EFFECT OF GREEN SUPPLY CHAIN MANAGEMENT PRACTICES ON PERFORMANCE OF TEA FACTORIES IN CENTRAL REGION KENYA

BY

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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 contains no material written or published by other people except where due reference is made and author duly acknowledged.

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ABSTRACT

Green Procurement also known as sustainable procurement is one of the emerging issues in procurement and therefore for any business to thrive in today's competitive business world it has to thrive to align its procurement department well to put in place the three bottom line practices of sustainable procurement which encompasses social, environmental and economic issues. Although some research has been conducted in multinationals that deals with tea in Kenya and further in tea estate in Kericho on environmental performance, very little has been done on the overall performance of a firm and this gives the objective of this study on investigating the effects of sustainable procurement practices on organizational performance using Tea factories in Central region Kenya. The literature review covers green supply chain management, reverse logistics, ecological design and green production in tea supply chain. This study adopted a descriptive research design; the target population of this study are all the factory managers and procurement staff of the tea factories .The researcher used both primary and secondary data. Primary data was collected using a questionnaire as a research instrument, where it was given to a fraction of the staff of the procurement department of the factories that were not used when sampling was done to ensure reliability of the data and a Cronbach's Alpha test was also conducted to ensure validity where all met the threshold of 0.7. Secondary data was obtained from relevant publications and KTDA website. The target population in this study was the 432 respondents from the 27 Kenya Tea Development Agency managed factories in central region where a sample of 9 factories was chosen using simple random sampling and 144 questionnaires issued. Data was tabulated and analysed for purpose of clarity, using SPSS version 22 software and presented using tables, and pie charts to make them reader friendly. This study also conducted a multiple regression analysis used to establish the relationship between the independent and dependent variables. The study found out that there is a positive relationship on green supply chain management practices and tea factories performance in Central Region in general R Square= 0.126 and R=.356, α=0.02 at 0.05 at significance level. The coefficient of determination indicates that 12.6% of the variation on performance in the tea factories is explained by the green supply chain management adopted by the factories. But unit decrease in performance is explained by 31.4% of eco-design and 0.9% decrease in reverse logistics. However, unit increase in performance is explained by 29.3% change in green production and 7.8% increase in the green procurement of the tea factories. This means that eco-designs and reverse logistics have negative relationship with the performance of tea factories. The recommendation was that the research gave was more participation of national government on implementation of sustainable agriculture to ensure that the future generation is well taken care of by ensuring the three bottom line of sustainable supply chain are practiced. And embracement of reverse logistics and eco design as emerging factors in green supply chain management and to increase the level of influence.

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DEDICATION

This research project is dedicated to all Tea farmers in Nyeri County where I grew up and went to school. This is especially in remembrance of Nereah Mugo my mother who dedicated her life as a tea farmer to see me and my siblings through school and out of this renowned tree I was able to ‘dine with the kings daughter through education’ as quoted by the late Nelson Mandela.

LIST OF ABBREVIATIONS

3PL'S-	Third party logistics
CENTRAL REGION-	Formerly central province
CRM-	Customer relationship management
DEFRA –	Department for environment and rural affairs
ECR-	Efficient consumer's response
EMCA-	Environmental management corporation act
EMS-	Environment management systems
ERS –	Economic recovery strategy
GDP-	Gross domestic product
GSCM –	Green supply chain management
KTDA-	Kenya tea development authority
MTP-	Medium term plan
NEMA –	National environmental management authority
NGO'S –	Non -governmental organizations
RBV-	Resource based view
SCM-	Supply chain management
SEE-	Social, economic and ecological issues
SOP-	Sales and operations
TQEM-	Total quality environmental management
TRBK-	Tea research board of Kenya
TRFK-	Tea research foundation Kenya
USA-	United State of America

OPERATIONAL DEFINITION OF TERMS

Procurement- is the acquisition of goods, services or works from an outside external source. It is favourable that the goods, services or works are appropriate and that they are procured at the best possible cost to meet the needs of the acquirer in terms of quality and quantity, time, and location (Lyson and Brian , 2006)

Green procurement- is an approach to procurement in which environmental impacts play an important role in purchasing decisions, with procurement officers concerned about more than just price and quality (Srivastava, 2007)

Sustainability-is how biological systems remain diverse and productive and includes the four interconnected domains: ecology, economics, politics and culture (Godfrey, 2012)

Tea- An evergreenshrub which is native to Asia, which grows mainly in tropical and subtropical climates (Sannes, 2008)

Supply chain-is a system of organizations, people, activities, information, and resources involved in moving a product or service from supplier to customer (Handfield and Nicholas, 2008)

Global warming- refers to the observed century-scale rise in the average temperature of the Earth's climate (Vasco, 2006)

Reverse logistics- It is the process of moving goods from their typical final destination for the purpose of capturing value, or proper disposal (Samir, 2008)

Ecological–design- any form of design that minimizes environmentally destructive impacts by integrating itself with living processes (Capra, 2004)

Green production- a new approach for enterprises to achieve profit and market share objectives by reducing environmental risk and impact (Muma et al, 2010)

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CHAPTER ONE

INTRODUCTION

1.1Background of the Study

Green Supply Chain Management is the practice of monitoring and improving environmental performance in the supply chain by integrating environmental thinking into a supply chain management throughout a product's life cycle (Muma, Matwere and Nyambega, 2014). In fact, Ngugi& Nderitu, (2014) have argued that waste and emissions caused by the supply chain have become the main sources of serious environmental problems including global warming and acid rain. Organizations have a number of reasons for implementing these green supply chain policies, from reactive regulatory reasons, to proactive strategic and competitive advantage reasons (Li, 2011). From an overall environmental and organizational perspective, it is important to understand the situation and what issues exist in this field of study (Muma *et al*, 2014).

With increased pressures for green supply chain management, it is expected that enterprises will need to implement strategies to reduce the environmental, economic and social impacts of their products and services (Sannes, 2008). Success in addressing green supply chain system may provide new opportunities for competition, and new ways to add value to core business programs (Ngugi and Nderitu, 2014). Green supply adoption influence appears at all stages of a product's life cycle. Therefore, GSCM has emerged as an important new archetype for companies to achieve profit and market share goals in terms of lowering their environmental, economic and social risks and influence while raising their ecological efficiency (Erasmus and van Hock, 2000). It is generally

perceived that green supply chain management promotes efficiency and synergy among business partners and their lead corporations, and helps to enhance environmental performance, minimize waste and achieve cost savings .This synergy is expected to enhance the corporate image, competitive advantage and marketing exposure (Li, 2011). On the global perspective, with the globalization of economies, supply chain management has become a promising area in achieving sustainability due to international environmental pressures and the concept of "green supply chain management (GSCM)". The concept of supply chain environmental management has been observed as a recent and novel managerial principle. The novelty of this topic makes it difficult to truly determine contradictory and conflicting issues that could be considered true "debates". In fact Sarkis, (2005) provides a comprehensive view of the state of research in this evolving topic, tracing the work of researchers who have investigated the issues involving, the reasons for incorporating these practices and also the way they have been practiced in different organizations.

According to Sarkis, (2005) the supply chain system should include purchasing and in-bound logistics, production, distribution and reverse logistics. This shows how firms focus on total quality management (TQM), with its emphasis on improving product quality, zero defects, customer satisfaction, training and employee empowerment, etc., and integrate it with environmental management resulting in total quality environmental management (TQEM) (Sharfman ,2009). Different researchers have defined Green Supply Chain Management from different perspectives, driving forces and purposes. Sarkis, (1999) refers to the supply chain as systems which includes purchasing,

production, distribution and reverse logistics. A recent definition by (Handfield and Nichols, 1999) goes as follows: The supply chain encompasses all activities associated with the flow and transformation of goods from raw materials (extraction) through the end user, as well as associated information flows. Many authors are exploring environmental initiatives within each of the major phases of the supply chain (Muma, 2014). In this study, green supply chain management is divided into four phrases: green purchasing, green production, eco design and reverse logistics.

1.2 Global Pperspectives of Green Procurement

Today's business environment is characterized by increasing uncertainties. GSCM has emerged as an important new approach for enterprises to achieve profit and market share objectives by reducing environmental risk and impact (Muma, 2010). In USA for example Nike has a well-established sustainability system. As the largest producer of athletic footwear in the world, Nike has a huge impact on people and resources around the globe (Derrig, King, Stocker, Tinson, Warren and Winson ,2010).The company has recognized their dependence on fossil fuel energy and oil for materials, exposing them to high oil prices or carbon restrictions in the future. Meanwhile, waste production and use of toxic materials and water also pose major risks. Nike has created a strategic alliance with an eco-non-profit organization "National Recycling Coalition" (NRC) in order to collect used tennis shoes, as part of Nike's Reuse a Shoe Program (Kumar, 2006).

This shows they have a well established reverse logistic system. Further they have a policy on factory emissions to minimize global warming by burning most of their wastes in an incinerator (Nike, 2010). The Nike name, generally linked to success and wealth,

first got into trouble in the early 90's when footage of sweatshop and child labour in their factories was broadcast on international television, smearing their name across the globe (Beder, 2002).This made them to better their policy on wage and legal age to work in their factories. This has shown how sustainable procurement can positively impact on performance with Nike though due to competition the company was not able to diverge most of the information on how much performance was enhanced on this (Henderson, 2009). According to Claver, Molina, Pereira and Tari,(2009). Chinese enterprises have increased their environmental awareness due to regulatory, competitive, and marketing pressures and drivers (Li, 2011). Chinese enterprises highlight their exporting philosophies by pursuing such international organizational standards as ISO9000 serial and ISO14001 certification. At the same time, in support of our second proposition, Chinese enterprises have sought to implement a variety of GSCM practices to improve their environmental performance in response to this export philosophy so that they can more effectively serve as suppliers to foreign enterprises in China (Sharfman, 2009). Internal environmental management, especially commitment from top-level managers and support from mid-level managers, will be necessary for development of any GSCM programs in China (Sannes, 2008).

This is not different from any enterprise almost any place in the world. Thus, education (raising awareness) of management in GSCM practices is one of the initial crucial steps in this arena. However, GSCM is still in its infancy in China. Chinese enterprises have recognized its importance, but have lagged in the implementation of these principles into practice (Li, 2011). It is not clear what the barriers are for this implementation, but the

lack of necessary tools, management skills and knowledge, and most likely the lack of an economic justification in terms of performance, may all be barriers (Naim, Mason, and Bateman, 2006). Therefore, even with higher environmental awareness and pressures in Chinese enterprises, this awareness has not translated into strong GSCM practice adoption, let alone to improvements expected in some areas of performance.

1.3 Regional Pperspective of Green Procurement

In the region, Ghana the mining sector has been an important part of the Ghanaian economy, with gold accounting for over 90% of the sector (Fofie , Nduro & Peprah, 2016).Ghana is the second largest gold producer in Africa and the 9th largest producer in the world (Aryee, 2012). The sector directly contributed 38.3% of Ghana's total corporate tax earnings, 27.6% of government revenue and 6% GDP in 2011(Aryee, 2012). The Ministry of Lands and Natural Resources (2010) indicates that the mining sector in Ghana has contributed an average of 5.5% to Gross Domestic Product (GDP) and 42% of total merchandise export from the period 2000 – 2008, being the single largest contributor from 1991. Regrettably from Priyadarshi, (2012) mining has led to high levels of environmental deterioration.

The negative impacts of mining in the world on the environment and health are immeasurable and often difficult to quantify (Munnik, *et al*, 2010). While the land degradation caused by the gold mining is pronounced, chemical contamination from the gold extraction process imposes a double burden on the environment, with harmful health implications for mining communities and people residing in close proximity to such activities (Yelpaala, 2004). Studies by Kusi-Sarpong, *et.al*, (2014) indicate patterns of

mercury intoxication during the gold amalgamation process. Although mining industry support the communities for economic reasons (Bloch and Owusu, 2012), it has been generally perceived as a socio-environmentally disruptive industry (Peck and Sinding, 2003). According to Kusi-Sarpong, *et.al,* (2014) improving sustainability, the mining industry has sought an attempt to go beyond its organizational boundaries in an effort to make their supply chain activities and designs more environmentally and socially sound. Green supply chain management (GSCM) recently is gaining importance because it is believed it can assist in minimizing the negative impact of the mining activities and also enhance the competitive advantage of the mining companies (Rozar, *et al,* 2013) to ensure environmental sustainability. Malawi according to Sannes, (2008) has a well established sustainable tea farming whereby they have embraced all areas of the triple bottom of environment, socially and economic thus making it one of the best in Africa for those countries that grow tea.

Ingari, Mule, Ondoro and Obura, (2012) they investigated whether procurement would be the solution to Kenyan supermarket performance problems at Uchumi supermarkets in Kisumu and found out that if they embrace sustainable procurement the performance would take a positive trend.Nakummat supermarket on the other hand has established eco design shopping bags to reduce plastic waste accumulated by the use of plastic shopping bags (Ingari *et al*, 2012). This though not well embraced has improved the image of the organization thus bigger market share that trickles down to improved firm performance (Ingari *et al*, 2012).

1.4Tea Farming in Kenya

Tea comes from an evergreen bush (the Camellia Sinensis) which grows at a fairly high altitude. Tea bushes mature for commercial exploitation 5 to 7 years after being planted and can remain productive for over 100 years (Sanne, 2008.) Tea grows in tropical and subtropical regions of the world. Tea production originated in Southeast China more than three thousand years ago and spread widely over the world especially in Asia and Africa (Rose, 2010). First it was to the countries in Asia, such as Vietnam, Japan, Bangladesh and Taiwan. Later, from the 19th century on, tea was introduced by the British in India, Sri Lanka, and by the Dutch in Indonesia. Commercial production in Africa started in former British colonies such as Kenya, Tanzania and Malawi well into the 20th century (Macfarlane, 2004) .Tea was first introduced in Kenya in 1903 by GWL Caine and was planted in present day Limuru. Commercialization of tea started in 1924 and since then the nation became a major producer of black tea (Tania Braga, 2014). Currently Kenya is ranked third behind China and India in tea production. Kenyan tea is also one of the top foreign exchange earners, alongside tourism, horticulture and Kenyan coffee (Uniliver, 2014). In the year 2010, the country produced 399 metric tons of made tea, earning Kshs. 97 billion in foreign exchange (Uniliver, 2013) .This represents about 26% of the total export earnings, and about 4% of the Gross Domestic Product (Tea Research Foundation of Kenya, 2014).However, the future of this much-loved beverage is uncertain. The tea industry faces unprecedented challenges; a shift in consumer demand and habit, a changing climate, resource constraints and mechanisation of farming are converging to

put pressure on an industry which recognises it needs to act if it is to create a sustainable future (Uniliver, 2014).

Tea production in Kenya is divided into two supply subsets; that produced by larger estates and produced by smallholdings (Gesimba &Kamau, 2005). The tea industry plays an important role in the Kenyan economy where it provides about 15% of the direct employment (Leijnse, 2011). Currently Kenya is ranked third behind China and India in tea production where Kenyan tea is also one of the top foreign exchange earners, alongside tourism, horticulture and coffee (Uniliver, 2014). In the year 2010, the country produced 399 metric tons of made tea, earning Kshs. 97 billion in foreign exchange (Uniliver, 2013).

This represents about 26% of the total export earnings, and about 4% of the Gross Domestic Product (Tea Research Foundation of Kenya, 2014.However, the future of this much-loved beverage is uncertain. The tea industry faces unprecedented challenges; a shift in consumer demand and habit, a changing climate, resource constraints and mechanisation of farming are converging to put pressure on an industry which recognises it needs to act if it is to create a sustainable future (Uniliver, 2014).Tea production in Kenya is divided into two supply subsets; that produced by larger estates and produced by smallholdings (Gesimba &Kamau, 2005). The small scale sector, with more than 260,000 farmers, is controlled by the Kenya Tea Development Agency (KTDA) (TRFK, 2016).The estates, consisting of 60-75 private companies, operate their own factories.

In 2012, the industry recorded a decrease of 2.2 per cent. This has gone showing a downward trend in recent years. Tea exports amounted to about Kshs 109 billion in 2011(Uniliver, 2013).The tea industry plays an important role in the Kenyan economy where it provides about 15% of the direct employment (Leijnse, 2011). This makes the tea industry a viable research are due to its importance to the Kenyan economy whereby specifically the researcher chose Central Region for the tea factories have achieved different levels of sustainability and would want to find out how this have affected performance of the specific tea factories

1.5 Statement of the Problem

Green procurement is rooted in the principle of pollution prevention, which strives to eliminate or to reduce risks to human health and the environment (Bolton, 2010). It means evaluating purchases based on a variety of criteria, ranging from the necessity of the purchase in the first place to the options available for its eventual disposal (Berger & Luckmann, 2007). To enhance environmental conservation, tea processing firms have adopted green initiatives such as afforestation and re-afforestation, use of efficient energy sources and improved waste management. Despite these initiatives, there is continued outcry by the tea factories managed by Kenya Tea Development Authority on behalf of small scale farmers where cost of production has continued to rise due to high energy, labour and leveraging on economies of scale in order to negotiate cheaper input purchases for small holder farmers (Amemba *et al*, 2013). A recent study by Muma *et al*, (2014) to show how green supply chain management adoption impacted on environmental performance among tea firms in Kericho County Kenya and concluded

that there was a positive performance but they went ahead to show further room for research on the other two of the triple bottom line indicators of green procurement namely social and the economic perspectives.

Also Wanyoike &Kipkorir (2015) on challenges facing implementation of green procurement in multinational tea companies in Kericho county found out that there were challenges but the few implementations yielded positive results to performance .This research was carried out in Kericho County being a large scale growing area of tea mostly in plantations which is different from central region where we have small scale farming and thus the gap that this research bridges by looking onto firms overall performance after implementation of green procurement in the tea supply chain (Kipkorir & Wanyoike, 2014). It is clear that there is need for further exploration on this area and this study aimed to bridge such gaps by exploring the effect of GSCM on firms Performance among Tea Processing Factories in Central Region Kenya. In addition, this research will add new knowledge to already existing literature; it will bring out an in-depth understanding of the effect of green supply chain management on KTDA run tea factories performance.

1.6 Objectives of the Study

The main objective of the study is to look at adoption of green supply chain management and business performance. The specific objectives of the study are:

1. To establish the effect of eco- design on performance of Central region tea factories

2. To find out the effect of reserve logistics on performance of Central region tea factories
3. To find out the effects of green procurement on performance of Central region tea factories
4. To find out the effects of green production on performance of Central region tea factories

1.6.1 Research Questions

The research questions of the study are:

1. To what extent does Eco design affects performance of tea factories in central region?
2. To what extent does reverse logisticsaffects performance of tea factories in central region?
3. To what extent does green production affects performance of tea factories in central region?
4. To what extent does green procurement affectsperformance of tea factories in central region?

1.6.2Research Hypotheses

The research hypotheses of the study are:

$H0_1$There is no significant effect of the ecological design on the performance of tea factories in Central Region

H_1There is a significant effect of the ecological design on the performance of tea factories in Central Region

$H0_2$There is no significant effect of reverse logistics on the performance of tea factories in Central Region

H_2There is a significant effect of reverse logistics on the performance of tea factories in Central Region

$H0_3$There is no significant effect of green production on the performance of tea factories in Central Region

H_3There is significant effect of green production on the performance of tea factories in Central Region

$H0_4$There is no significant effect of green procurementon the performance of tea factories in Central Region

H_4There is a significant effect of green procurement on the performance of tea factories in Central Region

1.7 Justification of the Study

This section highlights the reasons for conducting the study as well as identification of those set to benefit from its findings. The following are some of beneficiaries of the study:

1.7.1 Kenyan Government

The Kenyan Government may find this an integral factor when analysing the per capital income of its citizens since tea is one of the top foreign exchange earners, alongside tourism, horticulture and Kenyan coffee (Uniliver, 2014). In the year 2010 for instance, the country produced 399 metric tons of made tea, earning Kshs. 97 billion in foreign exchange (Uniliver, 2013) .This represents about 26% of the total export earnings, and about 4% of the Gross Domestic Product (Tea Research Foundation of Kenya, 2014). This study could further act as base for policymakers in government to introduce sustainable farming in Kenya being an agriculture lead economy (Muma*et al*, 2014)

1.7.2 Tea Farmers

KTDA run teafactories on behalf of small scale tea farmers would adopt the recommendations given in this study to ensure that production is sustainable thus accrue benefits that comes with this that include more sales , customer loyalty and bigger market share in the global market (Muma *et al* ,2014) .This leads to a trickle down effects to the tea farmers where they are able to get better bonus payments after sale of their processed tea since it is able to fetch more in global market (Gesimba & Kamau, 2005).

1.7.3 Scholars

This study can be useful to researchers to act as a base for further research in green supply chain management and in particular tea farming in Kenya (Muma *et al*, 2014) and (Wanyoike & Kipkorir 2015). This should major mostly on the social aspect of green supply chain in factors such include the kind of labour used whereby for a firm to fully

adopt green supply chain, it should avoid use of exploitative labour and child labour (Sannes, 2008).

1.8 Scope of the study

The aim of the study is to assess effect of green supply chain management practices on performance of tea factories in Central Region in Kenya. The target population is the 27 Kenya Tea Development Authority run tea factories in this region. These tea factories are farmers owned though they are run by KTDA on their behalf.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter will focus on theoretical literature as well as empirical review of green supply chain practices and organisation performance. Specific focus will be made on the theories that this study will be based upon and also provide an empirical review of earlier studies on this field. This chapter will also identify research gaps to be addressed through this study.

2.2 Theoretical Review

A theory is a supposition or a system of ideas intended to explain something, especially one based on general principles independent of the thing to be explained.This sectiontherefore presents theoretical foundations that underlie the importance of green supply chain management practices on organization performance .This study will be guide by resource based view theory, transaction cost economy theory and supply chain operations reference model theory.

2.2.1 Resource-Based View Theory

A resource is the total means available to a company for increasing production or profit including plant, labour, raw materials and assets (Clark, 2007). Therefore this theory is used to answers the question why do firms in the same industry vary systematically in performance over time? Or why do some firms persistently outperform others? According to Porter (1982) who came up with this ground breaking concept of the value chain to explain why some firms have competitive advantage over others. According to RBV, it is because internal capabilities and resources yield competitive advantage where

the firm emphasizes that the resource must be valuable, rare, imperfectly imitable, and non-substitutable (Miles & Covin, 2010).

These resources can consist of assets, capabilities, organizational processes or information that is classified into tangible and intangible resources (Dickinson *et al*, 2010). The theoretical mainstays are that resources that are entirely controlled or owned by the focal organization should be cultivated in order to enhance their contribution to the organization's competitive advantage in its industrial context (Hoffman & Sandilands, 2005). This theory links the research variable where we want to answer the question after adoption of green production is there any effect to the firm performance (Li & Geiser, 2009).

A resource is rare if the number of firms in competitive arena possessing a resource is less than the number of firms needed to generate perfect competition (Pfeffer, 2003) in this context in those factories that have adopted eco design which is unique in nature could better positioned than others (Hooley &Greenley, 2005) and answer the question whether after adoption of Eco-design there is change in firms performance. While competences express what a firm is able to do well (Prahalad & Hamel, 1990), core competencies encompass what the firm is able to do better than others (Lawson & Lorenz, 1999). In the resource based view, the allocation of resources to non-core activities leads to opportunity costs.

This is particularly important in green procurement in the tea sector. There is compelling evidence suggesting that most green products, services and works tend to cost more than

non-green counterparts (Bouwer *et al.,* 2006; Brammer & Walker, 2011). This ensure that after adoption of green procurement in tea factories, they create a positive impression to the mind of their consumers thus customer loyalty. A firm is also able to utilize the resources to its advantage is able to gain a competitive advantage. According to Tea Development Authority, (2014) those tea factories near large rivers are able to generate hydroelectric power making the cost of production cheaper and green therefore ensuring positive.

2.2.2 Transaction Cost Economic Theory

The most well-known contributor of this theory, William Oliver won the Nobel Prize in Economics in 2009. Originally, Transaction Cost Economic addresses these questions: Why do firms exist? What are the most effective strategies for maximizing profits? What should firms make? And what should firms buy? The main theoretical argument of this theory is concerned with the conditions under which certain characteristics of the transaction or the object of the transaction would lead to its internal hybrid, or external governance Coase, (2009) It has two important fundamental behavioural assumptions bounded rationality (Nderitu & Ngugi,2014) . What are these two assumptions talking about? Bounded rationality refers to that people have rationality, but limited.

Therefore, it is only possible for both parties in a transaction to sign an incomplete contracts William, (2008) Opportunism refers to that people cunningly behave opportunistically at the expense of others. The danger of opportunism is assumed to be less likely within a firm than in market coordination since it can be prevented within a firm by means of the authority principle (hierarchy m as well as outside the firm, such as

customers, suppliers, or shareholders (Muma *et al*, 2014).The basic argument is that the principal transfers decision rights to the agent. To make sure that the agent behaves as expected the principal sets incentives. The sole existence of firms is to make profit and therefore a firm that embrace sustainable supply chain is better placed over its competition. For example if the tea factories are able to effectively run the sustainability programme they are able to enhance performance of the firm in the industry making it profitable. Previous research by scholars in this field for example Sannes, (2008) was able to bring out the cost of doing business was affected by how well the firm was able to give to the society and what it was able to take as its raw materials. The more sustainable practices it embraced the more positive synergy it attracts thus good performance which eventually brings profitability (Muma, *et al* 2014).

2.2.3 Supply-Chain Operations Reference-Model (SCOR) Theory

Supply-Chain Operation Reference, which was proposed by the National Supply Chain Council in 1997 (Wang, 2012) .The most well-known contributor of this theory, William Oliver won the Nobel Prize in Economics in 2009 (Wang, 2012). Therefore, in the study of the performance evaluation of the green supply chain the enterprises will inevitably have to refer to the mind and analysis of the mechanism of the SCOR model (Poluha, 2007). Therefore, in the study of the performance evaluation of the green supply chain the enterprises will inevitably have to refer to the mind and analysis of the mechanism of the SCOR model (Blanchard, 2008).

This well explains the SCOR model of "Plan, Source, Make, Deliver and Return" which is a nice way to identify Lean opportunities in the Supply Chain (Sarkis, 2012). In terms

of the SCOR model, we can look for areas where "waste" might exist such as: Plan which is on Sales and Operations Planning (S&OP), Sourcewhich involves Procurement and the use of JIT principles which includes Vendor Managed Inventory or VMI, Make which entails (light) Manufacturing, assembly and Kitting (much of which is done in the warehouse or by a 3PL these days), Deliveror logistics where transportation must be optimized (especially important with high fuel prices) and later on Returndue to Shipping mistakes, returns, product quality, warranty issues and reverse logistics after use (Blanchard, 2008)**.**This theory is able to show that all firms exist to make profit and therefore a firm that embrace sustainable supply chain is better placed over its competition. Therefore if the tea factories are able to effectively run the sustainability programme they are able to enhance performance of the firm in the industry making it profitable (Wang, 2012).Previous research by scholars in this field for instance Sannes, (2008) was able to bring out the cost of doing business was affected by how well the firm was able to give to the society and what it was able to take as its raw materials.

The more sustainable practices it embraced the more positive synergy it attracts thus good performance which eventually brings profitability (Muma *et al*, 2014).It is also discussed why Lean should be of such great interest to supply chain & logistics professionals on how they can give their company a competitive advantage by supporting strategies based upon one or more of the following concepts of Differentiation, Cost Leadership and Response (Nyaoga *et al*, 2011.

2.3 Empirical Review

Empirical literature reviews studies previously carried out on the dependent variables as well as the independent variable (Kumar, 2005). In this study, empirical literature will cover ecological design, reverse logistics, green production and green procurement and organisation performance.

2.3.1 Ecological Design

Eco-Design or 'Green' Design also widely known as 'design for environment' consists of designing products for reduced consumption of materials/energy, reuse, recycle, recovery of materialsor components and reduce use of hazardous products (Aital &Vijai, 2016) . Further on, Wanyoike and Lagat, (2015).Ecological design is defined as "any form of design that minimizes environmentally destructive impacts by integrating itself with living processes.", thus, procurement of eco materials is the starting stage for manufacturing green products within a supply chain (Huang & Keskar, 2007). Ecological design is an integrative ecologically responsible design discipline. (Ingari *et al*, 2012).It helps connect scattered efforts in green architecture, sustainable agriculture, ecological engineering, ecological restoration and other fields. The "eco" prefix was used to ninety sciences including eco-city, eco-management and eco-technique (Muma *et al, 2014*) .The inchoate developing nature of ecological design was referred to the "adding in "of environmental factor to the design process, but later it was focused on the details of eco-design practice such as product system or individual product or industry as a whole.

Todd, (2008) included by life cycle models through energy and materials flow, ecological design was related to the new interdisciplinary subject of industrial ecology.

Importance of the design process in environmental management is well demonstrated by the existing literature. Reuse stands for both the use of a product without re-manufacturing and is a form of source reduction. Recycling is the process which makes disposal material reusable by collecting, processing, and remanufacturing into new products (Muma*et al*, 2014). As an environmental practice, resource reduction enables firms to minimize waste which results in more efficient forward and reverse distribution processes (Sannes, 2008).

Eco-design, design for environmental management, enables organizations to improve their environmental performance and close the supply chain loop by handling product functionality while minimizing life-cycle environmental impacts (Zhu *et a*l., 2008). As Although the earlier invention inclined energy adjusting the ecological balance, the latest population growth after industrial revolution led to change ecology abnormally (Capra, 2004).

2.3.2 Reverse Logistics

Muma, *et al*, (2014) referred reverse logistics as all operations related to the reuse of products and materials. It is "the process of moving goods from their typical final destination for the purpose of capturing value, or proper disposal). Remanufacturing and refurbishing activities also may be included in the definition of reverse logistics (Karen, 2006). Rogers & Tibben-Lembke, (1998) defined Reverse Logistics as “the process of planning, implementing, and controlling the efficient and cost effective flow of raw materials, in-process inventory, finished goods and related information, from the point of consumption to the point of origin, for the purpose of recapturing value of proper

disposal." This definition highlights the linkage between economic issues and the need for information.

Daugherty, *et al*, (2002) empirically tested the relationship between information systems and the results coming from the implementation of reverse logistics programs. Carter & Ellram, (1998) provided another interesting definition that emphasized the environmental aspect as the "process whereby companies can become more environmentally efficient through recycling, reusing, and reducing the amount of materials used." Similarly, Kroon & Vrijens, (2004) explains that reverse logistics "refers to the logistics management skills and activities involved in reducing, managing and disposing of hazardous or non-hazardous waste from packaging and products". Growing green concerns and advancement of green supply chain management concepts and practices make it all the more relevant (Samir, 2008). "The reverse logistics process includes the management and the sale of surplus as well as returned equipment and machines from the hardware leasing business. Normally, logistics deal with events that bring the product towards the customer (Muma *et al*, 2014) .In the case of reverse logistics, the resource goes at least one step back in the supply chain. For instance, goods move from the customer to the distributor or to the manufacturer (Rengel & Seydl, 2002) .When a manufacturer's product normally moves through the supply chain network, it is to reach the distributor or customer. Any process or management after the sale of the product involves reverse logistics. If the product is defective, the customer would return the product. The manufacturing firm would then have to organise shipping of the defective product, testing the product, dismantling, repairing, recycling or disposing the product.

The product would travel in reverse through the supply chain network in order to retain any use from the defective product (Harrington & Ryan, 2006).As for the case of tea production, companies such as Uniliver are trying to have a system where tea bags are returned for recycling and avoid environmental pollution (Uniliver, 2014). As for the purpose of this study the researcher tries to map the tea supply chain in Central region of Kenya and look into ways reverse logistic can be practiced or is being practiced on fertilizer sacks that are bio un-degradable, pesticide containers, packaging plastic papers for both exported and locally consumed tea leaves by tea farmers (Grace, 2013).

2.3.3 Green Production Practices

This is concerned with procedures that are put in place to ensure that all stakeholders in the tea sector adhere to issues that ensures the Triple bottom line or the three pillars of sustainability i.e. social, economic and ecological issues are met (Toke , 2010).In tea farming for example on the social aspect it is prohibited to use children under the age of 18 to pick tea or take it to the buying centres with clear notices on the door of the buying centres on the same (Uniliver, 2014).This due to the sensitization program me by USA Department of lab our that has studied and come up with the results that child lab our in tea farming is the worst form of child labour in the world (Tania, 2013). More so the tea factories are required by NEMA to reduce production machine noise to bear minimal due to the people who surround the area (Lagat, 2013).On economic side, farm inputs in tea farms e.g. fertilizer are bought collectively for farmers by KTDA so as to minimize exploitation on supplying side and to avoid farmers buying substitute inputs which may be expensive for collective buying enjoys the economies of scale and meets the safety

standards set (Mwaura, 2008). There is also introduction of hydroelectric power which reduces electricity cost by 50% on production cost initially incurred and having been introduced in four KTDA factories (Wakimani, 2014).

On ecology this covers the biggest percentage of tea sustainability aspects for it deals with air, soil, water, forest cover and wild animals. Habitat conversion is seen as the main harmful environmental impact of tea production (Clay, 2002). The reason for this is that the habitat for cultivation is often located in more rugged and remote areas, which tend to be those with the highest biodiversity. Converting such habitats leads to species reduction and due to the slope of the land, among other things; considerable soil is lost before the plantations are fully established to protect the soil. However even when a plantation is established soil erosion can be high. If a forest is replaced with a tea plantation, the same surface area may lose from 20 to 160 tons of earth each year (Equiterre, 2005). Tea processing is energy intensive with Withering, drying, grading and packing tea requires 4 to 18 kWh per kg of made tea, which compares to 6.3 kWh for a kilogram of steel. Different types of feedstock and energy are used, such as firewood, oil, natural gas, electricity and sometimes hydroelectricity depending on the county and area.

Drying, the most energy-intensive phase of tea processing, is mainly carried out using firewood from natural forest causing extensive deforestation and air pollution from wood smoke (Sanne, 2008). This deforestation leads to interference of flora and fauna leading to human animal conflict (Clay, 2003). Additionally the excess use of fertilizer beyond the recommended measures has also lead to soil degradation (Ogise, 2008). This interferes with the soil PH making the yields to come down due to saturation and

eventually is washed downstream to rivers leading to massive water pollution harming aquatic life, animals and human who depend on rivers for water (Sanne, 2008)

2.3.4 Green Procurement

Srivastava, (2007), defines 'green' supply chain management as "integrating environmental thinking into supply chain management, including product design, material sourcing and selection, manufacturing processes, delivery of final product to the consumers a well as end-of-life management of product after its useful life." Further on,Kleindorfer *et al*, (2005) provides the review of sustainable operations management and challenges that poses to the managers to integrate environment, health, and safety issues with the objective of achieving triple bottom line (TBL) .Therefore the process of greening the supply chain begins, obviously, with the suppliers whose practice and products must become environmentally friendly (Srivastava, 2007). Russel, (1998) defines green procurement as the integration of environmental considerations into purchasing policies, standards and actions. Furthermore, green procurement is directly connected to supplier's product aspects related to eco-label, energy use, recyclability, re-usability, use of environmental management systems (EMS), use of harmful substances, product lifecycle and other processes that support the product creation (Nagel, 2008).

The first green procurement initiatives emerged in the public organizations in 1980s, 1990s,Erdmenger *et al.,* (2008) and today in EU, a survey has estimated up to 85 % public respondents that involve environmental consideration into their procurement process (Ochoa& Erdmenger ,2008). Private organizations are less responsive to the environmental issues, except those influenced by stakeholders, NGOs and government

(Min & Galle, 2007). Moreover; the firms that have serious engagement with the environmental regulations are more likely to adopt green supplier selection. However, green criteria are rarely incorporated in purchasing decisions, unless there are clearly defined benefits for the buyer or there are strict governmental regulations (Porter & Van der Linde, 2008).

Environmental regulations enhance and force the eco-conscience of manufacturers, who, in order to find eco-alternatives for the materials that do not meet environmental criteria, initiate even suppliers environmental design. Selecting Green products is heavily based on behaviour and values on Green behaviour, Barber, (2010). He states that individual and collective values are the two major values that influence the Green behaviour of consumers. He also states that recycling is a behaviour driven by strong values. Sweden is considered to be one of the top developed markets with environmentally sensitive consumers, Pugh & Fletcher, (2007) where more than 90% of the population express and emphasize environmental friendly actions (Carlson ,2008). According to Barber (2010), consumers might consider themselves 'Green' but it is uncertain if they truly will select seemingly environmentally friendly products especially when quality is the main factor (Barber, 2010). This should create awareness to the tea factories to ensure tea delivered to their tea factories by small scale farmers is grown, handled and delivered sustainably (Uniliver, 2013).

2.4.5 Organizational Performance

The greening of procurement can yield higher profitability, which is an important reason why the topic has reached increased attention over the past decade (Theyel *et al*, 2001)

and (Vachon & Klassen, 2006). For example, (Carter *et al*, 2000) shows that environmental purchasing can lead both to increased net income and lower costs, thus promoting improved firm performance. Despite of the cradle research on green procurement focused on product suppliers, the interest has somewhat shifted to include services, (Bjorklund, 2011). Carter and Rogers (2008) developed a framework for sustainable supply chain, and further identified its relationship with environmental, social, and economic related firm performance measures. Zhu *et al*, (2005) explored the factors that determine the firm performance, namely, environmental, operational and economic performance.

Further on, Bai *et al, (*2012) developed sustainable performance measures for supply chains with reference to supply chain operations reference model (SCOR) that integrates business and environmental performance. Bjorklund *et al*, (2012) developed a framework for performance measurement by considering environmental logistics and 'green' supply chain management. Recently, Digalwar *et al*, (2013) identified the performance measures of 'green' manufacturing practicing firms in Indian manufacturing firms, namely, top management commitment, knowledge management, employee training, green product and process design, employee empowerment, environmental, health and safety, supplier and materials management, production planning and control, quality, cost, customer environ- mental performance requirement, and customer responsiveness and company growth Zhu *et al*, (2005) explored the factors that determine the firm performance, namely, environmental, operational and economic performance. Bai *et al*, (2012) developed sustainable performance measures for supply chains with reference to supply

chain operations reference model (SCOR) that integrates business and environmental performance. Bjorklund *et al*, (2012) developed a framework for performance measurement by considering environmental logistics and 'green' supply chain management. Recently, Digalwar *et al*, (2013) identified the performance measures of 'green' manufacturing practicing firms in Indian manufacturing firms, namely, top management commitment, knowledge management, employee training, green product and process design, employee empowerment, environmental, health and safety, supplier and materials management, production planning and control, quality, cost, customer environ- mental performance requirement, and customer responsiveness and company growth (Sarkis *et al*, 2005).

2.4 Conceptual Framework

A conception framework is a conceptthat is broadlydefinedand systematically organized to provide a focus, a rationale,and a toolfortheintegrationandinterpretation of information (Elsevier, 2008).The conceptual framework that guided the study as detailed below indicates the relationship between the independent variable and the dependent variables (Sarkis, 2005). Muma *et al* (2014) conceptualised the following independent variables against dependent variable environmental performance when studying GSCM in tea processing firms in Kericho County and they included green purchasing, green manufacturing, green distribution, green marketing and reverse logistics. This give validity for the researcher to use the following independent variables namely, ecological design, reverse logistics, green procurement and green production in the same sector tea

but in Central region Kenya. Muma *et al,* (2014).The study here is to be carried out on a different context which was overall firm.

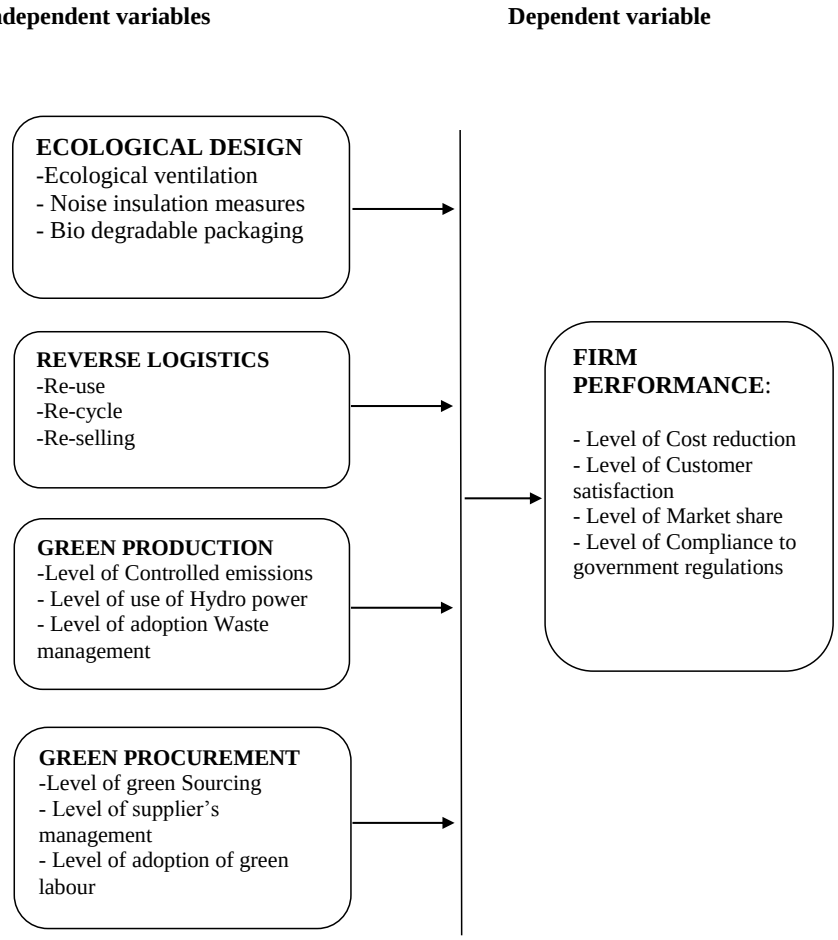

Figure 2.1: Conceptual Frame Work of Green Supply Chain and Performance

2.5 Operationalization of Variables

This is used to give weight to the variables in the study where they are given a measurable attribute.

Table2.1: Operationalization of Variables

Objective	**Variable Type**	**Indicators**	**Data analysis**
To find out effect of ecological design on performance of tea factories in Central Region.	**Independent** Ecological design	-Ecological ventilation - Noise insulation measures - Bio degradable packaging	Descriptive Regression
To find out effect of reverse logistics on performance of tea factories in Central Region.	**Independent** Reverse logistics	Re-use -Re-cycle -Re-selling	Descriptive Regression
To find out effect of green production on performance of tea factories in Central Region.	**Independent** Green production	-Level of Controlled emissions - Level of use of Hydro power -Level of adoption Waste management -Level of green Sourcing	Descriptive Regression
To find out effect of green procurement on performance of tea factories in Central Region.	**Independent** Green procurement	-Level of adoption Waste management -Level of green Sourcing -Level of supplier's management -Level of non-exploitative labour	Descriptive Regression
	Dependent Performance	Level of Cost reduction -Level of Customer satisfaction - Level of Market share -Level of Compliance to government regulations	Descriptive Regression

2.6 Critique of the Literature

Elizabeth, (2012) noted there was Inadequate awareness on good green supply chain practices appears to be one of the short comings to researcher as well as the cost associated with practising green procurement . Also some researchers in the past have only dealt with a fraction of the green supply chain ignoring the three pillar methods that incorporate all other aspects (Sannes, 2008). To add to the list also most firms are not aware that practising green supply chain becomes a strategy to maximize profits (Ester, 2010). Last but not least there is very little literature to work on when doing the literature review on sustainable tea farming though in other fields such as manufacturing it very well studied Liang and Chang, (2008), Pephrah *et al* (2016), Sarkis, (2005) and Mahamood *et al*, (2013).

2.7 Study Gaps

A gap in the literature is a research question relevant to a given domain that has not been answered adequately or at all in existing peer-reviewed scholarship (Aital &Vijai, 2016). A gap in the literature may emerge if one the question has not been addressed in a given domain, although it may have been answered in a similar or related area (Mwaura, 2014). Hoejmose and Adrien-Kirby (2012) developed a theoretical framework for socially and environmentally responsible procurement and its relationship with firm performance. Zhu *et al*, (2005) explored the factors that influencing 'green' supply chain management practices in Chinese manufacturing firms, namely, internal environmental management, external 'green' supply chain management, eco-design, and investment recovery.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1Introduction

This chapter shows methodology used to carry out the study by giving the research design, the target population, sample size , sampling technique to use and sampling frame, data collection technique and instrument used and how validity and reliability was checked of the instrument used. This chapter also describes how data was analysed and interpreted.

3.2Research Design

Mugenda, (2013) defined research design as a plan and structure of investigating so as to obtain answers of a research question. A descriptive research design is to be used in this study. Hoffman &Sandelands, (2005) defined descriptive design as a method of collecting information by interviewing or administering a questionnaire to a sample of individuals. The choice of this design is appropriate for this study for it is restricted to facts finding and may result in the formulation of important principles of knowledge and solutions to significant problems (Kothari, 2008). The study is to collect quantitative data using a self-administered questionnaire that are to be given to the respondents to complete with a cover letter from KCA University attached to ease administering of the questionnaire.

3.3 Target Population

Saunders, Lewis and Thorn hill, (2003); Schidler]& Cooper (2006); and Kothari (2008) all describe a population as the total collection of elements about which one wishes to make inferences while the sample size is a representative of a population. The target populationof this study will be432 Supply chain officersof the 27 KTDA runtea factories in Central region Kenya (KTDA, 2015)

Table 3. 1: Target Population

	Total	**Percentage**
Kiambu	112	25.92
Kirinyaga	80	18.51
Muranga	160	37.03
Nyeri	80	25.92
Total	**432**	**100.0**

3.4 Sampling and Sampling Procedure

A sample is a subset of the population being studied. It represents the larger population and is used to draw inferences about that population. It is a research technique widely used in the social sciences as a way to gather information about a population without having to measure the entire population (Crossman, 2016).Mugenda, (2003) agreed that 10-30% is a good representation of the entire population Mugenda (2003 and for this case , the study uses multi stage sampling where 30% of the tea factories in the four Counties that form Central Region where chosen giving a sample of 9 factories with 144 employees used as respondents for the study.

Table3. 2: Sampling Frame

	Population	**Sample Ratio**	**Sample size**
Kiambu	112	0.30	32
Kirinyaga	80	0.30	32
Muranga	160	0.30	48
Nyeri	80	0.30	32
Total	**432**		**144**

3.5 Research Instrument

The research instrument used was a questionnaire to collect primary data since they are cheap and easy to administer (Mugenda, 2008). Questionnaires are to be administered to the respondents by use of drop and pick method so that the personal touch can be enhanced for the maximum possible response rate and allow room for clarifications (Kothari, 2007).

3.5.1 Pilot Testing

The pilot test or content validity of an instrument is the subjective and judgmental extent to which it provides adequate coverage for the construct domain or essence of the domain being measured (Churchill, 1979). Prior to data collection, the content validity of the instrument was established by grounding it in existing literature. Pre-testing the measurement instrument before the collection of data further validated it. A factory manager and procurement employees of a factory not include in the study was used for pre testing process. It was reviewing the questionnaire for structure, readability, ambiguity, and Completeness. The final survey instrument incorporated changes to

remove ambiguities discovered during this validation process. These tests indicated that the resulting measurement instrument represented the content of SCM practices.

3.6 Reliability and Validity Test of the Instruments

Reliability concerns the extent to which an experience, test or any measuring procedure yields the same results on repeated trials (Carmines and Zeller, 2008). Generally, Cronbach's alpha value exceeding 0.7 are considered to have high internal consistency whereby in this study all values in the study are greater than 0.7, revealing the high internal consistency (Nunnaly, 1978) Content validity depends on how well the researchers create measurement items to cover the content domain of the variable being measured (Handfield *et al*, 2006). The content validity of \the questionnaire in this work was based on an exhaustive literature review and detailed evaluations by five GSCM process assurance and two external environment assurance (Kothari 2004).The five GSCM variables were Eco-design level, reverse logistics ,green production and green procurement.

3.7Data Analysis and Presentation

All questionnaires from the respondents were verified and checked for reliability and completeness. This study used quantitative statistical measures to describe and establish availability and extent of green SCM practices, supply chain and firm performance link. Inan applied management studies, the likert type scale are one of the acceptable techniques for measurement which allows the use of statistical tools to analyse data (Blaikie, 2003). With the aid of SPSS version 20 software, compositescores will be computed on Ecological design, reverse logistics, green procurement, green

manufacturing or production based on the likert scores recorded on the sub-items under each variable to allow for smooth analysis (Blaikie, 2003).

Descriptive statistics such as mean, standard deviation and mode were used to describe the basicfeatures of the data and to provide simple summaries about the sample and the measures. Together with simple graphics analysis, they form the basis of virtually every quantitative analysis of data (Trochim, 2006). The focus of the study was to evaluate and establish relationships between dependent and multiple independent variables of interest and the causal effects. Therefore, to address the study objectives, a regression analysis technique is projected for the study (Cooper & Schindler, 2006).This included an error term, whereby response variable were expressed as a combination of explanatory variables, and the unknown parameters estimated using observed values of the dependent and independent variables (Hesketh & Skrondal, 2008). However, the following assumptions are made under the multiple regression analysis: that all variables are included in the equation, that multicollinearity is not an issue, that no change in regime has occurred and that errors have the same variance throughout. The output of the data analysis was presented using tables, graphs and charts. (William 1994).

The regression analysis used is

$$\boldsymbol{Y = \beta_0 + \beta_1 x_{i1} + \beta_2 x_{i2} + \beta_3 x_{i3} + \beta_4 x_{i4} + \varepsilon_i \text{ for } i = 1, 2 \ldots 4.}$$

$$Y = \beta_0 + \beta_1 X1 + \beta_2 X2 + \beta_3 X3 + \beta_4 X4 + e$$

Where:

Y = Performance

X1 = Ecological design

X2 = Reverse logistic;

X3 = Green production

X4 = Green procurement

β_0 = Constant;

β 1, β_2, β_3, β_4, = Regression Coefficients

β e = error term.

CHAPTER FOUR

DATA ANALYSIS, FINDINGS AND DISCUSSIONS

4.1 Introduction

This chapter is a presentation of results and findings obtained from field responses and data broken into two parts. The chapter first applies descriptive statistics using statistical measures such as mean, standard deviation, graphs and charts to explore the nature of the results of the variables under study. Further it also applies regression analysis to determine the relationship between the study variables and the extent of the relationship between and among the variables.

4.2 Descriptive Data Analysis

In this section, descriptive statistics were used to describe in quantitive terms the main features of the collected data whereby the first analysis the respondents' profile. The survey targeted supply chain officers but to the nature of tea industry, the employees in the production department were used for this purpose for they were the people who dealt with tea leaves directly being the input commodity that based the research. And a total of 16 employees in each factory formed the population for the sample taken from the 27 tea factories in Central Region in Kenya and a sample of 9 factories was used.

4.2.1 Response Rate

From the data collected, out of the 144 questionnaires administered, 132 were fully completed and returned making a response percent of 92%. This percentage concurs with Mugenda (2003) who argues that for generalization a response rate of 50% is adequate

for analysis and a response rate of 70% and over is excellent, thus 92% was excellent for an analysis. This high response rate can be attributed to the data collection procedures, where the researcher personally administered the questionnaire by first asking the help of the factory manager and being the unit head was able to clarify to them the need to have the questionnaire filled and done within the stipulated time frame. The response rate was therefore adequate for the study to make relevant conclusions basing on the responses.

Table4.1: Response Rate

	Respondents	**Percentages**
Filled questionnaires	132	91.67
Unfilled questionnaires	12	8.33
Total	**144**	**100**

4.2.2 Reliability Results

Reliability of the questionnaire was evaluated through Cronbach's Alpha which measures internal consistency; a higher value indicating a more reliable generated scale. Cronbach's Alpha was calculated by application of SPSS version 20 for reliability analysis. The value to describe the reliability is at 0.7 significance level and the acceptable reliability coefficient is 0.7(Mugenda, 2008). This illustrates that all the four variables were reliable as their reliability values exceeded the prescribed threshold of 0.7 with 0.7 and above they show a high reliability and that the theoretical constructs exhibit good psychometric properties. Therefore the instrument was reliable for data collection).

Table 4.2: Reliability Analysis Results

	Cronbach's Alpha
Ecological design	0.741
Reverse logistics	0.843
Green production	0.763
Green procurement	0.721
Performance	0.747

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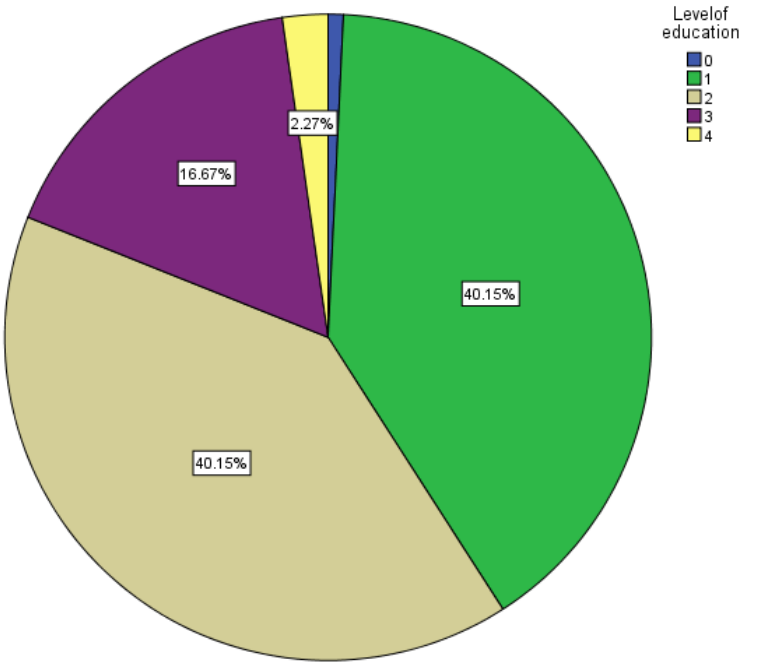
4.3 Demographic Characteristicsof Respondents

The study sought to find out the demographic information of the respondents which were level of education, Gender, Age and Years of service in the tea factory. This was important since it forms the foundation under which the study can fairly adopt in deriving conclusions. Theanalysis relied on this information relating to respondents to categorize the different results according to their acquaintance and responses.

4.3.1 Level of Education

The level of education was important so as the reader can easily understand the information to be answered in the questionnaire. According to (Arthur,2014) this is important to note since different people with different levels of education perceive and understand things differently. In the study those who had Certificate were 52(39.4%), Diplomas were 53(40.2%), bachelor's degree 23(17.4%) while those with postgraduate

degree were 4(3%) as shown in Figure 4.1



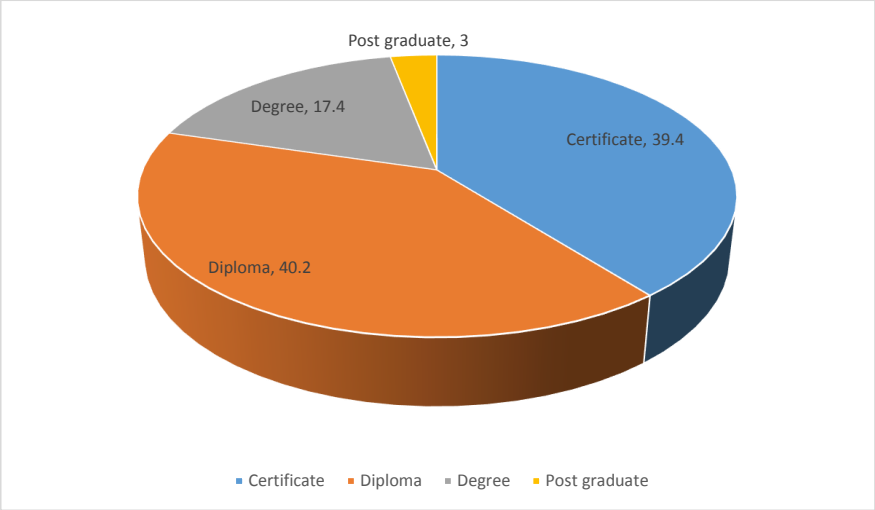


Figure4.1: Respondent Level of Education

This implies that most of the employees had either certificate or diploma in the area of the study.

4.3.2 Gender

This was done to avoid gender imbalance in the survey and for the purpose of this research there were 63(47.7%) were female while 69(52.3%) were male. According to (Sannes, 2008) this was necessary to find out whether they were more women than men to help alleviate social issues in cases where women are exploited.

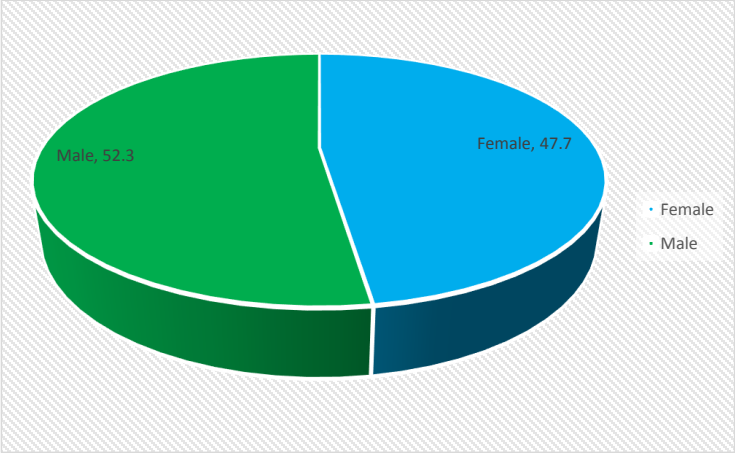


Figure 4.2: Gender of Respondent

4.3.3 Age of Respondents

Demographic results with regards to age reveal that below 25 years 18(13.6%), while those aged between 26-30 years were 31(23.5%), those aged between 30-40 years were 43(32.6%) while those aged above 40 years were 40(30.3%). This indicates that majority of respondents have a high level of grasping the issue of green supply chain being an emerging issue in all sector of live as what was portrayed in the study. The findings agree with Haugh and Kitson (2007) that age is associated with experience and responsibility at the work place

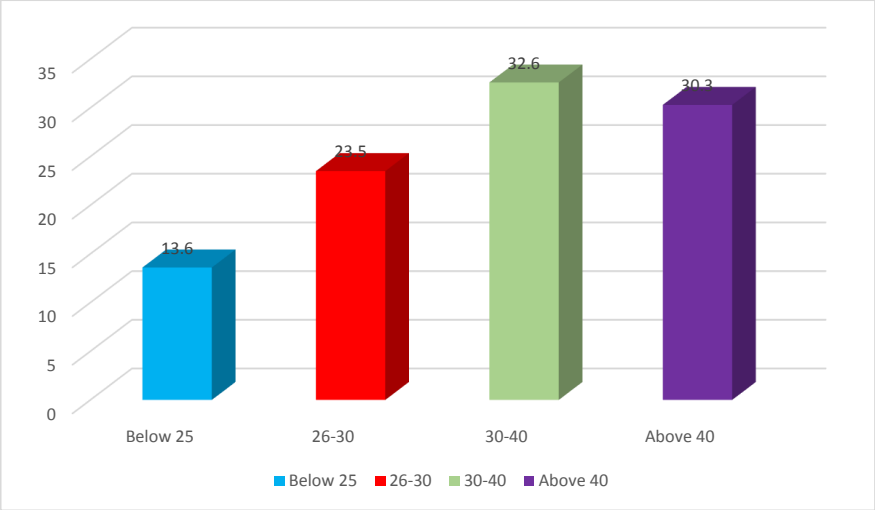


Figure 4.3: Age of Respondents

This implies that majority 86.4% are aged above 26 years old as illustrated in Figure 4.2.

4.3.4 Years of Experience

The experience one gets on a job is quite important in decision making and thus why it was necessary to the research supported by (Haugh and Kitson 2007) that the longer the experience at work is he more hand on information one has about his work place for the research carried out, 54(40.9%) have been working for over ten years, 44(33.3%) less than five years while 34(25.8%) between 5-10 years as shown in Figure 4.4.

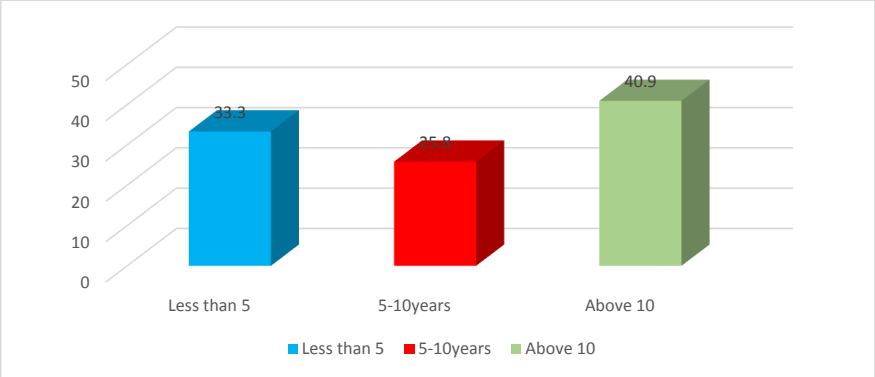


Figure 4.4: Experience of the Respondents

This findings shows that most of the respondents have been in the same tea factory for over 10 years, followed by those who have been there for less than five years. However in can be concluded that majority have worked in same tea factory for over five years.

4.4Descriptive Statistics of Independent Variables

The main objective was to find out how green supply chain affects performance under the following variables namely; Ecological design, Reverse logistics, Green production and Green procurement.

4.4.1 Ecological Design

The following research question were asked in the questionnaire to give a clear decision on how well to administer them to measure green supply chain against performance of the tea factories and findings is as shown in Table 4.3.

Table 4.3: Ecological Design

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Mean	S.D
The course curriculum is continuously revised based on market needs.	22.1%	22.1%	17.5%	23.9%	14.4%	2.86	1.380
The university registrar's office maintains error free records	8.0%	17.9%	29.9%	28.3%	15.9%	3.26	1.163
I believe the university gives quality education	8.6%	16.4%	27.7%	31.4%	15.9%	3.30	1.173
The lecturers ensure that the teaching methods are continuously improved for quality enhancement	13.3%	11.1%	26.5%	27.2%	21.9%	3.33	1.297
My academic results have no errors	11.5%	16.4%	29.9%	27.0%	15.3%	3.18	1.214
The Quality assurance departments conducts frequent evaluations to help in improvement of services offered.	16.2%	9.3%	27.2%	25.9%	21.5%	3.27	1.336
The customer feedback provided in the evaluations is implemented in making future decisions	4.2%	11.3%	28.5%	33.8%	22.1%	3.58	1.080

f

Descriptive Statistics

	N	Mean	Std. Deviation
Eco friendly gunny bags	132	2.21	.580
Eco friendly ventilation	132	2.25	.530
Noise reduction	132	2.40	.828

Eco friendly packaging	132	4.14	1.140
Eco labelling of products	132	3.71	1.214
Re using packaging	132	3.84	1.247
Valid N (listwise)	132		

f

	Mean	**Std. Deviation**
Are the tea delivery gunny bags eco friendly	3.100	1.152
Eco friendly materials on ventilation	2.480	1.232
Do the factory has noise reduction measures	2.280	1.315
Is the processed tea packaged in eco-friendly materials	2.206	1.402
Eco labeling of products	1.955	1.203
Re-using packages	1.144	0.352

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The tea factor to large extent (mean of 3.10) has adopted tea delivery gunny bags that are eco-friendly. However, mean of 2.48 agree that to small extent that tea factories have eco-friendly materials on ventilation, mean of 2.28 agree that to small extent does factories have noise reduction measures, mean of 2.20 agree that to a small extent have the tea factories processed tea packaged in eco-friendly materials while mean of 1.92 agree that to very small extent have factories used eco labelling products while mean of 1.144 agree that to very small extent have the factories re-used packages.

In support of above findings utilizing a sample consisted of 150 companies in electronics industry; Singhal (2013) reported a significant relationship between green design and environmental performance. Beyene (2015) added that green design results in enhanced

environmental performance. There is need for the companies to carry out these approaches as noted by Muchiri (2011) that waste management involves source reduction the recycle and re-use waste management programs focuses on management of waste after it has been created.

The above shows that tea factories most of them have adopted eco-friendly gunny bags for tea delivery. However, the tea factories have not used eco-friendly materials on ventilation; they do not use noise reduction materials, does not package tea in eco-friendly materials after processing, lack eco-friendly labelling products and does not re-use packages.

4.4.2 Reverse Logistics

The respondents were asked to what extent reverse logistics influences performance of tea factors and results is as shown in Table 4.4.

Table 4.4: Reverse Logistics

Descriptive Statistics			
	N	Mean	Std. Deviation
waste collection	132	4.09	1.257
Recycling	132	2.40	1.572
Reselling	132	3.97	1.425
Re- use of packaging material	132	4.25	1.007
Reduction of cost due to recycling	132	4.02	1.149

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	Mean	Std. Deviation
Waste collection for proper disposal or recovery of useful parts	3.080	1.060
Recycling of used products (re-processing or re-use)	3.110	1.053
Reselling	2.630	1.327
Re-using packages	2.170	1.303
Reduced costs due to recycle/re-use	1.477	0.715

This is to show how the tea factories are able to collect waste for proper disposal and reduce damage to the natural habitat (Umeda *etal,* 2003). This will help conserve our natural environment from non-degradable materials. From the survey from mean 3.08 implies that waste collection for proper disposal or recovery of useful parts averagely influences performance of tea factories, mean of 3.11 that recycling of used products averagely influences the performance of tea factories. It was also revealed that to small extent as shown by mean of 2.63 reselling influences on performance to small extent, mean of 2.17 that re-using packages influences performance to small extent and mean of 1.47 agree that reduced costs due to recycling influences performance to very small extent as shown in Table 4.4.Thesefindings implies that although the waste for proper disposal or use in other parts and recycling of used products averagely influences the performance of tea factories. However, the reselling, re-using packages and reduction of costs due to recycling influence performance to a small extent in the tea factories.

According to Ninlawan et al., (2010) concurs that green packaging involves downsized packaging and use of green packaging materials. They also point out the need to

cooperate with vendors to standardize packaging, encourage and adopt returnable packaging methods, promote recycling and reuse of packaging materials.In support of this study results according to their research findings, Rao and Holt (2005) showed that there exists a positive relationship between reverse logistics practices and organizational performance, De Giovanni and Vinzi (2012) established that the existing relationship was not significant while Azevedo et al. (2011) found a combination of positive relationship as well as other relationships. Ongombe (2012) studied the relationship between reverse logistics and the competitive advantage it has on an organization with specific focus being on the water bottling companies in Nairobi. The results of his research study showed that there is indeed a positive relationship between the two variables.

There are studies done in Kenya which concurs with above findings such as study done by Waithaka (2012) who studied the reverse logistics practices in medical supplies by looking at the case study of Kenya Medical Supply Agency. Although his study showed that the adoption of reverse logistics practices at the Kenya Medical Supply Agencies was low, there was a positive relationship between reverse logistics and operational performance of the agency. Ongombe (2012) looked at the relationship between reverse logistics and competitive advantage in water bottling companies in Nairobi. This study concluded that there was indeed a strong relationship between reverse logistics and competitive advantage. Companies that implemented reverse logistics practices benefitted from increased profit margins due to reduction in production costs and sales increase.

4.4.3 Green Production

The study third objective sought to establish how green production has influenced the tea factories performance and survey results is as presented in Table 4.5.

Table 4.5: Green Production

	Mean	Std. Deviation
Controlled emissions of smoke to the environment	3.07	1.113
Environmental audits of supply base	3.08	1.056
Do you have an waste burning incinerator	2.24	1.291
Does your factory use hydro power	2.88	1.185
Are there any certification due to adoption of ecological design	3.27	1.033

As shown in Table 4.5 on average the performance of tea factories is influenced by controlled emission of smoke to the environment as shown by mean of 3.07, with mean of 3.08 means that environmental audits of supply base is average in the factories Ninlawan et al., (2010) concurs that organizations can conduct Supplier Environmental Audits and Assessments to monitor supplier compliance to environmental standards and requirements. Other than the above initiatives organizations can opt for a participative approach to green purchasing by jointly developing cleaner technology and processes with their suppliers (Ninlawan et al., 2010).

Also in this studya mean of 3.27 shows that there is average certification due to adoption of ecological design. As shown by mean of 2.24 to little extent does the tea factory have waste burning incinerator and mean of 2.88 the factories use hydro power to little extent.

Nimawat and Namdev (2012) concurs that organizations and people must adopt environmentally responsible production and consumption in order to recover environmental quality, reduce poverty and bring about economic growth, with resultant improvements in healthy working conditions, and sustainability.

Amemba et al. (2013) advocated concurs that for use environmentally friendly energy sources like solar energy, recycling of raw materials and use biodegradable energy sources and materials in manufacturing operations.This is concerned on how the production process can adhere to measures that protect the ecological economic and social issues (Toke, 2010). This deals with factors such as smoke emission**,** environmental audit, having a burning incinerator and use of hydro electrical power**.** From the observations below**,** smoke emission is well looked at and environmental audits, though little is done on burning incinerator hydroelectric power where majority have not adopted with only a few who are up and running on hydroelectricity.

Concerning the relationship between green production and environmental performance, the results revealed by Chen et al. (2013) confirmed the positive impact of green production on environmental performance of hi-tech companies in Taiwan. Yu and Ramanathan (2015) collected data from industrial firms in the UK in order to investigate the impact of green production on environmental performance. Their results revealed that green production operations are firmly related to green performance.According to a study by Khaksar et al. (2016), green supplier was negatively associated with green performance. The results also suggest that green purchasing as evaluated by purchasing recycled products with reused materials in green packaging in order to reduce waste

besides the existence of formal policy on green purchasing increased green performance. This result is similar to result the reported by Nderitu and Ngugi (2014) and Chin et al. (2015).

This shows that in the tea factories there is average controlling of emission of smoke to environment, environmental audits of supply base and there average certification due to adoption of ecological design. In the tea factories they don't have waste burning incinerators and there is no certification due to adoption of ecological design.

4.4.4 Green Procurement

The study third objective further wanted to find out the effect of green procurement on performance of tea factories in Central Region where it is concerned with incorporating environmental consideration into a procurement process the findings is as shown in Table 4.6.

Table 4.6: Green Procurement Practices

	Mean	**Std. Deviation**
Collaboration with supply base to meet environmental objectives	3.03	1.077
Environmental audits of supply base	2.87	1.142
Use of Child labour	2.96	1.115

Joint decisions with supply base about ways to reduce overall environmental impact of products	2.83	1.102
Working with supply base to address environmental problems and/or issues	2.33	1.202

On average as shown by mean of 3.03 the tea factories have collaborated with supply base to meet environmental objectives, however, they have to small extent done environmental; audits of supply base as shown by mean of 2.87, mean of 2.96 agree that the tea factories to small extent use child labour, mean of 2.83 agree that tea factories to small extent have joint decisions with supply base about ways to reduce overall environmental impact of products while mean of 2.33 show that they agree that the factors to small extent work with supply base to address environmental problems or issues as shown in Table 4.6

It was concluded that the tea factories have on average done collaborations with supply base to meet the environmental objectives but they have to a small extent been able to do the environmental audit of the supply base, undertake joint decisions with supply base about ways to reduce overall environmental impact of products, work with supply base to address the environmental problems but they child labour to small extent.

Zhu Qinghua et al. (2004) found the suppliers stress had greater impact on the implementation of green supply chain through research. Fangmiao Hou (2007) pointed out that the close cooperation of suppliers and buyers would promote the successful completion of green purchasing activities this past studies concurs with current study findings.

4.4.4.1 Effect of green procurement practices performance

The study sought to establish the influence of green procurement on the performance of the tea factories and survey findings is as shown in Table 4.7.

Table 4.7: Effect of green procurement practices performance

Statement	Mean	Std. Deviation
Savings from conserving energy water and fuel	2.89	1.144
Lowering of hazardous material management fees	2.84	1.178
Elimination of fines (statutory) for non-environmental compliant	2.83	1.182
Reduction of waste management fees	2.58	1.192
Reduced input costs due to recycle/re-use	1.53	.795

The findings as shown in Table 4.7above, shows how to a small extent does the above green procurement practices influence performance. As shown by mean of 2.58 savings from conserving energy water and fuel influences performance to small extent, mean of 2.84 shows that lowering of hazardous materials management fees influences performance to small extent, mean of 2.83 indicates that examination of statutory fines for non-environmental compliance and mean of 2.58 shows that reduction of waste management fees due to green procurement influences tea factories performance to small extent. Also mean of 1.53 shows that reduction of input costs due to recycling reduces performance to a very small extent.

The green procurement practices such as saving from conservation of energy, water and fuel, lowering of hazardous materials management fees, elimination of statutory fines due to non-compliance with environmental, reduction of waste management fees and

reduction of inputs costs through recycling influences the tea factories performance to a small extent.

4.4.5 Performance Measure

This study also sought to establish the effect of green supply chain management practices on performance of tea factories in Central Region Kenya. The survey asked statements related to performance and results is as illustrated in Table 4.8.

Table 4.8: Performance Measures

	Mean	Std. Deviation
Cost reduction due to ecological design	3.93	1.297
Cost reduction due to reverse logistics	3.73	1.324
Cost reduction due to green production	3.06	1.517
Cost reduction due to green procurement	3.32	1.515
Customer satisfaction due to ecological design	3.65	1.451
Customer satisfaction due to reverse logistics	3.77	1.334
Customer satisfaction due to green production	3.70	1.396
Customer satisfaction due to green procurement	4.20	1.137
Increase in market share due to ecological design	4.06	1.164
Increase in market share due to reverse logistics	3.88	1.198
Increase in market share due to green production	3.80	1.400
Increase in market share due to green procurement	4.65	.478
Compliance level on ecological design	4.98	.123
Compliance level on reverse logistics	3.62	.624
Compliance level on green production	4.61	.661
Compliance level on green procurement	4.20	.670

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	Mean	**Std. Deviation**
Level of cost reduction improvement with introduction of ecological design	3.210	1.063
Level of cost reduction improvement with introduction of reverse logistics	3.110	0.998
Level of cost reduction improvement with introduction of green production	2.920	1.038
Level of cost reduction improvement with introduction of green procurement	2.850	1.201
Level of customer satisfaction with introduction of ecological design	2.546	1.274
Level of customer satisfaction with introduction of reverse logistics	1.508	0.502
Level of customer satisfaction with introduction of green production	1.985	0.941
Level of customer satisfaction with introduction of green procurement	1.902	0.987
Level of market share with introduction of ecological design	2.023	0.920
Level of market share with introduction of reverse logistics	1.841	0.863
Level of market share with introduction of green production	1.970	1.048
Level of market share with introduction of green procurement	1.826	0.912

Level of compliance on ecological design according to government laid down rules	1.962	0.886
Level of compliance on reverse logistics according to government laid down rules	1.939	1.002
Level of compliance on green production according to government laid down rules	2.046	1.010
Level of compliance on green procurement according to government laid down rules	2.861	3.769

4.4.5.1 Market Share

From the survey results as shown by mean of 2.023 agree that market share has increased to small extent as result of ecological designs. But as shown by mean of 1.841 agree that market share has increased to very small extent as result of introduction of reverse logistics, mean of 1.970 as result of introduction of green production and mean of 1.826 as result of introduction of green procurement. This implies that though increase is in very small extent we should reject the null hypothesis and accept the alternative.

4.4.5.2 Compliance with green production

The compliance has improved to very small extent as a result of compliance with ecological design according to government laid down rules mean of 1.962 and mean of 1.939 as result of compliance on reverse logistics according to government laid down rules. Also the performance of compliance as improved to small extent as result of compliance on green production according to government laid down rules mean of 2.046 and mean of 2.861 as result of compliance on green procurement according to government laid down rules. This support our alternative research objectives to having effect to performance.

4.4.5.3 Cost reduction

Most of the respondents as shown by mean >3.00 agree that performance has been influenced by at an average level. On relation to cost reduction, this is as shown by mean of 3.210 who agree that costs have been reduced due to introduction of ecological design and mean of 3.110 feel that cost has reduced averagely due to introduction of reverse logistics, mean of 2.92 0that cost has reduced due to introduction of green production, mean of 2.850 cost reduction has been due to introduction of green procurement to a small extent. This also support our research objectives on having effect to performance.

4. 4.5.4 Customers Satisfaction

In relation to customers satisfaction mean of 2.546 supports that customers are satisfied to small extent as result of reverse logistics. The customers are satisfied to very small extent as result of following factors; mean of 1.508 as result of introduction of reverse logistics, mean of 1.982 as result of introduction of green production and mean of 1.902 as result of introduction of green procurement.

The study shows that cost reduction performance as improved on average as a result of ecological design and reverse logistics introduction. Also cost reduction has been result of green production and green procurement to a small extent. The performance of customer satisfaction has been achieved to small extent as result of introduction of the ecological design and to very small extent because of; reverse logistics, green production and green procurement. The market share performance of tea factories has improved to

small extent as result of ecological design, but to very small extent as result of; reverse logistics, green production and green procurement.

The compliance performance of the factories has been to small extent as result of green production and green procurement according to government laid down rules and to very small extent as result ecological design and reverse logistics according to government laid down rules.To support above results Choi and Zhang (2011) conducted a study on green logistics and business performance in China. They also found out that some organizations have found a match between environmental considerations and profitability.According to Pietro et al. (2012), every organization must make better use of natural resources for sustainable growth.

Every organization must incorporate environmentally friendly practices in all its activities. Just like other business activities, Supply Chain activities are no exception. Muma *et al*, (2014) findings support above results that greening of the supply chain can lead to firm's profitability due to accrued benefits that are associated with the practices which includes market share increase, customer loyalty, compliance and cost reduction (Muma *etal*, 2014) To support reverse logistics and performance Laosirihongthong (2013) and Muma et al. (2014) conducted studies to determine the relationship between green supply chain management and organizational performance. The findings of both studies revealed that legislation and regulation is key in implementation of environmentally friendly supply chain management practices such as reverse logistics. The study revealed that the level of adoption of reverse logistics is still unpopular among many manufacturing organizations.

4.5 Inferential Statistics

This is a mathematical procedure whereby we convert information about the sample into intelligent guesses about the population (Mikki, 2012)

4.5.1 Pearson Correlation Analysis

Pearson correlation coefficient was used determine the strength and the direction of the relationship between the dependent variable and the independent variable.

Table 4.9: Pearson Correlation Analysis

Correlations						
		Eco Design	**Reverse logistics**	**Green production**	**Green procurement**	**Performance**
Eco Design	Pearson Correlation	1				
	Sig. (2-tailed)					
	N	132				
Reverse logistics	Pearson Correlation	.222*	1			
	Sig. (2-tailed)	.010				
	N	132	132			
Green production	Pearson Correlation	.333**	.448**	1		
	Sig. (2-tailed)	.000	.000			
	N	132	132	132		
Green procurement	Pearson Correlation	.271**	.373**	.417**	1	
	Sig. (2-tailed)	.002	.000	.000		
	N	132	132	132	132	
Performance	Pearson Correlation	-.208*	.067	.201*	.074	1
	Sig. (2-tailed)	.017	.443	.021	.401	
	N	132	132	132	132	132
*. Correlation is significant at the 0.05 level (2-tailed).						
**. Correlation is significant at the 0.01 level (2-tailed).						

From the table all the factors have positive correction except performance and eco-design with negative 0.208 but all the factors are significant at α=0.05 which implies that there is significant relationship between the variables.

4.5.2 Regression Analysis

Regression analysis shows how dependent variable is influenced with independent variable that is the combined effect of all independent variables on the dependentvariable. Regression analysis was used to determine the relationship between ecological design, reverse logistics, green production and green procurement and performance of tea factories in Central Region. Significance tests were conducted at 0.05 level of confidence

Table 4.10: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.356[a]	.126	.099	.046813	.126	4.597	4	127	.002

a. Predictors: (Constant), Green procurement, Eco Design, Reverse logistics, Green production

The overall model for the construct green supply chain management was tested. The findings in Table 4.8 shows the coefficient of determination R Square= 0.126 and R=.356at 0.05 at significance level. The coefficient of determination indicates that 12.6% of the variation on competitive performance in the tea factories is explained by the green supply chain management adopted by the factories.

Table 4.11: ANOVA for Influence Green Supply Chain Management on performance

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.040	4	.010	4.597	.002[b]
	Residual	.278	127	.002		
	Total	.319	131			

a. Dependent Variable: Performance
b. Predictors: (Constant), Green procurement, Eco Design, Reverse logistics, Green production

The results of Analysis of variance (ANOVA) for regression coefficients are as shown below, table 4.9. The analysis results indicate that the significance of F statistics is 5.853 is greater than 1 and α=0.027 which is less than 0.05. This implies that there is a significant relationship between Green Supply Chain Management and performance.

Table 4.12: Influence of Green Supply Chain Management on performance

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.193	.025		7.858	.000
	Eco Design	-.111	.031	-.314	-3.521	.001
	Reverse logistics	-.004	.044	-.009	-.098	.922
	Green production	.100	.034	.293	2.939	.004
	Green procurement	.033	.078	.040	.425	.672

a. Dependent Variable: Performance

According to table 4.12 β indicates is showing that unit change in green supply chain management influences 0.193 unit change in the tea factories performance.

$Y = 0.193 - 0.314X_1 - 0.009X_2 + 0.293X_3 + 0.040X_4 + 0.025$

The above implies that unit decrease in performance is explained by 31.4% of eco-design and 0.9% decrease in reverse logistics. However, unit increase in performance is

explained by 29.3% change in green production and 7.8% increase in the green procurement of the tea factories as illustrated in Table 4.10. Also if the value of t > 2, then it means results are significant. Here the value of *t* is 7.858 which show the significance of green supply chain management on performance is positive. In this case the null hypothesis was rejected.

In this study statistical significant impact of green production measured by resource utilization, waste generation, along with material and energy consumption. Similar to this study, Chen et al. (2013) found a positive impact of green production on environmental performance. Chien and Shih (2007) added that the adoption of green production standards has a significant impact on environmental and financial performance of electrical and electronic firms in Taiwan. As approved by Green Jr et al. (2012), Singhal (2013), Beyene (2015), and Al Khattab et al. (2015) green design is positively related to environmental performance of manufacturing companies. Like Muma et al. (2014), Chin et al. (2015), and Seroka-Stolka (2014).

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1Introduction

This chapter presented the discussion of key data findings, conclusion drawn from the findings highlighted and recommendation made there-to. The conclusions and recommendations drawn were focused on addressing the objective of the study.

5.2 Summary of the Findings

The general objective of this study was to establish the effects of green supply chain management on performance of tea factories in central region Kenya. The respondent rate of the study was 91.67% representing 132 respondents who filled and returned the questionnaires. Most respondents were male gender and were represented in the study with 52.3%. The research also revealed that most of respondents had an education level of Diploma and majority has an experience of above 10 years in the organization. The study sought to find out the demographic information of the respondents which were level of education, Gender, Age and Years of service in the tea factory. On level of education, the study concluded that most of the employees had either certificate or diploma in their areas of the study which according to (Arthur, 2014) this is important to note this since different people with different levels of education perceive and understand things differently. The aspect of gender was done to avoid gender imbalance in the survey and for the purpose of this research there were 63(47.7%) were female while 69(52.3%) were male which according to (Sannes, 2008) this was necessary to find out whether they were more women than men to help alleviate social issues in cases where women are exploited.

The study first objective was to establish whether the tea factories in central region had adopted eco design and the effect it has on performance. The study established that to a large extent they have adopted tea delivery gunny bags that are eco-friendly. However, the factories has to a small extent used eco-friendly materials on ventilation, have noise reduction measures, have processed tea packaged in eco-friendly materials, used eco labelling products and re-used packages. In support of above findings utilizing a sample consisted of 150 companies in electronics industry; Singhal (2013) reported a significant relationship between green design and environmental performance. Beyene (2015) added that green design results in enhanced environmental performance. There is need for the companies to carry out these approaches as noted by Muchiri (2011) that waste management involves source reduction the recycle and re-use waste management programs focuses on management of waste after it has been created.

From the study tea factories are able to collect waste for proper disposal and reduce damage to the natural habitat which positively affects performance of the tea factories. This in support to study by (Umeda *et al*, 2003). However, the reselling, re-using packages and reduction of costs due to recycling influence performance to a small extent in the tea factories. Ninlawan et al, (2010) also concurred that green packaging involves downsized packaging and use of green packaging materials. They also point out the need to cooperate with vendors to standardize packaging, encourage and adopt returnable packaging methods, promote recycling and reuse of packaging materials.In support of this study results according to their research findings, Rao and Holt (2005) showed that there exists a positive relationship between reverse logistics practices and organizational

performance, De Giovanni and Vinzi (2012) established that the existing relationship was not significant while Azevedo et al. (2011) found a combination of positive relationship as well as other relationships. Ongombe (2012) studied the relationship between reverse logistics and the competitive advantage it has on an organization with specific focus being on the water bottling companies in Nairobi and observed a positive relationship

Further on performance of tea factories as influenced by green production the factors such as controlled emission of smoke to the environment and environmental audits of supply base is average in the factories. Ninlawan et al, (2010) concurs that organizations can conduct Supplier Environmental Audits and Assessments to monitor supplier compliance to environmental standards and requirements. Other than the above initiatives organizations can opt for a participative approach to green purchasing by jointly developing cleaner technology and processes with their suppliers (Ninlawan et al., 2010). Nimawat and Namdev (2012) concluded that organizations and people must adopt environmentally responsible production and consumption in order to recover environmental quality, reduce poverty and bring about economic growth, with resultant improvements in healthy working conditions, and sustainability. Amemba et al. (2013) also concurs that for use environmentally friendly energy sources like solar energy, recycling of raw materials and use biodegradable energy sources and materials in manufacturing operations.This is concerned on how the production process can adhere to measures that protect the ecological economic and social issues (Toke, 2010). This deals with factors such as smoke emission**,** environmental audit, having a burning incinerator and use of hydro electrical power**.** From the study**,** smoke emission is well looked at and

environmental audits, though little is done on burning incinerator hydroelectric power where majority have not adopted with only a few who are up and running on hydroelectricity. Chen et al. (2013) confirmed the positive impact of green production on environmental performance of hi-tech companies in Taiwan. Yu and Ramanathan (2015) collected data from industrial firms in the UK in order to investigate the impact of green production on environmental performance. Their results revealed that green production operations are firmly related to positive performance.

The study fourth objective wanted to find out the effect of green procurement on performance of tea factories in Central Region where it is concerned with incorporating environmental consideration into a procurement process the findings. It was concluded that the tea factories have on average done collaborations with supply base to meet the environmental objectives but they have to a small extent been able to do the environmental audit of the supply base, undertake joint decisions with supply base about ways to reduce overall environmental impact of products, work with supply base to address the environmental problems but they child labour to small extent. This was supported by Zhu Qinghua et al. (2004) who also found out that the supplier's base had greater impact on the implementation of green supply chain.Fangmiao Hou, (2007) pointed out that the close cooperation of suppliers and buyers would promote the successful completion of green supply chain.

5.3 Limitations of the Study

The first challenge was to do with data collection cost, time and the unwillingness of respondents to participate. The topic too posed a challenge because a majority of the respondent were not sure on how to deal with some variables like reverse logistics for they did not understand it and therefore creating the need for more time and also asking for clarification. The benefits accruing in adoption are somehow not tangible thus laxity in late adoption by some factories. Further the findings show that most of the respondents were only familiar with ecological and economic part of the green supply chain and thus the questions on social aspects were somehow new to them. Further on, very few theories are there to give more weight to this study area and therefore one has to borrow much from the bigger field of social sciences.

5.4Recommendations

The tea supply chain should try to effectively adopt sustainable tea industry putting in consideration that it could be a cost today but a benefit in the long run. This is evident whereby the tea bonus earning have greatly improved over the four years in the study though other market demand and supply factors have contributed to the growth apart from green supply chain adoption.Among the practice those who have not put in place should thrive in adopting are reverse logistics for already used packaging which can be cost reducing method. There is need to also implement eco-designs in the tea factories since most of the factories have not adopted them and those who have implemented does not produce the needed or expected outcome. There is also need to use of alternative source of energy like the use of briquettes, husks and hydroelectric power which have

reduced cost by 75% for those who have implemented for example Maatara tea factory in Kiambu County.

5.5 Suggestions for Further Research

The study shows that more can be learnt about GSCM practices by accommodating more views from the players. This study gives room for a descriptive study as now some insight has already been obtained. The findings of the study also raise a number of additional research questions which may include similar research on the Agri business sector for Agriculture is the backbone of the Kenyan economy and the role of the government in the implementation of GSCM practices.

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APPENDICES

APPENDIX 1: INTRODUCTION LETTER

Bilha Ng'endo Mugo

P.O Box 1275 -10101 Karatina,

Tel: 0725 669 441

...../……...../2016

Dear Sir/Madam,

RE: ACADEMIC RESEARCH

I am a student at KCA University pursuing a post graduate degree with specialization in procurement and Supply Chain. As part of assessment for the awarding of the degree, I am conducting an academic research on effects of adoption of green supply chain on performance tea factories in Central Region.

You have been identified as suitable person to provide information on how green supply chain management has been adopted in your specific factory in respect to performance. The information provide is only used for the purpose of the research after adhering to high levels of Ethics when dealing with any information provided. Thanks in advance.

Yours Faithfully,

Bilha Mugo

APPENDIX 2: QUESTIONNAIRE

Part I: BACKGROUND INFORMATION

(Tick where appropriate)

1. Name of the factory……

2. Please indicate your level of education. Certificate ( ) Diploma ( ) Degree ( ) Post graduate ( )

3. What is your gender?

Female ( ) Male ( )

4. Age bracket

Below 25 ( ) 26-30 ( ) 30-40 ( ) Above 40( )

5. How long have you worked in your position

Less than 5( ) 5-10 ( ) Above 10 ( )

PART II: This section seek to investigate whether the Four variables of green procurement has been adopted appropriately in tea factories in Central region Kenya

A: Eco design

6. Among the following Eco- design practices, please tick the ones being practiced by your firm. (Where very large extent, large extent, average, small extent, very small extent and not at all) are represented by scores of 5,4,3,2 and 1 respectively

	5	4	3	2	1
Are the tea delivery gunny bags eco friendly					
Eco friendly materials on ventilation					
Do the factory has noise reduction measures					
Is the processed tea packaged in eco friendly materials					
Eco labelling of products					
Re-using packages					

B.Reverse logistics

7.Among the following reverse logistics practices, please tick the ones being practiced by your firm. Please indicate on a scale of 5 to 1, the extent to which the following have been implemented by your firm (where very large extent, large extent, average, small extent, very small extent and not at all are represented by scores of 5,4,3,2 and 1 respectively)

	5	4	3	2	1
Waste collection for proper disposal or recovery of useful parts					
Recycling of used products (re-processing or re-use)					
Reselling					
Re-using packages					
Reduced costs due to recycle/re-use					

C. Green production

8. Among the following green procurement practices, please tick the ones being practiced by your firm. Please indicate on a scale of 5 to 1, the extent to which the following have been implemented by your firm (where very large extent, large extent, average, small extent, very small extent and not at all are represented by scores of 5,4,3,2 and 1 respectively.

	5	4	3	2	1
Controlled emissions of smoke to the environment					
Environmental audits of supply base					
Do you have an waste burning incinerator					
Does your factory use hydro power					
Are there any certification due to adoption of ecological design					

D. Green procurement

9. Please indicate on a scale of 5to 1, the extent to which the above green procurement practices have been implemented in your firm? (Where a large extent, average, small extent, very small extent and not at all are represented by scores of 5,4,3,2 and 1 respectively

	5	4	3	2	1
Collaboration with supply base to meet environmental objectives					
Environmental audits of supply base					
Use of Child labour					
Joint decisions with supply base about ways to reduce overall environmental impact of products					
Working with supply base to address environmental problems and/or issues					

10. To what extent on a scale of 5 to 1, would you say the above green procurement practices have affected your firm's performance in terms of Compliance to environment protection here a large extent, average, small extent, very small extent and not at all being represented by scores of 5,4,3,2and 1respectively).

	5	4	3	2	1
Reduction of waste management fees					
Lowering of hazardous material management fees					
Savings from conserving energy water and fuel					
Elimination of fines (statutory) for non-environmental compliant					
Reduced input costs due to recycle/re-use					

11. To what extent on a scale of 5 to 1, would you say have affected your firm's performance in terms on the level of cost reduction, level of customer satisfaction, level of market share and level of compliance of government regulations in respect to ecological design, reverse logistics, green production and green procurement? (Where a large extent, average, small extent, very small extent and not at all being represented by scores of 5,4,3,2 and 1 respectively

	5	4	3	2	1
Level of cost reduction improvement with introduction of ecological design					
Level of cost reduction improvement with introduction of reverse logistics					
Level of cost reduction improvement with introduction of green production					

Level of cost reduction improvement with introduction of green procurement					
Level of customer satisfaction with introduction of ecological design					
Level of customer satisfaction with introduction of reverse logistics					
Level of customer satisfaction with introduction of green production					
Level of customer satisfaction with introduction of green procurement					
Level of market share with introduction of ecological design					
Level of market share with introduction of reverse logistics					
Level of market share with introduction of green production					
Level of market share with introduction of green procurement					
Level of compliance on ecological design according to government laid down rules					
Level of compliance on reverse logistics according to government laid down rules					
Level of compliance on green production according to government laid down rules					
Level of compliance on green procurement according to government laid down rules					

APPENDIX 3: LIST OF TEA FACTORIES IN CENTRAL REGION PER COUNTY

Kirinyaga County

1. Kimunye Tea Factory Co. Ltd

2. Kangaita Tea Factory Co. Ltd

3. Mununga Tea Factory Co. Ltd

4. Ndima Tea Factory Co. Ltd

5. Thumaita Tea Factory Co. Ltd

Kiambu County

1. Gachege Tea Factory Co. Ltd

2. Kambaa Tea Factory Co. Ltd

3. Kagwe Tea Factory Co. Ltd

4. Mataara Tea Factory Co. Ltd

5. Ndarugu Tea Factory Co. Ltd

6. Theta Tea Factory Co. Ltd

7. Maramba Tea Factory Co. Ltd

Muranga County

1. Nduti Tea Factory Co. Ltd

2. Gacharage Tea Factory Co. Ltd

3. Ikumbi Tea Factory Co. Ltd

4. Makomboki Tea Factory Co. Ltd

5. Kanyenyaini Tea Factory Co. Ltd

6. Kiru Tea Factory Co. Ltd

7. Gatunguru Tea Factory Co. Ltd

8. Gathambo Tea Factory Co. Ltd

9. Ngere Tea Factory Co. Ltd

10. Njunu Tea Factory Co. Ltd

Nyeri County

1. Chinga Tea Factory Co. Ltd

2. Gathuthi Tea Factory Co. Ltd

3. Gitugi Tea Factory Co. Ltd

4. Iriaini Tea Factory Co. Ltd

5. Ragati Tea Factory Co. Ltd