# EFFECT OF GREEN SUPPLY CHAIN MANAGEMENT PRACTICES ON PERFORMANCE OF DAIRY PROCESSING FIRMS IN KENYA

**BY**

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**A DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF MASTER OF BUSINESS ADMINISTRATION (PROCUREMENT AND SUPPLIES MANAGEMENT) IN THE SCHOOL OF BUSINESS AND PUBLIC MANAGEMENT AT KCA UNIVERSITY**

**AUGUST 2022**

## DECLARATION

I declare that this dissertation is my original work and has not been previously published or submitted elsewhere for award of a degree. I also declare that this is my own original work and contains no material written or published by other people except where due reference is made, and the author duly acknowledged.

Sign……. Reg. No: 19/03760

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I do hereby confirm that I have examined the master`s dissertation of

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And have certified that all revisions that the dissertation panel and examiners recommended have been adequately addressed.

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# ABSTRACT

Lately, organizations have been under increased pressure from different stakeholders to ensure that their operations are environmentally friendly. The concept of sustainability in the supply chain has emerged recently and has been touted as an effective means of addressing environmental challenges while contributing to enhanced performance of organizations. The aim of this study was to examine the effects of green supply chain management (GSCM) practices on the performance of dairy processors located in Kenya. This study had the following specific objectives: To establish the effect of each of the diverse components of green supply chain management namely, green procurement, ecological design, green packaging and reverse logistics, and their influence on performance of the firm. This study was guided by three theories, namely, the theory of constraints, channel coordination theory and supply chain network theory. A descriptive survey research design was adopted. The targeted population of the study comprised of 30 dairy processing firms domiciled in Kenya and licensed by Kenya Dairy Board (KDB). The unit of study included 3 employees from each firm selected from the procurement and logistics department, finance, and production department, making a total of 90 respondents A census study was carried out due to the limited number of licensed dairy processors in the country. The questionnaire was administered to 90 individuals with decision making authority and was collected via self-administered structured questionnaires. After collection of data, the researcher carried out data analysis by use of descriptive statistics to make key inferences. The study achieved a response rate of 95.5%. The study established that green procurement, ecological design, green packaging, and reverse logistics have a positive relationship with performance of dairy processing firms in Kenya. The study recommended that dairy processing firms should adopt green supply chain management practices so as to improve their performance and further inquiries should to be carried out in other firms across other industries to establish if similar results can be obtained. There is also need to identify the role that drivers of green supply chain management practices play in adoption of these practices in organization.



Keywords: GSCM, KDB.

# ACKNOWLEDGEMENT

First and foremost, I would like to give special thanks to my dissertation supervisor Dr. Jackson Ndolo Muthini and all my lecturers for their assistance, input, constructive criticism and advice in doing this research. I would also like to appreciate all KCA University staff and other comrades who in one way or another made this project a success. In addition, I would also like to give my gratitude to all respondents who took time to respond to the questionnaire, without which this study would not be complete. I would also like to thank my family for the support and prayers which were a great pillar for me. And to all those that I haven't mentioned but contributed towards the completion of this project, please feel acknowledged and appreciated.

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## DEDICATION

This research work is dedicated to the Almighty God for giving me the wisdom, strength, knowledge and mental fortitude to accomplish this academic journey. May His name be glorified.

## ACRONYMS AND ABBREVIATIONS

**CSR:** Corporate Social Responsibilty

**DVC:** Dairy Value Chain

**EAC:** East African Community

**EIA:** Environmental I pact Assessment

**EPP:** Environmentally Preferred Purchasing

**FSC:** Food Supply Chain

**GSCM**: Green Supply Chain Management

**IISD:** International Institute for Sustainable Development

**IMF:** International Monetary Fund

**KAM:** Kenya Association of Manufacturers

**KDB:** Kenya Dairy Board

**LEED:** Leadership in Energy and Environmental Design

**NEMA:** National Environmental Management Authority

**SCM :** Supply Chain Management

**SPSS:** Statistical Package for Social Sciences

## OPERATIONAL DEFINITION OF TERMS

**Ecological-Design**: It involves examining the life cycle of a product and reducing its adverse effects on the environment (Jaggi & Kadam, 2016).

**Green Manufacturing**: This is a process that seeks to minimize the manufacturing process's impact on the environment (Khan, 2018).

**Green Purchasing**: It involves procuring environmentally friendly products and services, selecting vendors, and setting environmental requirements (Peng and Lin, 2018).

**Green Supply Chain Management**: This is the process of incorporating sustainable environmental practices in the management of oragnizations in accordance with required standards (Gopal and Gitesh, 2012)

**ISO 14000**: This is an environmental management system of standards that has been accepted by firms worldwide as a commitment to environmental responsibility (Khan, 2018).

**Reverse Logistics**: This is aimed at to recapturing value and having proper disposal of wastes, work in processs and finished goods from the final consumers to the manufacturer (Jaggi & Kadam, 2016).

**Supply Chain Management**: This is defined as creating finished products from raw materials and delivering the same to the final consumer. It also includes managing the disposal and recycling process of a company's products (Chan, Chiou, Chung and Lettice, 2011).

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# CHAPTER ONE
# INTRODUCTION

## 1.1 Background of the Study

Firms are constantly facing increased pressure to adopt environmentally friendly practices due to concerns over the harmful effects that industrial activities have on the environment. This concerns have been more pronounced of late due to increased levels of harmful wastes in the environment. Depletion of the ozone layer due to discharge of harmful carbon emissions especially from industrialized nations has created uncertainty over the legacy of future generations (Jaggi & Kadam, 2016). Firms are therefore expected to reconsider their traditional goals such as profit maximization in order to accommodate social and environmental goals to conform to regulatory expectations.

The concept of adopting sustainable practices in the supply chain emerged recently in response to these pressures and the growing expectation to be responsible stewards of the environment. It is the practice of integrating sustainable environmental processes in organizations so that the final products and services are not harmful to the environment while at the same time providing a source of achieving a competitive advantage (Gopal & Gitesh, 2012). According to Khan (2018), the sustainability terminology encompasses an all-round perspective of economic, social and environmental effect of a firm's output on the immediate environment. Its aim is to completely visualize the life cycle of the firm`s operational activities and remove processes that harm the environment.

In today's world, there is a growing awareness on the effect of our ecological footprint on the planet. This awareness has been driven by overpopulation, industrialization and urbanization that have led to the questioning of manufacturing processes, supply chain activities and consumer values. According to Jaggi and Kadam (2016), while the basic ideology was to enhance environmental sustainability, modern firms are adopting green concepts to cut

production costs create a competitive advantage and create greater customer satisfaction. In the yesteryears, firms were mainly focused on the aspect of financial sustainability alone. Nowadays, many organizations are adopting sustainable practices due to pressure from customers, shareholders, government as well as regulatory bodies. Internal factors in the organization also influence firms to adopt GSCM activities.

Despite all these, there are several impediments that affect the effective adoption of GSCM activities. A study by Dube and Gawande (2016) established several factors inside the firm that impede the effective adoption of sustainable environmental practices. These factors include but are not limited inadequate top executive approval, commitment and support, insufficient education and training, financial constraints, and defiance to embrace new expertise. In a different study Govindan, Mathiyazhagan, Kannan and Haq (2013) established 47 impediments to adoption of GSCM practices in dairy processing firms located in Asia. Some of the most significant impediments are lack of financial, technological, knowledge and key stakeholder approval.

In the long term, improved economic performance and increased market share are some of the benefits of adopting sustainable practices to firms (Khan, 2018). It however remains unclear whether improved performance is due to embracing of sustainable practices or whether it is successful organizations that implement these practices According to Jaggi and Kadam (2016) in order for firms to adopt green initiatives, they have to balance, prioritize and establish a middle ground or common ground between different competing and sometimes opposing goals and aspirations. This may include goals such as maximizing profit, improving social welfare of the citizenry and taking care of the environment through various initiatives. This is because adoption of sustainable practices involves huge financial resources that may end up reducing the capital required for other key operational activities.

### 1.1.1 Green Supply Chain Management Practices

Hsu, Tan and Zailani (2016) opine that sustainable environmental practices include management actions and responsibilities that are meant to guarantee that regulatory requirements that relate to environmental issues are strictly adhered to. This is a continuous process that begins with sourcing of raw materials to ensuring that the final products meet certain specifications as well as effective management of waste products. This idea aims at ensuring that the supply chain performs optimally for economic, social and environmental benefits with greater resource utilization and overall efficiency. According to Peng and Lin (2018) negative environmental impacts occasioned by increased rapid developments in manufacturing sectors have led to harmful effects on the environment such as air, water and noise pollution, destruction of the ozone layer and harmful wastes.

There has been an increase in academic effort to establish the effects of adoption of sustainable practices on organizational performance (Mitra & Datta, 2014). Earlier empirical studies done to establish the effect of GSCM practices on performance of organizations have had conflicting findings that are not decisive. Zhu and Sarkis (2004) in their study established that adoption of GSCM processes have not led to significant enhanced financial performance in industrial firms located in China. However, during this period, the adoption of GSCM was not as advanced as it is today. Earlier stages of adoption usually require huge financial outlay and technological investment.

In the recent past, several researchers have established a relationship between adoption of GSCM practices and economic performance (Hsu, Tan & Zailani, 2016). These varied findings coupled with the necessity to establish a connection amongst various GSCM practices and firm performance have inspired this research. Some researchers have also conducted studies on the association that exists between implementation of GSCM practices and performance for organizations with ISO 14001 certification (Kuei & Madu, 2015;

Laosirihongthong, Adebanjo, & Choon, 2013). The hefty resources required to effectively implement and achieve ISO certification may lead to diversion of critical funds required to adopt green processes, leading to failure of such initiatives.

### 1.1.2 Performance OF Dairy Processing Firms

According to a study by Beamon (2009) performance can be defined as the level that a given job is done satisfactorily to expected previously established benchmarks of quality, expenses and accuracy. These attributes involve a systematic and continuous approach to monitoring and evaluating accomplishments based on how they meet or deviate from pre-established levels or standards. Measurement of performance as far as supply chain management is concerned considers three key dimensions that measure all aspects of performance relating to the supply chain, namely: output, flexibility and resource usage (Beamon 2009).

According to Håkansson and Snehota (2017) the financial aspect of performance aims at significantly minimizing expenses and improving productive capacity. Many organizations are inspired to adopt GSCM because reducing expenditure on unnecessary or inefficient processes will lead to maximization of profits. Implementing these practices will ultimately lead to a reduction in production budget, and minimum usage of components as a result adoption of principles such as re-using, recycling, and re-manufacturing. Adoption of GSCM practices provides an opportunity for firms located in developing countries to penetrate into previously unexplored territory, especially in the developed world. This will ultimately lead to increased profitability and market share.

Adoption of GSCM principles also leads to improved social performance. Social performance relates to enhancing standards of living of the populace while at the same time promoting environmental standards. It involves measurement of a variety of social issues that trigger concerns in society (Searcy, 2013). Additionally, it leads to an enhanced public image of the firm, improvement of environmental sustainability, and environmental risk reduction

(Hsu, Tan & Zailani, 2016). According to a study by Burritt and Schaltegger (2014), it is very difficult to enumerate social performance in the supply chain because it is very dynamic in nature, not easily quantifiable and social indicators usually suffer from subjectivity.

Ashby et al., (2012) established that environmental performance can be measurement by taking into account several metrics for measuring performance. These include energy consumption, efficiency, level of waste disposal, recycling and waste production per unit, use of environmentally friendly materials, green purchasing, green packaging among others. All these metrices have a direct impact on several stakeholders such as employees, suppliers, the focal firm, final consumers and the community at large. According to a study conducted by Ashby et al., (2012) up to 50 different metrices have been identified by other studies and can be used to enumerate environmental performance.

### 1.1.3 Dairy Industry

Consumption of dairy dates back to over six thousand years ago, and the trend has continued to grow every year all over the world. In the last two decades, there has been increased sophistication and milestones achieved in the global dairy industry that has led to adoption of better production practices and innovative processing capability. In 2019, the global dairy industry was estimated to be valued at about  about 720 billion U.S. dollars, which is projected to grow to 1,032 billion dollars by 2024 (Smallholder Dairy Project, 2019). The same reposrt established that over the past thirty years, world milk production has increased by more than 59 percent, from 530 million tonnes in 1988 to 843 million tonnes in 2018.

Recent statistics show that most of the expansion in milk production has been in South Asia, which is the main driver of milk production growth in the developing world. India ranks as the global leader in milk production, accounting for 22% of global production. This is closely followed by the United States of America, China, Pakistan and Brazil. In the African continent, milk production is expected to grow immensely over the next decade because of

adoption of better husbandry practices, increase in herd sizes and better adoption of technology. It is thought that especially goat's and sheep's milk will contribute to increased production in the region. During the period of 2020-2029, it is estimated that about a third of the worldwide livestock herd population will be located in Africa, where production will account for about 5 percent of world milk production (Smallholder Dairy Project, 2012).

According to IMF`s World Economic Outlook Report (2018), agronomy is very crucial to the economy of the country, contributing 25% of Kenya`s gross domestic product. More than 50% of the countryside populace in Kenya is reliant on agriculture as a means of livelihood. The Kenyan dairy industry contributes significantly to the economy and provides direct income (ACET, 2015). It provides a source of livelihood to over 2 million people, many of them smallholder farmers organized into cooperative societies. Lack of reliable data about the industry has hindered the development of crucial statistics and development of recommendations about the whole industry (Technoserve Kenya, 2018).

The dairy industry in Kenya has undergone massive growth since 1992 when the sector was liberalized by the government. The industry has embraced modern methods of production, packaging and marketing. Despite significant milestones, the dairy supply chain is characterized by chaotic distribution channels, stagnant demand and supply, poor returns to the processors and farmers, inefficient production and health risks associated with poor handling and adulteration (Technoserve Kenya, 2018). The dairy supply chain is composed of layers of several firms linked from `farm to fork` such as input suppliers, farmers, cooperatives, transporters, wholesalers, retailers, importers, exporters and the final consumers. The dairy supply chain consists of a network of four players, namely raw milk suppliers, plant/factory, warehouses and the final consumers.

The vibrant formal dairy industry is characterized by fierce competition amongst the main players. According to the Kenya Dairy Board Value Chain Assessment Report (2019) the

current number of active milk processors in Kenya has dropped due to mergers, acquisitions and insolvencies. There are 30 registered dairy processors in the country. The 5 major processors account for three quarters of the conventional dairy space. According to (ACET, 2015) the Kenyan Dairy Value Chain is made up of five large processors who cumulatively account for a huge proportion of the market. The major players are constantly looking for new milk sources to meet the increased capacity of the processing plants. Despite the huge market share, the main processors encounter fluctuating supply leading to inefficient application of their production capacity and facilities.

Processors also face a myriad of challenges. The Dairy Value Chain (DVC) is becoming increasingly sophisticated. There is inefficient employment of resources, and there exists fierce competitive rivalry from the unregulated market both in rural and urban areas. Recently there has been stiff competition from imported dairy products especially from the East African region. A study by The National Assembly's Committee on Agriculture (2019) established that milk imports from neighboring countries shot up in the last 3 years after the establishment of the EAC common market protocol. This policy framework allowed for unhindered movement within the 6 partner states. This trend came with a host of benefits as well as concerns especially to the formal dairy industry in Kenya. Processors are also faced with low profit margins due to constant fluctuations in price and supply.

Although it is difficult to ascertain the industry's actual profitability figures, a report by Kenya Dairy Board has established that the main players make margins which are line with dairy industry standards in other more developed jurisdictions. To improve this situation, better integration and adoption of GSCM practices will help in reducing operational costs and improving market share. Massive losses along the value chain due to the high perishability of dairy products could be managed by investing in chilling plants or cooling centers, optimizing

production processes to be more efficient. An increase in milk production will ultimately be advantageous to all partners in the value chain.

## 1.2 Statement of the Problem

Environmental concerns are rapidly gaining prominence in many industries across the world. They are a more serious issue in developing countries due to the prevalence of old practices and the use of outdated technology. According to Dheeraj and Vishal (2012), over the last two decades, there has been increased concerns about the effect of man`s ecological footprint on the planet. The dairy sector has been singled out as a major contributor to Kenya's total greenhouse gas emissions. It is among the sectors of the economy that have been singled out as contributing significantly to global greenhouse emissions. According to Mburu (2016) the dairy industry contributes approximately 20% of Kenya`s annual emissions from agriculture, or about 12.1 million tonnes of CO2. As a result of this pressure from different stakeholders, firms must proactively take into serious focus the effect of their activities on the environment. Management of modern supply chains are therefore expected to critically understand and implement GSCM activities to achieve competitive advantage.

Chan, Chiou, Chung and Lettice (2011) conducted a study on the effect of suppliers influences on performance and competitive advantage in Taiwanese firms. The researchers focused on suppliers and innovations in Taiwan only. The study established that greening of the supply chain led to innovations and competitive advantage. Acquah, Agyabeng-Mensah and Afum (2020) conducted a study on the connection between green employee management efforts, environmental practices and performance in hotels located in West Africa. The research found out that GSCM practices play a complementary role between green HRM and social, environmental, operational and market performance, and a mediating role between green HRM and performance. Additionally, the study established that the link between HRM and green SCM achieves the greatest effect on operational performance.

In Kenya, GSCM practices have been embraced by organizations albeit on an ad hoc basis (Okemba & Namusonge, 2014). According to the Kenya Association of Manufacturers

(KAM, 2012), an investor in Kenya is required to give an Environment Impact Assessment (EIA) report before investing. In this report the investor is required to give details on the type operations, scope, expected environmental impact and the likely benefits to the country and community. NEMA gives approval on the EIA as a pre-condition for the industrial activities to be carried out. The authority is tasked with ensuring sustainable management of the environment by acting as the supervisory and regulatory body in all matters concerning the environment.

Previous studies done in the country have either adopted a case study approach or focused on a single aspect of GSCM practices, which has resulted in limited application of the findings. This research examines four aspects of GSCM practices and how they enhance firm performance making the findings more generalizable. The dairy supply chain in Kenya was selected for this study because it key for the economy of Kenya and contributes significantly to the GDP. In addition, agriculture is one of the sectors that is facing the direct impact of climate change which has great and dire repercussions to the well-being of the population. On the other hand, the DVC is one of the biggest consumers of energy, and efforts are being made to ensure sustainability in the sector (FAO, 2018).

## 1.3 Objectives of the Study

### 1.3.1 General Objectives of the Study

The general study objective was to determine the effects of green supply chain management practices on the performance of dairy processing firms in Kenya.

### 1.3.2 Specific Objectives of the Study

The study had the following specific objectives:

i. To analyze the effects of green procurement on the performance of dairy processing firms in Kenya.

ii. To assess the effects of ecological design on the performance of dairy processing firms in Kenya.

iii. To determine the effects of green packaging on the performance of dairy processing firms in Kenya.

iv. To examine the effects of reverse logistics on the performance of dairy processing firms in Kenya.

## 1.4 Research Questions

The research questions of the study are:

i. What is the effect of green procurement on the performance of dairy processing firms in Kenya?

ii. How is performance of dairy processing firms in Kenya affected by adoption of ecological design practices?

iii. How does implementation of green packaging practices affect performance of dairy processing firms in Kenya?

iv. What is the effect of implementation of reverse logistics practices on performance of dairy processing firms in Kenya?

## 1.5 Justification of the Study

This study will be useful to the following stakeholders;

### 1.5.1 Managers and Entrepreneurs

This study is useful to investors, entrepreneurs, and managers of dairy processing firms in Kenya. The findings will help better manage dairy processing firms considering the current global GSCM trends. The area of GSCM is an emerging field that has the capacity to enable

firms obtain a competitive advantage especially in the dairy industry which is characterized by stiff competition from local and regional players. Entrepreneurs and managers can apply the principles identified in this study to make better investment, financial and management decisions to ensure success in the highly competitive industry. Managers of dairy processing firms will be enlightened on the best GSCM practices to adopt to enhance organizational productivity and gain a sustainable advantage in a sector that is characterized by stiff competition. Managers of other firms in different industries can also adopt the findings identified herein as a basis for establishing bench marking standards to enhance competitiveness.

### 1.5.2 Researchers and Scholars

Researchers and scholars who would wish to perform further analysis on the same topic or in firms across other sectors will also find this study useful. For example, a researcher can use the findings of this research to conduct comparative research so that important conclusions can be made. Researchers will also find this study invaluable as a source of knowledge in the field of GSCM academia as well as a readily available source of refence material in the emerging field of green supply chain management. Researchers can also make use of recommendations postulated by this study to identify additional topics for further research in the area of green supply chain management.

### 1.5.3 Government and Regulatory Bodies

The national government and the county governments will also find this study useful in coming up with appropriate policies, frameworks, and regulations for the dairy industry. This study will be useful to policymakers to ensure that sustainable practices are adopted to improve the competitiveness of firms in the dairy industry. Industry regulatory authorities as well as oversight bodies and institutions such as NEMA and Kenya Dairy Board (KDB) can use the

research findings to formulate policies that are beneficial to the whole industry. Oversight bodies such as those of the National Assembly, Senate and the county assemblies can also make use of this study to streamline the industry and create legislations that are beneficial to the whole industry.

### 1.6 Scope of the Study

This aim of this study was to assess the effect of green supply chain management practices on performance of Dairy processing firms in Kenya. The target population was 30 dairy processing firms licensed by the Kenya Dairy Board in Kenya.

# CHAPTER TWO
# LITERATURE REVIEW

## 2.1 Introduction

In this section, the researcher reviews literature on various Green Supply Chain Management (GSCM) practices in Kenya as well as in other countries across the globe. It provides an outlook on previous works by other researchers relating to the same topic. This chapter discusses the theoretical review, empirical review, research gaps, conceptual framework and review of research hypothesis.

## 2.2 Theoretical Review

This section presents theoretical foundations that underlie the effects of green supply chain management practices on organization performance. This study will be guided by several theories, namely, supply chain network theory, channel coordination theory and the theory of constraints.

### 2.2.1 The Supply Chain Network Theory

The Supply Chain Network Theory builds on the previously established theory of the firm that was introduced in early 1980s and developed periodically over time. Previously, the main focus area on organizational relationships was between just two firms in the network. This theory widened the scope and examined multiple relationships between several supply chain partners. A study by Chang, Chiang and Pai (2012) established that a typical supply chain network relationship is connected by various objects, events or persons. The researchers also established that the supply chain network is highly complex and sophisticated in nature and is made up of mutually beneficial associations by the different partners. The existence of these networks is important to facilitate inter-firm business activities that create value for the entire supply chain.

The supply chain network theory has several underlying assumptions. For instance, sharing of knowledge and information within partners in a network could lead to competitive advantage. A study by Hameri and Paatela (2015) established that firms embedded in a network have no freedom to operate towards facilitating their individual goals and objectives and in total isolation from other partners. In addition, firms are also able to outsource their goods and services to other firms in the network. This sort of arrangement is beneficial as it allows firms to purchase key supplies, goods and services required for their production processes to run effectively. For the relationship to be beneficial, a high degree of open communication channels and mutual trust is a key ingredient and is required and expected from all firms in the network.

Various researchers in an attempt to define the operations of the supply chain network theory have established the most important variables of the theory. Harland and Knight (2017) established that the major focus area of this theory has metamorphosized significantly over the years and that literature now emphasizes on several important aspects. These aspects include an examination of the building blocks and key pillars of the network, the communication channels that exist therein, the competitive position of the networks and the overall performance of the network. Firms can gain a competitive advantage in the network by positioning and locating their operations strategically. This is in order to have a greater influence on the operations of the network.

According to this theory, the firm that occupies a dominant position in the network can possess a greater influential ability compared to other firms in the same industry, and this can be considered as the independent variable. This perceived superior position that all firms ultimately expect to achieve can be considered as the dependent variable. The level of dominance of the firm in the network can be defined as being either highly dominant or low. According to Hameri and Paatela (2015) because the relationships within a network are likely

to have a long-term focus and a high level of complexity, the effective and efficient supervision of these relationships is an important element for success. Firms that are occupy a dominant position can achieve better operational efficiency as well as being in a position of greater influence to dictate variables such as agility, flexibility, quality, speed and price in the supply chain.

According to Bernardes and Zsidisin (2016) other examples for key variables in the supply chain network theory include but are not limited to embeddedness of a firm and level of sharing of knowledge and information throughout the network. The organization that is located centrally in the network can dictate key deliverables in the network, benefit from efficiency, reduced costs, increased market share and enhanced reputational image amongst customers. The supply chain network theory is relevant because with the expanding nature of supply chain networks, firms are exposed to increased risks as well as opportunities. This theory establishes an important tool of proactively visualizing the positioning of firms in the network and being in a greater position to identify and enhance the relationship to achieve maximum benefit for all partners in the supply chain network. By having a clear and unobstructed view of the network, opportunities as well as risks can be identified and mitigated early before adverse effects can occur.

### 2.2.2 Channel Coordination Theory

The theoretical foundations of the channel coordination theory were originally established and popularized in early 1990s by Ananta Subramania Kumar. The purpose of the theory is to identify the key deliverables of different players in the supply chain and creating a mutually beneficial middle ground and means of achieving shared aspirations. With the complex nature of modern supply chains, this theory is beneficial as it seeks to proactively engage the different stakeholders in creating shared purposes and beneficial teamwork and synergy. Because supply chains involve different decision makers, this theory creates a means of coordination and

communication that prevents conflict and facilitates efficient and transparent communication in setups that involve multiple organizations (Arlbjørn, Freytag & de Haas, 2011).

According to a study by Giannakis (2011) this theory can be useful in managing supply chains effectively across different spheres such as procurement of materials, reverse logistics, vehicle routing, material scheduling, inventory management among others. The main focus of this theory is to optimize the performance of the supply chain by effectively managing the different objectives of partners and creating a working solution that minimizes conflict and friction. These are commonly referred to as schemes or coordination mechanisms and they serve to regulate the of information and key factors of production in the supply chain. The channel coordination theory expects to achieve shared value that is beneficial to all partners in the supply chain. In view of this, competitive advantage created will be shared amongst different partners as opposed to within one firm in the network.

Sang (2013) established that in order for this approach to perform as desired, there has to be a regulatory mechanism or a contracting scheme. The purpose of this scheme is to establish common goals and aspirations from all partners in the supply chain. The goals have to be shared and expected to benefit all partners. An efficient planning mechanism must be established to prioritize the goals in order to allocate resources to the most pressing and viable projects as they fall due. Differing objectives and sources of conflict have to be smoothened out to prevent failure and mistrust amongst partners. This calls for the establishment of an agreed means of aligning differing objectives in order to create a middle ground and an objective that has the interests of all partners. For the planning aspect to be successful, there has to be open and clear lines of communication to prevent mistrust amongst partners. There has to be a process that is seen to be transparent and all information required by partners should be easily available and accessible.

For this process to work effectively, coordination across the network must be seamless and systematic in nature, and efforts of all partners need to be clearly established and known to all parties. Additionally, there must be a clear source of authority to guide the entire process and help in decision making. Organizations in the network can identify and allocate these roles based on previously mutually agreed criteria that is endorsed by all parties. Partners also need to actively strive to ensure that they operate towards achieving mutually beneficial goals as opposed to pursuing individual goals (Rabin, 2011). This process is usually done in a democratic and participatory manner that considers the positions of all stakeholders involved.

### 2.2.3 The Theory of Constraints (TOC)

The ultimate success of the supply chain is determined by a large extent on the strength of the supply chain link. In order to realize the maximum benefits from the supply chain, firms require to proactively engage themselves in tracing links that contribute to weaknesses in the system and affect the realization of increased performance of the entire network. Improved performance can be achieved by adopting this theory in the supply chain operations to remove constraints in the system that affect the achievement of organizational goals by creating variations. The theoretical underpinnings of this theory are contained in a publication by Dr. Eliyahu Goldratt which was popularized in the mid-1980s. The Theory of Constraints is an important methodology that aims at improving processes by identifying the system constraint or bottleneck (Gupta & Boyd, 2016).

The TOC states that every network must have a limitation that hinders the attainment of organizational goals. This constraint also regulates the amount of output that the organization can produce. According to Gupta and Boyd (2016) an effective way of guaranteeing the effective performance of networks is to entirely get rid of the system constraint or making slight improvements to the constraints in order to make it more efficient. Constraints in this context is used to refer to any variable that limits the extent to which an

organization can achieve its goals unhindered. Several adverse effects can occur as a result of the inability to effectively manage the system constraint. This will ultimately lead to a steep reduction in operational efficiency, increased costs, reduced profitability and loss of market share. When identified early and properly managed, constraints can lead to significant improvement and ensures continuous growth. However, when ignored, the constraint may lie idle, depleting system capacity.

TOC shifts the focus of top executives from maximizing the application of separate resources, capital assets and functions to increasing the flow of throughput generated by the entire system. The main processes of TOC are aimed at identifying and removing barriers that prevent each part of the process from working together as an integrated whole. (Gupta & Boyd, 2016). As far as the supply chain is concerned, the effectiveness and degree in which the network achieves its goals is dependent on the strength of the supply chain links. The weaker the link, the higher the probability of failure and vice versa. System failure is bound to occur at the point where the supply chain link is the weakest. By leveraging this constraint, firms can achieve their financial goals while delivering value to customers, reducing lead-time and preventing stock outs.

According to the TOC International Certification Organization, there are three basic assumptions surrounding this theory. The first assumption is that all problems in the network can be explained using a relationship that identifies causativeness. The effect is the problem, and by identifying the cause, one can understand what is happening and determine an appropriate solution. The second assumption of TOC is that the ultimate success of the network can be considered by effectively identifying and managing all the sources of variations that occur in the system. This include operational stock that is held by firms, system throughput expenses required to run the operational setup in the internal organizational processes (Gupta & Boyd, 2016).

The third assumption of the theory is that there are several underlying attributes which must be present before the organization can achieve its important aspirations. An example of these attributes includes legal obligations, quality standards in all internal and external processes as well as safety of the operations. It is therefore critical for supply chain managers to effectively and critically understand all the key attributes that must be present for the attainment of organizational goals (Gupta & Boyd, 2016). Having the ability to understand these concepts of key attributes can be a major source of improved organizational performance and competitive advantage. Organizations that master these processes usually achieve higher profit margins compared to their peers in the same industry.

The Theory of Constraints is relevant for this particular study because it can provide dairy processors in Kenya with a proven method of increasing their profitability and market share. This can be achieved by identifying constraints in the supply chain network and coming up with strategies and methodologies to get rid of them. For example, by studying throughput in processing plants, the constraint of seasonality in milk supply which is a major problem in the industry can be effectively addressed. This theory is highly effective and can be used as a means of determining which goals should be prioritized based on certain internal and external variables that exist in the firm. This is partly because organizations usually have different goals that are limited by the scarce nature of resources required to attain them.

### 2.3 Empirical Review

This section presents the empirical review on the relationship between green supply chain management practices and performance. This section examines the green supply chain management practices, namely green procurement, ecological design, green packaging and reverse logistics, as well as the performance of dairy processing firms in Kenya. It also provides a summary of the methodologies and findings of past studies in the same area.

### 2.3.1 Green Procurement

Green procurement is often referred to by several names such as ethical procurement or ethical sourcing. This is a fairly new concept that that has recently emerged as a key area of concern due to the increasing levels of environmental pollution directly caused operational activities of firms. It represents the first step of sourcing for raw materials required for the manufacturing process. Its main activities include sourcing for suppliers and procurement of raw materials that conform to specific agreeable environmental standards and established code of ethics (Eltayeb, Zailani & Ramayah, 2011). According to Ashby et al., (2012) green procurement is a deliberate and conscious effort that addresses the concept of environmental sustainability in a philanthropic manner.

The concept of green procurement advocates that a focal firm will use its power to demand environmentally friendly products and processes from the suppliers upstream. It also involves educating suppliers on environmentally sustainable practices and selecting only those who adhere to standards such as ISO 14001 (Srivastava, 2007). ISO 1400 is a globally accepted environmental management framework that provides guidelines that organizations can embrace in pursuant of their sustainability operations. Organizations therefore require to establish a comprehensive environmental policy that will serve as a guide during the procurement process. Firms also require to establish proper communication channels and collaborative activities with all suppliers to ensure that the required standards of goods and services are established and maintained in order to ensure smooth delivery and operations.

Even though many researchers advocate for the need for cooperative approaches, Ashby et al., (2012) discussed the concept of the principal firm and how it serves as a driver of green procurement amongst organizations. This concept refers to organizations that have a considerable influence over the entire network and take part in dictating key deliverables in the

market. They wield a lot of power and influence suppliers upstream, a process that is referred to as competence transfer. Gold et al., (2010) performed a study using several variables such as regulations, customers, stakeholders, CSR and communication. In their findings they emphasized that green procurement was important in building lasting relationships with suppliers.

A study by Lagat (2013) examined several issues that hinder effective adoption of sustainable sourcing at major airlines located in Nairobi, Kenya. The study pointed out that procuring firms can exert their authority in the supply chain by dictating the standards required of goods and services supplied thus deriving environmental advantages from green purchasing. The same study further brought to the fore the influence that the focal firm exerts on the entire supply chain. This process is achieved when a firm exerts pressure across several partners in the network stimulating a reduction in prices of greener goods as well as inspiring the research, adoption and embracing of sustainable practices across the network. Focal organizations are usually powerful firms with greater control over the entire supply chain activities and usually possess considerable advantages such as wide market share, huge research and development capability, key stakeholder support and massive capital base.

According to Mwaura (2015) the purchasing function in organizations can ensure environmental sustainability in the network in several ways, key among them; by developing a supplier environmental questionnaire. This is useful in establishing the supplier`s position on environmental issues before selecting suppliers. Further studies in the area of green procurement suggest that it is a growing practice and the literature available in this area shows that it is more developed than other aspects of GSCM. According to a study done by the International Institute for Sustainable Development (IISD), this phenomenon can be attributed to the fact that procurement is often seen as amongst the most important mechanisms for achieving sustainability and environmental goals in an organization.

The role of supplier evaluation is to contribute towards the reduction of solid and liquid wastes, factory emissions as well as to encourage optimum and sustainable use of resources. Organizations can use these guidelines in the tendering and evaluation process and the supplier selection process to ensure that only compliant suppliers are engaged. According to Sinclair (2010) green procurement is categorized into several major facets; supply chain management, design operational administration, ecological verification and ecological and peripheral supervision. The study further established that effective green procurement has the effect of contributing towards enhancement of the firm's competitive advantage, market share and greening the supply chain. This is because green procurement is the starting point of sustainable operations in the firm and sets the tone for other sustainability operations in the firm and across the network.

Based on literature reviewed, there is growing consensus that green procurement is among the most common sustainability practices that organizations have adopted in Kenya. A study by Lee (2008) found out that firms that seek to adopt green procurement need to establish effective communication and accountability standards with partners to ensure that they conform to certain specifications. This may include having multiple contracts with clauses that relate to environmental performance and a mechanism of maintaining checks and balances to ensure that strict standards are adhered to so that the firm`s sustainability operations are not adversely affected by non-compliance. To achieve this, the organizations may have to adopt mutually beneficial activities such as joint research, education, monitoring and evaluation, research and development, among others.

According to a study by Sinclair (2010) adoption of Environmentally Preferred Purchasing standards (EPP) in the USA has ensured that all industry players in the supply chain conform to green standards. The program assists U.S. federal governments to utilize private sector standards and ecolabels to help in identifying and procuring environmentally

preferable products and services. This concept has provided a streamlined and convenient way to make sense of the often-complex sustainable products environment. The EPP Program has generated numerous cost and environmental benefits to the federal government by supporting efficiency in federal operations and providing a convenient and streamlined way to utilize various environmental performance standards that exist in the global marketplace.

### 2.3.2 Ecological-Design

Ecological design is a sustainable practice that is aimed at incorporating effective product design that will ensure that the product will not have harmful effects to the environment in future and during the entire product life cycle (Albu, 2017). This process begins at the product conception stage and represents a proactive effort at establishing the future ecological footprint of the product during the entire product life cycle. This concept is also referred to by a host of other terminologies such as life cycle design, eco-friendly design, sustainable environmental design, green conscious design, life cycle engineering or clean design. According to Albu (2017) environmentally sustainable design achieves the most benefits if it works hand in hand with the other two variables of sustainable design, namely; economic and socially sustainable designs. This concept is sometimes termed as triple bottom line.

Luthra, Garg, and Haleem (2013) highlighted that sustainable design if used appropriately can provide a remedy for over 80% of environmental impacts associated with the product. Sustainable design is useful in minimizing adverse environmental effects by considering the entire life cycle use of the product. It also serves as a means of minimizing operational costs of firms as it promotes re-manufacturing and conversion of the product back into useful forms once it reaches the end of the life cycle. According to Muma et al., (2014), re-use involves using the same product without it undergoing re-improvement processes and is aimed at reducing usage of materials. Recycling is aimed at making disposed products useful

by converting them into useful forms and re-introducing them back into the life cycle. According to Zhu and Sarkis (2004), different organizations may adopt different sustainable design concepts based on their sector of operation and their product portfolio.

In the process of designing sustainable products, constraints such as economic aspects, end user experience and internal operational capacity must be accounted for. Sustainable design is considered as a long-term strategy because it considers the entire product life cycle process and emphasizes on reducing the environmental impact during the entire life cycle. According to Albu (2017) several activities are usually carried out during the sustainable design process. These include recovery of end of cycle materials, elimination of harmful biological hazards, product re-engineering and product resource efficiency programs. All these efforts are aimed at making sure that end of cycle products can still be incorporated into useful forms with little or no additional improvements. The main idea is to reduce costs associated with disposing off unwanted products or purchasing entirely new products to be used in the production process.

Recycling aims at ensuring that the product can be reconverted into useful products and re-introduced into the life cycle. It involves refurbishment, repair and rework activities to bring back the components into an improved position (Beamon, 2009). During the product design stage, it is important to ensure that the product will not consume too much materials and energy in order to guarantee significant cost savings during the life of the product. The product design should also take place with a view of ensuring that the product is compatible with future renewable sources of energy to prevent a scenario where products become obsolete faster than anticipated. Green design can be an expensive undertaking that involves establishing a common ground between financial considerations and sustainability. This may require a financial projection that spans the entire life cycle of the product vis a viz the cost of designing the product to ensure that it conforms to sustainability aspects.

Ecological design is the driving force behind a circular economy. A circular economy refers to a strategy of minimizing wastes in the supply chain by reusing, refurbishing, sharing and recycling existing materials as long as possible. All these strategies are geared towards addressing environmental problems plaguing the universe such as increased greenhouse gases emissions, climate change, loss of biodiversity, wastes and destruction of the ozone layer. According to Luthra et al., (2013) ecological design is governed by key regulations that are responsible for regulating sustainable products in the market. These regulations include ISO 14062, ISO 14001 and Cradle to Cradle (C2C). ISO 14062 is a global environmental standard that regulates the integration of environmental standards into the product development and design stage. ISO 14001 is a commitment from firms to certify their commitment to sustainability of the environment. Cradle to Cradle (C2C) is a program that certifies innovation in products that are sustainable.

### 2.3.3 Green Packaging

Green packaging has recently emerged as a major are of concern due to the direct contribution that harmful packages have on the environment. According to Hsu et al., (2016) green packaging refers to the usage of bio friendly materials during the packaging process. These materials have to be compostable, bio degradable or re-usable. Magnier and Schoormans (2015) identified packaging as an imperative area of concern because it serves several key functions such as facilitating informational exchange with final consumers, enhancing relationships, influencing buyer behavior, facilitating brand visibility as well as portraying a favorable brand image amongst the public. Packaging therefore plays a key role not only in keeping the products safe but also in communicating with customers and promoting a favorable brand image.

Hsu et al., (2016) established that green packaging has additional benefits such as offering protection to the product from elements during transportation, as well as reducing the chances of degeneration and wastage before the products reach the final consumer. Green packaging also ensures that the product is in strict adherence to compliance and legal frameworks as well as environmental standards. A study by Abad, Guerrero and Santamaría (2015) established that innovation in green packaging serves a key role that ensures customers can interact with the product and this aspect is key in ensuring that packaging influences buyer behavior and promotes brand loyalty. Customers are increasingly becoming environmentally aware and often demand that packaging conform to strict environmental standards. This is especially true as we exist in an information age where customers are exposed to developments in developing countries and expect that any positive outcomes being embraced in such jurisdictions be replicated locally.

Organizations must therefore be ready to invest significant efforts in embracing modern packaging material in order to gain consumer confidence and enhance competitive advantage. For green packaging to serve its intended purposes, it needs to consider effective protection of the product, it has to be appealing to the consumers in terms of design and it has to embrace and communicate the intended environmental message to the final consumer (Jerzyk, 2016). The perishable nature of products has also brought more focus on the role that packaging plays in protecting the product. Packaging requires to adequately protect the product from elements while at the same time ensuring that the packages are recyclable and not harmful to the environment.

According to a study done by Fitzpatrick, Verghese and Lewis (2012) in the past, various stakeholders only focused on the final point of reducing wastes and carrying out recycling initiatives. Of late, organizations are considering the entire useful life of the packaging material during the design process. This means that the concept of ecological design,

green packaging and reverse logistics are intertwined so as to reap the maximum benefits. The design process for packaging materials considers the entire life cycle of the material and is done in a manner that reduces material usage and facilitates future recycling initiatives. Reverse logistics comes in handy at the end of the packaging materials life cycle by facilitating return of the products back to the firm for safe disposal, re-use, recycling or re-manufacturing.

Green packaging is important since it enables for efficient and safe transportation, delivery and bulk handling of goods. According to Bellamy and Shuler (2017) green packaging enables the product to reach the intended users in the right condition by protecting it from adverse environmental contamination and the effects of adverse weather conditions during transportation, warehousing, and storage. Environmental messaging can also be included in green packaging to influence the perceptions of the final consumers. This will have the effect of enhancing a positive reputation of the firm, enhance brand loyalty and promote a favorable image of the firm amongst its consumers. This is especially important because consumers are becoming increasingly aware about global environmental concerns and trends as a result of the digital age that we are living in.

In the food processing sector, green packaging has received increased attention in the recent past due to the importance of proper packaging to preserve the quality of food. With the increasing complexity of modern distribution channels, food products are exposed to different hazards during transportation, shipping, storage and delivery. These include harsh weather patterns, environmental pollution, inadequate and inappropriate handling as well as lengthy supply chains. Modern packages are therefore required to balance between offering the required levels of protection while at the same time being sustainable in nature. Campaigns such as those advocating for 3Rs i.e., reduce, reuse, recycle are key features of modern packaging materials. According to Zheng and Zhang (2010) the packages are required to be of

light weight material to avoid wastage, made from natural or biodegradable materials and easier to produce.

According to Wikström, Williams and Venkatesh (2016) green packaging is an important tool in influencing consumer behavior about recycling, minimum material usage and re-use. Organizations can influence consumer perceptions about packaging by minimizing the harmful impact of the packaging material. This is because organizations can alter the perceptions of its final consumers and the way they interact with the product by incorporating design that reflects environmental sustainability. Organizations can also alter public perceptions by incorporating environmental messaging into the packaging material. This will serve to create a favorable image of the organization as well as to inform and educate customers on the firm's environmental protection strategies.

According to guidelines established by The Sustainable Packaging Alliance (2012) an effective sustainable packaging process must conform to 3 key deliverables of sustainability. These include the societal, financial and environmental pillars or 'triple bottom line' of packaging system. This means that the packaging process must ensure that the interest of all stakeholders is considered. According to Zheng and Zhang (2010) the packaging material should ensure that the organization saves costs by being affordable while at the same time protecting the product from harmful elements. The packaging material must be biodegradable and easily disposed off or repurposed without harming the environment. All these should be done with the aim of promoting a better society.

### 2.3.4 Reverse Logistics

According to a study by Zheng and Zhang (2010) reverse logistics includes activities such as repairs, usage of recyclable and safe packaging materials, recycling, re-use and use of environmentally friendly wrapping materials. In the traditional process of product flow, goods

are supplied from the factory to the retailer and finally to the end customers. Reverse logistics on the other hand begins from the final consumer and moves in the reverse direction in the supply chain. It often involves the collection and supply of finished goods that had been previously supplied to the end customers. These goods may be either return inwards or faulty products. Reverse logistics if used appropriately can ensure that organizations minimize operational costs, improved brand image and brand loyalty as well as increased market share (Buyukozkan & Cifci, 2012).

Despite the known and clear benefits of reverse logistics being numerous, its uptake across organizations is not as advanced and developed compared to other sustainable management practices. This is especially true in manufacturing hubs of developing countries located in Asia, South America and Sub Sahara Africa. This is despite these regions contributing a significant proportion to global environmental pollution and environmental degradation (Lau & Wang, 2009). This can be partly attributed to lack of clear sustainability efforts by firms especially at the end of the supply chain. According to Albu (2017), in the traditional linear economic model, products are manufactured or processed, used and discarded, often with harmful consequences on the environment. This has been replaced by the circular economic model where organizations engage in end of cycle activities such as recycling, re-using, re-manufacturing and refurbishing. There is also very little oversight by regulatory bodies and poor adherence to set environmental standards by firms. The regulatory framework is not as advanced especially in developing countries, and this coupled with lack of strict enforcement measures has led to poor adoption of reverse logistics strategies.

The most common initiatives associated with reverse logistics are usually carried out to end products, parts and components as well as packaging materials. Some of the programmes involved in reverse logistics include product recalls, re-manufacturing, reconversion, re-use and redistribution (Olorunniwo and Li, 2010). A study by Lau and Wang (2009) established

that for reverse logistics to function appropriately, the focal organization has to create an effective logistics and communication channel with its partners across the supply chain. This may include drop off points for faulty or damaged products or an effective communication channel with consumers to encourage them to bring back faulty or unused items for reconversion, recycling or further processing. Customers must also be aware of such strategies so that they can return damaged goods or waste packaging materials back to the point of purchase for recycling. Organizations also need to have an appropriate returns and refund policy so that customer satisfaction is not affected.

Previous research conducted by Ashby, Leat and Smith (2012) established that adoption of reverse logistics strategies led to improved environmental efficiency in the disposal of garbage from manufacturing plants and industrial setups. Choi and Zhang (2011) enumerated the effects of sustainable reverse logistics operations and its consequence on the performance of firms located in the Asian Peninsula. The researchers established that a positive association exists between adoption of these practices and enhanced overall performance. Reverse logistics ensures that majority of the wastes associated with the product flows back to the organization where it is put into good use. In other words, reverse logistics serves an important function of closing the loop in the supply chain. This is aimed at ensuring that the system produces the least amount of waste, majority of which is recycled back. All these efforts are done to ensure that the system benefit from significant cost savings.

Albu (2017) opines that in order for organizations to reap maximum benefits from reverse logistics, they must put in place an effective recycling program. This will ensure the conversion of end of cycle waste materials into other beneficial products or repurpose them into other forms that do not have a harmful effect on the environment. This can be achieved by having an effective recycling program with all partners in the supply chain to ensure that wastes are collected and transported back to the processing units for recycling. According to Ashby,

Leat and Smith (2012) wastes can also be used as a raw material in the production process, further reducing operational costs which can be quite significant in modern manufacturing setups.

Organizations need to make sure that they have an appropriate reverse logistics system in place. This is important in order to allow for a seamless operation of the outbound logistics and reverse logistics strategies. According to Albu (2017), attempting to impose reverse logistics operations into the traditional supply chain management framework will often result in delays, constraints, customer dissatisfaction and losses. An appropriate reverse logistics management function is often comprised of three phases. Return Policy and Procedure (RPP), Refurbishment or Remanufacturing (ROR) and Waste Disposal (WD). RPP is concerned with ensuring that returns from customers are handled efficiently to maximize customer satisfaction. ROR is concerned with the process that takes place when the returns arrive. WAD handles those products that are not fit for remanufacturing or re-furbishing and cannot be sold again, (Albu, 2017)

Another key concept that has emerged from reverse logistics is the concept of industrial mutuality. This is where multiple organizations conspire to support each another in reducing operational costs by making use of each other's industrial wastes as inputs in the production processes. This is useful in minimizing operational costs as funds previously allocated to purchase raw materials can be diverted to other more deserving areas of operation. It also ensures a ready market for industrial wastes that would otherwise have ended up in landfills as useless material (Tseng & Bui, 2016). Industrial mutuality leads to cost savings and reduced material consumption by ensuring that maximum output can be generated from waste materials. According to Albu (2017) the concept of industrial mutuality is an emerging and sustainable approach that enhances environmental sustainability, economic growth and facilitates inter

organizational relationship which is useful in enhancing a cohesive and cooperative supply chain.

### 2.3.5 Performance of Dairy Processing Firms in Kenya

The concept of firm performance can be examined by using the triple bottom line approach which considers several key variables that include environmental aspect, social aspect and financial aspect. Financial or economic performance is concerned with the level of profits that organizations achieve and is usually among the most important consideration amongst stakeholders of firms to embrace sustainable operations. The concept of financial performance can be enumerated by using several variables such as level of market share, sales figures and profit levels. This concept is usually regarded as the most important by stakeholders as it directly related to profitability of the firm.

The environmental aspect of performance relates to organizational activities that are geared towards minimizing the level of emissions, wastes and conservation of energy (Pagell & Wu, 2019). The aspect of environmental performance has received increased attention of late due to the increasing levels of global pollution. Firms have therefore been forced to seriously consider the environmental effects of their activities on the environment. In various jurisdictions, environmental policies have been established and strict adherence standards have been postulated to guide firms in their activities. This previously ignored concept also serves to create a favorable image of the firm to its customers. This can be seen by the various corporate social responsibilities efforts that organizations strive to engage in as a means of giving back to the society.

Social performance on the other hand is concerned with ensuring that the process has positive implications to the well-being of the immediate stakeholders of the firm and promotes

peaceful coexistence with the society. It includes variables such as guaranteeing the well-being of staff, upholding a positive image of the organization and facilitating and influencing positive perception amongst customers. Efficiency in social performance is concerned with making overall cost savings in the entire operational framework and using these resources to increase final consumer experience and enhancing the level of value perceived by the final consumers (Christopher & Peck, 2004). According to a study by Porter (1980) additional usefulness can be enhanced by proactively and appropriately targeting specific segments of the market and creating value that is difficult to be replicated by other rivals in the same market.

Efficiency is concerned with the degree in which capital is appropriately employed by the organization. The extent to which value is created is reliant on the level of minimizing the overall operational budget and ensuring that processes perform optimally and efficiently (Defee & Stank, 2015). Measuring supply chain efficiency involves comparing the number of resources employed vis a viz the expected benefit that is achieved from employing these resources. In order to guarantee improved value from scarce resources, it is imperative for supply chain managers to initiate efficiency monitoring and evaluation strategies in order to closely monitor the process and take corrective action when required. Effective management of the entire process is therefore an important activity of the management of the supply chain network (Lee, 2016).

Effectiveness compares the level of prudence that is put in place to ensure that key deliverables are achieved vis a viz the degree of the specific deliverable. According to Defee and Stank (2015), improving effectiveness should have an overall view of increasing the level of return based on pre-existing conditions, deliverables and challenges that exist in the environment. According to Walters (2006), in order to ensure that the highest degree of effectiveness is achieved, the organization must concentrate its efforts in ensuring that customers receive the highest value that guarantees satisfaction and promotes brand and

product loyalty. The organization must closely monitor key customer metrics by carrying out market analysis to guarantee that their products and services are received well in the market and that customers get the highest perceived value.

Due to the realization that adoption of sustainable management practices can have a great impact on organizational performance, there has been an increased level of adoption of such practices in an effort to improve competitive advantage. A study carried out by Kangangi (2009) established that organizations need to proactively align their overall strategies with sustainable goals in order to guarantee success and reap the maximum benefits from such initiatives. This means that sustainable practices should not be treated as secondary goals but should be pursued alongside other key goals by the organization. The same study further recommended that in order to guarantee successful implementation of green initiatives, there has to be synergy amongst supply chain partners, open communication channels, top executive support and goodwill from all stakeholders.

According to a study by Amemba, Nyaboke, Osoro and Mburu (2013), sustainability in the supply chain is concerned with ensuring that the operations of firms are done in a manner that reduces the overall operational budget and with the highest level of efficiency. The same study further identified financial performance as one of the most important goals that stakeholders pursue. The study also established that the most common green supply chain management activities adopted by firms in Kenya include; green manufacturing, green procurement, green distribution and reverse logistics.

A study by Muma, Nyaoga, Matwere, and Nyambega (2014) on the other hand identified the most popular activities amongst firms to be sustainable manufacturing, green marketing, green procurement, green supply and reverse logistics. The study further argues that GSCM offers an ideal management model that is useful in developing economic and social benefits in firms. Choi and Zhang (2011) carried out a study about the effect of sustainable

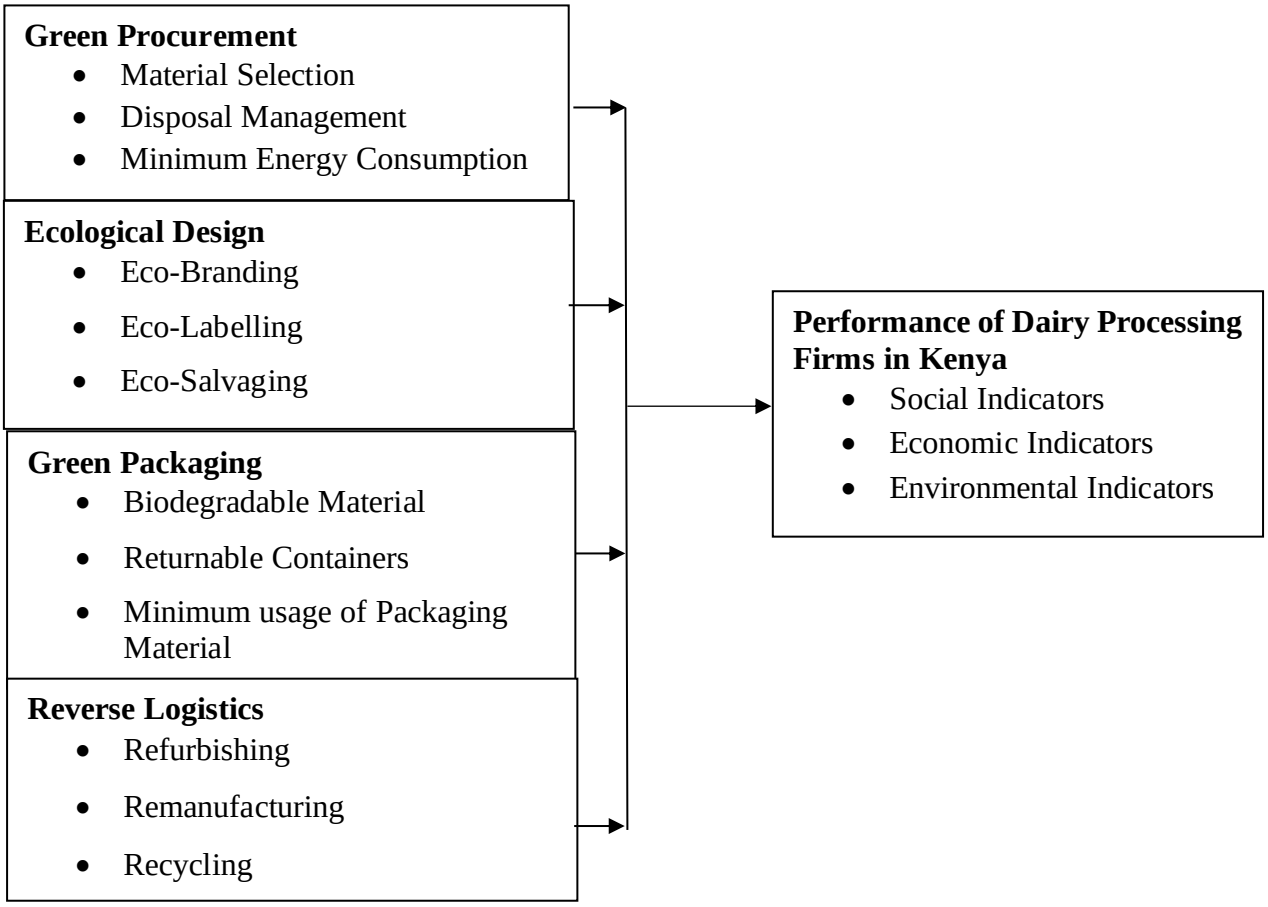
logistics on operations of Chinese firms. The researchers further identified a connection between sustainable logistics strategies and enhanced overall performance and competitive advantage of the firms under review.

The adoption of sustainable practices is influenced by several factors, key among them being the sector of the economy that the organization operates in. Most of the sustainable practices have been identified in industries that are known to contribute significantly to global pollution statistics such as manufacturing, paper, energy and Petro-chemical industries. A study by Dheeraj and Vishal (2012) associate sustainable management practices with green purchasing, sustainable distribution and marketing, green manufacturing and materials management, as well as reverse logistics. Several studies have only considered one aspect of sustainable management practices. For example, Lagat, (2013) only enumerated the practice of sustainable procurement in organizations while Baines, Brown, Benedettini and Ball (2012) researched on sustainable manufacturing. The latter established that adopting green manufacturing standards serves as the backbone for the adoption of sustainable operations across the entire organization. This is because manufacturing is a financially intensive operation and any positive outcome realized as a result of adopting sustainable practices is likely to be replicated across other functional areas of the organization and in extension, across the supply chain.

## 2.4 Conceptual Framework

**FIGURE 2.1**

**Conceptual Framework**




***Source: Author (2022)***

## 2.5 Operationalization of Variables

**TABLE 2.1**

**Operationalization of Variables**

| Variable Type | Variable | Indicator | Level of Measurement | Method of Collection of Data |
|---|---|---|---|---|
| Dependent | Performance | ○ Degree of reduction of costs/Operating expenses<br>○ Degree of market share<br>○ Level of energy savings, reduced wastes and pollution<br>○ Level of decreased scrap rates<br>○ Level of improved deliver times | Ordinal | Structured Questionnaire |
| Independent | Ecological Design | ○ Level of eco-branding<br>○ Level of eco labelling<br>○ Level of eco salvaging | Ordinal | Structured Questionnaire |
| Independent | Reverse Logistics | ○ Level of Remanufacturing<br>○ Level of recycling<br>○ Level of Re furbishing | Ordinal | Structured Questionnaire |
| Independent | Green Procurement | ○ Level of material selection<br>○ Level of disposal management<br>○ Level of minimal energy consumption | Ordinal | Structured Questionnaire |
| Independent | Green Packaging | ○ Level of reduction in material usage and energy<br>○ Level of use of new bio-degradable packaging material<br>○ Level of returnable containers | Ordinal | Structured Questionnaire |

***Source: Author (2022)***

## 2.6 Critique of the Existing Literature

First and foremost, the concept of GSCM is a new and emerging field with inadequate research and studies done in the area. Different researchers have used different terminologies and definitions in the field of GSCM practices causing confusion and difficulties in building robust classification. For example, some researchers have used the terminologies sustainability, green and GSCM interchangeably. Other researchers have also included the concept of logistics as part of supply chain management and treat reverse logistics as a distinct entity. Reverse logistics aims at making significant cost savings by reusing or reselling waste products to minimize the operational budget. Green logistics is concerned with reducing the environmental effect of the entire logistics operation. Going green looks at only the environmental aspects, while being sustainable is equivalent to considering the social, economic and environmental impact of a product or organization.

Secondly, several researchers in their analysis of GSCM practices have only discussed one or two sustainable practices. None of the recent studies reviewed highlighted the complete list of GSCM practices. The study by Srivastava (2007) was the only study that enumerated the comprehensive list of sustainable practices. However, this analysis was done many years ago. The findings may therefore lack relevance because many developments have occurred recently and because new findings are constantly being made in the topic of GSCM. From the literature reviewed, only two studies examined the entire range of GSCM practices (Srivastava, 2007) and (Malviya & Kant, 2015). Other researchers used the terms green and sustainability interchangeably (Fahimnia et al., 2015). As a result, there is no consensus on what sustainable management practices are composed of. An exhaustive analysis of what green practices is composed of is therefore required to guide further inquiry in this area.

According to Tang and Zhou (2012) adoption of GSCM practices is not as advanced specifically in third world nations in Sub Saharan Africa. Majority of the studies reviewed focused on industries located in Asian Emerging Economies (AEE) such as China, Malaysia, South Korea, Taiwan, India, Indonesia and Thailand (Lai & Wong, 2012). The researchers also focused their attention on traditionally known polluting sectors of the economy leading to insufficient literature to review in other sectors of the economy. Some researchers have also dealt with only one or two independent GSCM variables ignoring all other aspects. There is also very little literature locally on GSCM practices and no previous study has been done on the effects of adoption of sustainable environmental practices on performance of Kenyan dairy processors.

Firms are also expected to consider the financial aspect of adoption of sustainable operations versus the benefits to be accrued. The initial capital outlay required to effectively adopt green methodologies is often too high. Studies carried out Hsu, Tan and Zailani (2016) indicate that environmental management involves a huge financial investment. The hefty financial resources required constitute barriers to the implementation of GSCM. Financial constraints can thus lead to the resistance of implementing green practices. However, none of the studies reviewed has established the cost implication to guide firms in the implementation process. If the cost of implementation is too high, fewer firms will adopt it and vice versa. In other words, the implementation must be sustainable.

According to Sharma (2014) organization staff are crucial during the implementation phase of sustainable operations. In order to effectively implement green practices, firms require to adequately train and equip its employees with the necessary skills and knowledge. Learning capacity is enhanced by self-learning, on-the-job training, and continuous practice of professional skills. However, the researcher did not consider the function that top executives perform during the implementation process. Employees may have relevant knowledge but if

the adoption of these practices does not bring benefits that are clearly perceived by managers, then they will not be adopted. Yang and Wang (2014) also established the role that top executives play in the implementation of sustainability operations. Their input is crucial to provide a sense of direction and purpose as well as to facilitate the commitment of the necessary resources required to finance such operations.

A study by Wisner, Tan and Leong (2012) established that implementation of GSCM practices leads to cost savings by conserving materials, creation of a better public image, reducing energy consumption and reducing ecological degradation. Failure of adoption of green practices can be detrimental to the existence of firms and may lead to regulatory fines and implications, loss of key stakeholder support, diminished customer loyalty, loss of market share and overall financial losses. According to Flammer (2013) organizations that adopt sustainable practices often benefit from better performance across board and are likely to attract more investors. Firms may also be able to appeal to environmentally conscious customers leading to increase in market share, brand loyalty and competitive advantage. This is especially true in this information era where customers possess a greater influence over the performance of organizations and are more inclined to influence the strategic direction of firms.

Several studies have emphasized the key role that adoption of sustainability practices have in driving sustainability environmental stewardship and enhanced operations in organizations. The different aspects of firm performance include financial, environmental/ecological, operational and societal performance. As established by the various literature reviewed, GSCM practices in firms can have a wide variety of benefits among them, increased efficiency, minimized cost, improved service, and maximize sales, enhanced revenue and market growth as well as enhanced brand loyalty and company image. All these will ultimately result in a competitive advantage for the firm and improve overall performance.

# CHAPTER THREE
# RESEARCH METHODOLOGY

## 3.1 Introduction

In this chapter, the research method used is discussed and this includes the research design, population of study, sampling design, data collection instruments and the technique for analyzing data.

## 3.2 Research Design

This study adopted a descriptive research study design. Kothari (2011) established that this research design involves collecting and analyzing data in a logical manner so that key inferences can be established regarding an activity, program or project. It is used to obtain data useful in evaluating present practice and providing basis for decision. A descriptive study is important so as to ascertain and be able to describe the characteristics of the variable of interest in a situation (Kothari, 2008).

## 3.3 Target Population

The study population consisted of 30 dairy processing firms in Kenya licensed by Kenya Dairy Board (See Appendix 1). Due to the limited number of dairy processors licensed in the country, a census study was used. Using this approach, all elements of the study are considered, and this allows for the highest possible degree of accuracy to be obtained. The approaches involved gathering information from every member of the target population. This method was appropriate because it reduced on biasness in research, since all the respondents were given an equal chance to participate in the study (Mugenda & Mugenda, 2014). The unit of study included 3 employees from each firm selected from the procurement and logistics department, finance and production department, making a total of 90 respondents. The choice of respondents from these departments was because these were deemed the most relevant to the

topic of study. The respondents were considered to be sufficiently informed and knowledgeable on the various green supply chain management practices adopted by their organizations.

### 3.4 Instrumentation and Data Collection

This study used questionnaires as the main data collection instrument. Rowley (2014) indicated that questionnaires are efficient tools of data collection when the study uses a descriptive research design. The questionnaires were made up of both open and closed-ended questions for quick analysis of quantitative data. They also enabled the respondents to express their views more freely and openly. Mugenda and Mugenda (2013) established that the main advantage of questionnaires is that they can be administered easily, allows for quick analysis, are inexpensive and economical. The items of the questionnaire were phrased and arranged in a simple and concise manner to allow for easier understanding and to save time. The questionnaire was divided into several sections according to the study objectives.

### 3.5 Validity and Reliability of Research Instruments

Golafshani (2013) established that the validity of a survey is concerned with the measurements it aims to evaluate or the real outcomes of the research. Validity refers to the degree by which a specified sample of items under study represents the specific concept that the researcher is trying to measure (Kothari, 2018). In this study, a content validity coefficient index of 0.75 was used to test the validity of the questionnaire (Orodho, 2009). According to Kasomo (2007) reliability refers to the consistency of measurement that is basically the extent to which a particular experiment carried out, a test or any measurement procedure will produce the same results on repeated trials. Reliability is increased by including many similar items on a measure, by testing a diverse sample of individuals and by using uniform testing procedures. Reliability in most cases is induced or influenced by a random error. A random error here is a deviation from the true measurement due to factors that the researcher has not effectively addressed.

When there is an increase in the random error, the reliability decreases (Mugenda & Mugenda, 2008).

### 3.6 Data Collection and Presentation

The government measures introduced to curb the spread of COVID-19 severely limited traditional mechanisms for contacting respondents and administering questionnaires. The researcher used drop and pick method of administering questionnaires to the respondents. The researcher contacted the respondents via telephone to build rapport and invite them to answer the self-administered questionnaires. They were administered to individuals with decision-making authority who were well versed with the operational framework of the organization, such as procurement managers, production managers or their equivalents.

### 3.7 Data Processing and Analysis

The returned questionnaires were checked for consistency and analyzed using the Statistical Package for Social Scientists (SPSS V. 23.0) computer software. The researcher analyzed the quantitative data using descriptive statistics including frequencies, percentages, means and standard deviations. Pearson's correlations analysis was conducted at 95% confidence interval and 5% confidence level 2-tailed to determine the extent to which green supply chain management practices affect performance of dairy processors in Kenya. Multiple regression analysis was used to test the relationship between the independent variables (green procurement, ecological design, green packaging and reverse logistics) and the dependent variable (Organizational performance). The study findings were presented in form of tables, charts and discussions by using percentages and frequencies to facilitate comparisons and further analysis. A multiple regression model was developed to describe the relationship between GSCM Practices and firm performance.

This study adopted following regression equation.

$$Y= \beta 0 + \beta 1\ X_1 + \beta 2\ X_2 + \beta 3\ X_3 + \beta 4\ X_4 + \epsilon$$

Where: Y – Performance of dairy processing firms in Kenya

$X_1$- Green Procurement.

$X_2$- Ecological Design.

$X_3$- Green Packaging.

$X_4$- Reverse Logistics.

$\beta 0$ - the constant

$\epsilon$ - error term

### 3.8 Diagnostic Tests

Diagnostic tests are tests conducted to assess the validity of a regression model once it has been fitted. These test procedures are necessary to detect violations of the linear model's assumptions, gauge the severity of the violations and take appropriate remedial action. According to Mugenda and Mugenda (2013) heteroscedasticity is a phenomenon where the random variables exhibit dissimilar variances. For purposes of this study, the researcher used the Breusch-Pagan Heteroscedasticity Test. The Breusch-Pagan Heteroscedasticity test is a test that checks for a constant mean and stable variance. One of the key assumptions of regression is that the variance of the errors is constant across observations. If the errors have constant variance, the errors are called homoscedastic, if they are not, they are called heteroscedastic. Heteroscedasticity refers to the circumstance in which the variability of a variable is unequal across the range of values of a second or third variable that predicts. Typically, residuals are plotted to assess this assumption

# CHAPTER FOUR
# DATA ANALYSIS AND PRESENTATION

## 4.1 Introduction

This chapter presents results arising from the analysis of data collected using questionnaires. The study sought to determine the effects of green supply chain management practices on the performance of dairy processing firms in Kenya. The data collected was analysed using descriptive and inferential statistics and the findings presented in tabular summaries and their implications discussed in detail.

## 4.2 Response Rate

A total of 90 questionnares were administered to employees selected from the procurement and logistics departments, finance and production department. Out of the total popolation, 86 responses were received respresenting a response rate of 95.5%. This reponse rate was considered adequate in descriptive statistics according to (Mugenda & Mugenda, 2014). It is useful for a study to have a good response rate in order guarantee accuracy and usefulness of the results. This high response rate was attributed to the researcher making follow up calls and site visits to improve the response rate from the respondents. The results are summarized in table 4.1 below.

**TABLE 4.1**

**Response Rate of Respondents**

| Response | Frequency | Percentage |
|---|---|---|
| Actual Response | 86 | 95.5% |
| Non-Response | 4 | 4.5% |
| **Total** | **90** | **100%** |

### 4.3 Pilot Study

In this study, Cronbach`s alpha was used to test for internal consistency. It was calculated in terms of the average inter-correlations among the items measuring the concepts. According to Serekan (2006) the closer the alpha is to 1 the higher the reliability. A value of at least 0.7 is recommended. This was done on the four objectives of the study. The test is considered more reliable if the the coefficient is higher. The results are summarized in Table 4.2 below.

**TABLE 4.2**

**Reliability Results**

| Variable | No. of Items | Respondents | α=Alpha | Comment |
|---|---|---|---|---|
| Green Procurement | 10 | 9 | 0. 811 | Reliable |
| Ecological Design | 10 | 9 | 0. 881 | Reliable |
| Green Packaging | 10 | 9 | 0. 814 | Reliable |
| Reverse Logistics | 10 | 9 | 0. 797 | Reliable |

### 4.4 Demographic Information

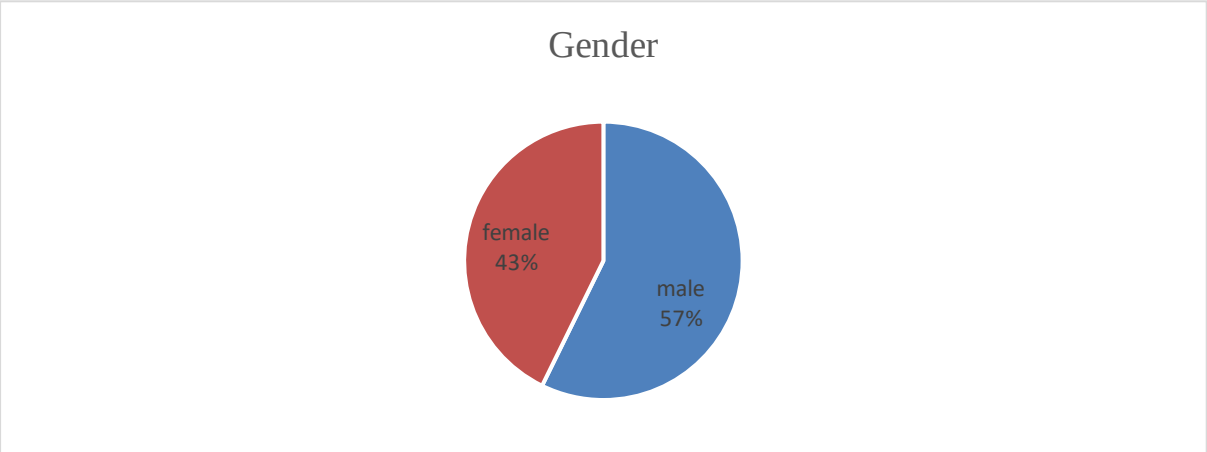
In this section, the personal details and charateristics of the respondents dreived from the questionnaires is presented. The study sought to determine the demographic characteristics of the respondents in order to give important insights on the respondents. This study considered the following characteristics: gender, age, highest level of education attained and work experience.

#### 4.4.1 Distribution of Respondents by Gender

The study also sought to determine the gender of the respondents. The results are shown in figure 4.1 where 57% of the respondents were male while 43 % of the respondents were female.

**FIGURE 4.1**

**Distributions of Respondents by Gender**




### 4.4.2 Distribution of Respondents by Age

The study sort to determine the age distribution of the respondents. The results are summarized in the table 4.3 shown below. The findings indicate that the majority respondents belonged to age bracket of 41-50 years and were at 41.9%. Respondents in the age bracket of 50 years and above accounted for 34.9%. Respondents between 31-40 years accounted for 20%.

**TABLE 4.3**

**Distribution of Respondents by Age**

| Age | Frequency | Percent |
|---|---|---|
| 31-40 | 20 | 23.3 |
| 41-50 | 36 | 41.9 |
| 50 and above | 30 | 34.9 |
| **Total** | **86** | **100** |

### 4.4.3 Distribution of Respondents by Level of Education

The respondents were requested to state their highest level of education that they had attained. The results are detailed in table 4.4. The outcome established that majority of the respondents representing 62.8% had acquired a degree, and 37.2% had a Post graduate diploma. This further

improves the reliability of the data collected as the respondents are deemed to be highly literate and understood the questionnaire.

**TABLE 4.4**

**Distribution of Respondents by Level of Education**

| Level of Education | Frequency | Percent |
|---|---|---|
| Degree level | 54 | 62.8 |
| Postgraduate | 32 | 37.2 |
| **Total** | **86** | **100** |

### 4.4.4 Distribution of Respondents by Length of Continuous Service

The study sought to find out the number of years the respondents had continuously worked in their current organization. From the findings most of the respondents had worked for 3-5 years at 51%, those who had worked for 6-8 years were 24%, 9 and above were also 24%. The findings are summarized in Table 4.5 below.

**TABLE 4.5**

**Distribution of Respondents by Length of Continuous Service**

| Experience | Frequency | Percent |
|---|---|---|
| 3-5 | 44 | 51 |
| 6-8 | 21 | 24 |
| 9 and above | 21 | 24 |
| **Total** | **86** | **100** |

## 4.5 Descriptive Statistics

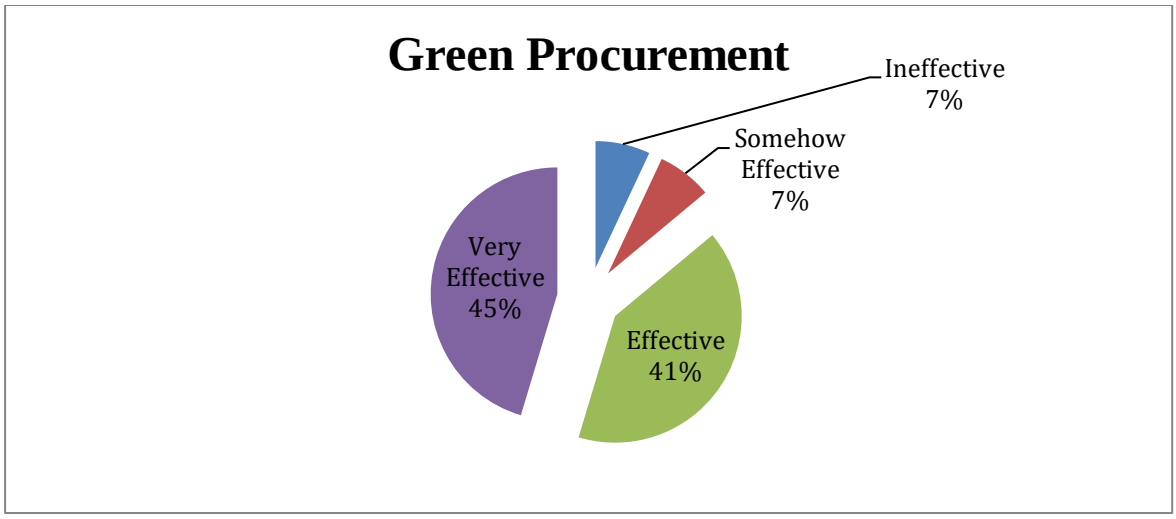
The study sought to establish the effects of green supply chain management practices on the performance of dairy processing firms in Kenya. In order to achieve this objective, four variables were hypothesized as components of green supply chain mangement adopted by dairy processing firms in Kenya. These include green procurement, ecological design, green packaging and reverse logistics.

### 4.5.1 Green Procurement

The first objective of the study was to assess the influence of green procurement on the performance of dairy processing firms in Kenya. The respondents were asked to rate to what extent green procurement influenced performance of dairy processing firms in Kenya. The results established that 41% of the respondents said it was effective, 45% said that it was very effective, 7% said it was ineffective, while 7% also said it was somehow effective. The results are summarized in Figure 4.2.

**FIGURE 4.2**

**Green Procurement**




The respondents were also requested to give their feedback in regard to the influence of green procurement on the performance of dairy processing firms in Kenya. A Likert scale was used to rate the responses and the results are presented in Table 4.6 below. The scores of 'strongly disagree' and 'disagree' were used to represent a statement not agreed upon, equivalent to mean score of 0 to 2.5. The score of 'neutral' has been taken to represent a statement agreed upon, equivalent to a mean score of 2.6 to 3.4. The score of 'agree' and 'strongly agree' have been taken to represent a statement highly agreed upon equivalent to a mean score of 3.5 to 5.

The outcome revealed that majority of the respondents representing a mean of (4.2) agreed with the statement that material selection plays a significant role in social performance

indicators. The standard deviation was 0.865 suggesting that the responses were varied. The outcome revealed that majority of the respondents representing a mean of (4.24) agreed with the statement that disposal management plays a significant role in social performance indicators. The standard deviation was 1.04 suggesting that the responses were varied. The outcome revealed that majority of the respondents representing a mean of (4.07) agreed with the statement that minimum energy consumption plays a significant role in social performance indicators .The standard deviation was 1.176. This suggests that the responses were varied.

The outcome revealed that majority of the respondents representing a mean of (4.06) agreed with the statement material selection plays a significant role in economic performance indicators. The standard deviation was 1.131 suggesting that the responses were varied. The result in table 4.5.1 revealed that most of the respondents representing a mean of (4.15) agreed with the statement disposal management plays a significant role in economic performance indicators. The standard deviation was 1.046 suggesting that the responses were varied. The results established that most of the respondents representing a mean of (4.03) agreed with the statement that minimum energy consumption plays a significant role in economic performance indicators. The standard deviation was 1.183. This suggests that the responses were varied.

The outcome revealed that majority of the respondents representing a mean of (4.06) agreed with the statement material selection plays a significant role in environmental performance indicators. The standard deviation was 1.209 suggesting that the responses were varied. The result in table 4.6 revealed that most of the respondents representing a mean of (3.93) agreed with the statement disposal management play a significant role in environmental performance indicators. The standard deviation was 1.272 suggesting that the responses were varied. The result in table 4.6 revealed that most of the respondents representing a mean of (4.15) agreed with the statement minimum energy consumption plays a significant role in

environmental performance indicators. The standard deviation was 0.927 suggesting that the responses were varied**.**

**TABLE 4.6**
**Green Procurement**

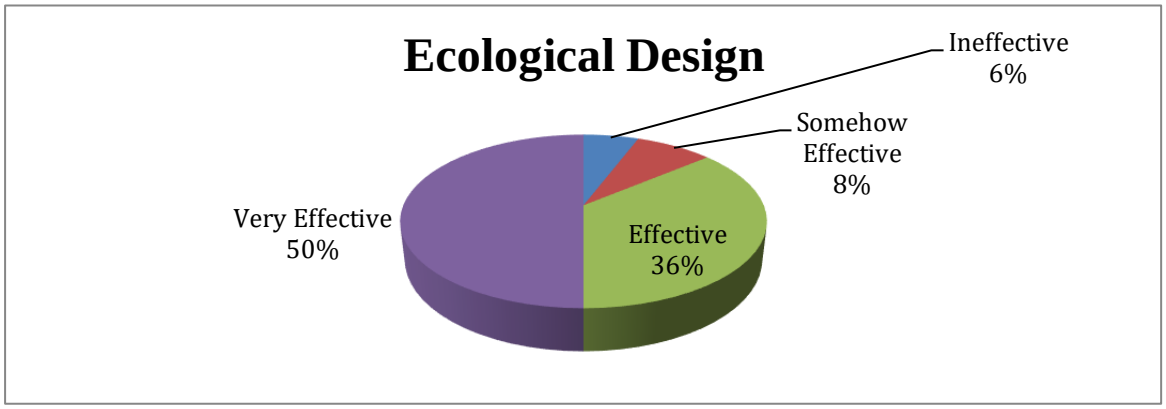
| | Mean | Std. Deviation |
|---|---|---|
| Material selection plays a significant role in social performance indicators | 4.2 | 0.865 |
| Disposal management play a significant role in social performance indicators | 4.24 | 1.04 |
| Minimum energy consumption plays a significant role in economic performance indicators | 4.07 | 1.176 |
| Material selection plays a significant role in economic performance indicators | 4.06 | 1.131 |
| Disposal management play a significant role in economic performance indicators | 4.15 | 1.046 |
| Minimum energy consumption plays a significant role in economic performance indicators | 4.03 | 1.183 |
| Material selection plays a significant role in environmental performance indicators | 3.86 | 1.209 |
| Disposal management play a significant role in environmental performance indicators | 3.93 | 1.272 |
| Minimum energy consumption plays a significant role in environmental performance indicators | 4.15 | 0.927 |

### 4.5.2 Ecological Design

The second objective of the study was to establish the influence of ecological design on the performance of dairy processing firms in Kenya. The respondents were asked to indicate to what extent ecological design affected performance of dairy processing firm in Kenya. The outcome established that majority of the respondents representing 50% agreed that it was very effective, 36% said that it was effective, 6% said it was ineffective, while somehow effective was at 8%. The results are summarized in Figure 4.3.

**FIGURE 4.3**

**Ecological Design**




The respondents were also requested to give their feedback in regards to the influence of ecological design on the performance of dairy processing firms in Kenya. The outcome revealed that majority of the respondents representing a mean of (4.0) agreed with the statement that eco-branding plays a significant role in social performance indicators. The standard deviation was 1.074 suggesting that the responses were varied. The outcome revealed that majority of the respondents representing a mean of (3.87) agreed with the statement that the eco-labelling plays a significant role in social performance indicators. The outcome revealed that majority of the respondents representing a mean of (3.84) agreed with the statement that eco-salvaging plays a significant role in social performance indicators. The standard deviation was 1.291. This indicates that the responses were varied.

The outcome revealed that majority of the respondents representing a mean of (4.01) agreed with the statement eco-branding plays a significant role in economic performance indicators. The standard deviation was 1.241 suggesting that the responses were varied. The result in table 4.7 revealed that most of the respondents representing a mean of (3.95) agreed with the statement eco-labeling plays a significant role in economic performance indicators 1.177. The standard deviation was 1.177 suggesting that the responses were varied. The outcome revealed that majority of the respondents representing a mean of (3.77) agreed with

the statement that eco-salvaging plays a significant role in economic performance indicators 1.205. The standard deviation was 1.205. This suggests that the responses were varied.

The outcome revealed that majority of the respondents representing a mean of (4.3) agreed with the statement eco-branding plays a significant role in environmental performance indicators. The standard deviation was 0.783 suggesting that the responses were varied. The result in table 4.7 revealed that most of the respondents representing a mean of (3.43) agreed with the statement eco-labelling plays a significant role in environmental performance indicators. The standard deviation was 1.297 suggesting that the responses were varied. The result in table 4.7 revealed that most of the respondents representing a mean of (3.63) agreed with the statement eco-salvaging plays a significant role in environmental performance indicators. The standard deviation was 1.398 suggesting that the responses were varied**.**

**TABLE 4.7**

**Ecological Design**

| | Mean | Std. Deviation |
|---|---|---|
| Eco-branding plays a significant role in social performance indicators | 4.00 | 1.074 |
| Eco-labelling plays a significant role in social performance indicators | 3.87 | 1.254 |
| Eco-salvaging plays a significant role in social performance indicators | 3.84 | 1.291 |
| Eco-branding plays a significant role in economic performance indicators | 4.01 | 1.241 |
| Eco-labelling plays a significant role in economic performance indicators | 3.95 | 1.177 |
| Eco-salvaging plays a significant role in economic performance indicators | 3.77 | 1.205 |
| Eco-branding plays a significant role in environmental performance indicators | 4.3 | 0.783 |
| Eco-labelling plays a significant role in environmental performance indicators | 3.43 | 1.297 |
| Eco-salvaging plays a significant role in environmental performance indicators | 3.63 | 1.398 |

### 4.5.3 Green Packaging

The study also sought to investigate the influence of green packaging on the performance of dairy processing firms in Kenya. The respondents were requested to comment on the extent in which green packaging influences performance of dairy processing firms in Kenya. The outcome established that majority of the respondents representing 40% agreed that it was very effective, 42% said that it was effective, while ineffective was at 10% and somehow effective was at 8%.

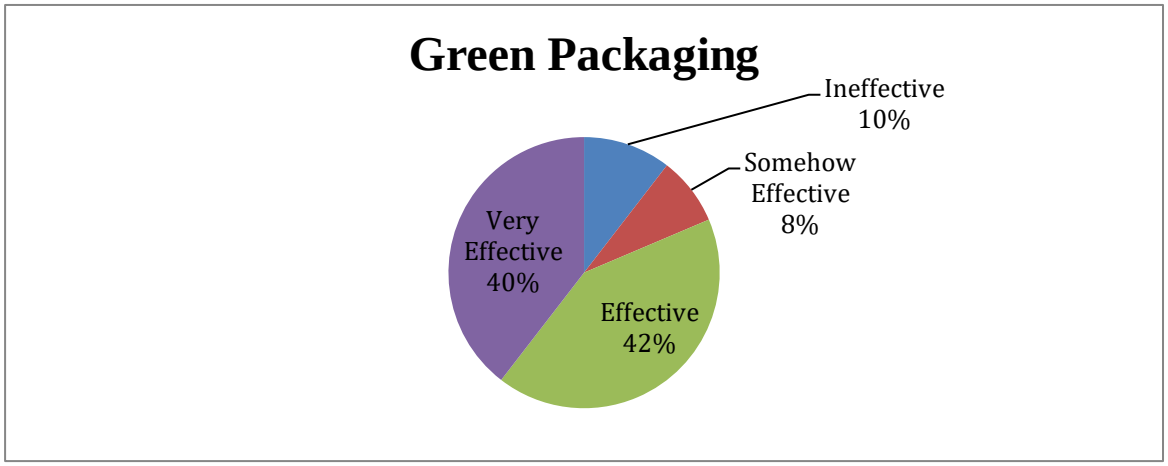



**Figure 4.4: Green Packaging**

The respondents were also requested to give their feedback in regards to the influence of green packaging on the performance of dairy processing firms in Kenya. The outcome revealed that majority of the respondents representing a mean of (3.57) agreed with the statement that biodegradable material plays a significant role in social performance indicator. The outcome revealed that majority of the respondents representing a mean of (4.52) agreed with the statement that the use of returnable containers plays a significant role in social performance indicators. The outcome revealed that majority of the respondents representing a mean of (3.51) agreed with the statement that minimum usage of packaging material plays a significant role in social performance indicators. The standard deviation was 1.166. This suggests that the responses were varied.

The outcome revealed that majority of the respondents representing a mean of (3.92) agreed with the statement biodegradable material plays a significant role in economic performance indicators. The standard deviation was 1.2 suggesting that the responses were varied. The result in table 4.8 revealed that majority of the respondents with a mean of (3.94) agreed with the statement use of returnable containers plays a significant role in economic performance indicators. The standard deviation was 1.202 suggesting that the responses were varied. The outcome revealed that most of the respondents with a mean of (4.08) agreed with the statement that minimum usage of packaging material plays a significant role in economic performance indicators. The standard deviation was 1.22. This suggests that the responses were varied.

The outcome revealed that majority of the respondents representing a mean of (4.26) agreed with the statement biodegradable material plays a significant role in environmental performance indicators. The standard deviation was 0.897 suggesting that the responses were varied. The result in table 4.8 revealed that most of the respondents representing a mean of (4.22) agreed with the statement use of returnable containers plays a significant role in environmental performance indicators. The standard deviation was 0.832 suggesting that that the responses were varied. The result in table 4.8 revealed that most of the respondents representing a mean of (4.02) agreed with the statement minimum usage of packaging material plays a significant role in environmental performance indicators. The standard deviation was 1.095 suggesting that the responses were varied.

**TABLE 4.8**

**Green Packaging**

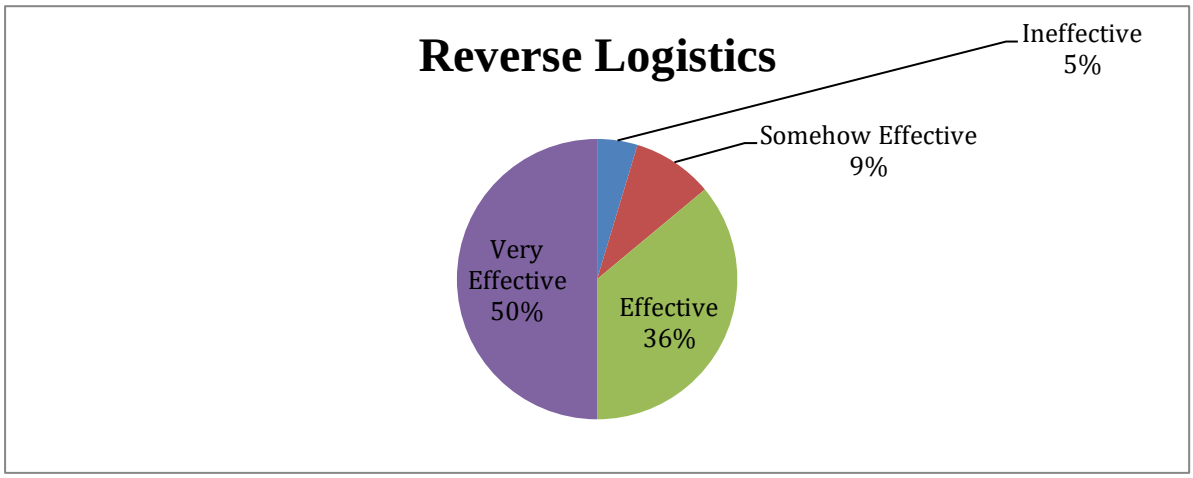
| | Mean | Std. Deviation |
|---|---|---|
| Biodegradable material plays a significant role in social performance indicators | 3.57 | 1.333 |
| Returnable containers play a significant role in social performance indicators | 4.52 | 0.502 |
| Minimum usage of packaging material plays a significant role in social performance indicators | 3.51 | 1.166 |
| Biodegradable material plays a significant role in economic performance indicators | 3.92 | 1.2 |
| Returnable containers play a significant role in economic performance indicators | 3.94 | 1.202 |
| Minimum usage of packaging material plays a significant role in economic performance indicators | 4.08 | 1.22 |
| Biodegradable material plays a significant role in environmental performance indicators | 4.26 | 0.897 |
| Returnable containers play a significant role in environmental performance indicators | 4.22 | 0.832 |
| Minimum usage of packaging material plays a significant role in environmental performance indicators | 4.02 | 1.095 |

### 4.5.4 Reverse Logistics

The study also sought to evaluate the influence of reverse logistics on the performance of dairy processing firms in Kenya. The respondents were also requested to give their feedback regarding reverse logistics on performance of dairy processing firms in Kenya. Results showed that 50% of respondents indicated it was very effective, effective were at 36 %, somehow effective was 9%, while ineffective was at 5%.

**FIGURE 4.5**

**Reverse Logistics**




The respondents were also requested to give their feedback regarding the influence of reverse logistics on the performance of dairy processing firms in Kenya. The outcome revealed that majority of the respondents representing a mean of (4.06) agreed with the statement that refurbishing plays a significant role in social performance indicators. The standard deviation was 1.182 suggesting that the responses were varied. The outcome revealed that majority of the respondents representing a mean of (3.65) agreed with the statement that the remanufacturing plays a significant role in social performance indicators. The standard deviation was 1.166 suggesting that the responses were varied.

The outcome revealed that majority of the respondents representing a mean of (3.21) agreed with the recycling plays a significant role in social performance indicators. The standard deviation was 1.456. This suggests that the responses were varied. The outcome revealed that majority of the respondents representing a mean of (4.48) agreed with the statement refurbishing plays a significant role in economic performance indicators. The standard deviation was 0.502 suggesting that the responses were varied. The result in table 4.9 revealed that most of the respondents representing a mean of (4.42) agreed with the statement remanufacturing plays a significant role in economic performance indicators. The standard deviation was 0.677 suggesting that the responses were varied. The outcome revealed that majority of the respondents representing a mean of (4.28) agreed with the statement that recycling plays a significant role in economic performance indicators. The standard deviation was 0.916 suggesting that the responses were varied.

The outcome revealed that majority of the respondents representing a mean of (4.4) agreed with the statement refurbishing plays a significant role in environmental performance indicators. The standard deviation was 0.771 suggesting that the responses were varied. The result in table 4.5 revealed that most of the respondents representing a mean of (4.27) agreed with the statement remanufacturing plays a significant role in environmental performance indicators. The standard deviation was 1.067 suggesting that the responses were varied. The result in table 4.9 revealed that most of the respondents representing a mean of (4.05) agreed with the statement recycling plays a significant role in environmental performance indicators. The standard deviation was 1.094 suggesting that the responses were varied.

TABLE 4.9
Reverse Logistics

| | Mean | Std. Deviation |
|---|---|---|
| Refurbishing plays a significant role in social performance indicators | 4.06 | 1.182 |
| Remanufacturing plays a significant role in social performance indicators | 3.65 | 1.166 |
| Recycling plays a significant role in social performance indicators | 3.21 | 1.456 |
| Refurbishing plays a significant role in economic performance indicators | 4.48 | 0.502 |
| Remanufacturing plays a significant role in economic performance indicators | 4.42 | 0.677 |
| Recycling plays a significant role in economic performance indicators | 4.28 | 0.916 |
| Refurbishing plays a significant role in environmental performance indicators | 4.4 | 0.771 |
| Remanufacturing plays a significant role in environmental performance indicators | 4.27 | 1.067 |
| Recycling plays a significant role in environmental performance indicators | 4.05 | 1.094 |

### 4.6 Correlation Analysis

The degree of relationship between variables was analysed using correlation analysis. This method determines both the significance and the degree of association of the variables. The results of the correlation analysis are summarized in Table 4.10 below.

**TABLE 4.10**

**Summary of Pearson's Correlations**

| Correlations | | Green Procurement | Ecological Design | Green Packaging | Reverse Logistics | Performance |
|---|---|---|---|---|---|---|
| Green Procurement | Pearson Correlation | 1 | | | | |
| | Sig. (2-Tailed) | | | | | |
| Ecological Design | Pearson Correlation | .907** | 1 | | | |
| | Sig. (2-Tailed) | 0 | | | | |
| Green Packaging | Pearson Correlation | .667** | .701** | 1 | | |
| | Sig. (2-Tailed) | 0 | 0 | | | |
| Reverse Logistics | Pearson Correlation | .828** | .782** | .654** | 1 | |
| | Sig. (2-Tailed) | 0 | 0 | 0 | | |
| Performance | Pearson Correlation | .912** | .932** | .683** | .820** | |
| | Sig. (2-Tailed) | 0 | 0 | 0 | 0 | |

** Correlation is Significant at the 0.05 Level (2-Tailed).

The correlation analysis was used to determine the relationship between the different variables of green supply chain management. Pearson correlation coefficient was computed and tested at 5% significance level. The correlation summary shown in Table 4.10 indicates that the associations between each of the independent variables and the dependent variable were all significant at the 95% confidence level.

The outcome suggests that there is a positive relationship (r=0.912) between green procurement and performance of dairy processing firms in Kenya. Additionally, the relationship was found to be statistically significant at 5% level (p=0.000, <0.05). The results

indicate that there is a positive relationship (r=0. 932) between ecological design and performance of dairy processing firms in Kenya. In addition, the relationship was found to be statistically significant at 5% level (p=0.000, <0.05).

Correlation analysis was carried out to determine the relationship between green packaging and performance of dairy processing firms in Kenya. Pearson correlation coefficient was computed and tested at 5% significance level. The results indicate that there is a positive relationship (r=0.683) between green packaging and performance of dairy processing firms in Kenya. In addition, the relationship was found to be statistically significant at 5% level (p=0.000, <0.05). The results indicate that there is a positive relationship (r=0.820) between reverse logistics and performance of dairy processing firms in Kenya. In addition, the relationship was found to be statistically significant at 5% level (p=0.000, <0.05).

### 4.7 Diagnostic Test Results

Results for the test of heteroscedasticity indicated that heteroscedasticity is not present. The null hypothesis is that heteroscedasticity not present. The rejection rule is that the null hypothesis is rejected if the significant value is less than 0.05.

The results are summarized in table 4.11 below.

**TABLE 4.11**

**Summary of Heteroskedasticity Test Results**

| | LM | Sig. |
|---|---|---|
| BP | .712 | .950 |

### 4.8 Regression Analysis

This study adopted multivariate regression analysis to determine the significance of the relationship between the dependent variable and all the independent variables. Regression analysis was conducted to find the proportion in the dependent variable (performance of dairy processing firms in Kenya) which can be predicted from the independent variables, each of the

aspects of GSCM (green procurement, ecological design, green packaging, and reverse logistics).

Table 4.11 presents the regression coefficient of independent variables against the dependent variable. The results of regression analysis revealed that there is a significant positive relationship between dependent variable and the independent variable. The independent variables reported R value of 0.843 suggesting that that there is perfect relationship between the dependent variable and independent variables. R square value of 0.711 means that 71.1 % of the corresponding variation in performance of dairy processing firms in Kenya can be explained or predicted by green procurement, ecological design, green packaging, and reverse logistics.

**TABLE 4.12**

**Model Summary**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|---|
| **1** | .843a | 0.711 | 0.697 | 0.46323 |

a) Predictors: (constant), green procurement, ecological design, green packaging, and reverse logistics

b) Dependent Variable: performance of dairy processing firms

**TABLE 4.13**

**ANOVA**

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| **1** | Regression | 42.784 | 4 | 10.696 | 49.845 | .000b |
| | Residual | 17.381 | 81 | 0.215 | | |
| | Total | 60.165 | 85 | | | |

The significance value is 0.000 which is less than 0.05 thus the model is statistically significant in predicting how green procurement, ecological design, green packaging, and reverse logistics) influence performance of dairy processing firms in Kenya. The study therefore

establishes that; green procurement, ecological design, green packaging, and reverse logistics were all important practices influencing performance of dairy processing firms in Kenya.

**TABLE 4.14**

**Coefficients of Determination**

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | 0.508 | 0.312 | | 1.631 | 0.107 |
| | Green Procurement | 0.287 | 0.096 | 0.227 | 3.003 | 0.004 |
| | Ecological Design | 0.187 | 0.077 | 0.168 | 2.42 | 0.018 |
| | Green Packaging | 0.323 | 0.075 | 0.356 | 4.315 | 0.00 |
| | Reverse Logistics | 0.311 | 0.079 | 0.303 | 3.94 | 0.00 |

a) Predictors: (constant), green procurement, ecological design, green packaging, and reverse logistics

b) Dependent Variable: performance of dairy processing firms

This research used the following multiple regression model.

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

Where **Y**= performance of dairy processing firms

$\boldsymbol{\beta_0}$= Constant

$\mathbf{X_1}$= Green Procurement

$\mathbf{X_2}$= Ecological Design

$\mathbf{X_3}$= Green Packaging

$\mathbf{X_4}$= Reverse Logistics

$\boldsymbol{\mathcal{E}}$= Error Term at 95% confidence level.

The following regression equation was adopted.

$$Y= 0.508+ 0.287X_1 + 0.187X_2 + 0.323X_3 +0.311X_4$$

The regression equation above has established that taking all factors into account (green supply chain management practices) constant at zero, performance of dairy processing firms in Kenya will be an index of 0.508. The findings presented also shows that taking all other independent variables at constant, a unit increase in green procurement will lead to a 0.287 increase in performance of dairy processing firms in Kenya in Kenya. The P-value was 0.004 which is less 0.05 and thus the relationship was significant.

The study also found that a unit increase in ecological design will lead to a 0.187 increase in performance of dairy processing firms in Kenya. The P-value was 0.018 and thus the relationship was significant. In addition, the study found that a unit increase in green packaging will lead to a 0.323 increase in the performance of dairy processing firms in Kenya. The P-value was 0.00 and thus the relationship was significant.

Lastly, the study found that a unit increase in reverse logistics will lead to a 0.311 increase in the performance of dairy processing firms in Kenya. The P-value was 0.00 and hence the relationship was significant since the p-value was lower than 0.05. The findings of the study show that, green packaging contributed most to the performance of dairy processing firms in Kenya.

# CHAPTER FIVE
# SUMMARY, CONCLUSION AND RECOMMENDATIONS

## 5.1 Introduction

The main aim of the study was to investigate the influence of green supply chain management practices on performance of dairy processing firms in Kenya. It specifically sought to determine the influence of each of the aspects of GSCM practices, namely, green procurement, ecological design, green packaging, and reverse logistics in the performance of dairy processing firms in Kenya. In this chapter, a comprehensive summary of the findings of the study are provided. It also provides conclusions and discusses implications derived from the findings. Finally, it provides recommendations and suggests areas for further study on the same area of focus.

## 5.2 Summary of Findings

The study sought to examine the effect of green supply chain management practices on performance of dairy processing firms in Kenya. The study targeted respondents from the procurement, logistics, finance, and production departments in dairy processing firms. A total of 90 employees participated in the study. This study established that majority of respondents highly agree that performance of dairy processing firms in Kenya had improved due to adoption of green procurement strategies, ecological design strategies, green packaging strategies and reverse logistics strategies. In the summary of the study findings shown below, the research objectives established in chapter one of the study were followed.

### 5.2.1 Green procurement

The first objective of this study was to assess the influence of green procurement on performance of dairy processing firms in Kenya. A majority of respondents were found to strongly agree that dairy processing firms had embraced green procurement with regards to their procurement activities. Material selection and disposal management were among the most

common strategies embraced by dairy processing firms in Kenya. Correlation and regression results revealed that this was the third most important variable that could perhaps be explained by the observation from the findings that green procurement was an important factor influencing performance among dairy processing firms.

### 5.2.2 Ecological design

The second objective of the study was to investigate the influence of ecological design on performance of dairy processing firms in Kenya. Most respondents were found to highly agree that dairy processing firms in Kenya had embraced ecological design strategies. Eco-branding was identified as the most common strategy among dairy processing firms in Kenya. Correlation and regression results revealed that this was the fourth most important variable that could perhaps be explained by the observation from the findings that ecological design was an important factor influencing performance among dairy processing firms.

### 5.2.3 Green packaging

The third objective of the study was to assess the influence of green packaging on performance of dairy processing firms in Kenya. Most respondents were found to highly agree that dairy processing firms had embraced green packaging activities. Use of returnable containers was the most common strategy employed by dairy processing firms in Kenya. The outcome of ccorrelation and regression analysis revealed that this was the most important variable that could perhaps be explained by the observation from the findings that green packaging was an important factor influencing performance among dairy processing firms.

### 5.2.4 Reverse logistics

The fourth objective of the study was to examine the influence of reverse logistics on performance of dairy processing firms in Kenya. Most respondents were found to highly agree that dairy processing firms had embraced reverse logistics strategies in their operations. Recycling was the most common strategy embraced by dairy processing firms in Kenya. The

outcome of ccorrelation and regression analysis revealed that this was the second most important variable that could perhaps be explained by the observation from the findings that reverse logistics was an important factor influencing performance among dairy processing firms.

### 5.2.5 Performance of Dairy Processing Firms in Kenya

The goal of the study was to examine how green supply chain management strategies affected the performance of Kenyan dairy processing firms. The regression results demonstrated that the green supply chain management techniques highlighted in the study, namely green procurement, ecological design, green packaging, and reverse logistics, could explain 71.1 percent of the variability in performance among dairy processing enterprises when combined. The remaining 28.9% could be ascribed to alternative techniques that aren't described by the model or variables.

## 5.3 Conclusion of the Study

Based on the study findings discussed above, the study concludes that performance of dairy processing firms in Kenya can be improved by adoption of green supply chain management activities, namely green procurement, ecological design, green packaging and reverse logistics. First, in regard to green procurement, the regression coefficients of the study show that it has a significant influence of 0.287 on performance among dairy processing firms. This implies that increasing levels of green procurement by a unit would increase the levels of performance among dairy processing firms by 0.287. This result shows that green procurement has a positive influence on performance among dairy processing firms in Kenya.

Secondly, in regard to reverse logistics, the regression coefficients of the study show that it has a significant influence of 0.311 on performance among dairy processing firms. This ultimately implies that increasing levels of reverse logistics by a unit would increase the levels

of performance among dairy processing firms by 0.311. This shows that reverse logistics has a positive influence on performance among dairy processing firms in Kenya.

With regards to the third objective, ecological design, the regression coefficients of the study show that it has a significant influence of 0.187 on performance among dairy processing firms. This ultimately implies that increasing levels of ecological design by a unit would increase the levels of performance among dairy processing firms by 0.187. This shows that ecological design has a positive influence on performance among dairy processing firms in Kenya.

Lastly, concerning green packaging as the last objective, the regression coefficients of the study show that it has a significant influence of 0.323 on performance among dairy processing firms. This implies that increasing levels of green packaging by a unit would increase the levels of performance among dairy processing firms by 0.323. This shows that green packaging has a positive influence on performance among dairy processing firms in Kenya.

Drawing on this research, lack of adoption of green supply chain management activities such as green procurement, ecological design, green packaging and reverse logistics in dairy processing firms will lead to poor performance. Though the dairy processing firms are striving hard to improve their performance there are still issues of poor-quality products, long lead time and high cost of projects/products. It was articulated that the current phenomenon of poor performance among the dairy processing firms can be reversed if the firms and other stakeholders ensure green procurement, ecological design, green packaging and reverse logistics are embraced in their activities. Thus, it is evident that all the independent variables identified in this study were all important green supply chain management practices that influenced the performance among dairy processing firms in Kenya.

## 5.4 Recommendations of the Study

To ensure that dairy processing firms in Kenya achieve better performance, they should focus more on adopting green procurement strategies so as to establish the correct disposal methods and appropriate material selection from suppliers that meet certain environmental certification criteria. This can be done by setting up standards and performing frequent environmental audits to monitor environmental compliance of the major suppliers. Organizations should also embrace sustainable sourcing strategies so as to reduce the costs of production by embracing sustainability in the entire production phase.

With regards to the second objective, it would be valuable for dairy processing firms in Kenya to invest more resources in the ecological design phase of products, processes and services in the entire life cycle so as to reduce the adverse impact of the processing activities and the product on the environment. This will also serve to support recycling and remanufacturing strategies which will ultimately result in cost savings.

In relation to green packaging, the organizations should form strategic alliances with their suppliers so as to embrace returnable containers and use of bio-degradable materials. This will also have the effect of promoting a favorable brand image amongst consumers of the products as environmental messaging can be incorporated on the packaging materials ensuring that they will be easily accepted in the market. This will ultimately result in a reduction in the overall marketing budget which will translate to a lesser costs and better returns.

Concerning reverse logistics, there is need for dairy processing firms to always set aside a substantial part of their resources for activities that consume a huge amount of total costs, which is in determining customer requirements. Reverse logistics is aimed at reducing wastes by encouraging re-use and recycling initiatives. Organizations therefore need to set up a robust system of encouraging recycling and reuse of packaging material at the end of the chain. In the same regards, organizations should outsource consultants to enable them to come up with

reverse logistics strategies that articulate with their organization objectives. In addition, firms should set up strategic partnerships with other supply chain partners to facilitate the process of reverse logistics to facilitate re-manufacturing, minimize wastes and re-use components. This can be achieved for instance by having strategic and convenient collection points for waste products, un-used products or damaged components.

### 5.5 Recommendations for Future Research

The findings of this study demonstrated the important green supply chain management practices that influence performance of dairy processing firms in Kenya to include; green procurement, ecological design, green packaging and reverse logistics. Further inquiry should be carried out to include other green supply chain management practices that may as well have a positive significance to performance among dairy processing firms. There is also need to undertake similar studies in other firms in Kenya and other countries in order to establish whether the explored practices herein can be generalized to influence performance in the institutions. There is also a need to identify how adoption of green supply chain management activities affect other aspects of performance such as operational performance, and competitiveness of organizations. In addition, there is also a need to identify drivers of adoption of green supply chain management practices. This is because external and internal pressures play a significant role in adoption of green supply chain management practices amongst organizations.

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# APPENDICES

## Appendix I: Introduction Letter

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**SCHOOL OF GRADUATE STUDIES AND RESEARCH**

KCA/SGS/Sept. 21/1 16th September 2021

**TO WHOM IT MAY CONCERN**

Dear Sir/Madam,

**RE: PETER OKARONON EKIRAPA REG NO: 19/03760**

It is my distinct pleasure to introduce to you Mr. Peter Ekirapa who is a student in our institution pursuing a Master of Business Administration at the College of Business.

Peter is conducting a research on a topic titled: *"Effect of Green Supply Chain Management Practices On the Performance of Dairy Processing Firms in Kenya"* which is part of the requirements of the program he is pursuing. The research as well as the data procured thereof shall be used for academic purposes only.

Any assistance accorded to him is highly appreciated.

In case of further inquiry, do not hesitate to contact the undersigned.

Yours faithfully,

Dr. Nyaribo Misuko
**Dean, School of Graduate Studies & Research**

## Appendix II: List of Participating Dairy Processors in Kenya

1. Afrodane Foods Industires
2. Amken Farm
3. Aspendos Dairy Limited
4. Bahati Agro Processors Limited
5. Beta Dairies
6. Bio Foods Ltd
7. Brookside Dairy Limited
8. Githunguri Dairy F.C.S.
9. Glacier Products Ltd
10. Happy Cow Ltd
11. Highland Creamers and Foods Ltd
12. Katheri Milkway Dairies
13. Kenran Investment Company Limited
14. Kiambaa D.F.C.S. Ltd
15. Kinangop Dairy Limited
16. Latte Dairies Kisumu
17. Lessos Farmers' Co-operative
18. Life Fresh Dairies
19. Lowland Dairies
20. Miyanji Dairy
21. Mogawat Enterprises
22. Morani Ltd
23. Mukurwe-ini Wakulima Dairy Ltd
24. New K.C.C.
25. Njambini Dairy Farmers Cooperative Society
26. Oak Milk Limited
27. Sameer Agriculture & Livestock Ltd
28. Superior Highland Dairy
29. Tidy Pack Dairies
30. Uplands Premium Dairies

***SOURCE: KENYA DAIRY BOARD, (2020)***

# Appendix III: Questionnaire

## STATEMENT OF CONFIDENTIALITY

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

**SECTION 1: DEMOGRAPHIC INFORMATION**

Please use a tick (√) or cross mark (X) to respond to the following questions.

1. What is your gender?

Male ☐ Female ☐

2. What is your age bracket?

31-40 [ ] 41-50 [ ] 50 and above [ ]

3.What is your highest level of academic qualification?

Undergraduate degree ☐ Post Graduate degree/diploma ☐

4. For how long have you held this post in the organization (years)?

3-5 [ ] 6-8 [ ] 9 and above [ ]

**SECTION 2: Green Procurement**

5. How would you rate the green procurement program implemented in your department? Please indicate as appropriate in the box using a tick (√) or cross mark (X).

a) Very Effective ☐
b) Effective ☐
c) Somehow Effective ☐
d) Ineffective ☐

6. **Please indicate the extent to which you agree or disagree with the following statements. (Please Tick 1 for "Strongly Disagree", 2 for "Disagree", 3 for neutral", 4 for "Agree" and 5 for "Strongly Agree").**

| | **STATEMENT** | **1** | **2** | **3** | **4** | **5** |
|---|---|---|---|---|---|---|
| a) | Material selection plays a significant role in social performance indicators | | | | | |
| b) | Disposal management play a significant role in social performance indicators | | | | | |
| c) | Minimum energy consumption plays a significant role in economic performance indicators | | | | | |
| d) | Material selection plays a significant role in economic performance indicators | | | | | |
| e) | Disposal management play a significant role in economic performance indicators | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| f) | Minimum energy consumption plays a significant role in economic performance indicators | | | | | |
| g) | Material selection plays a significant role in environmental performance indicators | | | | | |
| h) | Disposal management play a significant role in environmental performance indicators | | | | | |
| i) | Minimum energy consumption plays a significant role in environmental performance indicators | | | | | |

**SECTION 3: Ecological Design**

7. How would you rate the ecological design program implemented in your department? Please indicate as appropriate in the box using a tick (√) or cross mark (X).

a) Very Effective ☐
b) Effective ☐
c) Somehow Effective ☐
d) Ineffective ☐

8**. Please indicate the extent to which you agree or disagree with the following statements. (Please Tick 1 for "Strongly Disagree", 2 for "Disagree", 3 for neutral", 4 for "Agree" and 5 for "Strongly Agree").**

| | **STATEMENT** | **1** | **2** | **3** | **4** | **5** |
|---|---|---|---|---|---|---|
| a) | Eco-branding plays a significant role in social performance indicators | | | | | |
| b) | Eco-labelling plays a significant role in social performance indicators | | | | | |
| c) | Eco-salvaging plays a significant role in social performance indicators | | | | | |
| d) | Eco-branding plays a significant role in economic performance indicators | | | | | |
| e) | Eco-labelling plays a significant role in economic performance indicators | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| f) | Eco-salvaging plays a significant role in economic performance indicators | | | | | |
| g) | Eco-branding plays a significant role in environmental performance indicators | | | | | |
| h) | Eco-labelling plays a significant role in environmental performance indicators | | | | | |
| i) | Eco-salvaging plays a significant role in environmental performance indicators | | | | | |

**SECTION 4: Green Packaging**

9. How would you rate the green packaging program implemented in your department? Please indicate as appropriate in the box using a tick (√) or cross mark (X).

a) Very Effective ☐
b) Effective ☐
c) Somehow Effective ☐
d) Ineffective ☐

10. **Please indicate the extent to which you agree or disagree with the following statements. (Please Tick 1 for "Strongly Disagree", 2 for "Disagree", 3 for neutral", 4 for "Agree" and 5 for "Strongly Agree").**

| | STATEMENT | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| a) | Biodegradable material plays a significant role in social performance indicators | | | | | |
| b) | Returnable containers play a significant role in social performance indicators | | | | | |
| c) | Minimum usage of packaging material plays a significant role in social performance indicators | | | | | |
| d) | Biodegradable material plays a significant role in economic performance indicators | | | | | |
| e) | Returnable containers play a significant role in economic performance indicators | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| f) | Minimum usage of packaging material plays a significant role in economic performance indicators | | | | | |
| g) | Biodegradable material plays a significant role in environmental performance indicators | | | | | |
| h) | Returnable containers play a significant role in environmental performance indicators | | | | | |
| i) | Minimum usage of packaging material plays a significant role in environmental performance indicators | | | | | |

**SECTION 5: Reverse Logistics**

11. How would you rate the reverse logistics implemented in your department?

Please indicate as appropriate in the box using a tick (√) or cross mark (X).

a) Very Effective ☐
b) Effective ☐
c) Somehow Effective ☐
d) Ineffective ☐

12. **Please indicate the extent to which you agree or disagree with the following statements. (Please Tick 1 for "Strongly Disagree", 2 for "Disagree", 3 for neutral", 4 for "Agree" and 5 for "Strongly Agree").**

| | STATEMENT | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| a) | Refurbishing plays a significant role in social performance indicators | | | | | |
| b) | Remanufacturing plays a significant role in social performance indicators | | | | | |
| c) | Recycling plays a significant role in social performance indicators | | | | | |
| d) | Refurbishing plays a significant role in economic performance indicators | | | | | |
| e) | Remanufacturing plays a significant role in economic performance indicators | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| f) | Recycling plays a significant role in economic performance indicators | | | | | |
| g) | Refurbishing plays a significant role in environmental performance indicators | | | | | |
| h) | Remanufacturing plays a significant role in environmental performance indicators | | | | | |
| i) | Recycling plays a significant role in environmental performance indicators | | | | | |

**SECTION 6: Performance of Dairy Processing Firms**

**13. (Please indicate the index of social performance indicators over the last five years)**

Social performance indicators

| | **2016** | **2017** | **2018** | **2019** | **2020** |
|---|---|---|---|---|---|
| Labour practices | | | | | |
| Health of stakeholders | | | | | |
| Safety of stakeholders | | | | | |

**14. (Please indicate the index of economic performance indicators over the last five years)**

Economic performance indicators

| | **2016** | **2017** | **2018** | **2019** | **2020** |
|---|---|---|---|---|---|
| Improved delivery times | | | | | |
| Market share | | | | | |
| Reduction of costs | | | | | |

**15. (Please indicate the index of environmental performance indicators over the last five years)**

Environmental performance indicators

| | **2016** | **2017** | **2018** | **2019** | **2020** |
|---|---|---|---|---|---|
| Energy savings | | | | | |
| Reduced wastes | | | | | |
| Reduced pollution | | | | | |

**Thank You very much for Your Cooperation**