just one element of a product's overall environmental impact, hence reducing the environmental impact of packaging continues to be a major focus of innovation within the packaging industry. It is a highly visible use of resources accounting for about a fifth of the household waste stream and between a tenth to a twentieth of commercial and industrial waste. Therefore, packaging is an issue of concern to both consumers and policy makers.

Basic packaging functions are composed of containment, protection, preservation, communication, convenience and, in some cases, marketing functions (Jinkarn & Suwannaporn 2015). Packaging has both a logistic and marketing function, the former protects the products on transit while the latter provides consumers with information about product attributes (Arboretti & Bordignon 2016). Packaging has been identified as an integral part of processing in the food industry. The food package is the physical entity that functions as the barrier between the contents and the exterior atmosphere. Other roles of packaging are: protection (active packaging), information (intelligent packaging) and transport (Singh *et al.*,2012).

Packaging - whether single-trip or reusable - plays a crucial function protecting goods, preventing damage during transport and storage from the elements, vibration, dropping and compression. It also provides the opportunity to communicate information to a customer regarding the product's contents – whether promotional, factual or mandated by law, as well as providing product security, such as, making items more tamper-resistant.

From raw material to finished goods, plastic reusable packaging safely and efficiently moves material/ product along different points of the supply chain and ultimately to its destination. Plastic reusable packaging improves the flow of product all along the supply chain in many industries, to reduce total costs and achieve sustained optimization.

Whether shipping plastic bottles to a soft drink bottler for filling; trimmed parts to an automotive manufacturer; electronic components to a computer manufacturer or consumer goods to the mass retailer; plastic reusable containers and pallets help to move products faster, better, safer and more cost effectively (Orbis 2004). Re-using packaging along the supply chain can cut cost, waste and carbon emissions compared with single trip packaging.

There may be many opportunities to reuse packaging directly without any further treatment except washing. These include reuse by suppliers, within the plant itself or by other businesses and community groups. It is important that food processors design packaging to encourage packaging reuse. Packaging should also be stored and handled carefully to avoid damage that may prevent its reuse. It entails designing packaging so that it can be readily and efficiently recycled more easily. Using recycled material for packaging will not only reduce the amount that may end up in landfill but may reduce the carbon foot print of a pack. Most consumers consider using recycled content packaging to be a positive move by a brand or retailer. Some packaging materials have the ability to use a recycled option, in the case of glass, aluminium, steel, paper and board, it is the industry norm.

In today's ever changing economic, social and regulatory environment, organizations should adopt non-hazardous packaging approach on all their products. This approach not only meets but exceeds expectations and regulations while also reducing carbon emissions and risks. Packaging waste forms a significant part of solid waste and has caused increasing environmental concerns, resulting in a strengthening of various regulations aimed at reducing the amounts generated. The use of biodegradable materials will contribute to sustainability and reduction in the environmental impact associated with disposal of packaging materials (Song *et al.*,2009). All packages containing hazardous materials must be properly classified, described, packaged, marked, labelled and in proper condition for transportation according to applicable regulations.

2.3.5 Legislations

Environmental laws help ensure to the environment and economy are equally protected and promoted, not just because we need them both, but because each needs the other (Page, 2012). Generally, environmental legislation is mostly reactionary to environmental

disasters or public concerns about potential environmental problems (Steele, 2020). However, Page (2012) asserts that environmental laws should be designed to ensure both the environment and the economy are equally protected. Kepner (2016), posits that the common purpose of environmental laws is to protect human health and the environment for future generations, while minimizing interference with commerce or public liberty; and to limit environmental inequality with regard to cost burdens. There are however differing viewpoints and Kepner's argument is not universally accepted.

Kenya enacted the Environmental Management and Coordination Act which was assented to in 1999 and commenced in 2000. It was later amended to the environmental management and co-ordination (amendment) Act, 2015. This is an ACT of Parliament to provide for the establishment of an appropriate legal and institutional framework for the management of the environment and for the matters connected therewith and incidental thereto. In a society there's need for rules to maintain social order and resolve disputes, as well as for distributing social resources according to what people need or deserve. Ethics and law are obligatory elements of social order aiming at the best arrangement of social relations, (Elena & Olga, 2020). Rules appeared when intellectual human beings examined different ways to live and act and agreed that some of these ways were better while others were worse (Ilyin, 1994).

The law strengthens the position of moral norms that are considered to be the most important for the society (Bentham, 1948). Legal rules create the compulsory force of the state (Hobbes, 1985) and limit the unsafe behaviour of individuals (Duhaime, 2007). However, the rules of law are effective only when they are consistent with universally valid and widely accepted moral rules. The Kenyan case of implementing green supply chain initiatives proves this case. Research has highlighted a number of hard and soft laws enacted by many countries focusing on sustainable development needs. In the context of the ten Organization for Economic Co-operation and Development(OECD) countries, these laws can be divided into nine criteria: Basic Environmental protection; Climate change; Air and sound pollution; Water protection and management; Waste management; Soil protection; Habitat protection; Energy and; Heritage properties protection (United Nations General Assembly, Intergovernmental Negotiating Committee 1992; OECD 2017; Vivian *et al.*,2019). Other hard and soft international instruments have been applied such as Stockholm Declaration (1972), Geneva Convention (1979),

Vienna Convention (1985), Montreal Protocol (1987), and the United Nations General Assembly, Intergovernmental Negotiating Committee (1992).

Legislations are statutory laws that have been enacted by legislature of a given country. Laws and legislations are developed within the respective country's constitutional framework. In Kenya there are legislations governing different sectors of the economy including the manufacturing sector being a very important contributor to the Country's GDP. In manufacturing, environmental regulations are of essence to the operations of firms because they are aimed at protecting the environment from harmful actions. Manufacturing firms face pressures from stakeholders, including end customers who prefer to buy eco-friendly products, along with a growing number of legal regulations that establish environmental standards for products, such as the Waste Electrical and Electronic Equipment Directive and the Restriction of Hazardous Substance Directive (Hu and Hsu, 2010; Shukla *et al.*,2009). These regulations and emergent market pressures have prompted some organizations to seek ways to reduce their environmental impact and develop green products.

ISO Certifications

The ISO 14000 family of standards provides practical tools for companies and organizations of all kinds looking to manage their environmental responsibilities, ISO 14001:2015 and its supporting standards such as ISO 14006:2011 focus on environmental systems. To achieve this, the standards focus on specific approaches such as audits, communication, labelling and lifecycle analysis, as well as environmental challenges such as climate change (International Organization for Standardization 2015, 2017).

Certification can be a useful tool to add credibility by demonstrating that your product or service meets the expectations of your customers. For some industries, certification is a legal or contractual requirement**.** It is the provision by an independent body of written assurance or a certificate that the product, service or system in question meets specific requirements.

Environmental regulations

Effective environmental laws make sure, among other things, that companies design projects that cause the least amount of environmental harm and make the best use of resources. Laws also make sure these companies are the ones paying the costs of preventing or repairing damage to the environment, rather than downloading them to taxpayers as clean-up cost or healthcare expenses. Regulations forces companies to take care of the environment as part of the price of doing business, (International Organization for Standardization 2015, 2017).

Environmental law, also known as environmental and natural resources law, is a collective term describing the network of treaties, statutes, regulations, common and customary laws addressing the effects of human activity on the natural environment. The core environmental law regimes address environmental pollution. Environmental law refers to the protection of natural resources and the regulation of businesses that impact them.

Regulatory Compliance

Regulatory compliance is the process of putting in place the measures necessary to comply with the regulations, laws, and guidelines that govern the operations of a business. These regulations may be set by a governmental agency such as National Environmental Management Authority (NEMA) or by a governing body for the applicable industry. Compliance means conforming to a rule, such as a specification, policy, standard or law. Regulatory compliance describes the goal that organizations aspire to achieve in their efforts to ensure that they are aware of and take steps to comply with relevant laws, policies, and regulations. Compliance means incorporating standards that conform to specific requirements.

Environmental policies

Environmental policy is the commitment of an organization to the laws, regulations, and other policy mechanisms concerning environmental issues. These issues generally include air and water pollution, waste management, ecosystem management, maintenance of biodiversity, and the protection of natural resources, wildlife and endangered species. Environmental policy is the measure by a government or corporation or other public or private organization regarding the effects of human activities on the environment,

particularly those measures that are designed to prevent or reduce harmful effects of human activities on ecosystems.

2.3.6 Performance of Firms in the Food and Beverage Processing Sector

There are many reasons as to why organizations measure their performance, for instance to see progress, identify success, report performance, evaluate performance, confirm what they already know, reveal what they do not know, understand their processes, assist operational personnel, identify problems and bottlenecks, form new objectives and targets, determining future courses of action and to confirm priorities (Björklund, 2012).

Performance measurements are central to improving organizational competitiveness. Organizations and researchers have developed and investigated various performance-measurement systems to manage and improve internal and external operations for logistics and supply chains (Bai & Sarkis 2012). Performance is an important component of organizations success (Whitten *et al.,* 2012); previous studies that were conducted on firm performance focused on quality and costs. Further Whitten *et al.,* (2012), posits that organizational performance should be based on financial and marketing aspects. Molina-Azorı´n *et al.,* (2009), notes that a number of studies on green management suggest that it significantly enhances organizational performance. Further studies have established that substantial environmental management lowers manufacturing costs by eliminating waste.

2.4 Empirical Literature Review

Green supply chain management practices are critical to the success of manufacturing firms owing to its impact on the performance. Several studies have been carried out on green supply chain management practices however, little has been done in the context of the food and beverage processing firms. This empirical review reveals the studies that have been conducted before, mostly in Asia and Europe.

2.4.1 Green Procurement and Firm Performance

The adoption of green procurement is one of the commonly accepted dimensions of GSCM practice. Tritos *et al.,* (2013), states that buying organizations with a green supply chain initiative will pay attention to green practices of their suppliers, especially the small

and medium-sized enterprises. In order to ensure that suppliers meet their environmental objectives, the buying firm may deploy collaboration-based activities that include training, environmental information sharing and joint research. Other organizations may adopt a less collaborative approach by simply demanding that their suppliers adopt environmental systems such as ISO 14001.

External motivators and customer pressure are key drivers of the adoption of ISO 14001 (Tritos *et al.*,2013). Other aspects of green procurement earlier discussed in the literature include the facilitation of recycling, reuse and resource reduction (Large & Thomsen, 2011; Diabat & Govindan, 2011). Studies have demonstrated that some organizations adopt a compliance and evaluative approach to the GSCM practices of their suppliers. This involves evaluation of suppliers based on environmental criteria and a requirement for suppliers to develop and maintain some form of environmental management system (Sarkis, 2012).

Green procurement is an integration of environmental management into the purchasing function of an organization that attempts to ensure that the purchased material meet the environmental objectives set by the procuring companies; such as promoting reusability, recycling, eliminating hazardous material from the product and substitution of material (Lokesh *et al.*,2017). It entails acquisition of environmentally friendly raw materials without sacrificing the traditional purchasing criteria of product quality, cost and delivery time. Green procurement is the alignment of environmental policies with the traditional procurement process. It emphasizes on reduction of waste produced, material substitution through environmental sourcing of raw materials and waste minimization of hazardous material.

2.4.2 Green Manufacturing and Firm Performance

Green manufacturing has different terms: clean manufacturing, environmentally-conscious manufacturing, environmentally responsible manufacturing, sustainable manufacturing or sustainable production (Kuldip & Varinder 2015). Adoption of Green Manufacturing is correlated with reduction on material waste and energy consumption. Furthermore, it brings down the cost of production and enhances product quality, (Cory & Carolina 2016; Gupta & Jain, 2013). Deif (2011) defined environmental waste as the

unnecessary use of resources, or the release of substance to the air, water, or land that could harm human health or the environment.

Green manufacturing is a technique that reduces waste and pollution for all the industries, it decelerates the depletion of natural resources and further lowers the volume of trash that enters landfills. Further it emphasizes on parts reduction, re-use of components, materials rationalization and to help in building products more efficiently (Shrivastava, 2017). According to Maruthia and Rashmi (2015) the principle of green manufacturing is to check on pollution, save energy and reduce generation of harmful substance. It incorporates product and process design that influence manufacturing, planning and control, in order to identify, quantify, assess and manage waste based on its impact on the environment, and maximize resource efficiency.

The crux of green manufacturing is to prevent pollution and save energy through the discovery and development of new processes which reduce the generation of hazardous substances in the design and manufacturing phases. Green manufacturing is a system that integrates product and process design issues, which influence manufacturing planning and control, in such a manner so as to identify, quantify, assess, and manage the flow of environmental waste with the goal of reducing and minimizing the impact on environment and also trying to maximize resource efficiency.

Green manufacturing has emerged to be a critical component for industries owing to the laws and regulations that govern manufacturing emissions and changing consumer preference with respect to eco-labelled products and an upsurge in the global prerequisites on environmental certifications (Sharma *et al.*,2015). There is evidence to the fact that when firms embrace green manufacturing their operations on environment are milder (Sharma *et al.*,2015). The primary goal of green manufacturing is to manufacture products while conserving energy and further reduce energy consumption and pollution by embracing technological approaches (Sharma *et al.*,2015; Tsai *et al.*,2014). For the industry to be successful in their green manufacturing practices, four factors should be checked; volume of energy and resource consumption, extend of green energy, volume of hazardous waste and the number of recycles of hazardous waste (Sharma *et al.*,2015; Chen *et al.*,2012).

It is important to note that green manufacturing has embraced green strategies and other innovative techniques which include products and systems that consume less material and energy, utilization of new input materials and introduction of processes that reduce unwanted outputs. Cory and Carolina (2016), posits that green manufacturing includes programs to convert outputs into inputs (recycling), and discover novel uses for by-products that result in secondary products, with the objective of reducing environmental wastes in delivering products and services to customers.

2.4.3 Reverse Logistics and Firm Performance

Reverse logistics entails planning, implementation, and control of the efficient and cost-effective flow of raw materials, work in process inventory, finished goods and related information from the point of consumption to the point of origin in order to create value and proper disposal (Sharma *et al.*,2016). Further, reverse logistics can incorporate remanufacturing and refurbishment. The primary focus of reverse logistics is the reverse flow of materials from customers to suppliers with the aim of maximizing value from the returned items or reduce the total cost incurred, such that products can be sorted for re-use, re-manufacture, re-cycle and disposal (Sharma *et al.,* 2016). Previous studies have shown that recovery of used products is more economically sound than disposal hence organizations are very keen on this concept.

Reverse logistics has become a competitive necessity for many firms, the concept of reverse logistics has gained significant attention in both academia and practice, due to a variety of reasons especially those pertaining to environmental concerns (Sajan *et al.*,2017). These reasons include the motive for economic potential associated with used products and the resulting business options. A good number of multinational firms have recognized and embraced reverse logistics practices, for instance Dell, General Motors, HP, Kodak & Xerox (Ulster *et al.*,2007). There is need for the food and beverage processing firms to handle the reverse logistics function appropriately owing to the cost associated with the process. A study by Min and Ko (2008) established that organizations have not been keen to return merchandise until things get out of control.

Reverse logistics practices usually reduce organizations current assets as it lowers returned products, inventory value and lengthens order cycle time due to shipping of ordered items. Min and Ko (2008), state that it causes organization to lose on sales and

thus reduce sales revenue. It is imperative to dispose of products in a proper manner after their useful life, failure to which it may pose a serious harm to the ecological environment. The management of returned products is a hazardous task as it requires special logistics hence there is need to design a proper reverse logistics network. According to Melo *et al.*, (2014), the network design decision entails site selection for the location of new facilities, determination of numbers and size of facilities, identifying the channels of distribution and transportation requirements to meet customer needs.

Reverse logistics has been recognized as a strategic function of green supply chain management practices. Researchers have revealed how efficient management of reverse logistics can bring rewarding economic benefits and enhance organizations' competitiveness (Buyukozkan & Cifci, 2012). Though the impact of reverse logistics on greening the supply chain is significant, development of the reverse logistics function typically lacks other aspects of GSCM (Xie & Breen, 2012). Further, Lau and Wang (2009) noted that development of the reverse logistics is still at infancy stage in most developing countries in the world yet that is where the bulk of the world's manufacturing is undertaken.

2.4.4 Green Packaging and Firm Performance

This is packaging related eco design and it is an integral component of GSCM practices. Green packaging includes: use of re-usable packaging, recyclable packaging material, use of non-hazardous packaging material, use of biodegradable packaging material and adopting reduced size of packaging in order to reduce transport cost, enhance better utilization of shelf space and reduce carbon foot print. Green packaging comes with a number of benefits; according to Ouyang, (2014), it reduces packaging cost and solid waste, it further maximizes environment friendliness through alternative packaging materials and techniques. Troisi, (2015), also posits that green packaging reduces waste and liability cost while building green corporate image for firms.

There is good and bad news about the environmental impact of packaging; the good news is that many countries have succeeded in considerably reducing the amount of packaging waste going to landfill, for example 61% of the packaging waste in EU (Santén 2012; Besch *et al.*,2016) was recycled in 2008, exceeding the 55% target defined in the EU

Packaging and Packaging Waste Directive (PPWD) for 2008. The bad news is that there are still environmental problems connected to packaging that remain unsolved.

With respect to food, the functions of packaging are continually evolving from simple preservation methods to include aspects such as convenience features, tamper evidence and active packaging innovations that extend product shelf life or improve safety or sensory properties, while maintaining product quality and intelligent technologies that provide stakeholders with the status of the food or its surrounding environment (Besch & Pålsson, 2015). According to Grönman *et al.,* (2013) the primary role of packaging is to protect and distribute the right product to the right end-user in a safe, cost-efficient and user-friendly way. Theory suggests that improved packaging can mitigate the environmental impact of supply chains by minimizing product waste (Lewis 2007). Packaging development process should integrate requirements on packaging from the whole supply chain.

Today's consumers are becoming increasingly aware of and concerned about their social responsibilities and their direct impact on environment through their purchasing behaviour (Lyndsey & Debbie,2014; Stolz *et al.*,2013). Most consumers are conversant with the benefits of making environmentally responsible purchasing decisions. According to Juwaheer *et al.,* (2012), green marketing strategies including green packaging, can influence consumers' purchases. Katrin and Henrick (2016), note that there is need for better packaging per se, but that contributes to minimizing total resource consumption, emissions and waste, along the supply chain. Food packaging has been developed to contain food products, maintain food quality and inform consumers about the properties of the enclosed product (John & Abdennour 2016). In distribution, choosing the right size and material for packaging could cut logistical costs considerably (Power Packaging, 2010). According to Sing *et al.,* (2016), studies have found out that many companies are switching towards re-usable packaging systems. Re-usable containers can reduce solid waste and product damage during shipping which can further help in eliminating ergonomic and safety problems.

2.4.5 Legislations

Recent studies by (Lokesh *et al.*,2017; Dubey *et al.*,2015 & Zhu *et al.*,2012) have suggested that the regulatory bodies have forced the industries to improve adoption of

green supply chain management (GSCM) practices. In China, the legal requirements and the pressure of external market are the key drivers for adoption of environmental practices (Everton *et al.,*2014; Zhu *et al.,*2008). A study by Elcio *et al.,* (2015), notes that Governmental regulations might motivate firms to closely monitor their critical suppliers, whereas top management could drive firms to adopt a more collaborative approach with suppliers to improve environmental performance.

Kenyan environmental management practices are governed by laws and regulations under the Environmental Management and Co-ordination (Amendment) Act, 2015 No. 5 of 2015. This Act came by through the amendment of The Environmental Management and Coordination Act, 1999, which is referred to as the "principal Act" under section 2 of the 2015 amended Act. There are a number of regulations under the umbrella of EMCA (Amendment) Act (2015) including the Environmental Impact Assessment regulations 2009, noise regulations, 2009, wetland regulations, 2009 and water quality regulations.

According to Vivian *et al.,* (2019) environmental laws and regulations of any country regulate many aspects including environmental protection and even Green House Gas (GHG) emissions. With respect to international environmental laws and regulations, there are three sustainable pillars: environmental, social, and economic pillars. Choosing soft or hard laws to confront environmental issues is always the question for any government all over the world. Hard laws, also known as binding laws, refer to lawful obligations that are defined and implemented by the state authority. Soft law applies when at least one of these aspects of legalization are violated: obligation, precision, and delegation (Abbott *et al.,*2000; Shaffer & Pollack 2009).

2.5 Critique of Relevant Existing Literature

A clear picture of whether GSCM practices affect firms' performance in the food and beverage processing sector in Kenya has emerged from a number of previous studies. Whereas some researchers such as Zhu & Sarkis (2004); Rao & Holt (2005); Green *et al., (*2012) & Runala, & Zaffar (2015), found a positive correlation between environmental practices and organizational performance, researchers such as De Giovanni & Esposito Vinzi (2012) and Huang *et al.,* (2012), established that there was no significant correlation between such practices and organizational performance. Furthermore, studies

by Averedo *et al.,* (2011) & Wu & Page (2011), found a combination of both positive and negative correlation.

Though environmental legislation and strategies for sustainable development have been put in place for implementation since the 1990s (Human Development Report, 2005; Elena & Olga 2020). There are several barriers for implementation of environmental legislation to follow a sustainable path in Kenya, particularly on the misunderstanding of the value and significance of the natural environment in the Kenyan society. GSCM has been considered as an important pathway to improve profits while reducing the negative impact of industrial processes on environment (Egilmez *et al.,* 2017; Pan *et al.,* 2020). Large numbers of authors employed various methods and proved that GSCM plays an important role in sustainable development (Rao & Holt 2005; Luthra *et al.*,2015; Mohanty & Prakash 2014; Pan *et al.*,2020). Diabat and Govindan (2011) believes that GSCM may be a good method to balance the environmental, economic and social benefits. Sheu (2008), suggested that GSCM is an important organizational strategy and an efficient approach for enhancing manufacturing sustainability in modern business environment.

2.6 Research Gaps

In spite of the numerous discussions of the positive impacts on GSCM adoption on firm performance by researchers, some studies found out contrary results on that relation. For instance, the implication of GSCM application on firm performance, whether it is positive or negative, is still controversial (Wagner *et al.*,2001; Ilyas *et al.,* 2018). A study by Ali *et al.,* (2017) examined how GSCM is practiced by UK food retail SMEs and how that impacts on their performance outcome. The impact turned out to be positive and this ought to be replicated in the African Context.

Inclusion of green practices within the supply chain is a subject that has become topical in academic literature. Despite its increasing popularity in industrialized countries, several areas of green supply chain management (GSCM) require further research particularly as greening the supply chain has been identified as a key issue of sustainable SCM (Large & Thomsen, 2011; Kenneth *et al.*,2012; Tritos *et al.*,2013). GSCM has also begun to gain popularity in emerging economy countries such as China and Malaysia. Eltayeb *et al., (*2011), carried out a study on the outcomes of green supply chain initiatives among ISO

14001 certified firms in Malaysia, whereas Zailani *et al.*,(2012), carried out a study on GSCM research in Malaysia to analyse the impact of internal and external forces on environmental performance. However, studies in the context of other emerging economy countries, including African countries are still relatively rare. Therefore, this study examines the deployment of green supply chain practices on firm performance.

Prior studies on GSCM practices and performance have focused on the environmental performance aspects. However, a study by Green *et al.,* (2012), inferred that the cost saving nature of environmental performance should lead to improved economic performance and that both environmental and economic performance should yield improved operational performance. Further research should examine the impact of GSCM practices on Business and Social performance. A number of studies have not highlighted legislation as a variable that can contribute to firm's environmental initiatives. According to Vachon (2007), major manufacturers have begun to implement comprehensive programs to control environmental practices throughout their supply chains which should be complemented by environmental legislations.

2.7 Summary of Literature Reviewed

From the above discussion, there is a strong theoretical base for linking GSCM practices to firm's performance, the theories include; Resource Based Theory, Transaction Cost Economics, Institutional Theory, Diffusion of Innovation Theory and the Theory of Reasoned action. The study was carried out in the Kenyan food and beverage processing sector. The predictor variables are; green procurement, green manufacturing, reverse logistics and green packaging, further the constructs of firm performance to be examined include: quality, environmental aspect, cost management and operational performance.

Table 2.1: Relevant Literature on GSCM Practices

Predictor	Relevant Literature
Green procurement	Tritos*et. al.,(*2013), Tritos*et.al.,(*2013), (Large and Thomsen, 2011; Diabat and Govindan, 2011). (Sarkis, 2012), (Lokesh*et. al.,* 2017), (Rameshwar *et.al.,* 2017; Dubey *et al.,* 2013)
Green Manufacturing	(Kuldip&Varinder2015), (Cory H & Carolina C 2016;Deif 2011). ; Gupta and Jain,2013), Deif (2011), (Shrivastava,2017), Maruthia& Rashmi, (2015), Sharma *et.al.,* 2015)., He *et al.,* 2008). Tsai *et al.,* 2014, Chen *et al.,* 2012
Reverse Logistics	Sharma S.K *et.al.,*2016:Hawks,2006, (Sharma S.K *et. al.,* 2016). (Sajan*et.al.,*2017). (Ulster *et.al.,*2007). Min and Ko (2008), Senthil*et al.,* 2014; Sharma *et. al.,* (2011), Melo*et. al.,* (2014), Buyukozkan and Cifci, 2012). (Xie and Breen, 2012) Lau and Wang (2009), Olorunniwo and Li, (2010), Field and Sroufe, (2007), (Das, 2012).
Green Packaging	Ouyang, (2014), Troisi, (2015), (Santén, 2012; Molina-Besch*et al.,*2016), Molina-Besch& Henrik Pålsson, 2015). Grönman*et. al.,* (2013), Lewis,(2007), Lyndsey S. and Debbie V, 2014; Stolz *et al.,*2013). Juwaheer*et.al.,* (2012), Katrin M and Henrick P (2016), John B and Abdennour A,2016, (Power Packaging,2010). Sing R.K *et.al.,* (2016).

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter describes research methodology that was used for the study. The primary objective of this study was to examine the effect of green supply chain management practices on the performance. The methodology is based on previous research on the relationships between green supply chain practices and performance. The chapter describes the research design, census, population, data collection techniques and data analysis techniques that were used.

3.2 Research Design

The study adopted explanatory research design as it aimed at examining the effects of green supply chain management practices on the performance of food and beverage processing firms in Kenya. The research design was appropriate since it is quantitative in nature hence hypotheses were tested by measuring the relationships between variables. Further, it facilitated data analysis using statistical techniques. The performance constructs are: quality, environmental aspect, cost management and operational aspect.

Explanatory research design explains the relationship among variables. The predictor variables in this study are green procurement, green manufacturing, reverse logistics and green packaging; legislations is the moderator variable and; performance is the dependent variable. According to Cooper &Schindler (2008), research design constitutes a blueprint for the collection, measurement and analysis of data, further, Green and Tull (2009), defined research design as the specification of methods and procedures used to acquire information needed. The essence of research design is to prepare an appropriate framework within which the research works and activity is undertaken.

The goal of this study was to establish and document green supply chain management practices that affect firm performance. The explanatory research design was therefore deemed suitable since the study seeks to establish the relationship between independent

variables and the dependent variable. Further, a descriptive survey design allowed was applied in order to detail the descriptive factors that affect firm's performance.

3.2.1 Research Philosophy

Research Philosophy is what the researcher perceives to be truth, reality and knowledge. It outlines the beliefs and values that guide the design of the collection and analysis of data in research study, these choices are contemplating philosophical principles. (Ryan, Gemma 2018). Ontology relates to the values a researcher holds about what can be known as real and what someone believes to be factual (Bryman 2008).

Research paradigm is a belief system, world view or framework that guides research and practice in the field (Willis, 2007). From a philosophical perspective, the research paradigm comprises a view of the nature of reality which is considered to be objective and measurable while human beings are assumed to be rational.

The study was anchored on the positivist research paradigm which views the researcher as independent of the study they are conducting. In this context, researchers are detached from participants which is essential in remaining emotionally neutral. The positivist ontology believes that the world is external and that there is a single objective reality to any research phenomenon or situation regardless of the researcher's perspective or belief. In positivism studies, the researcher's role is limited to the collection of data, analysis and interpretation through an objective approach. The findings are observable and quantifiable.

3.3 Target Population

Population refers to the entire group of people, events, or things of interest that the researcher wishes to investigate (Sekaran, 2010). Barnat (2015), described population as the entire group of individuals, events or objects having common observable characteristics. According to Kombo and Tromp (2011), population is a group of individuals, objects or items from which samples are taken for measurement. The target population for this study were the food and beverage processing firms in Kenya. According to the Kenya Association of Manufacturers, (KAM, 2017), there are 187 registered food and beverage processing firms in Kenya. The study specifically targeted

one respondent per firm, who could be attached in one of the following three departments: supply chain, production and the safety & environment.

The supply chain managers known as heads of procurement or distribution in some companies, are the key implementers of the green initiatives in manufacturing firms (UNEP, 2016). They are well knowledgeable on the green supply chain measures taken by their respective companies. The Kenyan manufacturing sector has been at the forefront of implementing green and sustainable development as reported by the Ministry of Environment (2017). All firms are required to adhere to environmental conservation measures and sustainable practices including green supply chain practices. This is to imply that the study assumed that all the food and beverage processing firms were practicing green supply chain practices, hence they were all targeted.

3.4 Sampling Frame

The Sampling frame for the study comprised the food and beverage processing firms in Kenya that were registered with the Kenya Association of Manufacturers by the time the study was conducted. This study primarily used individual firms in the food and beverage manufacturing sector as a unit of analysis. The study focussed on the food and beverage sector since it was the largest sub sector under manufacturing firms in Kenya, constituting 22 percent membership. Secondly, its supply chain operations are closed loop, incorporating all the green supply chain management practices.

Table 3.1: Manufacturing Sub-Sectors in Kenya

S/No	Sectors	Percentage
1.	Building, Mining & Construction	3
2.	Chemical & Allied	9
3.	Energy, Electrical & Electronics	5
4.	Food & Beverages	22
5.	Leather & Footwear	1
6.	Metal & Allied	9
7.	Automotive	6
8.	Paper & Board	8
9.	Pharmaceutical & Medical Equipment	3
10.	Plastics & Rubber11.	3
11.	Services & Consultancy	10
12.	Textiles & Apparel	7
13.	Timber, Wood & Furniture	2
14.	***Agriculture/Fresh Produce***	1

Source: Kenya Association of Manufacturers Website (2016)

3.5 Sample and Sampling Technique

In practice, the sample will be drawn from a list of population elements that often differs somewhat from the defined target population. The sampling frame is a list of elements from which the sample may be drawn, referred to as the working population because these units eventually provide the data that is analysed (Zikmund *et al.*,2013). The sampling frame of this study were the 187 food and beverage processing firms registered with the Kenya Association of Manufacturers. Census survey was selected as the appropriate data collection technique for a population of this size (Saunders *et al.,* 2009; Nyang'au 2017)

A Census survey was conducted for all the 187 food and beverage processing firms registered with the Kenya Association of Manufacturers being the unit of analysis. The unit of observation comprised of one senior manager per organization attached to one of the following three departments: supply chain, production and safety and environment.

According to Topal, (2014), there are instances whereby the entire population is chosen since the size of population has the particular set of characteristics that you are interested in and the population size is very small.

3.6 Research Instrument

A questionnaire was considered appropriate for this study since it provides for the collection of standardized data which is easier to analyse and further provide access to a bigger group of respondents (Zikmund, 2010). A questionnaire is a formulated written set of questions to which respondents record their answers, usually within rather closely defined alternatives (Sekaran *et al.*,2011). The primary data was collected using structured and semi-structured questionnaires that capture the variables of the study.

Developing the questionnaire followed the four phases suggested by Lie *et al.*, (2006): item generation, pre-pilot study, pilot study and large- scale data analysis. The questionnaire contains four sections: background information, green supply chain management practices, moderating variable and performance as a dependent variable. The 24 items in part one (GSCM) practices were drawn from a number of sources in literature; a five point Likert scale was used to measure all of the research constructs. The options and corresponding scores in the Likert scale included: 5-Strongly Agree, 4-Agree, 3-Neutral, 2-Disagree and 1- Strongly Disagree.

3.7 Data Collection Procedure

The data used for this study consisted of questionnaire responses from respondents from the Kenya food and beverage processing firms. The list of the food and beverage firms was obtained from the Kenya Association of Manufacturers. The questionnaires were administered to a subset of the population of interest that comprised of managers who were the key personnel because of their knowledge of the green supply chain initiatives being implemented in their respective companies. According to Salwa *et al.*, (2017), general managers, environmental health and safety managers and green technology managers, all qualify as key personnel. These were either, in a broad sense. This is because they understand and/or are in charge of the supply chain, production and safety and environment departments.

According to Sekaran *et al.,* (2011), questionnaires can be administered in person, mailed to the respondents or distributed electronically. The questionnaires in this study were directly administered to the respondents. Direct presentation of questionnaires to respondents is considered to be socially responsible as respondents prefer face to face contact in order to avoid suspicion. One-on-one administration of questionnaires is an effective way to collect data since complete responses can be collected in a short time frame. Further, any doubts from respondents on any question can be clarified immediately. It also affords the researcher an opportunity to introduce the research topic and motivate respondents to offer their frank answers.

The survey was carried out for a period of five months due to a slow and low response rate. Several initiatives were taken to improve the response rate including repeated follow-up calls as well as giving assurance of mailing the results of the study to the respective participating companies, for their own future reference; this is considered to be of importance by Sundram *et al.,* (2016).

3.8 Pilot Study

A pilot test was conducted before the commencement of the study. Nine respondents from the manufacturing sector were issued with questionnaires during the pilot study, however, a total of seven questionnaires were returned. The pilot study was done to test for instrument validity and reliability, and further do some modifications and adjustments before the actual data collection exercise began. The pilot survey was used to increase the clarity and readability of items, reduce item difficulty and validate the use of appropriate terminologies; this is the purpose of a pilot study according to Hazen *et al.*, (2015 and Rahman, (2017). According to Sang *et al.,* (2013), the role of pilot study is to review the preliminary questionnaire, check for ambiguity and in appropriateness of items. The managers were asked to review whether the measurement items were appropriate in real-world business situations, and based on the suggestions they gave, the questionnaires were refined for clarity.

Surveys are pilot tested to avoid misleading, inappropriate or redundant questions; pilot testing ensures that a research instrument can be used properly and that the information obtained is consistent. According to Zikmund (2010), pre-testing the questionnaire is of essence so as to obtain feedback and check whether it is effective and well understood by

respondents. In this context pre-testing was carried out using a few randomly selected employees working for manufacturing firms outside the study. Some of the questions were revised to convey their intended meaning more precisely and a few items were also removed from the questionnaire as suggested.

3.8.1 Reliability of the Research Instrument

Reliability is defined as the extent to which a questionnaire, observation or any measurement procedure, produces the same results on repeated trials (Lalit & Shyamkumar 2019). It is the stability or consistency of scores over time or across different researchers or administrators of the instruments (Carmines & Zeller 1979).

Internal consistency analysis was carried out to measure the reliability of the items under each critical factor by use Cronbach's alpha. This is a useful and flexible method that can use to investigate the reliability of test results and applied when test items are scored dichotomously (Toke & Kalpande, 2018). Cronbach alpha is used to estimate the proportion of variance that is systematic or consistent in a set of test scores. It can range from 00.0 (if no variance is consistent) to 1.00 (if all variance is consistent), with all values between 00.0 and 1.00 also being possible. For example, if the Cronbach alpha for a set of scores turns out to be 0.90, you can interpret that as meaning that the test is 90% reliable, and by extension that it is 10% unreliable. The acceptable value for Cronbach's alpha is greater than 0.6 (Soo & Quazi 2005; Kalpande *et al.*,2013a; Toke & Kalpande 2019).

Instrument reliability refers to the consistency of scores or answers from one administration of an instrument to another, and from one set of items to another (Fraenken & Wallen, 2003). Reliability score of an instrument indicates the stability and consistency of the items it contains and to what limit it measures the concept in a correct manner. Cronbach's coefficient (α) was calculated to test reliability and internal consistency of responses in the survey. Cronbach's alpha coefficient (α) is the measure of the extent to which all the variables in the scale are positively related to each other (Ravi & Ravi, 2015). Nunally, (1978) states that a general rule for the Cronbach's alpha coefficient is that it should be above 0.7, meaning that there exists a high degree of internal consistency in the responses.

The Cronbach's alpha coefficient value is the main indicator of internal consistency, a value of above 0.7, is considered to be good indicator for internal consistency reliability. Reliability addresses the repeatability of the experiment and whether replications are possible and will achieve the same results (Protti, *et al.*,2012).. In research when Cronbach Alpha Values for all of the measurement scales exceed the recommended level of 0.7 there's sufficient reliability (Garver & Mentzer 1999; Green Jr *et al.*, 2013).

3.8.2 Validity of the Research Instrument

Instrument validity is the ability of an instrument to measure the intended concept (Al-Shboul et *al.*,2017). It is the extent to which an instrument measures what it is supposed to measure and performs as it is designed to perform (Cheng 2014). It is used to determine whether the research instrument actually measures what it anticipated to measure (Naga *et al.*,2014). The main aim of validity analysis is to provide the research instrument that allows the researchers to meet the objectives of the research study.

To achieve a good level of validity, a five-point Likert scale, paper-based, questionnaire survey was revised after the pilot study. The objective of revision was to ensure that each construct was properly and accurately addressed. The respondents were requested to provide feedback regarding the clarity of questions as well as the organisation, logic and length of the questionnaire. This helped in refining the data collection instrument; based on the respondents' feedback, redundant and ambiguous items were modified, eliminated and new items were added whenever necessary.

The validity of the research instrument was sought in the pilot study. This is the ability of the research instrument to address the intended purpose so as to ensure that the respondents understood and responded to the questions as required. Face validity, content validity and construct validity were tested. The questions were presented to different experts including the supervisors who indicated their recommendations thus contributing to the content validity. Construct validity was enhanced by use of five-point Likert scale questions to avoid repetitiveness of the questions.

Before the commencement of data collection exercise, the content validity of the survey was established through an extensive literature review, discussion with both practitioners and academic experts in the area, and a pretest of the survey with interviews, as proposed

by Lee (2015). Construct validity addresses the establishment of the appropriate operational measures for concepts studied (Parotti *et al.*,2012). According to Yin (2003) one way to deal with construct validity is to return the case study reports to informants for verification.

3.9 Data Analysis

The survey's data was analysed using descriptive and inferential statistical analysis techniques. Descriptive statistics gave the profile of the respondents, that is, the frequencies and their percentages; whereas inferential statistics adopted a hierarchical, moderated, multiple regression analysis model in order to determine the effect of the explanatory variable, that is, the effect of green supply chain management practices on the performance of firms in the food and beverage processing sector in Kenya. A statistical analysis was done using multivariate method since the data arose from more than one variable. Owing to the existence of a moderator as the fifth variable, the moderated multiple regression analysis model was deemed appropriate.

Inferential statistics were used to test and validate the hypothesised relationships between green supply chain management practices and performance. The responses were coded and analysed using SPSS statistical package Version 24. Multivariate analyses were used to process the survey data results based on Likert scale evaluations that allowed statistical and graphical representation (Klementora *et al.*,2015). Data analysis is the application of reasoning to understand the data that has been gathered (Zikmund, 2010); it entails statistical analysis of data gathered to see if the hypotheses that were generated are supported (Sekaran & Bougie, 2011).

3.9.1 Statistical Modelling

Moderated Multiple Regression Analysis Model was adopted for this study. It is the method of choice for testing hypotheses involving moderating effects of categorical variables. The model allows the simple relationship between the dependent variable and independent variables to be tested. The regression model for the un moderated effect of green supply chain on the performance of food and beverage processing firms was regressed through the following model:

$$Y=\alpha_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + e \text{ ……..(i)}$$

Where Y = Firm performance.

X_1=Green Procurement.

X_2=Green Manufacturing.

X_3= Reverse Logistics.

X_4= Green Packaging.

β = The coefficients for the independent variables

α = The constant/Y-intercept

e = Error term

The moderating effect of legislations was analysed using the following regression model:

$$Y=\alpha_0+\beta_1 X_1+\beta_2 X_2+\beta_3 X_3+\beta_4 X_4+Z+e \text{ ……(ii)}$$

Where:

Z = Legislations

The second model sought to establish whether legislations had a direct effect on the performance as a predictor (independent) variable.

The third equation was to test for the moderating effect of legislations. The model is as shown:

$$Y=\alpha_0 + \beta_1 X_1 * Z + \beta_2 X_2 * Z + \beta_3 X_3 * Z + \beta_4 X_4 * Z + e \text{ ……(iii)}$$

3.9.2 Assumptions of Moderated Multiple Regression Analysis Model

Statistical tests rely upon certain assumptions about the variables used in an analysis (Osborne & Waters, 2002). Multiple regressions examine the relationship between a

single outcome measure and several predictors or independent variables (Jaccard *et al.*,2006).

Linearity

Linearity defines the dependent variable as a linear function of the predictor (Independent) variables (Darlington, 1968). Multiple regressions can accurately estimate the relationship between dependent variable and independent variables when the relationship is linear in nature (Osborne & Waters, 2002). According to Keith (2006), if linearity is violated, all the estimates of the regression including regression coefficients, standard errors, and tests of statistical significance may be biased. Further, if the relationship between the dependent and independent variable is not linear, the results of linear analysis will under or over-estimate the true relationship and increase the risk of Type I and Type II errors (Osborne & Waters, 2002).

Homoscedasticity

It refers to equal variance of errors across all levels of the independent variables (Osborne & Waters, 2002). According to Keith (2006), Researchers assume that errors are spread out consistently between the variables, that is, variance around the regression line is same for all values of the predictor variable.

Normality Test

Multiple regressions assume that variables have normal distributions (Darlington, 1968; Osborne & Waters, 2002). This means that errors are normally distributed, and that a plot of the values of the residuals will approximate a normal curve (Keith, 2006). The assumption is based on the shape of normal distribution and gives the researcher knowledge about what values to expect (Keith, 2006).

Collinearity Test

Collinearity refers to the assumption that the independent variables are uncorrelated (Darlington, 1968; Keith, 2006). It occurs when several independent variables correlate at high levels with one another, or when one independent variable is near linear combination of other Independent variables (Keith, 2006). Multicollinearity can result in misleading and unusual results, inflated standard error and reduced power of the regression coefficients that create a need for larger sample sizes (Jaccard *et al.*,2006; Keith, 2006).

CHAPTER FOUR

RESEARCH FINDINGS AND DISCUSSION

4.1 Introduction

This chapter presents the findings of the study on the effect of green supply chain management (GSCM) practices on the performance of firms in the food and beverage processing sector in Kenya. It outlines the results of the pilot study, the demographic data of the respondents as well as the descriptive analysis of the findings on the study variables. It also covers the diagnostic tests for the model of the study as well as inferential analysis and hypotheses testing.

4.2 Response Rate

According to Young (2013), a response rate analysis is essential to determine whether a study obtained a threshold of participants required to make it valid and effective as well as to be a representative of the targeted population. The study sought to collect data from 187 food and beverage processing firms in Kenya where the respondents comprised of one senior or departmental manager, per firm, from each of the 187 firms and in the targeted departments: supply chain or procurement, production or safety and environment.

Out of the sample size, 161 respondents returned the questionnaires for data analysis. This translated to response rate of 86.1% while a total of 26 questionnaires were either returned partially filled, not filled at all or were not returned at all, thus implying a non-response rate of 13.9% as shown in Table 4.1 The response rate was considered adequate for analysis based on the observations by Cohen *et al.,* (2007) and Granados (2014), who contend that a response rate of above 60% is adequate for making inference on the entire sample size. According to Garg and Kothari (2014) a response rate of more than 70% is reliable to conduct analysis. In this regard the distribution of survey questionnaire across a wide geographical area of food and beverage processing firms provided a broad overview of green supply chain management practices common among Kenyan firms.

Table 4.1: Response Rate

Sample Size		Response		Non-response	
Frequency	**Percentage**	**Frequency**	**Percentage**	**Frequency**	**Percentage**
187	100%	161	86.1%	26	13.9%

Pilot Study Results

Reliability was sought in the pilot study to ascertain the ability of the questions to relate to each other and deliver reliable and consistent findings. The findings as shown in table 4.2 revealed the Chronbach's alpha coefficient score for the variables: green procurement had a score of 0.810 with six items (number of questions); green manufacturing had a score of 0.734 with five items; reverse logistics had a score of 0.863 with five items; green packaging had a score of 0.754 with six items; legislation had a score of 0.770 with four items; and the dependent variable, performance, had a score of 0.845 with twenty two items. The findings herein portray that all the variables met the rule of thumb of 0.7, thus implying that the research instrument was reliable.

Table 4.2: Reliability Test

Variable	Number of Items	Cronbach's Alpha
Green Procurement	6	0.810
Green Manufacturing	5	0.734
Reverse Logistics	5	0.863
Green Packaging	6	0.754
Legislation	4	0.770
Performance	22	0.845

4.3 Descriptive Findings

The aim of the study was to find out the effect of green supply chain management practices on the performance of food and beverage processing firms in Kenya. The study was guided by four major dependent variables: green procurement, green manufacturing, reverse logistics and green packaging; with legislations as a moderator variable and performance as the dependent variable. The findings are presented based on these

variables. According to Creswell (2013), descriptive analysis is necessary in a study as it helps to stipulate the findings as they are; thus, forming the basis for the researcher to deeply understand the phenomenon under which the research is based on.

The main descriptive statistics used in the study were the mean and the standard deviation. The mean is the average score of the data values. The interpretation of the mean is that the higher the mean, the higher the data values. A high mean would signify that more respondents indicated the highest values in the Likert scale while a low mean would signify that more respondents indicated the least values on the Likert's scale. Standard deviation (Std. Dev.) measures the spread of data values around the mean. The smaller the standard deviation, the closer the data values to the mean and the higher the mean, the further the data values are spread from the mean.

4.3.1 Green Procurement

The first objective of the study was to find out the effect of green procurement on the performance of food and beverage processing firms in Kenya. The respondents were asked to rate specific aspects of green procurement practices in their respective firms based on a five-point Likert's scale where, 5= Strongly, 4= Agree, 3=Neutral, 2= Disagree and 1=Strongly Disagree.

The findings tabulated in Table 4.3 revealed that on the first aspect which was on cooperation with suppliers for eco design of inputs, majority of the respondents indicated that they practiced this as evidenced by a mean of 4.36 and a standard deviation of 0.73. On the statement that the organization cooperated with suppliers for environmental objectives, the respondents agreed as shown by a mean of 4.41 and a standard deviation of 0.71. The other aspect was that the organizations carried out environmental audits for suppliers' internal management and in this, the respondents indicated that they practiced this, as shown by a mean of 4.02 and a standard deviation of 1.08. With regard to the firms conducting environmental awareness seminars, most of the respondents agreed and this is evidenced by a mean of 3.59 and a standard deviation of 1.08. The respondents further agreed that they practiced reduced purchase of items that were difficult to dispose-off as evidenced by a mean of 4.21 and a standard deviation of 0.95. On the last statement that the firms had reduced the purchase of hazardous materials, most of the respondents

agreed with this as shown as evidenced by a mean of 4.29 and a standard deviation of 0.83.

The findings imply that most of the food and beverage processing firms in Kenya have been relatively observing green procurement as an aspect of green supply chain management practices. The findings compare with those by Min and Kim (2012), who established that the best practice of green supply chain was green procurement whereby through purchasing of products that promote green environment, the producers will as well insist on producing green supplies out of which green supply chain will be enhanced. According to Davies and Hochman (2007), green supply chain starts right at the bottom whereby the buyer insists on a certain commodity and the supplier has no option but to comply. However, if the green supply chain is not upheld by the firm doing the purchases, it will be difficult for other parties in the chain to comply.

Table 4.3: Green Procurement

Statement	**N1**	**SD (%)**	**D (%)**	**N2 (%)**	**A (%)**	**SA (%)**	**Mean**	**Std. Dev.**
Our organization cooperates with suppliers for eco design of inputs.	161	2.5	1.2	11.8	38.5	46.0	4.36	0.73
Our organization cooperates with suppliers for environmental objectives.	161	2.5	8.1	26.1	35.4	28.0	4.41	0.71
Our organization carries out environmental audits for suppliers' internal management.	161	0.0	1.2	8.1	35.4	55.3	4.02	1.08
Our organization has been conducting environmental awareness seminars.	161	3.1	15.0	23.8	35.6	22.5	3.59	1.08
Reduced-purchase-of-items-difficult-to-dispose-off	161	4.3	11.8	24.2	23.6	36.0	4.21	0.95
Reduced-purchase-of-hazardous-materials	161	3.7	1.9	19.3	39.8	35.4	4.29	0.83

Key: SD: Strongly Disagree; **D**= Disagree; **N1** = Number of respondents; **N2** = Neutral; **A**= Agree; **SA**= Strongly Agree

4.3.2 Green Manufacturing

The second objective of the study was to establish the effect of green manufacturing on the performance of food and beverage processing firms in Kenya. The respondents were asked to rate various aspects of green manufacturing as applied in their respective organizations based on a five-point Likert scale. The findings as shown in table 4.4 revealed the following: on organizations cooperation with the customers to ensure products are eco-designed, majority of the respondents agreed as shown by a mean of 4.24 and a standard deviation of 0.89; on the statement that the organizations cooperation with the customers for cleaner production, most of the respondents agreed as shown by a mean of 3.78 and a standard deviation of 1.02; on the third statement that the organization's processes were designed to reduced wastes, most of the respondents agreed as shown by a mean of 4.44 and a standard deviation of 0.69; on the statement that the operations of the organizations were designed to enhance full capacity utilization, most of the respondents agreed as shown by a mean of 4.24 and a standard deviation of 0.76; on water conservation by manufacturing firms during their operations, the respondents agreed and; on the last statement that food and beverage manufacturing firms had drastically reduced the generation of hazardous wastes during their operations, majority of the respondents agreed as evidenced by a mean of 4.43 and a standard deviation of 0.71.

Table 4.4: Green Manufacturing

Statement	N1	SD (%)	D (%)	N2 (%)	A (%)	SA (%)	Mean	Std. Dev.
Our organization cooperates with customers for product eco-design.	**161**	2.5	1.2	11.8	38.5	46.0	4.24	0.89
Our organization cooperates with customers for cleaner production.	**161**	2.5	8.1	26.1	35.4	28.0	3.78	1.02
Our organization processes are designed to reduce wastes.	**161**	0.0	1.2	8.1	35.4	55.3	4.44	0.69
Our operations are designed to enhance full Capacity utilization.	**161**	0.0	1.2	16.1	39.1	43.5	4.24	0.76
There are effective measures to ensure water conservation in our organization	**161**	0.6	3.1	8.7	37.9	49.7	4.32	0.81

Our organization has drastically reduced the generation of hazardous waste in its operations	**161**	0.0	1.2	8.7	35.4	54.7	4.43	0.71

Key: SD: Strongly Disagree; **D**= Disagree; **N1** = Number of respondents; **N2** = Neutral; **A**= Agree; **SA**= Strongly Agree

4.3.3 Reverse Logistics

The third objective of the study was to establish the effect of reverse logistics on the performance of food and beverage processing firms in Kenya. The study sought to unearth the relationship between reverse logistics and performance in reference to green supply chain management practices. The respondents were asked to indicate their levels of agreement on specific statements regarding reverse logistics based on a five-point Likert scale. The findings are as shown in table 4.5. and they indicated the following: on the first statement that the company's supply chain framework provided better product return frameworks and channels, most of the respondents agreed with the statement as evidenced by a mean of 4.29 and a standard deviation of 0.99; on the second statement that the organizations designed products that could be remanufactured, most of the respondents agreed neither agreed nor disagreed with the statement as shown by a mean of 3.49 and a standard deviation of 1.28 and; on the third statement that the organizations designed recyclable products, a slight majority of the respondents agreed with statement as shown by a mean of 3.65 and a standard deviation of 1.27. The findings imply that reverse logistics is not highly upheld in the food and beverage processing firms as a contributor to performance.

Table 4.5: Reverse Logistics

Statement	**N1**	**SD**	**D**	**N2**	**A**	**SA**	**Mean**	**Std.**
	(%)	**(%)**	**(%)**	**(%)**	**(%)**	**(%)**		**Dev.**
The firms supply chain framework provides for product Returns.	**161**	3.7	1.9	1.9	28.6	64.0	4.29	0.99
The organization designs products that can be remanufactured.	**161**	0.0	1.9	2.5	26.1	69.6	3.49	1.28

Our organization designs products that are recyclable.	**161**	8.1	6.2	5.6	36.6	43.5	3.65	1.27
Our organization designs products that are reusable.	**161**	11.2	3.7	16.8	21.1	47.2	3.45	1.37
Use-of-returnable-packaging-material	**161**	0.0	1.9	2.5	26.1	69.6	3.75	1.35
Manufacture-of-products-which-can-be-incinerated	**161**	34.8	31.1	11.8	0.0	22.4	3.82	1.23

Key: SD: Strongly Disagree; **D**= Disagree; **N1** = Number of respondents; **N2** = Neutral; **A**= Agree; **SA**= Strongly Agree

4.3.4 Green Packaging

The fourth objective of the study was to examine the effect of green packaging on the performance of food and beverage processing firms in Kenya. The study sought to find out the respondents' views on specific aspects of green packaging as a prospect of green supply chain management practice. The respondents were asked to rate specific statements based on a five-point Likert scale. The findings are as shown in table 4.6 and they revealed the following: majority of the respondents agreed with the first statement that the organizations used reusable packaging materials as evidenced by a mean of 4.10 and a standard deviation of 1.22; on the second statement that the organizations used recyclable packaging materials and this is evidenced by a mean of 4.23 and a standard deviation of 1.12; on the third statement that the organization designed packaging materials that were non-hazardous, most of the respondents agreed as shown by a mean of 4.51 and a standard deviation of 0.74 and; on the last statement that they utilize low-density-packaging-material, as shown by a mean of 4.01 and a standard deviation of 0.98.

The findings imply that as much as packaging was concerned, the firms relatively observed green practices- a move that could go a long way towards enhancing performance of food and beverage processing firms in Kenya.

Table 4.6: Green Packaging

Statement	N1	SD (%)	D (%)	N2 (%)	A (%)	SA (%)	Mean	Std. Dev.
Our organization uses re-usable packaging material.	**161**	6.2	5.6	15.5	16.8	55.9	4.10	1.22
Our organization uses recyclable packaging material.	**161**	5.6	3.1	9.9	24.8	56.5	4.23	1.12
Our organization designs packaging materials that are non-hazardous.	**161**	1.2	0.6	5.6	30.4	62.1	4.51	0.74
Our organization packages product using bio-degradable materials.	**161**	4.3	9.3	21.7	36.0	28.6	3.75	1.10
Reduced-packaging-material	**161**	4.3	11.8	24.2	23.6	36.0	3.75	1.18
Low-density-packaging-material	**161**	3.7	1.9	19.3	39.8	35.4	4.01	0.98

Key: **SD:** Strongly Disagree; **D**= Disagree; **N1** = Number of respondents;

N2 = Neutral; **A**= Agree; **SA**= Strongly Agree

4.3.5 Moderating effect of legislations

The fifth and last objective of the study was to establish the moderating effect of legislations on the relationship between green supply chain practices and performance of food and beverage processing firms in Kenya. The study sought to find out the respondents' level of agreement with various statements on legal and regulatory framework based on a five-point Likert scale. The findings as shown in table 4.7 revealed that: on the first statement that the organizations had been operating in line with the ISO certifications, majority of the respondents agreed with the statement as shown by a mean of 4.51 and a standard deviation of 0.76; on the second statement that the organizations strived to comply with environmental regulations in their operations, most of the respondents agreed with the statement as shown by a mean of 4.78 and a standard deviation of 0.47; on the third statement that the organizations have been implementing County Government By-laws, majority of the respondents agreed with this as shown by a mean of 4.78 and a standard deviation of 0.47 and; on the last statement that the

organizations complies with pollution regulations, the respondents agreed with the statement as shown by a mean of 4.65 and a standard deviation of 0.59. The findings imply that as much as legal regulations were concerned, the food and beverage processing companies had effectively complied.

Table 4.7: Moderating effect of Legislations

Statement	N1	SD (%)	D (%)	N2 (%)	A (%)	SA (%)	Mean	Std. Dev.
Our organization has been operating in line with ISO certifications.	**161**	0.6	0.0	12.4	21.7	65.2	4.51	0.76
Our organization complies with environmental regulations in their operations	**161**	0.0	0.0	2.5	17.4	80.1	4.78	0.47
Our organization has been working towards regulatory Compliance.	**161**	0.0	0.0	2.5	16.8	80.7	4.78	0.47
Our organization has always implemented environmental policies	**161**	0.0	0.6	4.3	24.8	70.2	4.65	0.59

Key: SD: Strongly Disagree; **D**= Disagree; **N1** = Number of respondents; **N2** = Neutral; **A**= Agree; **SA**= Strongly Agree

4.3.6 Performance of Food and Beverage Processing Firms

The study sought to find out the performance of food and beverage processing firms in Kenya as the dependent variable for the study. The main measures used to unveil the performance of the companies as far as supply chain is concerned included; quality, environmental aspect, cost containment and financial performance. The findings are therefore presented based on these measures.

Environmental Aspects

The environmental aspect of performance of food and beverage processing firms was sought in the study. The respondents were asked to rate their respective firms' performance based on various aspects of environmental retardation findings as shown in table 4.8. The finding revealed that: majority of the respondents significantly ranked their firm performance based on the reduction of air emission, reduction of waste water as well as reduction of solid wastes as evidenced by mean of 4.18, 4.45 and 4.46 respectively. Moreover, majority of the respondents indicated that their respective firms relatively performed as far as decrease in consumption of hazardous and toxic materials was concerned, decreased frequency of environmental accidents as well as improved the environmental situation of the organization as far as pollution was concerned. This is shown by means of 4.34, 4.44 and 4.39 respectively. The findings imply that as much as the environment was concerned, the food and beverage processing firms were relatively performing.

The findings compare with those by Govindan *et al.,* (2013), who found that the main measure of firm performance in organizations is the ability to meet the environmental needs by ensuring it minimizes the pollution rates through control of emissions and wastes. Seman (2012), on the other hand recorded that green supply chain is an aspect of ensuring all the processes of supply chain are controlled within the environmental requirements and that pollutions are minimized during the organization operations.

Table 4.8: Rating the aspects of Environmental Performance

Statement	SD (%)	D (%)	N (%)	A (%)	SA (%)	Mean	Std. Dev.
Reduction-in-air-emission	0.0	2.5	12.6	49.7	35.2	4.18	0.74
Reduction-of-waste-water	0.6	1.9	7.5	32.3	57.8	4.45	0.76
Reduction-of-solid wastes	0.0	1.9	9.3	30.4	58.4	4.45	0.74
Decrease-of-consumption-for-hazardous/harmful/toxic materials	3.1	1.2	11.8	26.1	57.8	4.34	0.96
Decrease-of-frequency-for-environmental-accidents	0.6	1.2	9.9	29.8	58.4	4.44	0.77
Improve-an-enterprise's-environmental-situation	0.0	0.0	16.8	26.7	56.5	4.39	0.76

Key: SD: Strongly Disagree; **D**= Disagree; **N**= Neutral; **A**= Agree; **SA**= Strongly Agree

Cost Management

The study sought to find out performance among the food processing companies based on the cost containment. The findings as indicated in table 4.8 revealed that: most of the firms had attained a decrease in cost of material purchasing, cost of energy consumption as well as fee for waste treatment as evidenced by means of 4.22, 4.27 and 4.14 respectively. The findings further showed that majority of the firms had recorded decrease in fees for wasted discharge as well as fines for environmental accidents as shown by means of 4.20 and 4.39, respectively. Increase in goods delivered on time, decrease in inventory levels and decrease in scrap rates were also recorded. This indicates that the performance of the organizations as far as cost management was concerned was relatively high. This is an indication that food processing firms in Kenya were working towards enhancing their performance by upholding green supply chain practices. The findings concur with those by Large and Thomsen (2011) who stipulated that as a result of effectively observing the green supply chain practices, firms benefit from decreased operational cost in both the short-term and long-term.

Table 4.9: Performance based on the Cost Management

Statement	SD (%)	D (%)	N (%)	A (%)	SA (%)	Mean	Std. Dev.
Decrease-of-cost-of-material-purchasing	0.0	1.3	22.6	28.3	47.8	4.22	0.84
Decrease-of-cost-of-energy-consumption	0.0	6.2	14.3	26.1	53.4	4.27	0.92
Decrease-of-fee-for-waste-treatment	2.5	6.8	15.5	24.2	50.9	4.14	1.07
Decrease-of-fee-for-waste-discharge	4.3	5.0	11.2	24.8	54.7	4.20	1.10
Decrease-of-fine-for environmental-accidents	2.5	1.2	9.9	26.7	59.6	4.39	0.90
Increase-amount-of-goods-delivered-on-time	1.2	3.7	14.9	21.7	58.4	4.32	0.94
Decrease-inventory-levels	0.0	1.2	23.0	39.8	36.0	4.10	0.79
Decrease-scrap-rate	0.0	3.7	12.4	37.3	46.6	4.26	0.81

Key: SD: Strongly Disagree; **D**= Disagree; **N**= Neutral; **A**= Agree; **SA**= Strongly Agree

Quality of the Products

Performance of the food and beverage processing firms in Kenya based on the quality of their products was sought. The findings as shown in table 4.10 revealed that majority of the firms had achieved the aspect of promoting product quality as shown by a mean of 4.78 and a standard deviation of 0.52. The findings further revealed that most firms had recorded increase in the product lines as well as improved capacity utilization as evidenced by mean of 4.43 and 4.53 respectively.

The findings established that quality was realized by embracing green supply chain management practices by the food and beverage processing firms in Kenya. According to Wahat and Idris (2012), among the major drivers of green supply chain is quality and unless the companies achieve the best quality as far as their products are concerned, then green supply chain could not be counted to be successful.

Table 4.10: Quality as a Measure of Performance

Statement	SD (%)	D (%)	N (%)	A (%)	SA (%)	Mean	Std. Dev.
Promote-product-quality	0.0	0.0	5.6	9.9	84.5	4.78	0.52
Increased-product-line	0.0	3.7	14.9	15.5	65.8	4.43	0.87
Improved-capacity-utilization	0.0	1.2	13.0	16.8	68.9	4.53	0.76

Key: SD: Strongly Disagree; **D**= Disagree; **N**= Neutral; **A**= Agree; **SA**= Strongly Agree

Operational Performance

Performance of the food and beverage processing firms in Kenya was analysed based on their operational performance. The findings as shown in table 4.11 revealed that: majority of the respondents agreed that their respective firms had a positive average return on investment over the past three years prior to the period of the study, as evidenced by a mean of 4.09 and; majority agreed that their firms recorded profit growth over the past three years as well as average return on sales for the past three years prior to the period of the study as evidenced by a mean of 3.96 and 3.94 respectively and, standard deviations of 0.76 and 0.85, respectively. The respondents further agreed that their respective firms had recorded an average growth in their market share and this is evidenced by a mean of 3.87 and a standard deviation of 0.71.

The findings imply that financial performance of the companies was fairly good. The findings concur with the argument by Al-Hassan *et al.,* (2013), who established that financial performance of modern manufacturing organizations is not only tied to their market potential but also to their ability to save on cost, through observing environmental prospects that seek to establish a conducive environment for everybody.

Table 4.11: Rating the aspects of Operational Performance

Statement	SD (%)	D (%)	N (%)	A (%)	SA (%)	Mean	Std. Dev.
Average-return-on-investment-over-the-past-three-years	0.0	1.9	20.5	43.5	34.2	4.09	0.78
Profit-growth-over-the-past-three-years	0.0	4.3	18.0	54.7	23.0	3.96	0.76
Average-return-on-sales-over-the-past-three-years	0.0	6.8	18.6	47.8	26.7	3.94	0.85
Average-market-share-growth-over-the-past-three-years	0.6	1.9	23.0	58.4	16.1	3.87	0.71
Average-sales-volume-over-the-past-three-years	0.0	5.6	17.4	59.6	17.4	3.88	0.74

Key: SD: Strongly Disagree; **D**= Disagree; **N**= Neutral; **A**= Agree; **SA**= Strongly Agree

4.4 Correlation Analysis

Correlations analysis was carried out to establish the degree of the relationship of variables against each other using the Pearson Product-Moment Correlation. The findings established that all the GSCM variables: green procurement, green manufacturing, reverse logistics, green packaging and legislations, were significantly and positively correlated with performance.

Correlations were done using a 1-tailed test, setting the significance value at 0.05. Values smaller than the significant value (0.05) were deemed as significant while those greater than 0.05 were deemed insignificant. The correlation coefficient ranges from -1.0 to +1.0 and the closer the coefficient is to +1 or -1, the more closely the two variables are related. Correlation analysis was done based on the objectives of the study with the following interpretations: 0- 0.19 is regarded very weak, 0.20- 0.39 is regarded as weak, 0.40-0.59 is regarded as moderate, 0.60- 0.79 is regarded as strong and 0.80-1 is regarded as very strong correlation.

The findings as shown in table 4.12 revealed that all the variables: green procurement, green manufacturing, reverse logistics, green packaging, legislations and firm performance; had p-values less than the standard p-values of less than 0.05 thus implying that all the variables were correlated hence approving the model. According to Merlino (2011), when the correlation of each independent variable with the other is significant, it implies that the variables measure a different aspect from each other hence the model can be reliable to deliver the projected results.

Findings indicate that green procurement and firms' performance had a Pearson coefficient of 0.29. The significant value was obtained at (p=0.000) which was below 0.05 at 1- tailed test conducted in the study. Therefore, there was a weak positive significant relationship between green procurement and performance With regard to green manufacturing and performance, the findings established a Pearson coefficient of 0.545. The significant value was obtained at (p=.000) which was below 0.05 at 1- tailed test conducted in the study, hence there was a moderate positive significant relationship between green manufacturing and performance.

On reverse logistics, the Pearson coefficient of 0.401 was obtained and the significant value was obtained at (p=.000) which was below 0.05 at 1- tailed test conducted in the study implying a moderate positive significant relationship between reverse logistics and performance. On green packaging, the value of Pearson coefficient was 0.533 and the significance value was obtained at (p=.000), hence there was a moderate positive significant relationship between green packaging and performance.

The results therefore indicate that green manufacturing had the strongest correlation with performance as shown by the Pearson Correlation coefficient of 0.545. The second one was green packaging with a coefficient of 0.533, followed by reverse logistics with a Pearson correlation coefficient of 0.401 and lastly, green procurement with a Pearson correlation of 0.290. The results imply that based on Pearson correlation, green manufacturing has more impact on the performance of food and beverage processing companies followed by green packaging and reverse logistics. Green procurement has the least impact on the performance of food and beverage processing companies.

Table 4.12: Overall Correlation Matrix

		Firm Performance	Green Procurement	Green Manufacturing	Reverse Logistics	Green Packaging
Firm Performance	Pearson Correlation	1				
	Sig.					
	N	161				
Green Manufacturing	Pearson Correlation	.545**	.451**	1		
	Sig.	.000	.000			
	N	161	161	161		
Green Packaging	Pearson Correlation	.533**	.217**	.526**	.401**	1
	Sig.	.000	.006	.000	.000	
	N	161	161	161	161	161
Reverse Logistics	Pearson Correlation	.401**	.408**	.309**	1	
	Sig.	.000	.000	.000		
	N	161	161	161	161	
Green Procurement	Pearson Correlation	.290**	1			
	Sig.	.000				
	N	161	161			

**. Correlation is significant at the 0.01 level (2-tailed).
Source: Survey Data (2018)

4.5 Factor Analysis

The study conducted a Confirmatory Factor Analysis (CFA) to uncover the underlying structure of relatively large sets of variables. CFA was done using the Kaiser-Meyer-Olkin (KMO) test for sampling adequacy and Barlett's Test of Sphericity. KMO and Barlett's test play an important role for accepting sample adequacy. While the KMO ranges from 0 to 1, the accepted index should be above 0.6 (Kaiser, 1974). This was the threshold used in the study. The factor analysis was carried systematically as per the variables under the study.

4.5.1 Factor Analysis on Green Procurement

The study carried out factor analysis for the first variable which was green procurement. The findings as shown in Table 4.13 revealed that KMO sampling adequacy for the variable was 0.650. This is within the threshold hence the factors under this variable were considered meeting the sampling adequacy hence they were all adopted for the final analysis.

Table 4.13: KMO and Bartlett's Test for Green Procurement

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.650
Bartlett's Test of Sphericity	Approx. Chi-Square	113.473
	Df	15
	Sig.	.000

4.5.2 Factor Analysis on Green Manufacturing

Factor analysis using KMO measure of sampling adequacy was carried out for the green manufacturing as one of the variables in the study. The results as shown in Table 4.14 revealed that the KMO for the variable was 0.776, which is greater that the threshold of 0.6 according to Kaiser (1974). The variable was considered to have met the threshold hence all the factors under the variable were retained for the final analysis.

Table 4.14: KMO and Bartlett's Test for Green Manufacturing

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.776
Bartlett's Test of Sphericity	Approx. Chi-Square	279.800
	Df	15
	Sig.	.000

4.5.3 Factor Analysis for Reverse Logistics

A confirmatory factor analysis by extraction method of principle components was conducted for all items under the reverse logistics. The findings as shown in Table 4.15

revealed that the KMO measure of sampling adequacy for the items under the variable was 0.893 hence all the items were retained since they met the threshold of 0.6 (Kaiser, 1974). This implies that all the items under the reverse logistics were adopted for further analysis.

Table 4.15: KMO and Bartlett's Test for Reverse Logistics

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.893
Bartlett's Test of Sphericity	Approx. Chi-Square	358.200
	Df	15
	Sig.	.000

4.5.4 Factor Analysis for Green Packaging

Factor analysis for green packaging as one of the study variables was carried out. This was done using the KMO test for sampling adequacy. The findings are as shown in Table 4.16. As the findings portray, the KMO measure for sampling adequacy was 0.698 an implication that the factor loadings for the items under the variable met the threshold of 0.6 hence all the items were adopted in the analysis.

Table 4.16: KMO and Bartlett's Test for Green Packaging

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.698
Bartlett's Test of Sphericity	Approx. Chi-Square	336.604
	Df	15
	Sig.	.000

4.5.5 Factor Analysis for Legislations

The factor analysis results from the moderating variable (legislations) are as shown in Table 4.17. As the findings portray, the KMO measure of sampling adequacy for the variable was 0.713. This implied that the factors under the variable met the 0.6 margin hence they were all adopted for further analysis in the study.

Table 4.17: KMO and Bartlett's Test for Legislations

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.713
Bartlett's Test of Sphericity	Approx. Chi-Square	241.341
	Df	6
	Sig.	.000

4.5.6 Factor Analysis for Performance of Food and Beverage Processing Firms

The study sought to establish the sampling adequacy for the factors under the dependent variable: firm performance. This was done using the KMO test for sampling adequacy and the findings are as shown in Table 4.18 As the findings portray, the KMO measures of sampling adequacy for the variable was 0.769 which implied that the items under the variable met the threshold and were adequate hence adopted for the further analysis of the data.

Table 4.18: KMO and Bartlett's Test for Firm's Performance

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.769
Bartlett's Test of Sphericity	Approx. Chi-Square	2388.362
	Df	231
	Sig.	.000

4.5.7 Overall Factor Analysis

Factor analysis was carried out for all the items under the study. The findings as shown in table 4.19 revealed that KMO for all the items under the research instrument was 0.724 and Bartlett's test(x^2) = 277.085, p = 0.000. The results implied that the KMO value was higher than the 0.6 threshold thus indicating that the factors in the study meet the threshold while the Chi-Square is at a significant level of 0.00<0.05 indicating that the factors are statistically significant to determine the study model.

Table 4.19: Overall KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.724
Bartlett's Test of Sphericity	Approx. Chi-Square	277.085
	Df	15
	Sig.	.000

4.6 Statistical Modelling

T-statistics was adopted for hypothesis testing. In the case of t-test, t distribution is used and a value is considered to be statistically significant if it lies in the critical region, in which case the Alternative Hypothesis is accepted. The test of significance method is to verify the truth or falsity of the alternative hypothesis using sample results, showing that the means of two normally distributed populations are equal. There were four tests of relationships to be tested using one- way ANOVA. In all the tests, the decision was that: if the p-value observed (calculated p) is less than the set alpha (α) that is the confidence level of 0.05, then accept the alternative hypothesis but; if the p-value is greater than the set alpha of 0.05, the alternative hypothesis is to be rejected. The results of the hypotheses tested in the study were as shown below.

4.6.1 Hypotheses Testing

Hypothesis testing was done to establish the effect of each independent variable on the performance of food and beverage processing firms in Kenya. The study formulated the following hypotheses to test the relationship between the variables of the study: green procurement has a positive significant effect on the performance of food and beverage processing firms in Kenya; green manufacturing has a positive significant effect on the performance of firms in the food and beverage processing sector in Kenya; reverse logistics has a positive significant effect on the performance of firms in the food and beverage processing sector in Kenya; green packaging has a positive significant effect on the performance of firms in the food and beverage processing sector in Kenya and; finally, legislations have a positive significant moderating effect on the performance of firms in the food and beverage processing sector in Kenya. The findings are tabulated in table 4.20.

Ha_1: *Green procurement has a significant effect on the performance of firms in the food and beverage processing sector in Kenya*

The first hypothesis was that green procurement had a positive and significant effect on the performance of firms in the food and beverage processing sector in Kenya. The findings replicated that the P-value for the variable was 0.000, R^2= 0.084, β =0.283 and *t*=3.816. The findings imply that indeed there was a significant relationship between green procurement and performance of food and beverage processing firms in Kenya. This therefore, leads to accepting the alternative hypothesis that green procurement has a positive and significant effect on the performance of firms in the food and beverage processing sector in Kenya.

Ha_2: *Green manufacturing has a significant effect on the performance of firms in the food and beverage processing sector in Kenya*

The second alternative hypothesis of the study was that green manufacturing had a positive and significant effect on the performance of food and beverage processing companies in Kenya. The findings from the model revealed that R^2 was 0.297, β = 0.563, *P-value* = 0.000<0.05 and *t*=8.195. This implied that green manufacturing had a significant and positive effect on the performance of firms in the food and beverage processing sector in Kenya. The study therefore accepted the alternative hypotheses that there is a significant and positive relationship between green manufacturing and performance of food and beverage firms in Kenya.

Ha_3: *Reverse logistics has a significant effect on the performance of firms in the food and beverage processing sector in Kenya*

The third alternative hypothesis of the study was that there is a positive and significant relationship between reverse logistics and performance of food and beverage processing firms in Kenya. The model output revealed that the P-value for the value for the variable was 0.000, β= 0.347, R^2= 0.161 and t=5.517. The significant value obtained was less than 0.05 set by the study, similar to the t value which was more than 1.96 at 5% significant level. The results therefore imply that there was a positive significant relationship between reverse logistics and performance of food and beverage processing firms in Kenya.

Ha_4: *Green packaging has a significant effect on performance of firms in the food and beverage processing sector in Kenya*

The fourth hypothesis of the study was that there was a significant and positive influence between green packaging and performance of food and beverage processing firms in Kenya. The findings revealed that the p-value was 0.000, R2=0.285, β= .424 and t=7.952. The findings implied that there was a positive significant relationship between green packaging and performance of food and beverage processing firms in Kenya since the significant value obtained was less than 0.05, similar to the t value which was more than 1.96 at 5% significant level. The results therefore implied that there was a positive significant relationship between green packaging and performance of food and beverage processing firms in Kenya. Based on the findings, the study accepted the alternative hypothesis that there is a positive significant relationship between green packaging and performance of the food and beverage processing firms in Kenya.

Table 4.20: Hypothesis Testing

Hypothesis	R^2	Beta	T Value	P-value	Conclusion
H_{a1}: Green procurement has a significant effect on the performance of firms in the food and beverage processing sector in Kenya.	0.084	.283	3.816	0.000	Accept H_{a1}
H_{a2}: Green manufacturing has a significant effect on the performance of food and beverage processing sector in Kenya.	0.297	0.563	8.195	0.000	Accept H_{a2}
H_{a3}: Reverse logistics has a significant effect on performance of firms in the food and beverage processing sector in Kenya.	0.161	0.347	5.517	0.000	Accept H_{a3}
H_{a4}: Green packaging has a significant effect on performance of firms in the food and beverage processing sector in Kenya.	0.285	0.424	7.952	0.000	Accept H_{a4}
H_{a5}: Legislations has a significant moderating effect on the relationship between green supply chain practices and performance of firms in the food and beverage processing sector in Kenya.	0.575	0.816	2.212	0.000	Accept H_{a5}

4.7 Diagnostic Tests

The study conducted diagnostic tests which included multicollinearity test, normality test and test for autocorrelation. The tests were conducted to establish whether the data collected was accurate, reliable and capable of inferring the study results to the population. The section is arranged beginning with multicollinearity test followed by normality test and test for autocorrelation.

4.7.1 Multicollinearity Test

The study sought to find out the collinearity among the independent variables using tolerance and variation inflation factor (VIF) statistics of the predictor constructs. Variance inflation factor (VIF) was accessed to indicate the presence of Multicollinearity (Billings & Wroten, 1978). All the VIF's were less than 2.0, thereby suggesting the absence of potential threats from multicollinearity, as suggested by Hair *et al.,* (2009). Multicollinearity among the Independent (Predictor) variables is a concern when using multiple regression analysis model. Hair *et al.,* (2006) recommended assessing multicollinearity by reviewing correlation matrix for the Independent Variables further by computing tolerance and variance inflation factor (VIF) values.

The study adopted a threshold value of variance inflation factor of 4.0 to represent high multicollinearity status. The findings as shown in table 4.21 revealed that the independent constructs; green procurement, green manufacturing reverse logistics and green packaging attained a high tolerance value, which is a clear indication that the beta values of the regression equation of the independent constructs would be stable with low standard error terms. Tolerance is regarded as part of the denominator in calculating the confidence limits on the partial regression coefficient. According to Porter and Gujarat (2009), the VIF of independent construct that exceed 10 as a rule of thumb is regarded as collinear. Therefore, benchmarking on this rule of thumb implies that there was no multicollinearity among the independent constructs.

Table 4.21: Multicollinearity Test

Model		Tolerance	VIF
1	Green Procurement	.734	1.362
	Green Manufacturing	.617	1.621
	Reverse logistics	.731	1.367
	Green packaging	.515	1.943

a. Dependent Variable: Performance

4.7.2 Normality Test

Normality test was done using Shapiro-Wilk test and Kolmogorov Tests as shown in Table 4.22 below. The study conducted normality test at 95% confidence interval for the mean, where the p-value was compared to determine whether to accept the alternative hypothesis- meaning data was either normally distributed (greater than 0.05) or not (less than 0.05). This test sought to find out the normal distribution for the responses in the study which was tested for Gaussian distribution using Kolmogorov-Smirnov (KS) and Shapiro-Wilk. According to Indiana (2011), many data analysis methods such as t-test, ANOVA and regression analysis relies on the assumption that data was sampled from a Gaussian distribution. The computed values of Kolmogorov-Smirnov (KS) and Shapiro-Wilk test indicate insignificant statistics with p-values exceeding the standard p-value of 0.05. This implies that the responses on green procurement, green manufacturing, reverse logistics and green packaging are normally distributed.

Table 4.22: Normality Test

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	**Df**	**Sig.**	**Statistic**	**Df**	**Sig.**
Green Procurement	.096	7	.200*	.972	7	.872
Green manufacturing	.225	7	.129	.898	7	.075
Reverse Logistics	.202	7	.081	.922	7	.182
Green packaging	.192	7	.116	.872	7	.349

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

The Q-Q plot for normality as shown in figure 4.1, also shows that the constructs in the study are normally distributed. At very low values of the construct, some minimal deviation from normality is regarded as normal. Nevertheless, on the overall, the distribution appears normally distributed. More so, on the basis of the calculated insignificant test statistics, normality of the dependent construct was maintained. According to the findings by Shelvin & Miles (2010), the significance test result for such data is regarded as fairly accurate.

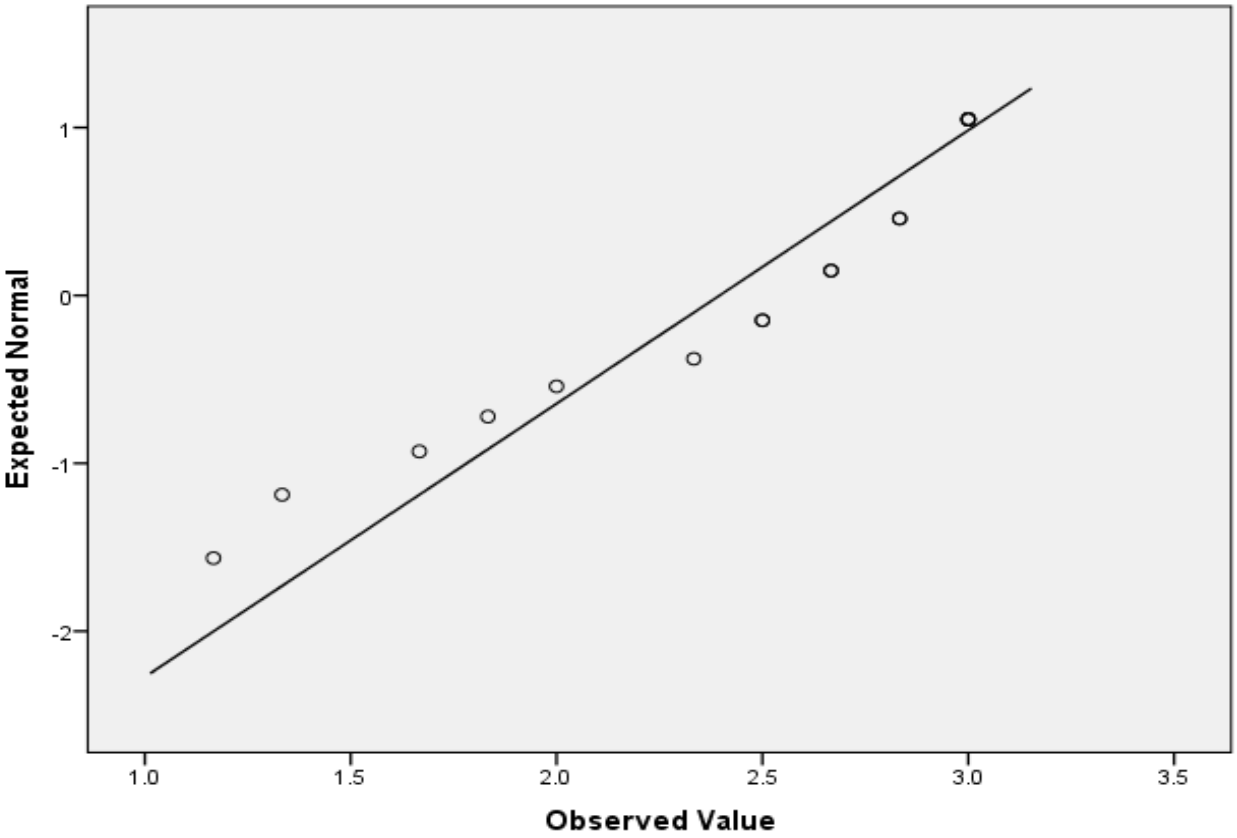

Figure 4.1: Q-Q Plot for Normality Test

4.7.3 Test for Autocorrelation

The study conducted an autocorrelation test using the Durbin-Watson method. The findings indicated that the Durbin-Watson value was at 2.374, which is between 1.5 and 2.5 as indicated in table 4.23. Therefore there was no autocorrelation, as proposed by Hair *et al.*, (2010) and Gandiet *et al.*, (2017).

According to Verbeek, (2004) and Gujarat (2009), the Durbin-Watson values of less than 1.0 or greater than 3.0 may be a cause of concern. A Durbin-Watson value closer to 2.0 is regarded as satisfactory. Thus, the value 2.374 lies within the satisfactory levels and thus regarded as acceptable.

Table 4.23: Test for Correlation using Durbin-Watson

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.297[a]	.088	-.244	.54911	2.374

The autocorrelation was further examined by use of scatter plot. As indicated in figure 4.2. The study residuals do not form any unique pattern hence reinforcing the assertion that there is no autocorrelation in the constructs investigated in this study.

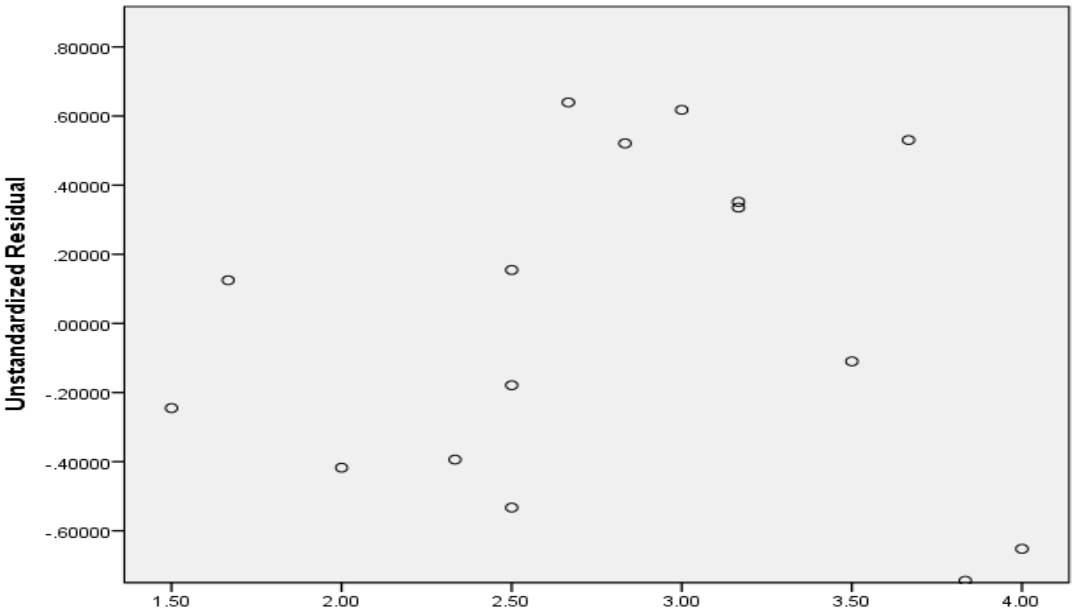

Figure 4.2: Scatter Plot for Autocorrelation

4.8 Regression Analysis

The Regression analysis was conducted using a simple regression analysis which involved running the least square regression method and interpreting the R^2 values, F values and coefficients. The strength and reliability of regression model was determined using the coefficient of determination (R^2) and F-test. A R^2 value of 0% indicates that the model explains none of the variability of response data around its mean while100% indicates that the model explains all the variability of the response data around its mean. Similarly, the study compared the F-value with the overall significance level to determine if the hypotheses are significant or not.

The primary objective of the study was to establish the effects of green supply chain management (GSCM) practices on performance of firms in the food and beverage processing sector in Kenya. The independent variables in the study were green procurement, green manufacturing reverse logistics and green packaging, while the dependent variable was performance of firms in the food and beverage processing sector in Kenya. The study also had legislations as a moderating variable. The study therefore sought to establish the relationship between these variables through inferential statistical analysis technique. The main measures utilized herein included the R squared (R^2), the P-value as well as the Beta coefficients. According to Young (2010), inferential analysis goes beyond just presenting the responses in a study by unveiling the statistical relationship between the variables and how independent variables affect the dependent variables. Through this, concrete conclusions and recommendations in study are made.

4.8.1 Green Procurement

Ha_1 *Green procurement has a significant effect on the performance of food and beverage processing firms in Kenya*

On the first hypothesis of the study, model summary, Analysis of Variance (ANOVA) and regression coefficients were used to establish the relationship between the independent variable (green procurement) and the dependent variable (performance). The findings on the model summary as shown in table 4.24 revealed that the R^2 for the model was 0.084 which implies that green procurement explained up to 8.4% variation of performance.

Elsewhere, the findings on the Analysis of Variance revealed that at the F-calculated value of 14.565, the model was significant at p-value of 0.000; an implication that the model was statistically significant and could be used to place a decision on the hypothesis of the study. This is because the P-value is less than the standard p-value of 0.05. The findings imply that green procurement can be a good indicator of firm performance among food and beverage processing firms in Kenya.

The regression coefficients results shown in table 4.23 on the other hand revealed that the beta coefficient for green procurement was 0.283 at a significant level of 0.000<0.05. This is an implication that a unit change in green procurement can explain up to 28.3% of

performance. The original model; $\mathbf{Y=\beta_0+\beta_1X_{1+}\varepsilon}$ now becomes; $\mathbf{Y=3.071+0.283X_{1+}\varepsilon}$**.** The findings therefore justify the move to accept the alternative hypothesis that green procurement has a significant effect on the performance of food and beverage processing firms in Kenya.

Table 4.24: Regression Results for Green Procurement

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.290[a]	.084	.078	.46032

a. Predictors: (Constant), Green Procurement

ANOVA

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	3.086	1	3.086	14.565	.000[b]
	Residual	33.692	159	.212		
	Total	36.778	160			

a. Dependent Variable: Performance

b. Predictors: (Constant), Green Procurement

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.071	.316		9.707	.000
	Green Procurement	.283	.074	.290	3.816	.000

a. Dependent Variable: Performance

4.8.2 Green Manufacturing

Ha_2 *Green manufacturing has a significant effect on the performance of food and beverage processing firms in Kenya*

On the second hypothesis of the study, model summary, ANOVA and regression coefficients were used to test for the hypothesis and exemplify the statistical relationship between green manufacturing and performance of food and beverage processing firms in Kenya. The model summary findings as shown in table 4.25 revealed that the R^2 for the model was 0.297, which implies that green manufacturing explained up to 29.7% of the variation on the performance of the food and beverage processing firms in Kenya. On the other hand, the ANOVA results indicated that the model had an F-calculated value of 67.156 at a significance level of 0.000<0.05. The P-value is less than the standard P-value

of 0.05 hence the model is statistically significant and green manufacturing can statistically explain the firm performance of food and beverage processing firms in Kenya.

The regression coefficients shown in table 4.24 revealed that green manufacturing had a significant effect on the performance of food and beverage processing firms in Kenya ($\beta = 0.563$ and P-value = $0.000<0.05$). The findings imply that a unit change in green manufacturing can explain up to 56.3% of performance of the food and beverage processing firms. This therefore justifies the decision to accept the alternative hypothesis that green manufacturing significantly and positively affects the performance of food and beverage processing firms in Kenya.

Table 4.25: Regression Results for Green Manufacturing

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.545[a]	.297	.293	.40326

a. Predictors: (Constant), Green Manufacturing

ANOVA

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	10.921	1	10.921	67.156	.000[b]
	Residual	25.857	159	.163		
	Total	36.778	160			

a. Dependent Variable: Performance

b. Predictors: (Constant), Green Manufacturing

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.853	.297		6.243	.000
	Green Manufacturing	.563	.069	.545	8.195	.000

a. Dependent Variable: Firm Performance

4.8.3 Reverse Logistics.

Ha_3: *Reverse logistics has a significant effect on the performance of food and beverage processing firms in Kenya*

The study sought to find out the relationship between reverse logistics and the performance of food and beverage processing firms in Kenya. The statistical relationship between the two variables was sought through regression model whereby the output was generated in terms of model summary, ANOVA and regression coefficients. The model adopted herein was of the form: $\mathbf{Y=\beta_0+\beta_3X_{3+}\ \varepsilon}$**.** The findings on the model summary as shown in table 4.26, revealed that the R^2 for the model was 0.161 an indication that the variation of performance of the food and beverage processing firms was explained by up to 16.1% by reverse logistics.

The ANOVA results on the other hand revealed that at an F-calculated value of 30.44, the model was significant at a significant level of 0.000<0.05. This implies that the performance of the food and beverage processing firms could be explained by reverse logistics and that the model was significant to give a direction on whether to accept or fail to accept the alternative hypothesis.

The regression coefficients shown in table 4.25 on the other hand revealed that at a beta coefficient of 0.347, reverse logistics significantly and positively influenced performance at a significance level of 0.000. The model now becomes: $\mathbf{Y=2.876+0.347X_{3+}\ \varepsilon}$**.** This implies that a unit change in reverse logistics leads to 34.7% increase in performance among food and beverage processing firms in Kenya. This therefore gives a go-ahead to

accept the alternative hypothesis of the study that reverse logistics have a significant and positive effect on the performance of food and beverage processing firms in Kenya.

Table 4.26: Regression Results for Reverse Logistics

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.401[a]	.161	.155	.44061

a. Predictors: (Constant), Reverse Logistics

ANOVA

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	5.910	1	5.910	30.440	.000[b]
	Residual	30.868	159	.194		
	Total	36.778	160			

a. Dependent Variable: Performance

b. Predictors: (Constant), Reverse Logistics

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.876	.255		11.274	.000
	Reverse Logistics	.347	.063	.401	5.517	.000

a. Dependent Variable: Firm Performance

4.8.4 Green Packaging.

Ha_4: *Green packaging has a significant effect on the performance of food and beverage processing firms in Kenya*

Simple regression analysis was carried out to find out the statistical relationship between green packaging and performance of food and beverage firms in Kenya. Model summary (R^2), Analysis of Variance (ANOVA) and regression coefficients (β) were used to explain the relationship. The model summary results as shown in table 4.27 revealed that the R^2 for the model was 0.285. This implies that the green packaging explained up to 28.5% variation of performance among food and beverage processing firms in Kenya.

The ANOVA results on the other hand as shown in table 4.26 revealed that at the F-calculated of 63.24 the model was significant at a p-value of 0.000 which is less than the standard p-value of 0.05. This implies that the model can significantly explain the relationship between green packaging and performance of food and beverage processing firms in Kenya. The regression coefficients on the other hand revealed the beta coefficient for green packaging was 0.424 at a significant level of 0.000. The model now changes from $\mathbf{Y=\beta_0+\beta_4X_{4+}\ \varepsilon}$ to $\mathbf{Y=2.514+0.424X_{3+}\ \varepsilon}$ which implies that a unit change in green packaging can explain up to 42.4% of supply chain performance of the food and beverage processing companies. This on the other hand means that the study accepts the alternative hypothesis that green packaging has a significant and positive effect on the performance of food and beverage processing firms in Kenya.

Table 4.27: Regression Results for Green Packaging

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.533[a]	.285	.280	.40680

a. Predictors: (Constant), Green Packaging

ANOVA

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	10.465	1	10.465	63.240	.000[b]
	Residual	26.312	159	.165		
	Total	36.778	160			

a. Dependent Variable: Firm Performance

b. Predictors: (Constant), Green Packaging

Regression Coefficients

Model		**Unstandardized Coefficients**		**Standardized Coefficients**	**t**	**Sig.**
		B	Std. Error	Beta		
1	(Constant)	2.514	.223		11.265	.000
	Green Packaging	.424	.053	.533	7.952	.000

Dependent Variable: Performance

4.8.5 The Overall Model

A multi-stage approach was used to determine the effect of the moderator. The study used a moderated multiple regression model to assess the moderating effect of legislations. The moderated multiple regression model involved first running regression analysis between green supply chain management practices and performance, green supply chain management practices with the moderating variable, and finally running regression with the moderator to observe the interaction effect between legislations and green supply chain management practices

Overall Unmoderated Model

An overall model was carried out but without the moderating effect of legislations. This is known as the overall un moderated model. The regression equation for the model was given as:

$$\mathbf{Y=\beta_0+\beta_1X_1+\beta_2X_2+\beta_3X_3+\beta_4X_4} + e$$

Where; Y is Performance

β_0 is the constant

β_1- β_4 are the coefficients of the independent variables

X_1-X_4 are green procurement, green manufacturing, reverse logistics and green packaging.

Table 4.28 provide a model summary indicating an R^2 value of 0.597 for the relationship between green supply chain management practices: green procurement, green manufacturing, reverse logistics, green packaging and performance, implying that 59.7% of the variations in performance could be attributed to green supply chain management practices.

The study carried out ANOVA test to determine the significance of the models. The significant value for the model was 0.000 which was less than 0.05 at 95% confidence level indicating that the model was statistically significant.

Based on the outcome of the regression analysis shown in Table 4.22, the model therefore was:

$$\mathbf{Y=2.57+0.24X_1+0.343X_2-0.284X_3+0.1X_4} + e \text{……………………………… (i)}$$

The findings revealed that green procurement had a coefficient of 0.24, green manufacturing had a regression coefficient of 0.343, and reverse logistics had a regression coefficient of 0.284, while green packaging had a regression coefficient of 0.1. The results imply that when regressed together but without the moderating effect of legislations, green procurement, green manufacturing, reverse logistics and green packaging influence the performance by 24%, 34.3%, -28.4% and 10% respectively.

Table 4.28: Un moderated Multiple Regression Model

Model	R	R Square	Adjusted R Square		Change Statistics				
					R Square Change	F Change	df1	df 2	Sig. F Change
1	.773a	0.597	0.587	0.3081	0.597	57.861	4	156	0.000

*Green Procurement

ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	21.97	4	5.492	57.861	.000[b]
	Residual	14.808	156	0.095		
	Total	36.778	160			

a Dependent Variable: Performance

b Predictors: (Constant), Green Packaging, Reverse Logistics, Green Manufacturing, Green Procurement

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	Constant	2.570	0.267		9.623	0.000
	GP	0.240	0.066	0.278	3.659	0.000
	GM	0.343	0.071	0.332	4.839	0.000
	RL	0.284	0.034	0.437	8.417	0.000
	GPACK	0.100	0.055	0.126	1.83	0.000

a Dependent Variable: Performance

The Moderating Effect of Legislations

Model two results have an addition of the moderating variable to the initial model. This study established that in the joint model with green supply chain management practices, the moderating variable of legislations had a significant influence on the performance.

As the results on Table 4.29 show, when legislation was included as a variable, the R^2 value increased to 0.633 implying that 63.3% of the variations in performance could be attributed to legislations and green supply chain management practices. Further when legislations moderated the relationship between green supply chain management practices and performance, the study realized an R^2 value of 0.713 which indicated that 71.3 percent of variations in performance could be attributed to green supply chain management when moderated by legislations.

The second was adopted as follows;

$$\mathbf{Y=\beta_0+\beta_1X_1+\beta_2X_2+\beta_3X_3+\beta_4X_4+Z+\varepsilon}$$

$\boldsymbol{\beta_0}$ is the constant

β_1- β_4 are the coefficients of the independent variables

X_1-X_4 are green procurement, green manufacturing, reverse logistics and green packaging.

Z is the moderator (legislations) and ε is the error term.

Based on the Regression Analysis shown in Table 4.28, the model therefore became.

$$\mathbf{Y=1.479+0.138\ X_1+0.343X_2-0.229\ X_3+0.126\ X_4+0.250Z+}\boldsymbol{e}\mathbf{\ldots\ldots\ldots\ldots\ldots\ldots..(ii)}$$

This model implies that when all green supply chain management practices and legislations are held constant except green procurement, performance will improve by 0.138. Further when all green supply chain management practices and legislations are held constant except green manufacturing, performance will improve by 0.343. However, when all green supply chain management practices and legislations are held constant

except reverse logistics, performance will decrease by 0.229; when all green supply chain management practices and legislations are held constant except green packaging, performance will improve by 0.126 and finally; when all green supply chain management practices are held constant; legislations will improve performance by 0.250.

The interaction effect of green supply chain management practices and legislations shows that when all variables are held constant other than interaction between green procurement and legislations, performance increases by 0.03; when all variables are held constant other than interaction between reverse logistics and legislations, performance increases by 0.041 and; when all interactions are held constant other than interaction between green packaging and legislations, performance increases by 0.25.

Upon comparing the coefficients of the Third model and their respective p-values, the study found that only reverse logistics was statistically significant. This meant that legislations moderated green supply chain management practices when acting jointly with the other variables but not individually. It was important to realign the model given the study findings, the model was therefore adjusted to the optimal model (iv).

Table 4.29: Moderated Multiple Regression Model

Model	R	R Square	Adjusted R Square		Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.796b	0.633	0.621	0.2951	0.036	15.043	1	155	0.000
2	.844c	0.713	0.696	0.26451	0.08	10.481	4	151	0.000

Green procurement, legislations

Green procurement, legislations, X3*, X1*, X2*, X4*

ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	23.28	5	4.656	53.464	.000[c]
	Residual	13.498	155	0.087		
	Total	36.778	160			
2	Regression	26.213	9	2.913	41.628	.000[d]
	Residual	10.565	151	0.07		
	Total	36.778	160			

a Dependent Variable: Performance
b Predictors: (Constant), Green Packaging, Reverse Logistics, Green Manufacturing, Green Procurement, Legislations
c Predictors: (Constant), Green Packaging, Reverse Logistics, Green Manufacturing, Green Procurement, Legislations, X3, X1, X2, X4

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	Constant	1.479	0.38		3.892	.000
	GP	0.138	0.068	0.16	2.023	.004
	GM	0.343	0.068	0.332	5.052	.000
	RL	0.229	0.035	0.352	6.496	.000
	GPACK	0.126	0.053	0.158	2.375	.019
	LF	0.251	0.065	0.229	3.878	.000
2	Constant	3.247	0.615		5.281	.000
	GP	0.012	0.082	0.013	0.141	.008
	GM	0.358	0.082	0.346	4.379	.000
	RL	0.312	0.036	0.481	8.578	.000

GPACK	0.029	0.085	0.025	0.238	.008
LF	0.122	0.125	0.112	0.975	.011
X_1	0.017	0.012	0.076	0.827	.004
X_2	0.003	0.018	0.026	0.194	.006
X_3	0.041	0.007	0.376	5.997	.000
X_4	0.025	0.016	0.217	1.514	.013

a Dependent Variable: Performance

Optimal Model

The optimal model for the study is drawn from the overall model with the interaction effect of the moderating variable (legislation). The generated equation is as shown:

$$\mathbf{Y=\beta_0+\beta_1X_1+\beta_2X_2+\beta_3X_3+\beta_4X_4+\beta_1X_1*Z+\beta_2X_2*Z+\beta_3X_3*Z+\beta_4X_4*Z+\varepsilon}$$

Where Y= Performance

$\boldsymbol{\beta_0}$ is the constant

β1- **β**4 are the coefficients of the independent variable

$\mathbf{X_1}$-$\mathbf{X_4}$ are green procurement, green manufacturing, reverse logistics and green packaging.

Z is the moderator (legislations) and ε is the error term.

Based on the outcome of the Regression analysis shown in table 4.29 the model therefore became;

$$\mathbf{Y=3.247-(0.012X_1+0.358X_2-0.312X_3-0.02X_4)+(0.01X_1*Z+0.03X_2*Z+0.041X_3*Z+0.025X_4*Z)+}\boldsymbol{e}\mathbf{\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots..(iii)}$$

This model implies that when all green supply chain management practices are held constant other than green manufacturing, a unit increase in green manufacturing will

improve performance by 0.358; when all green supply chain management practices are held constant other than reverse logistics, a unit increase in reverse logistics will reduce performance by 0.312; likewise, when all green supply chain management practices are held constant other than green packaging, a unit increase in green packaging will decrease performance by 0.02.

CHAPTER FIVE

SUMMARY CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter discusses the summary of the main findings, draws conclusions, makes recommendations based on findings and suggests areas for further research. The chapter presents the summary of findings of the study on the influence of green supply chain management practices on the performance of food and beverage processing firms in Kenya.

5.2 Summary of Research Findings

The study sought to determine the effect of green supply chain management practices on the performance of food and beverage processing firms in Kenya. The study carried out a comparative study between the various green supply chain management practices and their effect on the performance for each practice. The objectives of the study were: to examine the effect of green procurement on the performance of food and beverage processing firms in Kenya; determine the effect of green manufacturing on the performance of food and beverage processing firms in Kenya; investigate the effect of reverse logistics on the performance of food and beverage processing firms in Kenya; examine the effect of green packaging on the performance of food and beverage processing firms in Kenya and; to establish the moderating effect of legislations on the performance of food and beverage processing firms in Kenya.

5.2.1 Green Procurement

The findings of the study indicated that there was a positive significant relationship between green procurement and performance of the food and beverage processing firms in Kenya. The regression analysis found out a coefficient of determination (R^2) value of 0.337, meaning that 33.7% of the variation in performance could be attributed to changes in green procurement in the food and beverage processing firms in Kenya. These findings confirmed that there was a positive significant effect of green procurement on the performance of food and beverage processing firms in Kenya. The study therefore

accepted the alternative hypothesis that green procurement positively affects firm's performance and is therefore an important factor in determining the performance of food and beverage processing firms in Kenya.

5.2.2 Green Manufacturing

The study findings indicated that green manufacturing practices affected performance in the food and beverage processing firms in Kenya. The regression analysis findings indicated a coefficient of determination (R^2) value of 0.297, which implies that 29.7% of the variations in performance of the food and beverage processing firms in Kenya were as a result of green manufacturing, while all other factors contributed to 70.3 % of variations in performance. Hence green manufacturing is an important factor in determining performance of food and beverage processing firms in Kenya. The findings of the regression coefficient confirm the importance of green manufacturing by indicating that there was a positive significant relationship. The alternative hypothesis was confirmed that green manufacturing has a positive significant effect on the performance of food and beverage processing firms in Kenya.

5.2.3 Reverse Logistics

The findings of the study indicate that there was a moderate positive relationship between reverse logistics and performance of food and beverage processing firms in Kenya. The regression analysis findings indicated a coefficient of determination (R^2) value of 0.185, which implies that 18.5% of the variations in performance of the food and beverage processing firms in Kenya can be attributed to reverse logistics, whereas 81.5 percent can be attributed to other factors other than reverse logistics. The p-value was below 0.05 hence the findings were significant. The study therefore affirmed that there was a positive significant relationship between reverse logistics and performance in the food and beverage processing firms in Kenya.

5.2.4 Green Packaging

The fourth objective of the study was to determine the effect of green packaging on the performance of food and beverage processing companies in Kenya. The study established

that green packaging has a positive significant effect on the performance of food and beverage processing firms in Kenya. The coefficient of determination (R^2) value was 0.285 which implies that 28.5% of the variations in performance of the food and beverage processing firms in Kenya can be attributed to green packaging whereas, 71.5% can be attributed to other factors other than green packaging. The regression coefficients realized indicated a positive significant relationship between green packaging and performance, hence the study accepted the alternative hypothesis and affirmed that there is a positive significant relationship between green packaging and performance of food and beverage processing firms in Kenya. The study therefore held that green packaging is an important indicator of performance in the food and beverage processing firms in Kenya.

5.2.5 Moderating effect of legislations

The study conducted a hierarchical multistage regression analysis of the moderator and realized a coefficient of determination (R^2) value of 0.597 before the introduction of legislations as a moderator and 0.633 upon the introduction of legislations as a moderator. This implies that when using legislations as a moderator, 63.3% of variations in performance could be attributed to green supply chain management practices. All the coefficient values were significant hence the alternative hypothesis was accepted and affirmed that legislations positively moderated the relationship between green supply chain management practices and the performance of food and beverage processing firms in Kenya.

5.3 Conclusions of the Study

The study aimed at determining the effect of green supply chain management practices on the performance of food and beverage processing firms in Kenya. Green procurement, green manufacturing, reverse logistics, and green packaging were the green supply chain management practices included in the study. The firms' performance was assessed in terms of environmental aspects, cost management, quality and operational performance. The study established a positive effect of green supply chain management practices on the performance of food and beverage processing firms in Kenya.

Regarding green procurement practices, the study concludes that most food and beverage processing firms in Kenya have adopted this dimension. This could be attributed to the

strong relationship between green supply chain management practices and performance of food and beverage processing firms in Kenya. Some of the aspects of green procurement that were widely practised in the processing sector, as determined by the study, include: cooperation with suppliers for eco-design of inputs, cooperation with suppliers for environmental objectives, reduced purchase of hazardous materials, reduced purchase of items that are difficult to dispose of, carrying out environmental audits for supplier's internal management and, conducting environmental awareness seminars. The study therefore concluded that to enhance firms' performance, it is imperative for manufacturing firms to invest heavily in green procurement practices with respect to green supply chain management practices.

On the aspect of green manufacturing, the study established that adoption of green manufacturing practices contributes to improved performance of the food and beverage processing firms in Kenya. The study found a strong relationship between green manufacturing practices and the performance of food and beverage processing firms. The study therefore concluded that improved performance was attributed to green manufacturing practices such as: production processes designed to reduce wastes and ensure water conservations; enhancing full capacity utilization; reduction of hazardous wastes during the production process; product eco-design and; cleaner production techniques. In conclusion there is need for manufacturing firms to adopt green manufacturing techniques.

With regard to reverse logistics, the study found that it has a significant effect on the performance of the firms under study. This could be attributed to a framework for waste reduction and cost mitigation through the concept of reverse logistics within the food manufacturing supply chain. The study concluded that efficient and effective management of reverse logistics in the food and beverage manufacturing firms led to better performance.

Regarding green packaging the study established that green packaging is a critical component in cost mitigation and performance enhancement in the food and beverage processing firms. Elements that have a strong effect on the performance with respect to green packaging include: the use of re-usable packaging material, recyclable packaging material, use of non-hazardous packaging, use of bio-degradable packaging, use of reduced packaging materials and use of low- density packaging materials.

Finally, the study concluded that the green supply chain management practices: green procurement, green packaging, reverse logistics and green packaging; when properly implemented lead to higher financial performance, superior quality of products, reduced costs and better environmental preservation. Further, it was established that legislations have a positive significant moderating effect on green supply chain management practices when implemented on all the four green supply chain practices as opposed to when applied to specific individual green supply chain management practices in the firms. The study inferred that performance of the food and beverage processing firms depended on application of green procurement, green manufacturing, reverse logistics and green packaging with legislations being a moderator, hence leveraging performance.

5.4 Recommendations

Based on the study findings and conclusions, the following recommendations are drawn: overall, the study recommends that green supply chain management practices should be embraced by the food and beverage processing firms as a way of not only saving on costs of operations, but also to enhance their viability in the market and customer focus.

While the global campaign for a greener and sustainable environment intensifies, food and beverage processing firms should be at the forefront of implementing the sustainable goals through embracing green supply chain practices.

Further, the study supports the integration of green supply chain management practices with legislations as a moderator and strategy for enhancing performance in manufacturing firms. There is need to comply with the prerequisite legislations across the manufacturing industry.

The study recommends the adoption and sustenance of green procurement practice in order to enhance performance of food and beverage manufacturing firms in Kenya. The study found a positive significant relationship between green procurement and performance of the food and beverage processing firms in Kenya. It is recommended that manufacturing firms adopt and implement green procurement practices in compliance with all applicable legislations. The food and beverage processing firms have the duty to engage their suppliers and set terms on the need for supply of materials that are in compliance with sustainable environment.

With regard to green manufacturing, the study recommends that manufacturing firms embrace green manufacturing practices to cut down on the cost of production and further comply with any legislations governing manufacturing sector in the Kenyan and international context. The primary areas of focus on green manufacturing include: water conservation during manufacturing, reduced generation of hazardous wastes, reduction of wastes during manufacturing, full capacity utilization, cleaner production strategies and product eco-design. The Kenyan Government established statutory bodies such as the National Environment Management Authority (NEMA) in a move to curb environmental pollution by including, among others, the manufacturing firms. The food and beverage processing firms being advocators of healthy living, have the mandate to ensure that they set the example by practicing green manufacturing practices.

The study recommends the adoption of reverse logistics as a strategy to boost manufacturing firms' performance. The manufacturing firms ought to show their commitment towards having a greener environment by putting measures that encourage reverse logistics. This can be attained through encouraging the customers to return non-environmentally friendly materials such as wrapping bags, containers and other wastes. Recycling these wastes should be embraced so as to reduce the release of the pollutants to the environment. This will not only create opportunities for the companies, but also show their contribution to sustaining the environment. While the local legislations are not clear on reverse logistics, the Government should be committed towards encouraging the manufacturing firms to uphold reverse logistics as a green practice to enhance sustainability.

The study recommends the following as far as green packaging is concerned: manufacturing firms should embrace the use of re-usable packaging material, recyclable packaging material, non-hazardous packaging material, bio-degradable packaging material, reduced packaging material and low- density packaging material. The findings established a positive significant relationship between green packaging and performance of food and beverage processing firms. By fully implementing the practice it will result in significant cost reduction hence improve firms' financial and environmental performance. The government through the ministry of environment recently banned use of polythene bags across the country. It is therefore recommended that the food and beverage

processing firms back this initiative by reducing polythene usage in their packaging and other supply chain processes.

5.5 Areas for Further Research

The focus of the study was to establish the relationship between green supply chain management practices and performance of food and beverage processing firms in Kenya, it should be noted that this study was limited in scope and methodology.

The study focused on four green supply chain management practices, hence in future, similar studies should expand the scope of green supply chain management practices.

The focus of this study was on the food and beverage processing firms in Kenya. It is recommended that future research should be carried out in other industries such as cement manufacturing, textiles, chemical and allied, compared to the present study.

This study adopted quantitative methods for data processing and analysis. It is recommended that future studies should consider using qualitative or mixed methods to come up with findings for comparison with the findings of this study.

With respect to performance, this study measured performance with a keen focus on the following dimensions: quality, cost, environmental aspect, cost management and operational performance. Future scholars should measure performance using measures such as return on investment, profitability and market share and; corroborate the findings with those of this study.

Finally, the study adopted legislations as a moderator. It should be noted that the moderation effect was assessed collectively for all the four variables: green procurement, green manufacturing, reverse logistics and green packaging. It is recommended that future scholars should assess the effect of the moderator on individual green supply chain management practices. Further, future researchers should establish whether the relationship between green supply chain management practices and performance can be moderated by other factors such as firm size and the leadership style.

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APPENDICES

Appendix I: Introduction Letter

Bor Jones

JKUAT

Nairobi,

To whom it may concern

Dear Sir/Madam;

RE: REQUEST FOR DATA COLLECTION

I am a Doctor of Philosophy Supply Chain Management student at JKUAT Nairobi CBD campus, currently undertaking my research for my thesis in partial requirement for the award. My research topic is Green supply chain management practices and performance of food and beverage processing firms in Kenya.

I am happy to inform you that you have been selected to be a respondent in this study. For ease of response you are allowed to refer to any documentation, reference material, or individuals both within and outside your firm. You can also seek clarification from the researcher/research assistants on any unclear issues in the questionnaire who will be present as you fill the questionnaire. Your responses will be used for academic purposes only and will be treated with utmost confidentially. Your identity will not be revealed. Your cooperation will be highly appreciated.

Yours Faithfully

Bor Jones

Appendix II: Questionnaire

SECTION A: Green Procurement practices

Please tick (√) the appropriate choice.

Green procurement focuses on cooperating with suppliers for the purpose of developing products that are environmentally sustainable.

Please indicate the level of green procurement practice in your company, and use 1-5 likert point scale (5=Strongly Agree 4= Agree 3=Neutral 2= A Disagree 1=Strongly Disagree)

		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
S/No.		5	4	3	2	1
B1	Our Firm cooperates with suppliers for eco design of inputs.					
B2	Our Firm purchases environmentally friendly materials.					
B3	Our Firm conducts environmental audits for suppliers 'internal management.					
B4	We have been conducting environmental awareness seminars.					
B5	Our organization has reduced purchase of items that are difficult to dispose of.					
B6	Our organization has reduced the purchase of hazardous materials.					

SECTION B: Green manufacturing practices

It is a method for manufacturing that minimizes waste and pollution for all industries, it slows down the depletion of natural resources as well as lowers the extensive amounts of trash that enter landfills. Further it emphasizes on reducing parts, rationalizing materials, and reusing components, to help to build products more efficiently.

Please indicate the level of green procurement practice in your company, and use 1-5 likert point scale (5=Strongly Agree 4= Agree 3=Neutral 2= A Disagree 1=Strongly Disagree)

		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
		5	4	3	2	1
C1	Our firm cooperates with customers for product eco-design.					
C2	We have been practicing cleaner production strategies.					
C3	Our processes are designed to reduce wastes.					
C4	Our operations enhances full Capacity utilization.					
C5	Our firms' processes enhance water conservation.					
C6	Our processes are designed reduce generation of hazardous waste.					

SECTION C: Reverse logistics practices

The movement of product or materials in the opposite direction for the purpose of creating or recapturing value, or for proper disposal.

Please indicate the level of green procurement practice in your company, and use 1-5 likert point scale (5=Strongly Agree 4= Agree 3=Neutral 2= A Disagree 1=Strongly Disagree)

S.No.		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
		5	4	3	2	1
D1	Our supply chain framework provides for product Returns					
D2	Our firm designs products that can be remanufactured					
D3	We designs products that are recyclable					
D4	Our firm designs products that are reusable					
D5	We encourage suppliers to use Returnable packaging materials.					
D6	Our firm manufactures products which can be incinerated					

SECTION D: Green packaging practices

Green packaging is the use of manufacturing methods and materials for packaging of goods that has low impact on the environment and energy consumption.

Please indicate the level of green procurement practice in your company, and use 1-5 likert point scale (5=Strongly Agree 4= Agree 3=Neutral 2= A Disagree 1=Strongly Disagree)

S.No.		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
		5	4	3	2	1
E1	Our Firm uses re-usable packaging material.					
E2	Our Firm uses re-cyclable packaging material.					
E3	Our Firm uses non-hazardous packaging material					
E4	Our Firm uses bio-degradable packaging materials.					
E5	Our Firm uses reduced packaging material					
E6	Our Firm uses low density packaging material.					

SECTION E: Legislations

Environmental legislation is a collection of many laws and regulations aimed at protecting the environment from harmful actions.

Please indicate the level of green procurement practice in your company, and use 1-5 likert point scale (5=Strongly Agree 4= Agree 3=Neutral 2= A Disagree 1=Strongly Disagree)

S.No.		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
		5	4	3	2	1
F1	Our Firm operates in line with ISO Certifications.					
F2	Our Firm complies with environmental Regulations in their operations.					
F3	Our Firm implements County Government By-laws.					
F4	Our Firm complies with pollution regulations.					

SECTION F. Performance of Food and Beverage Processing Firms

Please indicate the level of green procurement practice in your company, and use 1-5 likert point scale (5=Strongly Agree 4= Agree 3=Neutral 2= A Disagree 1=Strongly Disagree).

S/No	Performance measures PI. rank your performance under following criteria.	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1	Reduction of air emission					
2	Reduction of waste water					
3	Reduction of solid wastes					
4	Decrease of consumption for hazardous/harmful/toxic material					
5	Decrease of frequency for environmental accidents					
6	Improve an enterprise's environmental situation					
7	Decrease of cost of material purchasing					
8	Decrease of cost of energy consumption					
9	Decrease of fee for waste treatment					
10	Decrease of fee for waste discharge					
11	Decrease of fine for environmental accidents					
12	Increase amount of goods delivered on time					
13	Decrease inventory levels					
14	Decrease scrap rate					
15	Promote product quality					
16	Increased product line					
17	Improved capacity utilization					
	Period in years					
18	Average return on investment over the past three years					
19	Profit growth over the past three years					
20	Average return on sales over the past three years					
21	Average market share growth over the past three years					
22	Average sales volume growth over the past three years					

Adapted from; Lokesh Vijayvargy *et al.*,(2017) modified by Researcher (2017)

Appendix III: K.A.M Food and Beverages Manufacturing Firms

1. Africa Spirits Ltd
2. Agricultural & Veterinary Supplies Ltd (AGRI-VET)
3. Agriner Agricultural Development
4. Agri Pro-Pak Ltd
5. Agro Chemical and Food Company Ltd
6. Al- Mahra Industries Ltd
7. Alpha Fine Foods Ltd
8. Alphine Coolers Ltd
9. Aquamist Ltd
10. Arkay Industries Ltd
11. Bakers Corner Ltd
12. Bakex Miller Ltd
13. Belat Enterprises
14. Belfast Millers Ltd
15. Beverage Services (K) Ltd
16. Bidco Africa Ltd
17. Bio Food Products Ltd
18. Bounty Ltd

19. The Breakfast Cereal Company (K) Ltd

20. Kenya Ltd Broadway Bakery Ltd

21. Brookside Dairy Ltd

22. Bunda Cakes & Fees Ltd

23. Bunge East Africa Ltd

24. Butali Sugar Mills Ltd

25. Buzeki Dairy Ltd

26. C. Dormans Ltd

27. Cardbury Kenya Ltd

28. Caffe Del Duca Ltd

29. Candy Kenya Ltd

30. Capwell Industries Ltd

31. Centrofood Industries Ltd

32. Chai Trading Company Ltd

33. Chemelil Sugar Company Ltd

34. Chirag Kenya Ltd

35. Coast Silos (K) Ltd

36. Coastal Bottlers Ltd

37. Coca-Cola East & Central Africa Ltd

38. Coffee Agriworks Ltd

39. Cofftea Agencies

40. Danone Baby Nutrition Africa & Overseas

41. Deepa Industries Ltd

42. Tropical Brand (Africa) Ltd

43. Del Monte Kenya Ltd

44. Diamond Industries Ltd

45. DoinyoLessos Creameries Ltd

46. DPL Festive Ltd

47. Dutch Water Ltd

48. East Africa Breweries Ltd

49. East African Malt Ltd

50. East Africa Sea Food Ltd

51. Edible Oil Products

52. Eldoret Grains Ltd

53. Elekea Ltd

54. Ennvalley Bakery Ltd

55. Equator Bottlers Ltd

56. Erdemann Co. (K) Ltd

57. Europack Industries Ltd

58. Excel Chemicals Ltd

59. Farmers Choice Ltd

60. Fresh Produce Exporters Association of Kenya

61. Frigoken Ltd

62. Giloil Company Ltd

63. Githunguri Dairy Farmers Co-Operative Society

64. Glaciers Products

65. Global Fresh Ltd

66. Global Tea & Commodities (K) Ltd

67. Gold Crown Beverages (K) Ltd

68. Gona Best Ltd

69. Grain Industries Ltd

70. Green Forest Foods Ltd

71. Happy Cow Ltd

72. Heritage Foods Kenya Ltd

73. Highlands Canners Ltd

74. Highlands Mineral Water Company Ltd

75. Insta Products (EPZ) Ltd

76. Jambo Biscuits (K) Ltd

77. James Finlay Kenya Ltd

78. Jetlak Foods Ltd

79. Jjasm Mini-Distillery

80. Juja Coffee Exporters

81. Jungle Group Holdings

82. Kabianga Dairy Ltd

83. Kerio Valley Development Authority

84. Eastern Produce (K) Kakuzi

85. Kambu Distillers Ltd

86. Kamili Packers Ltd

87. Kappa Oil Refineries Ltd

88. Karirana Estate Ltd

89. Kenafric Bakery

90. Kenafric Industries Ltd

91. Kenblest Ltd

92. Kenchic Ltd

93. Kenlab Supplies Ltd

94. Kenstaste Products

95. Kenya Meat Commission

96. Kenya Nut Company Ltd

97. Kenya Sweets Ltd

98. Kenya Tea Development Agency

99. Kenya Tea Growers Association

100. Kenya Tea Packers Ltd (KETEPA)

101. Kenya Wine Agencies Ltd

102. Keroche Industries Ltd

103. Kevian Kenya Ltd

104. Kibos Sugar & Allied Industries

105. Kinagop Dairy Ltd

106. Kisii Bottlers Ltd

107. Koba Waters Ltd

108. KrishCommodieties Ltd

109. Kuguru Food Complex Ltd

110. Kwality Candies & Sweets Ltd

111. London Distillers (K) Ltd

112. Mafuko Industries Ltd

113. Mama Millers Ltd

114. Manji Food Industries Ltd

115. Mayfeeds Kenya Ltd

116. MDI Ltd

117. Melvin Marsh International

118. Menegai Oil Refineries Ltd

119. Milly Fruit Processors

120. Mini Bakeries

121. Miritini Kenya Ltd

122. Mjengo Ltd

123. Mombasa Maize Millers

124. Morani Ltd

125. Mount Kenya Bottlers Ltd

126. Mumias Sugar Company Ltd

127. Mzuri Sweets Ltd

128. Nairobi Bottlers Ltd

129. Nairobi Flour Mills Ltd

130. Nas Airport Services Ltd

131. New Kenya Co-Operative Creameries Ltd

132. Nesfoods Industries Ltd

133. Nestle Foods Kenya Ltd

134. Nicey Nicey Maize Millers

135. Nicola Farms Ltd

136. Njoro Canning Factory (Kenya) Ltd

137. Norda Industries

138. Nutro Manufacturing Epz Ltd

139. Nzoia Sugar Company Ltd

140. Palmhouse Diaries Ltd

141. Patco Industries Ltd

142. Pernod Ricard Kenya Ltd

143. Pearl Industries Ltd

144. Pembe Flour Mills Ltd

145. Premier Flour Mills Ltd

146. Premier Food Industries Ltd

147. Pride Industries Ltd

148. Pristine International Ltd

149. Proctor & Allan (E.A) Ltd

150. Promasidor Kenya Ltd

151. Pwani Oil Products Ltd

152. Rafiki Millers Ltd

153. Raka Milk Processors Ltd

154. Razco Ltd

155. Re-Suns Spices Ltd

156. Rift Valley Bottlers Ltd

157. Salim Wazarani Kenya Company Ltd

158. Sameer Agriculture & Livestock (Kenya) Ltd

159. SBC Kenya Ltd

160. Sigma Supplies Ltd

161. Selecta Kenya Gmbh & Sons KG

162. Spectre International Ltd

163. South Nyanza Sugar Company Ltd

164. Spice World Ltd

165. Sunny Processors Ltd

166. Supa Sweets Ltd

167. Sweet Rus Ltd

168. Trufoods Ltd

169. Trust Feeds Ltd

170. Trust Flour Mills Ltd

171. T.S.S Grain Millers Ltd

172. Umoja Flour Millers Ltd

173. Umoja Maintenance Centre (K) Ltd

174. Unga Group Ltd

175. United Distillers And Vintners

176. United Millers Ltd

177. Usafi Services Ltd

178. Valuepak Food

179. Valley Confectionery Ltd

180. Vinepack Ltd

181. W.E Tilley(Muthaiga) Ltd

182. Wanaishi Marine Products (K) Ltd

183. Wanji Food Industries Ltd

184. West Kenya Sugar Company Ltd

185. Winnie's Pure Health

186. Wrigley Company (E.A.) Ltd

187. Xpressions Flora Ltd

Source: Kenya Association of Manufacturers (2017)

Appendix IV: Factor Loadings

Green procurement Component Matrix	1 Extraction
Eco-design-of-inputs	0.523
Purchase-of-environmentally-friendly-materials	0.692
Environmental-audits-for-suppliers-internal-management	0.439
Environmental-awareness-seminars	0.502
Reduced-purchase-of-items-difficult-to-dispose-off	0.596
Reduced-purchase-of-hazardous-materials	0.573

Green Manufacturing Component Matrix	1 Extraction
Cooperation-with-customers-for-product-eco-design	0.593
Cleaner-production-strategies	0.54
Processes-designed-to-reduce-waste	0.589
Full-capacity-utilization-processes	0.588
Water-conservation-processes	0.587
Reduced-generation-of-hazardous-waste	0.611

Reverse Logistics Component Matrix	1 Extraction
Product-returns	0.557
Design-of-products-that-can-be-remanufactured	0.663
Design-of-recyclable-products	0.774
Design-of-reusable-products	0.734
Use-of-returnable-packaging-material	0.497
Manufacture-of-products-which-can-be-incinerated	0.564

Green Packaging Component Matrix	1 Extraction
Re-usable-packaging-material	0.624

Re-cyclable-packaging-material	0.682
Non-hazardous-packaging-material	0.54
Bio-degradable-packaging-material	0.411
Reduced-packaging-material	0.651
Low-density-packaging-material	0.537

Legislations Component Matrix	1 Extraction
Operation-in-line-with-ISO-Certifications	0.586
Compliance-with-environmental-regulations	0.249
Regulatory-compliance	0.727
Environmental-policies	0.655

Firms Performance Component Matrix	1 Extraction
Reduction-in-air-emission	0.504
Reduction-of-waste-water	0.617
Reduction-of-solid wastes	0.61
Decrease-of-consumption-for-hazardous/harmful/toxic materials	0.688
Decrease-of-frequency-for-environmental-accidents	0.781
Improve-an-enterprise's-environmental-situation	0.761
Decrease-of-cost-of-material-purchasing	0.703
Decrease-of-cost-of-energy-consumption	0.683
Decrease-of-fee-for-waste-treatment	0.726
Decrease-of-fee-for-waste-discharge	0.098
Decrease-of-fine-for environmental-accidents	0.167
Increase-amount-of-goods-delivered-on-time	0.611
Decrease-inventory-levels	0.726
Decrease-scrap-rate	0.062
Promote-product-quality	0.631
Increased-product-line	0.438
Improved-capacity-utilization	0.644

Average-return-on-investment-over-the-past-three-years	0.581
Profit-growth-over-the-past-three-years	0.757
Average-return-on-sales-over-the-past-three-years	0.668
Average-market-share-growth-over-the-past-three-years	0.639
Average-sales-volume-over-the-past-three-years	0.758

Extraction Method: Principal Component Analysis.

Appendix V: Introductory from the University Letter

JOMO KENYATTA UNIVERSITY
OF
AGRICULTURE AND TECHNOLOGY
NAIROBI CBD CAMPUS
JKUAT Towers, City Square, Kenyatta Avenue
P.O. Box 62000 - 00200, Nairobi, KENYA Tel: +254705- 950712
Office of the Director

REF: JKU/6/BJ/1/2017 DATE: 30th May, 2017

TO WHOM IT MAY CONCERN

SUBJECT: BOR, Jones (HD411-C004-0659/2015)

The above mentioned is a student of Jomo Kenyatta University of Agriculture and Technology, Nairobi CBD Campus pursuing PhD in Supply Chain Management. He was admitted in September 2015 and has successfully completed the coursework. He is currently enrolled for Research.

Any assistance accorded to him will be appreciated. For any further clarification, kindly contact the undersigned.

JKUAT NAIROBI CBD CAMPUS
02 JUN 2017
DIRECTOR

PROF. WARIO GUYO
DIRECTOR, NAIROBI CBD CAMPUS
/dck

Appendix VI: Research Authorization

NATIONAL COMMISSION FORSCIENCE, TECHNOLOGY ANDINNOVATION

Telephone: +254-20-2213471,
2241349,3310571,2219420
Fax: +254-20-318245,318249
Email: dg@nacosti.go.ke
Website: www.nacosti.go.ke
When replying please quote

Off Kan Utalii Close
Uhuru Highway
P.O Box 30623-00100
NAIROBI-KENYA

Ref No: **NACOSTI/P/17/53739/19026** Date: **7th September, 2017**

Jones Mosbei Bor
Jomo Kenyatta University of
Agriculture and Technology
P.O. Box 62000-00200
NAIROBI.

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on ***"Green Supply Chain Management practices and performance of food and beverage processing firms in Kenya"*** I am pleased to inform you that you have been authorized to undertake research in **all Counties** for the period ending **7th September, 2018.**

You are advised to report to **the County Commissioners and the County Directors of Education, all Counties** before embarking on the research project.

Kindly note that, as an applicant who has been licensed under the Science, Technology and Innovation Act, 2013 to conduct research in Kenya, you shall deposit **a copy** of the final research report to the Commission within **one year** of completion. The soft copy of the same should be submitted through the Online Research Information System.

GODFREY P. KALERWA MSc., MBA, MKIM
FOR: DIRECTOR-GENERAL/CEO

Copy to:

The County Commissioners
All Counties.

The County Directors of Education
All Counties.

THIS IS TO CERTIFY THAT:
MR. JOWES NOSBEI BOR
of JOMO KENYATTA UNIVERSITY OF AGRICULTURE & TECHNOLOGY, 0-30100 Eldoret,has been permitted to conduct research in *All Counties*

on the topic: *GREEN SUPPLY CHAIN MANAGEMENT PRACTICES AND PERFORMANCE OF FOOD AND BEVERAGE PROCESSING FIRMS IN KENYA*

for the period ending:
7th September,2018

.....
Applicant's Signature

Permit No : NACOSTI/P/17/53739/19026
Date Of Issue : 12th September,2017
Fee Recieved :Ksh 2000

.....
Director General
National Commission for Science, Technology & Innovation

CONDITIONS

1. The Licence is valid for the proposed research, research site specified period.
2. Both the Licence and any rights thereunder are non-transferable.
3. Upon request of the Commission, the Licensee shall submit a progress report.
4. The Licensee shall report to the County Director of Education and County Governor in the area of research before commencement of the research.
5. Excavation, filming and collection of specimens are subject to further permissions from relevant Government agencies.
6. This Licence does not give authority to transfer research materials.
7. The Licensee shall submit two (2) hard copies and upload a soft copy of their final report.
8. The Commission reserves the right to modify the conditions of this Licence including its cancellation without prior notice.

REPUBLIC OF KENYA

National Commission for Science, Technology and Innovation

RESEARCH CLEARANCE PERMIT

Serial No.A 15697

CONDITIONS: see back page

Appendix VII: Summary of Descriptive statistics

		Mini	ax	ean	Std. Dev.	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Eco-design-of-inputs	61	1		.24	.89	0.80	1.46	.19	.69	.38
Purchase-of-environmentally-friendly-materials	61	1		.78	.02	1.05	0.58	.19	0.18	.38
Environmental-audits-for-suppliers-internal-management	61	2		.45	.70	0.49	1.10	.19	.77	.38
Environmental-awareness-seminars	60	1		.59	.09	1.19	0.44	.19	0.61	.38
Reduced-purchase-of-items-difficult-to-dispose-off	61	1		.75	.19	1.41	0.57	.19	0.67	.38
Reduced-purchase-of-hazardous-materials	61	1		.01	.98	0.96	1.11	.19	.36	.38
Cooperation-with-customers-for-product-eco-design	61	1		.24	.89	0.80	1.46	.19	.69	.38
Cleaner-production-strategies	61	1		.78	.02	1.05	0.58	.19	0.18	.38
Processes-designed-to-reduce-waste	61	2		.45	.70	0.49	1.10	.19	.77	.38
Full-capacity-utilization-processes	61	2		.25	.77	0.59	0.63	.19	0.49	.38
Water-conservation-processes	61	1		.33	.81	0.66	1.31	.19	.87	.38
Reduced-generation-of-hazardous-waste	61	2		.43	.71	0.50	1.07	.19	.63	.38
Product-returns	61	1		.47	.92	0.85	2.39	.19	.98	.38
Design-of-products-that-can-be-remanufactured	61	2		.63	.63	0.40	1.97	.19	.45	.38
Design-of-recyclable-products	61	1		.01	.21	1.48	1.34	.19	.85	.38
Design-of-reusable-products	61	1		.89	.34	1.80	1.04	.19	0.09	.38
Use-of-returnable-packaging-material	61	2		.63	.63	0.40	1.97	.19	.45	.38
Manufacture-of-products-which-can-be-incinerated	61	1		.44	.52	2.30	.79	.19	0.86	.38
Re-usable-packaging-material	61	1		.11	.22	1.50	1.22	.19	.43	.38
Re-cyclable-packaging-material	61	1		.24	.12	1.24	1.60	.19	.89	.38
Non-hazardous-packaging-material	61	1		.52	.74	0.55	2.00	.19	.52	.38
Bio-degradable-packaging-material	61	1		.75	.10	1.21	0.72	.19	0.12	.38
Reduced-packaging-material	61	1		.75	.19	1.41	0.57	.19	0.67	.38
Low-density-packaging-material	61	1		.01	.98	0.96	1.11	.19	.36	.38
Operation-in-line-with-ISO-Certifications	61	1		.51	.76	0.58	1.51	.19	.10	.38
Compliance-with-environmental-regulations	61	3		.78	.47	0.23	2.03	.19	.41	.38

Regulatory-compliance	61	3		.78	0.47	0.22	2.08	.19	.68	.38
Environmental-policies	61	2		.65	.60	0.36	1.66	.19	.56	.38
Reduction-in-air-emission	59	2		.18	.74	0.55	0.67	.19	.27	.38
Reduction-of-waste-water	61	1		.45	.77	0.59	1.55	.19	.84	.38
Reduction-of-solid wastes	61	2		.45	.74	0.55	1.24	.19	.94	.38
Decrease-of-consumption-for-hazardous/ harmful/ toxic materials	61	1		.34	.96	0.91	1.69	.19	.87	.38
Decrease-of-frequency-for-environmental-accidents	61	1		.44	.77	0.60	1.44	.19	.23	.38
Improve-an-enterprise's-environmental-situation	61	3		.40	.76	0.58	0.81	.19	0.81	.38
Decrease-of-cost-of-material-purchasing	59	2		.23	.84	0.71	0.58	.19	0.99	.38
Decrease-of-cost-of-energy-consumption	61	2		.27	.93	0.86	1.04	.19	.00	.38
Decrease-of-fee-for-waste-treatment	61	1		.14	.07	1.15	1.12	.19	.43	.38
Decrease-of-fee-for-waste-discharge	61	1		.21	.10	1.21	1.44	.19	.35	.38
Decrease-of-fine-for environmental-accidents	61	1		.40	.90	0.82	1.80	.19	.51	.38
Increase-amount-of-goods-delivered-on-time	61	1		.32	.95	0.90	1.32	.19	.09	.38
Decrease-inventory-levels	61	2		.11	.80	0.63	0.34	.19	0.92	.38
Decrease-scrap-rate	61	2		.27	.82	0.67	0.95	.19	.28	.38
Promote-product-quality	61	3		.79	.53	0.28	2.48	.19	.10	.38
Increased-product-line	61	2		.43	.88	0.77	1.31	.19	.47	.38
Improved-capacity-utilization	61	2		.53	.77	0.59	1.42	.19	.82	.38
Average-return-on-investment-over-the-past-three-years	61	2		.10	.78	0.62	0.41	.19	0.61	.38
Profit-growth-over-the-past-three-years	61	2		.96	.77	0.59	0.53	.19	.19	.38
Average-return-on-sales-over-the-past-three-years	61	2		.94	.85	0.73	0.57	.19	0.19	.38
Average-market-share-growth-over-the-past-three-years	61	1		.88	.71	0.51	0.55	.19	.16	.38
Average-sales-volume-over-the-past-three-years	61	2		.89	.75	0.56	0.62	.19	.53	.38
Valid N (listwise)	56									