INFLUENCE OF GREEN SUPPLY CHAIN PRACTICES ON PERFORMANCE OF ENERGY AND PETROLEUM STATE CORPORATIONS IN KENYA

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Influence of Green Supply Chain Practices on Performance of Energy and Petroleum State Corporations in Kenya

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DECLARATION

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

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DEDICATION

This work is dedicated to my mother Jael Amukoa Akumbi and my wife Alice Namiti.

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LIST OF ACRONYMS AND ABREVIATIONS

CIPS Chartered Institute of Procurement and Supplies

EU European Union

GOK Government of Kenya

GDC Geothermal Development Corporation

GDP Gross Domestic Product

GNP Gross National Product

ERC Energy Regulatory Commission

IMF International Monetary Fund

KENGEN Kenya Energy Generating Company

KETRACO Kenya Electricity Transmission Company

KISM Kenya Institute of Supplies Management

KPC Kenya Pipeline Corporation

KPLC Kenya Power and Lighting Company

REA Rural Electrification Authority

RoK Republic of Kenya

NOC National Oil Corporation

SME Small and micro enterprises

WB World Bank

DEFINITION OF TERMS

Adoption of Green: A firm's tendency to voluntarily take up environmental conservation beyond its legal obligation (Freeman, 1984).

Energy Industry: The energy industry is the totality of all the industries involved in production and sale of energy including fuel extraction, manufacturing, refining and distribution (EU, 2011).

Firm Performance: Financial or non-financial Indications that a firm is able to meet at least some interests of most or all its stakeholders (Lebas, 1995).

Green Disposal: Product waste that decays naturally and in a way that is not harmful to the environment (Muma et al., 2014).

Green Distribution: Green distribution consists of green packaging and logistics (Muma et al., 2014).

Green Raw Materials: Non-toxic, biodegradable, ecologically inclined (not containing any NPE (nonylphenoxyethoxylate) raw materials or that use biotechnologies (Pickett-Baker, 2008).

Green Research and Design: Research and design for the Environment is a research and design approach to reduce the overall human health and environmental impact of a product, process or service, where impacts are considered across its life cycle (Athavaley, 2009).

Green Manufacturing: The manufacturing of "green" products, particularly those used in renewable energy systems and clean technology equipment of all kinds, and the "greening" of manufacturing — reducing pollution and waste by

minimizing natural resource use, recycling and reusing what was considered waste, and reducing emissions (Parthasarathy, Hart, & Jamro, 2005).

Green Manufacturing Technology: its use of clean manufacturing systems that reduce or eliminate polluting substances harmful to the environments. (Lean et al, 2016)

Green products: products that have been designed in a manner to reduce environmental impacts in their production, use and disposal after end life (All-recycling, 2011).

Green Public Procurement: Using public purchasing power to improve environmental footprint by acquisition of products and services with smaller-than-average environmental footprints (EU, 2016).

Green Supply Chain Practices: This included considering the impacts of the entire lifecycle of a product while sourcing, procuring and storing (IBM, 2009)

State Corporations: Organizations that are fully or partially owned by the government, established to achieve a specific purpose but with autonomous management structure out of the usual government ministry structure (Woo-Cumings, 1999).

Supply Chain Management: Encompasses all activities associated with the flow and transformation of goods from raw materials through to the end user, as well as the associated information flows. (Harland,1996)

Sustainability: A concept on use of natural resources to meet today's needs without compromising the ability of future generations to utilize the same (Hua, Ja & Pei, 2015).

ABSTRACT

Adopting green supply chain in business operations has become an important strategic issue that organizations are today dealing with. This is in order to meet legal obligations, enhance sustainability, improve image and attract green funding. Adopting green supply chain means greening functions. Among the key functions in any business is supply chain management. Through supply chain, raw materials, parts and technologies are brought in to a firm. This realization has jolted businesses to work towards reducing their impacts on the environment by adopting green in their supply chain processes. In addition, power production and distribution is among the highest contributors to environmental degradation through carbon emissions and depletion of forest cover. Although research has been done on several aspects of firm performance, there is a gap on how adoption of green supply chain practices affects organizational performance of state corporations in Kenya. This is the gap that this study aimed to fill. This study used a descriptive design to describe the phenomena of how green supply chain practices affect performance. Thus, the main purpose of the study was to determine the influence of green supply chain practices on performance of the energy and petroleum state corporations in Kenya. The specific objective were to assess influence of green raw materials on performance of energy and petroleum state corporations in Kenya, establish use of green manufacturing technologies on performance of energy and petroleum state corporations in Kenya, determine influence of green distribution on performance of energy and petroleum state corporations in Kenya, ascertain influence of green disposal on performance of energy and petroleum state corporations in Kenya, establish whether regulatory framework moderate the relationships between the green supply chain practices and performance of energy and petroleum state corporations in Kenya. The study adapted a survey research design. It targeted all the 10 energy related state corporations in Kenya. Two hundred and fifty five employees manning the procurement departments in the said corporations were sampled from the 761 total. The sampled employees were stratified according to cadres to ensure proper representation. Primary data was collected using self administered questionnaires filled by the sampled employees. Further, there was one questionnaire to each Finance Manager in each state corporation and 1 questionnaire to a stakeholders and another one to the environment officer to help collaborate the information collected from the procurement officers. Additional secondary data was sourced from material such as annual reports and policy documents publicly available. Quantitative data was then coded and analysed as per the study objectives using SPSS. Content analysis was done on qualitative data to derive meaning. Data was then presented in figures, tables and charts and discussed as per the objectives. Results indicated that green supply chain practices; considering the use of green raw material, considering the use of green manufacturing technology, considering green distribution, considering products capacity for green use, and considering green disposal are significantly related to performance of energy and petroleum state corporations in Kenya. The relation is inverse meaning a rise in the practices lowers performance. The study also established that regulations and policy frameworks on environmental conservation moderates the relationship between green supply chain practices and performance of energy and petroleum state corporations in Kenya. Based on these findings, it is recommended that the government develops green supply chain policy and guidelines that will motivate energy and petroleum state corporations to adopt green supply chain practices.

CHAPTER ONE
INTRODUCTION

1.1 Introduction

This chapter provides information on the background to the study. It also provides a statement of the problem and objectives of the study. It states the questions the study sought to answer, the justification, limitations of the study and concludes with the scope.

1.2 Background of the Study

There is an ongoing debate regarding the effectiveness of various environmental practices designed to meet the complex and conflicting environmental pressures from various sources in improving the competitiveness of business concerns. This debate has received a growing attention in recent years among researchers and practitioners. Specifically, much attention has been given to the ability of such practices in enabling firms to achieve adequate levels of environmental and economic performances (Zeng et al., 2010; Zhu et al., 2012).

There has been increasing emphasis on environment-friendly corporate activity in recent times, and many progressive companies are embracing green procurement. Numerous studies have attempted to find and explore green procurement. Green supply chain alludes to the manner by which advancements in green purchasing and industrial purchasing might be considered given the environment (Sung Rha, 2010). Green supply chain means to adjust marketing performance with natural issues. To address with difficulties, for example, Kumar and Chandrakar (2012) note that conservation of energy and decrease in pollution, undertakings have endeavored to green their supply chains, that is, to make systems of suppliers to buy products that are environmental friendly or to create agreeable ways to deal with decrease in waste and operational efficiencies. With regard to environmental performance management, coercive pressure provides a minimum level of compliance to requirements amongst suppliers but tends to be limited in its capacity to encourage advanced performance outcomes such as new knowledge or innovation. Collaboration on environmental performance issues tends to increase the range and complexity of possible outcomes such as new products or technologies but requires a far greater level of involvement for customers and suppliers (Simpson & Samson, 2010)

Green supply chain strategies become more complex and involve greater levels of relationship investment for their potential to be realised (Simpson & Samson, 2010).

Seuring (2014) points out that green procurement and logistics endeavors have made firms consider shutting the supply chain loop. Inside green procurement exercises, recoverable product environments, and the outline of these products and materials, have turned into an inexorably critical fragment of the general push in industry towards ecologically cognizant production and logistics for increase in competitiveness. Zhu and Sarkis (2006) note that the green procurement covers wide areas of green supply management practices (GSM) and SCM's participants and activities from green purchasing to coordinated supply chains occurring from providers, to producers, to clients, and to the turnaround supply chain.

Green supply chain structures are attractive since they make the administration more receptive to proactive strategies that make them competitive. Green supply chain is increasing enthusiasm among specialists and practitioners of supply chain management and operations. The developing significance of green supply chain is driven primarily by the raising destruction of the environment, for instance decreasing raw material assets, flooding waste sites and expanding level of contamination. On the other side, it isn't just about being friendly to the environment; it is about great negotiating prudence and higher profit. Toke, Gupta and Dandekar (2010) note that the green procurement incorporates buying and in-bound logistics like materials administration, generation, outbound logistics and reverse logistics.

The liberalization of the Kenyan economy in the early 1990's led to unprecedented level of competition from manufacturers who came in from other countries. Additionally, the 1999 enactment of the Environmental Management and Coordination Act (EMCA) meant that organizations, both public and private had to deal with a range of legal requirements aimed at conserving the environment. These include annual environmental audits, noise control, environmental impact assessments at the inception of any potentially environmental harmful projects among others (RoK, 1999). All these requirements go to eating up a firm's income and ultimately, raise their production costs, making them less competitive (Wanjohi et al., 2016).

Moreover, customers and communities hosting both private and public firms are becoming more aware of such firms' responsibilities to them, which include conserving their environmental integrity. The above requirements leave firms with no option but to ensure their processes do not pollute the environment. The challenge has been in

establishing whether strategies used by firms for firm performance are mutually exclusive of proactive environmental conservation. The costs involved in cleaner production are enormous. Firms need to procure environmental friendly technologies, train staff and hire others with the right skill sets and continuously audit processes to ensure they comply with set pollution and other environmental protection guidelines (Wanjohi et al., 2016). Scholars are in agreement that complying with environmental regulation is expensive. Spending on a cleaner environment can lead to a raise in the cost of goods produced and hence reducing their consumption (Simpson and Samson, 2010).

Supply Chain management is a critical service work in any association. Basheka (2008) points out that there is as yet an information gap on how the procurement procedure can add to enhanced performance of the supply chain function among developing nations. Research in the field of administration by Lardenoije, Van Raaij, and Van Weele, (2005) demonstrate that associations have focused on expenses or reserve funds as the sole pointer or measure of performance. On the off chance that costs decrease, the supply chain function capacity will be applauded, while if investment funds decrease, the supply chain function capacity will be questioned. It seems as though the purchasing capacity is built up to center around limiting expenses while expanding effectiveness. Money related measures disregard market elements and expanded multifaceted nature in securing of products and ventures for public entities (Kipchilat, 2006).

1.2.1 Overview of Green Supply Chain Practices

As per the Australian Chartered Institute of Purchasing and Supplies Management, Supply chain management is the business administration work that guarantees recognizable proof, sourcing, access and administration of the outside assets that an association needs or may need to satisfy its key targets (CIPS, 2007). Accordingly, supply chain management exists to investigate supply market openings and to actualize resourcing procedures that convey the most ideal supply result to the association, its partners and clients. Chartered Institute of Purchasing and Supplies additionally says that supply chain management incorporates exercises and occasions when the marking of an agreement and additionally the general administration exercises related with a scope of agreements. These are, pre-contract exercises, for example, planning, needs identification and examination, and sourcing, post-contract exercises, for example, contract administration, supply chain management and disposal, and general exercises, for

example, corporate governance, supplier relationship management, management of risk and administrative consistence (CIPS, 2007).

Supply chain conveys a scope of advantages. It not only looks to decrease costs and to guarantee supply, it likewise bolsters key organizational objectives, for example, market extension and product advancement. The Chartered Institute of Procurement Management has recognized seven main advantages of procurement. These incorporate security of supply, lesser costs, decreased risk, enhanced quality, more noteworthy included value, expanded effectiveness and innovation. As indicated by IBM Global Business Services (2009), green supply chain then again includes considering the entire life cycle of a product, covering perspectives, for example, the obtaining of raw materials utilized, the quality of the product or its manufacturing forms, on the off chance that it contains any reused materials, the measure of packing utilized for the product, regardless of whether it is energy or water proficient, upkeep required, potential for reuse or reusing, disposal choices, where it is made and if the product is supporting fair trade.

Green supply chain is tied in with picking products that are less harming to the earth and human prosperity than the products as of now being acquired. Green supply chain isn't tied in with purchasing the 'greener' product available, it's tied in with sourcing 'greener' and discovering products that suit organizational requirements (Kennard, 2006). Green supply chain is a strategy for supply chain where ecological and social contemplations are taken with weighting to price, accessibility and performance.

Each product bought impacts on the earth and along these lines on human prosperity amid its life cycle. Bobis and Staniszewski (2009) note that individuals' purchasing, utilization and waste disposal decisions can have any kind of effect in their local group as well as on a worldwide scale. Green supply chain activities can possibly convey noteworthy market changes towards economical utilization all through the world. This has both monetary and ecological results. As indicated by Victor and John (2009), green procurement’s standards incorporate limiting superfluous supply chain, limiting waste, limiting harmfulness, limiting habitat pulverization, limiting soil corruption, limiting ozone harming substance discharges, boosting energy proficiency, expanding water effectiveness, amplifying an incentive for cash, augment reasonable trade opportunities, augment the buy of eco-labeled ecologically favored products/services, augment training for supportability opportunities and in conclusion, augment safety.

Measuring supply chain effectiveness has always been an interesting topic for organizations and corporations. The pressure of reporting of the effects of the supply chain function to the management is high and in many cases related to the personal performance targets of procurement staff. Cabral et al, (2012) conceives green supply chain as a system that includes the design of products, supply and use of green materials from suppliers, green consumers and green manufacturing processes, in addition to management that must be performed at the end of the useful life of a product.

Mendoza-Fong et al, (2018) say that green supply chain consists of three components or fundamental elements; suppliers that provide raw materials to the manufacturer, green production processes that transform the raw materials to finished products and distribution that lead the product to final customers through distributors, warehouses and wholesalers among others.

The viable supply chain function management ought to recognize intricacy, locate the correct abilities and compose the work, Develop a sound methodology, manage timetable successfully, Follow sound offer assessment strategy and build up a keen, reasonable contract. Effective supply chain requires composed collaboration: experts, duties, schedule, and assets (Eduardo, 2004). Gunasekaran et al. (2004) notes that it is not easy to determine the numerical estimation of cost savings produced through effective procurement management, it is crucial to take into account all the other factors that might influence the effectiveness of supply chain function. These factors may include issues such as a new service model, better payment terms or a decreased number of suppliers.

1.2.2 Global Perspective of Green Supply Chain Management

Across the world, public authorities are increasingly becoming aware of their environmental impacts and their responsibility to reduce them. Green public supply chain management is a well-established and fast developing concept. In Africa, South African companies have been integrating sustainability issues. An example is Woolworths who are offering environmental friendly products and charging a premium for them. This includes organic foods which people are willing to buy at a higher price (Mazumder, 2010).

In Europe for example, it is gaining momentum as the vehicle of choice for public authorities to manage their environmental impacts and influence business and society to

do the same. Green public supply chain is practiced by many governments, and is generally underpinned by robust international and national policy frameworks (EU, 2016). Whilst implementation models differ, the use of agreed, minimum environmental product specifications is widespread and appears to be the main mode of delivery, widely supported by governments.

The huge resources that organizations and governments spend in supply chain function can be directed towards creating need for environmental conservation. In the European Union for instance, public procurement accounts for approximately 19% of the GDP. The EU is keen to harness this purchasing power to lower environmental impacts and incentivize the market to develop green technologies and products (EU, 2016).

Countries, in Europe and some in the Scandinavia have practiced green public supply chain for a long time. Sweden for instance, has been a long-standing and strong proponent of integrating environmental criteria in public procurement. Whilst implementation of green public procurement (GPP) is voluntary, the legal framework allows for criteria other than price (i.e. environmental) to be taken into account in the procurement process. Responsibility for sustainable procurement lies with the Swedish Ministry for the Environment; the Swedish Environmental Management Council (MSR) implements GPP. Sweden develops its own sustainable product criteria. As of May 2013 sustainable product criteria for 9 product groups was in place. These are broadly in line with the Pan-European GPP criteria. There is a process-specific target in place, namely, to increase the criteria documents to 60 by 2015

Another country that places importance in green procurement is Netherlands. Like Sweden, the Netherlands has a long-standing commitment to sustainable supply chain management. Responsibility for overall implementation lies with the Ministry of Infrastructure and the Environment, a federal body. This is supported by a number of other state bodies that have responsibility for implementation at regional and local government levels. The method of implementation, as set out in the National Action Plan (published in 2003), is through the use of sustainable product criteria. This is underpinned by political, output-based targets for federal government and decentralized public sector administrations (Provinces, Municipalities, Water boards) and regular monitoring. The EU, (2016) further adds that legal framework removes barriers but does not mandate the

use of these criteria. As of May 2013, criteria documents had been developed for 50 product groups.

In addition to the two countries, Norway was one of the early adopters of green supply chain. Whilst Norway is not an EU Member State, it is subject to similar legislation as the rest of the EU. However, public sector supply chain managers are bound by law to taking environmental aspects and life cycle costs into consideration when planning all public supply chain and, as far as possible, specifying concrete environmental requirements. According to EU (2016), the latter are largely in the shape of product standards. Responsibility for policy development lies with the Ministry of Environment and implementation with the Agency for Public Management and Government (under the Ministry of Government Administration and Reform). Norway has also developed environmental criteria for 14 prioritized product groups. There are no set implementation targets and monitoring is ad hoc.

1.2.3 Local Perspective of Green Supply Chain Management

Kenyan organizations practice green supply chain for various reasons ranging from energy conservation to lowering of their annual spending levels (Omariba & Iraki, 2013). Big organizations like Standard Chartered Bank Kenya Head Office in Nairobi adopted a new building, which is "environmentally friendly, energy efficient and has large office areas which are very well laid out." The building had been built to the Global Office Workplace Standards which are a clearly defined set of standards for all the Group's new buildings across the world which is in the banks` commitment to building a sustainable business over the long-term and is trusted worldwide for upholding high standards of corporate governance, social responsibility, environmental protection and employee diversity (Omariba & Iraki, 2013). Another sustainability driven Kenyan company is Safaricom. Every year, since 2012, the company publishes annual sustainability report. The report aims at raising awareness on sustainability and examines the company's social economic and environmental impacts (Safaricom, 2018).

In Kenya, public supply chain management is guided by the Public Procurement and Assets Disposal Act (2015). This law means to set up strategies for procurement and the disposal of unserviceable, out of date or surplus stores and equipment by public entities to accomplish the accompanying destinations: to augment economy and proficiency; to advance rivalry and guarantee that contenders are dealt with reasonably; to advance the

uprightness and decency of those techniques; to build straightforwardness and responsibility in those systems; and to expand public trust in those methods and to encourage the advancement of local industry and monetary improvement (RoK, 2015). Although the law does not directly cite environmental conservation as one of its objectives, it is flexible enough to allow for green supply chain in that it maximizes economy and efficiency of the procuring entity.

Be that as it may, as Brammer and Walker (2011) note that Kenya, as one of the developing nations has been moderate in taking up organized and policy-driven way to deal with improving reception of green supply chain the advantages accruing in any case. The government has however put in place a wide range of policy, institutional and legislative to govern all business activities to ensure there is protection of the environment (Odhiambo, 2008). The Public Procurement and Disposal Act (PPDA) of 2005 and the Procurement Regulations of 2006, for instance has presented new benchmarks for public procurement in Kenya.

Another sustainable driven company in Kenya is Unilever. A study found that top management greatly supports adoption of green supply chain. This is in consonance with their corporate behaviour of being transparent in its dealings, fair in competition and law abiding (Wanyonyi, 2013).

1.2.4 Energy and Petroleum Production and Distribution in Kenya

Kenya is in a very interesting development phase with regards to its domestic energy requirements. In the past two decades the country grappled with the challenge of unreliable, expensive and unsustainable energy use supporting a stagnating industrial and manufacturing base. This is due to aging energy infrastructure that can no longer meet the modern day requirements as envisaged in the country's economic blueprint, the Kenya Vision 2030 (IEA, 2015).

At the same time the country has recently made some welcome discoveries in the form of coal, oil and gas deposits that could significantly change the structure of the economy, with major contributions to public revenue as well as impact on other economic sectors. By 2009, Kenya had a national electrification level that was below 15%. Just around 5% of the rural family units' approach electricity while biomass, mainly firewood, which represents 77% of the aggregate energy, expended (Christopher et al., 2009). Kenya's

energy sources comprise of imported petroleum products and inexhaustible sources which incorporate biomass, hydro, geothermal, solar-based and wind (around 0.01%).

The aggregate installed electricity limit was 2,333.6 MW in 2015 included hydro-electric 52.1%, geothermal 13.2%, conventional thermal 32.5%, wind while others represented 2.2%. Broadly 69% of all family units utilize firewood for cooking. It is assessed that the current renewable energy power generation is just 5% of the aggregate potential. Huge potential exists for generation from wind, solar, geothermal and hydro resources (RoK, 2016). The Kenyan government has planned to raise total installed capacity to 6,762MW by 2017 of which 55% would consist of thermal and 32% of geothermal. Geothermal generation appears to be very attractive as it presents the highest efficiency rate and does not rely on any combustible energy sources that need to be imported. Moreover, it is a renewable source of energy, which has no sizable adverse effects on the environment (RoK, 2012).

According to Mugenya, (2014) it is anticipated that peak demand will be 18,000MW in 2030 against installed capacity of 24,000MW. The bulk of this generation capacity is expected to come from fossil fuel sources, geothermal, nuclear, wind and solar. The drastic rise in demand will require adoption of production strategies that will result to cheap and reliable energy generation. This will most likely lead to hastening nuclear energy generation and use of recently discovered coal deposits to generate.

These generation methods are harmful to the ecosystem. Care needs to be exercised by the power sector players to lower their impacts on the environment as a mitigation towards the expected impacts from exploitation of fossil fuels and nuclear to generate additional power. The production of electric power delivers more contamination than some other single industry in the United States. The energy sources most usually utilized for power creation petroleum derivatives, for example, coal, oil and flammable gas; are known as non-inexhaustible assets. They take a huge number of years to be shaped in the outside layer of the earth by regular procedures. When consumed to deliver power, they are gone forever (Warde & Lindmark, 2006).

Consuming petroleum derivatives, for example, coal or oil makes unwelcome by-products that pollute when discharged into our environment, changing the planet's atmosphere and hurting environments. As per the Energy Information Administration

(2007), the U.S. power generation industry is in charge of; 62.6% of U.S. sulfur dioxide outflows that add to acid rain, 21.1% of U.S. nitrous oxides discharges that add to urban smog, 40% of U.S. carbon discharges that add to worldwide environmental change. Among the other major ecological issues connected to electricity are water effects, generation of waste and the disturbance of land uses.

According to Keay, (2007) by-products of electricity production are also harmful to the environment. These incorporate; Nitrous oxides outflows add to ground-level ozone, particulate matter contamination, smog pollution in national parks and wilderness zones, dark colored clouds in significant western urban areas, acid deposition in delicate biological systems the nation over, and the eutrophication of seaside waters and lifted ozone levels enduring all through the nation have likewise prompted the antagonistic health impacts of smog and millions of dollars in horticultural harm. A convincing collection of logical confirmation connects fine molecule concentrations with disease and a large number of unexpected losses every year. The elderly and children are especially in danger. Further, Power generation is the biggest source of greenhouse gas (GHG) discharges. Rising levels of GHG have made logically more transmitted energy from the sun wind up caught in the environment and held by the planet, bringing about worldwide patterns towards a sultrier earth. This pattern is ordinarily alluded to as global warming or environmental change. Albeit a few groups fight that GHG has nothing to do with environmental change, there are evident signs that something isn't right - hotter winters, cooler summers, floods, tropical storms, storms and dry seasons. In the course of recent 150 years, carbon dioxide gas has risen from 280 parts per million (ppm) to around 380 ppm.

Contrasted with the mid 1990s, in the mid-2000s, the development of petroleum gas plants multiplied because of demand bringing about higher fuel costs yet negligible decline in emissions (Department of Energy, 2003). Diminishing our utilization of electricity has sudden effects on the air quality by lessening emissions. This will yield huge societal advantages to general health. Tragically, accessibility of satisfactory electricity is a noteworthy determinant of a nation's capability to develop and grow.

Bharvirkar, et al. (2003) point out that all energy sectors have reportedly attempted to minimize the effects of environmental concerns especially those associated with energy production. Due to the ever rising demand for energy, especially in the developing

countries, these efforts need to be stepped up. Green supply chain is one initiative that can help to minimize energy production impacts on the environment. Additionally, green supply chain in the public sector can be used to steer suppliers and an economy at large towards adoption of green.

1.3 Statement of the Problem

In recent times, humanity has been facing existential threat from the effects of climate change. The threats have been direct to lives through extreme weather patterns such as floods, droughts and famine as well as changing patterns of disease occurrence and spread. The contribution to climate change by human economic activity is among the important discussions in recent times. According to Elizabeth and Helen (2015) , this has resulted from the realization that climate change, if unchecked, has potential to wipe out life on planet earth through depletion of life supporting systems such as clean water and air, destruction of habitats and increased natural disaster occurrence including disease outbreaks (Cahil & Ftizpatrick, 2006).

Without sound green supply chain practices being implemented in the most polluting sectors such as energy generation and distribution in the developing countries, researchers are constrained in assessing which practices work best to promote well-performing firms and in proposing socially beneficial reforms (Masters, 2004). This helps in explaining why the study of the influence of green supply chain practices on firm performance among the energy and petroleum state corporations in Kenya was needed.

Research indicates that adopting green practices has several benefits. To begin with, it is a self-preservation strategy against the vulgaries of climate change such as depletion of raw materials. Other benefits include access to affluent markets, access to special financing, good public image, approval from environmental regulatory authorities and it can also be a source of competitive advantage (Wanjohi *et. al*, 2016). There are also dissenting views on the benefits of adopting green. Some researchers like (Godstein, 1995) argue that the costs associated with adopting green far outweigh the benefits. Such include the cost of new technologies, lower productivity, specialized staff recruitment, training and development among others.

As such, there is no unanimity on economic usefulness of adopting green. That may not be construed to mean that adopting green has no specific benefits in enhancing performance of specific organizational functions such as procurement. Nasiche (2014)

points out that in Kenya, adoption of green procurement has been slow resulting in lower diffusion rate. This could be attributed to inadequate information on the contribution of green public procurement practices towards firm performance.

In all the studies cited, it was evident that the findings were conflicting with studies from different regions providing different conclusions. Furthermore, managers are evaluated based mainly on financial performance criteria. It is evident that there is inadequate data that can help managers to decide on whether to adopt green procurement practices based on their relationship with performance. This study aimed to establish the convergence, or divergence of performance and green supply chain practices.

1.4 Objectives of the Study

The general and specific objectives of this study were as outlined below.

1.4.1 General objective of the study

The general objective of this study was to determine the influence of green supply chain practices on performance in the energy and petroleum state corporations in Kenya.

1.4.2 Specific Objectives

The following specific objectives guided this study;

1) To assess the influence of use of green raw materials on performance of energy and petroleum state corporations in Kenya.

2) To establish influence of use of green manufacturing technologies on performance of energy and petroleum state corporations in Kenya.

3) To determine influence of green distribution on performance of energy and petroleum state corporations in Kenya

4) To ascertain influence of green disposal on performance of energy and petroleum state corporations in Kenya.

5) To establish influence of regulatory framework moderate the relationships between green supply chain practices (green raw materials, green manufacturing technology, green distribution, green disposal) and performance of energy and petroleum state corporations in Kenya

1.5 Hypotheses

The following null hypotheses were tested in this study;

H_{01}: Use of green raw materials has no significant influence on performance of energy and petroleum state corporations in Kenya

H_{02}: Use of green manufacturing technologies has no significant influence on performance of energy and petroleum state corporations in Kenya

H_{03}; Use of green distribution has no significant influence on performance of energy and petroleum state corporations in Kenya

H_{04}: Green disposal has no significant influence on performance of energy and petroleum state corporations in Kenya

H_{05}: Regulatory framework has no significant influence between green supply chain practices (green raw materials, green manufacturing technology, green distribution, green disposal) and performance of energy and petroleum state corporations in Kenya

1.6 Significance of the Study

Energy production is among the most environmentally harmful human practices around the world. In the developed countries like the USA, electric power generation produces more pollution compared to any other single industry. The situation is not very different in developing countries like Kenya where renewable energy sources account for a small fraction of the overall energy production mix. According to Aulera (2009), renewable energy sources, mainly geothermal and solar contributed 6.15% of total energy production in Kenya.

The projected steep rise in energy demand to facilitate the achievement of Kenya's Vision 2030 will lead to a rise in environmental pollution. This will lead to depletion of important resources such as water which is used to sustain life and also produce energy, clean air and fertile productive soils. The government can help to check the rate of environmental depletion through energy production by ensuring that as much as possible, it practices green procurement. That is the basis on which this study is based.

This study is important to a number of stakeholders.

1.6.1 State Corporations

To the state corporations, the study will give a clear indication as to whether there are performance benefits that can be derived from being green. This will enable them to carry out an objective cost benefit analysis in the process of adopting green environment. Next are environmental lobby groups. This study will help them in lobbying such state corporations and other manufacturers and other business concerns by not only insisting on environmental conservation for sustainability's sake but also as a means of improving performance.

1.6.2 National Environment Management Authority

The next group that will benefit from this study is the National Environment Management Authority (NEMA), the government's environmental management arm. NEMA will be at a position to gauge the awareness levels of state corporations on environmental conservation and their role in it. This will inform NEMAs awareness programming targeting state corporations and other public bodies. Lastly, this study will impact the lives of all Kenyans, current and future generations. This is by continuing to raise awareness on the need to conserve the environment and safeguard the live supporting natural systems required for life today and by future generations.

1.6.3 Government and Policy Makers

This study is as well important to the Kenyan government and policy makers, in that the recommendations derived from the study are vital in guiding the supply chain strategies and policies that can significantly improve on supply chain status in the government and positively impact the GDP of the Country. The study can also be used as a reference by the Public Procurement and Oversight Authority (PPOA) when developing policies, regulations and legal proposals regarding green supply chain.

1.6.4 Researchers and Future Scholars

This study will add to the body of knowledge by further exploring green supply chain practices in a developing economy and its effect on performance of energy and petroleum state corporations. Study findings provide theoretical insights on applicability of green supply chain practices in energy and petroleum state corporations.

1.7 Scope of the Study

This study was centered on the influence of green supply chain practices on performance of energy and petroleum state corporations in Kenya. Green supply chain is an important entry point in greening the organization. This is the entry point of raw materials, parts for further processing and technologies used in production. Lowering carbon foot print during procurement leads to an overall reduction of carbon footprint throughout the value addition process. Energy and petroleum production and distribution, are among the most environmentally polluting human undertaking. Serious environmental conservation must therefore start by looking at how energy and petroleum are produced and distributed.

In Kenya, energy and petroleum are produced/generated and distributed by government owned state corporations. Currently, there are ten state corporations involved in energy production, distribution, research or as sector watch dog with a total of 761 procurement staff of different cadre. The study involved a census of the entire 10 state corporations as indicated on Appendix (VI). Sampled staff of different cadre; top management, middle management and lower cadre, took part by filling a self-administered questionnaire. The study focused on four green supply chain practices, green raw materials, green manufacturing technologies, green distribution and green disposal.

1.8 Limitation of the Study

The study scope was limited to respondents drawn from 10 energy and petroleum state corporations. This may limit the generalization and application of the findings to other public institutions. It may be necessary to undertake more studies in different state corporations to establish trends that are generalizable. However, the information generated would assist in directing the adoption of green supply chain practices.

CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

This section deals with reviewed literature deemed relevant to the study. It provides a theoretical and empirical grounding for the problem under investigation. The section is separated in to several sections. The first part identifies and explains the theoretical framework models on which the study was based. Second part relates the dependent and independent variable in a conceptual framework, which guided the entire study. Next will be a look at the study variables and how they were measured followed by a brief on related empirical studies. Thereafter it discusses the research gaps which this study aimed to fill and the chapter summary.

2.2 Theoretical Review

Several theories have been advanced to explain adoption of green environment in management processes and firm performance. This study was grounded on a few such theories. These are; the social-economic theory, the stakeholder's theory, natural resource based view theory. Others are; the innovation theory, the economic approach theory and the institutional sociology and appreciative management theory.

2.2.1 Socio-economic Theory

Sutinen and Kuperan (1999) propounded the financial hypothesis of consistence by coordinating monetary hypothesis with speculations from brain research and humanism to represent moral commitment and social impact as determinants of people's choices on consistence. As per Lisa (2010) mental points of view give a premise to the achievement or disappointment of authoritative consistence. Wilmshurst and Frost (2000) included that the authenticity hypothesis hypothesizes that the association is mindful to unveil its practices to the partners, particularly to people in general and legitimize its reality inside the limits of society. This hypothesis, which centers around the relationship and communication between an association and the general public, gives an adequate and prevalent focal point for understanding government acquirement framework (Hui *et al*., 2011). From this hypothesis, we can comprehend the approach, arranging and feasible acquisition hones in broad daylight organizations and their effect on benefit conveyance to the general public. The hypothesis bolsters the autonomous factors in this examination. Further it lays basis for the independent variables green distribution and green disposal.

2.2.2 Stakeholder Theory

As per Freeman (2014b), a partner is any gathering or person who can influence or is influenced by the accomplishment of the association's targets. Miles (2006) states that the association itself ought to be thought of as gathering of partners and the reason for the association ought to deal with their interests, needs and perspectives. Freeman (2014a) characterizes partners as those gatherings who are fundamental to the survival and accomplishment of the enterprise. The hypothesis is to a limited extent worried about the impact of an extensive variety of on-screen characters in an association's situation on authoritative execution the same number of analysts have contended (Donaldson &Preston, 2005; Freeman, 2014; Quin & Jones, 1995; Mitchell et al., 1997). Not at all like conventional information yield models of association execution, partner hypothesis underlines the cooperation between intrigue gatherings, for example, the association's workers, individuals from the social group, investors, and other united associations, in deciding association execution.

A few partners distinguished by Friendman and Miles (2006) incorporate, clients, workers, nearby groups, providers and wholesalers, the media, people in general as a rule, business accomplices, who and what is to come, past ages (originators of associations), scholastics, contenders, non-Governmental associations or activists thought about exclusively, partner delegates, for example, exchange associations or exchange relationship of providers or merchants and agents, other than investors (obligation holders, bondholders, lenders), contenders, government, controllers and policymakers. Present day essayists have distinguished the common habitat as a feature of an association's partners. This has been informed by the important role that the natural environment plays in the success of businesses. Most raw materials are found as naturally occurring substances, plants and plant products, animal or animal derivatives and minerals among others. The environment also acts as the sink at the end of the pipe.

It is thus impossible to think of success and performance of manufacturing firms without the natural environment. According to Porter (1980), competitive advantage and hence high performance can be achieved by controlling raw material source. In order to safeguard this important stakeholder, firms have an important role in pollution and emission control through active and proactive measures. This theory supported the green

disposal and the firm performance variables in this study as the green environment forms part of the stakeholders to the state corporations.

2.2.3 Natural Resource Based View Theory

Scientists in the field of administration have long comprehended that upper hand relies upon the match between particular inside (hierarchical) capacities and evolving outside (natural) conditions (Andrews, 2001; Chandler, 1962; Wang & Li, 2008; Penrose, 1959). According to Hart (1995) it was only in the 1950s that a bonafide theory, known as the resource-based view of the firm, emerged, articulating the relationships among firm resources, capabilities, and competitive advantage. The match between internal and external environments according to Porters (1995) leads to competitive advantage due to cost leadership and quality differentiation.

Afterwards, it was noted that "competing for the future" is an important measure of competitive advantage. According to Hamel and Prahaland (1994) the firm must not only strategize on current/ short term profitability and competitive advantage but also the long term ones. The asset based view sets that upper hand can be managed just as the abilities making it are upheld by assets that are not effectively repeated by contenders (Hart, 1995).

Recent environmental challenges facing the world have led to scrutiny of human economic activity, especially manufacturing. Projected population growth in the next 40 years will lead to accelerated production. According to Gore (1992), this growth might not be ecologically sustainable. Such production will stress the earth's natural systems beyond recovery (Commoner, 1992). As such, economic activity must change or risk irreversible damage to the planet's basic ecological systems. This theory also forms the basis for the green raw material variable as the natural environment is a key success factor especially in the energy and petroleum related state corporations.

2.2.4 Theory of Innovation

This theory is attributed to Schumpeter (1934, 1939, 1943). The theory had low status until end of 1970s. The economic depression of the 1970s and the subsequent boom lead to the conclusion that innovations are the determinants responsible for most growth when an economic boom begins in a period of depression (Freeman, 1974). Earlier on, Schumpeter (1943) had credited benefit to dynamic changes coming about because of a

development. To begin with he takes an industrialist shut economy which is in a stationary balance. This harmony is portrayed by what Schumpeter calls a "roundabout stream" which keeps on rehashing itself for ever. In such a static state, there is superbly focused balance. The cost of every item just equivalents its cost of creation and there is no benefit. Just exogenous elements like climate conditions can cause changes in the roundabout stream position. In the roundabout stream position products are being delivered at a steady rate. This normal work is being performed by the salaried directors. The business visionary exasperates the channels of this roundabout stream by the presentation of an advancement. In this way Schumpeter doles out the part of a trailblazer not to the industrialist but rather to the business person. He underscores making new esteem creating exercises as a method for scanning for higher benefits from development. Such esteem age can be tapped from selection of the green condition.

Sundbo (1998) argues that innovations are important to the national economy during periods of depression. He adds that it is also important to individual organizations because it portends potential for expansion and future profits. Being innovative includes adopting issues of current global concern in to business processes in a manner that gets the business competitive advantage (Porters, 1995). According to Wanjohi (2016) the current global concern is climate change and its effects to human lives and livelihoods. Well managed organizations are innovatively adopting the green environment in their processes to gain competitive advantage. This theory supports green manufacturing technology variable in this study.

2.2.5 The Economic Approach Theory

The monetary approach portrays firms' reception conduct as driven by execution results. A firm will more probable receive a procedure or an advancement which will specifically prompt enhanced benefit. This hypothesis tries to recognize the conditions when it pays to be green and that chiefs show normal conduct when they embrace past consistence natural practices otherwise called ecological proactivity (Russo & Fouts, 1997; King & Michael, 2001). It will be expected that firms will adopt any practice that results to economic gain. As such, should it be established that adoption of green environment positively affects economic outcomes of a firm; such a firm will willingly adopt such practices to maximize on such gain.

Green adoption has been credited with winning firms' environmental conscious high end clients, opening up controlled western markets, lowering of production costs and in the public sector, attracting green donors and green grant makers as well as setting an important example to the private sector (Wanjohi, 2016). The above theory supports the dependent variable, firm performance. This is because firms will adapt processes that make them effective and efficient, which leads to improved overall productivity. The theory supports the dependent variable, firm performance.

2.2.6 The Institutional Sociology Theory

This theory is established in institutional sociology forms through which firms react to institutional pressures. The institutional sociology system accentuates the significance of administrative, regularizing and psychological variables that influence firms' choices to receive a particular association practice, well beyond the specialized productivity of the practice. Institutional theory places specific accentuation on legitimation forms and the propensity for institutionalized organizational structures and techniques to be underestimated, paying little heed to their productivity suggestions (Hoffman & Marc, 2002).

Institutional theoreticians likewise assert that something recognized at a larger scale is utilized to clarify procedures and results at a lower level of investigation (Clemens & Cook 1999; Amenta 2005). Institutionalists tend to center around various sorts of higher-order determinants and contrast in the amount they matter causally. All things considered, it would be normal that large companies and government bodies set pace and recognize issues that small firms in an economy attempt to get from. Moreover, Institutional Sociologists like Pierson and Skocpol (2002) tend to contend that country level foundations mediate the impact of local organizations and worldwide procedures. This means that the national level organizations borrow from the multinational organizations, with which they deal with. Some of processes, behaviors and attitudes they borrow end up being rubbed off on the smaller regional organizations that they deal with (Amenta, 2005).

As indicated by Ameta and Ramsey (2002) institutional Sociology hypotheses as connected set two unmistakable types of foundations' impact over organizational activity. Organizations can be obliging, superimposing states of probability for activation, access, and impact. Foundations restrict a few types of activity and encourage others. Through

the use of public supply chain, a government can craft an operational direction in an economy. By adopting green public supply chain, the government encourages its suppliers to think green. This is cascaded down to the other suppliers and firms in the whole chain. Over time, green gets adopted in the entire economy. This theory supports moderating variable in this study.

2.2.7 Contingency Management Theory

The contingency way to deal with administration was impacted by two earlier investigation programs trying to pinpoint compelling leadership conduct. Amid the 1950s, analysts at Ohio State University regulated broad polls estimating a scope of conceivable pioneer practices in different organizational settings. Contingency theory is a way to deal with the investigation of organizational behavior in which clarifications are offered regarding how unforeseen factors, for example, innovation, culture and the external environment impact the plan and capacity of firms. The assumption underlying contingency theory is that no single type of management process is equally applicable to all organizations (Reid & Smith,2000; Chenhall, 2003; Woods, 2009).

Different experts set that contingency theory investigations hypothesize that organizational results are the outcomes of a fit or match between at least two elements. The concept of fit has been defined by Van de Ven and Drazin (1985) in three approaches -selection, interaction and systems approaches. First, in the selection approach, the interpretation of fit was that, if an organization wants to survive or be effective, it must adapt to the characterizations of its organizational context.

According to Islam and Hu (2012), contingency theory has been applied in management in order to address three types of questions. These questions are about: first, the fit between organizational control and structure; second, the impact of such fits on performance; third, investigation of multiple contingencies and their impact on organizational design.

Albeit various arrangements of leadership practices were initially distinguished in light of these surveys, two sorts of practices ended up being particularly normal of viable pioneers. The first is consideration. These are pioneer practices that incorporate building great compatibility and relational connections and demonstrating backing and worry for subordinates. Second are behaviors that initiate structure. Environmental consideration

is emerging as an important contingent consideration today (Wanjohi, 2016). This implies that it will be an important success factor for organizations. As such, managers need to work on establishing a fit with the environment. This theory supports the green distribution variable in this study.

2.2.8 Complexity Theory

A comprehensive effort to integrate Complexity Theory into governance was made by Teisman and Klijn (2008) in a special issue of Public Management Review, and by Teisman et al. (2009a) in a book entitled Management of Complex Governance Systems. Complexity inside an organizational setting can be characterized through heterogeneity or assorted variety in ecological factors, for example, clients, suppliers, government controls, and technological progressions (Chakravarthy, 1997). As complexity nature builds, firms think that it's harder to design and anticipate their organizational activities, such as green supply chain usage. This theory proposes that organizations work in a framework that incorporates both order and turmoil (Prigogine, 1984) where collaborations of the included groups will decide the performance results of the framework. It is fundamental for firms to be delicate and receptive to their surroundings with co-development and inter-dependencies in adjusting to the framework (Crozier & Thoenig, 1976).

The usage of green supply chain includes various individual groups working in the framework. This circumstance is especially clear for external green supply chain exercises, for example, availing design specification to suppliers including natural necessities, examining suppliers' environmental management frameworks, participating with clients for eco-design, and dealing with product feedback from clients. Green procurement execution troubles can be heightened by the complexities related with more extensive organizational complexities, for example, size and connections (Vachon & Klassen, 2006b), or particular exercises, for example, product return, reusing, re-manufacturing, review, and quality monitoring.

These complexities innate in shutting the circle for a supply chain have been perceived in past investigations (Guide & Wassenhove, 2009; Matos & Hall, 2007). Because of the limited objectivity of individual groups, the performance result of a green supply chain action can't be precisely anticipated without knowing the genuine commitments by other

included partners in the framework. There will be exacerbated complexities for executing green supply chain if the more extensive natural, financial, administrative, social, and political components are considered with a bigger number of groups collaborating with others. At the point when an unpredictable framework extends with an expanding number of communicating groups, or frameworks, it winds up hard to deduce the practices and gauge the cooperation results of the framework.

For dealing with a supplier framework, Choi and Krause (2006) recognized supply base many-sided quality as a key area of administrative thought which is conceptualized in three measurements: first is the number of suppliers in the supply base, secondly is the level of separation among these suppliers, and lastly the level of between connections among the suppliers. They allude to intricacy as how the individuals from a framework (e.g., suppliers in a base) are differed and connect with each other. Through understanding the intricacy of a framework, matters identifying with the transaction costs, supply risk, supplier responsiveness, and supplier development in a supply base can be better overseen (Choi & Krause, 2006). This thought has likewise been connected to social network theory (SNT) and its suggestions to green supply chain (Miao & Xi, 2007). Shi *et al.* (2010) note that complex versatile frameworks have been utilized to likewise clarify the rise and administration of eco-industrial parks.

The investigation ramifications of complexity theory for green supply chain are that a few exercises, like client collaboration for product returns, include a dynamic system of connections in the framework. Supplier coordination in product advancement (for eco-design in green procurement) will likewise decide performance in product development and quality in a framework (Koufteros *et al*., 2007; Vachon & Klassen, 2006b). It is the firm among the partner groups that takes into consideration the sharing of information and creation of meaning. In doing as such, it will help diminish the vulnerability that emerges from actualizing the green supply chain exercises and guide the working of the framework. This theory supports the firm performance variable in this study.

2.3 Conceptual Framework

A conceptual framework is a visual aid explaining the major factors to be examined, the important factors, concepts or variables and the assumed relationships among them (Wanjohi, 2016). A conceptual framework is a model of presentation where a researcher

conceptualizes or represents the relationship between independent and dependent variables in the study and shows the relationship graphically or diagrammatically. The purpose of the conceptual framework is to help the reader to quickly see the proposed relationships. In the current study, the dependent variable was developed from Toke *et al*. (2012). The study's independent variables were adopted from Zhu and Sarkis (2004) who suggested that green supply chain practices involve green raw materials, green manufacturing technologies, green distribution and green disposal (Zhu & Sarkis, 2004a). The relationships studied are represented in the Figure 2.1.

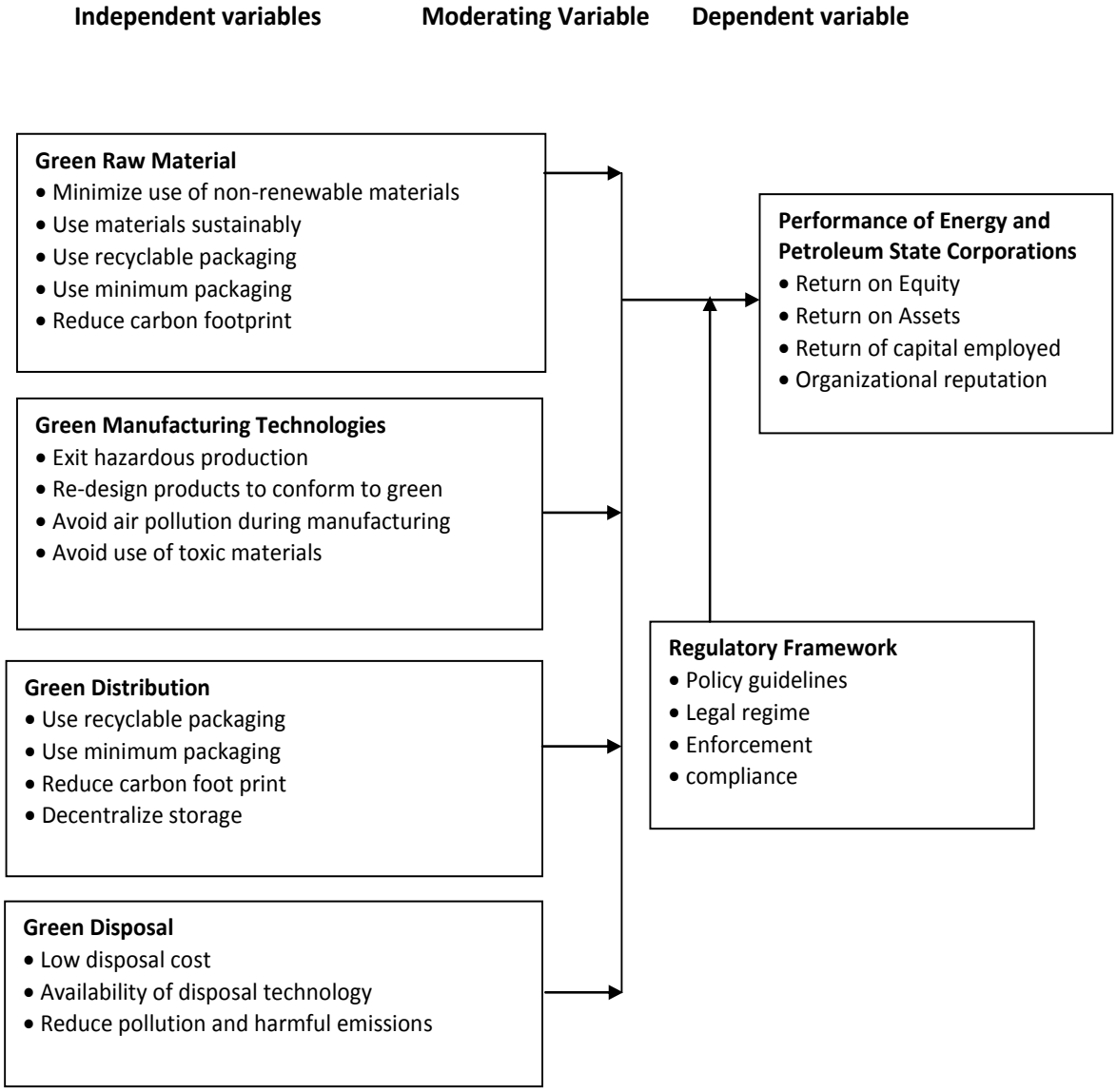

Figure 2.1: Conceptual Framework

To qualify a product as being green or not, its life cycle can be audited. This according to Hervani, and Sarkis (2005) is a good way to help one in establishing greenness of products. The variables are explained in the following subsections.

2.3.1 Green Raw Material

According to Hart (1994), growing concerns over depletion of forests and other natural resources, and environmental degradation created by mining and fossil fuel production, suggest that corporations may need to rethink their raw material and procurement strategies. Significant sectors of the business community, especially large corporations engaged in the lumber and energy industries, continue to take issue with such sentiments, arguing that resources remain plentiful. But many other businesses, citing the findings of

both the scientific and environmental communities (or the internal data of their marketing arms), have begun to make changes in the ways that they gather raw materials for their products. Reliance on recyclable or renewable materials, new energy and material conservation initiatives, and "replenishment" programs (such as forest replanting programs) have all been touted as effective tools in establishing processes that do not unduly harm the environment (Stern, Alissa, & Tim, 2000).

2.3.2 Green Manufacturing Technology

As indicated by Mohan and Sahay (2000), the effects of procedures utilized as a part of manufacturing products and services likewise fluctuate. Manufacturing procedures may contrast in the productivity of information utilization, the sum and sort of waste created and ecological impacts on biological systems and human wellbeing. Such effects might be decreased by manufacturers through different means, running from upgrades concentrating on singular factors, for example, amounts and sources of energy utilized, to coordinated methodologies, for example, lean manufacturing strategies, which intend to diminish waste and enhance proficiency all through the manufacturing procedure.

Seeking after the green manufacturing of products is extremely useful in the lightening of ecological pressures. Green manufacturing is a manufacturing mode intended to limit the natural effect in the manufacturing procedures of products (Tan, et al., 2002), and the reception of green manufacturing lessens waste and contamination (Hui, *et al*., 2001).

Environmentally capable manufacturing forms, GSCM practices, and their numerous related standards have turned out to be critical techniques for organizations to accomplish profit and increase share of the market by bringing down their natural effect and improving productivity (Zhu & Sakis, 2006). Manufacturing procedures have been impacted by natural prerequisites (Gmelin & Seuring, 2014). Factors, for example, impediment of raw material, consumption of common resources and worries about the transfer of technological waste, related with worries about maintainability, have constrained organizations to audit their manufacturing methodologies (Dey et al., 2011). Another factor is the development of a corporate image, which can be influenced by poor performance in ecological and supportability angles (Zhu *et al*., 2008a).

In this sense, a critical change has been seen in the business, and in its supply chains: central organizations have guided more endeavors to meet ecological issues, lessening

natural dangers and expanding their own particular eco-effectiveness, and those of their business partners. Expanding eco-productivity is more than minor consistence with current enactment, including different angles (Tseng et al., 2014). Thus, huge monetary profits have been acquired by decreasing utilization of raw materials and energy, and additionally by reusing waste, or possibly by diminishing waste in the production procedure. The raw materials provided are gone into a generation procedure that must be aware with nature. Just like the green practices inside the supply chain, the gainful procedures have turned out to be essential methodologies for organizations with the goal for accomplishing working benefit and expansion in the market. As needs be, it tries to have a lessening of natural effect and accomplish more noteworthy productivity (Lean *et al*., 2016).

In this way, a procedure of green creation can be characterized as the perfect generation framework that lessen or eventually, take out contaminating substances hurtful for the earth. This sort of framework is situated towards the change of profitability, lessening of energy utilization, and protection of resources. A few authors contend that the utilization of products respectful with the earth can be the main impetus behind the age of added value and cost diminishment to the supply chain.

For the accomplishment of this reason, the ecological components ought to be taken into two; green production attributes and its impact from the phase of product design up to the last product distribution phase, with a specific end goal to make successful utilization of resources and to diminish the fundamental natural contamination (Hursen *et a*l., 2015).

2.3.3 Green Distribution

The green supply chain in the delivery stage can go up against various structures, on the grounds that the organizations are responsible for the circulation of the products, leaving to outsiders this undertaking. This stage incorporates the different procedures associated with distributing a product or service to clients once it has been manufactured or created. It incorporates such things as packaging, marketing, transportation, storage, and sales. For commercial off the shelf (COTS) products and services that is, those that are instant and accessible to the general public, as opposed to those that are explicitly manufactured for a purchaser to custom details.

This is generally the phase at which purchasers would first be able to survey expenses and effects of potential acquisitions .This can prompt high cost in appropriation, poor administration, late deliveries, and more significant ecological effects, among others (Ameknassi *et a*l., 2016; Zhang *et al*., 2015).

In any case, a green distribution can be done with the blend of particular appropriation organizations the logistics branch of the associations so as to diminish the potential contamination, for example, commotion, air contamination, pointless waste material pressing discharged to the earth amid the transportation, packaging and distribution process (Hursen *et al*., 2015). For the above, it is comprehended that in the GSC can't be dismissed in any of its components, in light of the fact that the synchronized capacity thereof, will bring about the right resources organization.

2.3.4 Green Disposal

Green disposal isn't just correctly recycling used materials. It's the recycling of all office and plant equipment, stationary and machinery. These include all electronic devices, including phones, printers, computers, televisions, paper and decommissioned machinery. The correct way to dispose of old and used materials and equipment is to recycle them. By recycling them, they can be broken down into new materials, or to be re-used as parts (Defra, 2011). Buying green products that have negative environmental consequences after use beats the sustainability goal.

2.3.5 Regulatory Framework

In this investigation, regulatory framework will be the moderating variable. Government directions and ecological state of mind can be best foreseen through green procurement practices (Holt & Ghobadian, 2003). The function of government of upholding strict directions to be consented by firms empowers green procurement practices in settling environmental issues. This is becoming up increasingly imperative as generally perceived by scholars (Simpson, et al., 2007). Environmental regulations bring about enhanced environmental techniques and green practices (Williamson et al., 2006). This is additionally like the investigation done by Palmer (2000), where government regulations are viewed as the 'primary main impetus for firms to embrace green procurement, to upgrade environmental improvement". Firms are relied upon to embrace green practices to conform to environmental controls set by regulatory establishments, fundamentally government bodies (Eitayeb et al., 2009).

In view of the examination carried out by Holt and Ghobadian (2009), the impact of UK's present environmental legislation has the most astounding impact for organization to start green procurement practices. The outcomes from different examinations likewise infer that government regulations apply the most perceived pressure on manufacturing firms and states a critical positive relationship on green procurement (Ghobadian et al., 2001; Logamuthu & Zailani, 2010; Preuss, 2001; Zhu & Geng, 2001). Regulatory pressure alludes to the degree to which controllers debilitate to or really hinder an organization's tasks. Pun (2006) contends that environmental issues are basic worries of operations management field. They constrain manufacturers to conform to directions and to scan for potential legitimate discoveries of financial obligation for environmental harm. New environmental regulations developed through Acts of Parliament which include; Air Act, Clean Water Act, Toxic Substances Act, ISO 14000 series and others where Kenya assumes a part from the Kyoto Protocol, EMCA 1999, Controlled substances regulation 2007, and Waste Management regulation 2006.

This pressure forces firms to create techniques through which they can request from suppliers products that are in accordance with the regulatory benchmarks. Environmental regulation consistence fills the need of enhanced raw material preservation for sustainable development in Kenya (GOK, 2006). Kenya has embraced a few green economy-related methodologies and strategies, which incorporate executing renewable energy feed in tariffs in 2008, installing sustainable natural resource use into its 2010 Constitution and mainstreaming green economy in its Second Medium Term Plan (2013-2017) (UNEP, 2014). Seksan et al., (2010) review of Thai electronic firms discovered control and export pressure since most vital drivers for Thai electronics supply chains to execute GSC system. The findings of the experimental investigation evaluated three classifications of adoption of the green strategy as passive green strategy, reactive and integrative which looks at to resistance based procedure, compliance based technique focused on responding at outside pressure, strategy focused on the business and environmental excellence and lastly, leading edge strategy.

Al Kidir and Zailani (2011) reached the inference that drivers (factors, for example, directions, client prerequisites, expected business additions and social obligation) prompted greening of supply chains through supply chain activities towards environmental sustainability. Regulations are required to urge the business associations

to take after the environmental practices and embrace the green procurement activities. On the off chance that controls are satisfactorily authorized, at that point there is a higher possibility of green procurement adoption among business-both public and private firms in Kenya.

2.3.6 Performance of energy and petroleum state corporations in Kenya

State corporations are established to achieve certain specific public good as outlined in their mother Acts. To be said to be performing well, a state corporation must have met at least some interests of most or all its stakeholders. Objectively, a firm's performance can according to Comincioli et al., (2012), be indicated by use of accounting measures and non-accounting measures. This study utilized both types of measures as set out below.

2.3.6.1 Accounting Measures

Data for measuring these variables was sourced from the financial managers in each organization. A separate questionnaire was developed purposely for that reason. The variables to be looked out for were; Return on Equity, Return on Assets and Return on Capital Employed.

Return on Equity (RoE)

According to Bowman and Haire (1975) and Spicer, (1978) this is one of the most used performance measures. It is calculated by dividing the yearly net income by the total equity (excluding preferred shares) expressed as a percentage. This measure indicates how profitable a firm is. It indicates the efficiency of a firm in generating earnings from every dollar of net equity. It is expected that firms that adopt green environment have a higher RoE than similar firms that do not adopt the green environment.

$$ROE = {}^{ai}/_{te} \quad \text{……..Equation 2.1}$$

Return on Assets (RoA)

Mc Williams and Siegel, (2001) argue that this variable measures the contribution of the assets of a company to the revenue generating process. It is given by the ratio of net income and total assets. This ratio gives an indication of "what the firm can do with what it has." Return on assets shows how many dollars/ shillings the firm can earn for every dollar/ shilling of assets owned (Luce et al., 2001). It is expected that firms that adopt green environment have a higher RoA than similar firms that do not adopt the green environment. Their RoA is also expected to rise over the years.

$$ROA = {}^{ni}/_{ta} \quad \ldots\ldots\ldots\ldots\ldots \text{Equation 2.2}$$

Return on Capital Employed (RoCE)

This measures the return a firm generates from capital employed. Preston and O,Bannon (1997) argues that this measure can be used to compare performance between businesses and check whether returns generated are enough to pay back the cost of capital. It is measured as a ratio between pre-tax profits and the employed capital. It is expected that firms that adopt green procurement practices have a higher RoCE than similar firms that do not adopt the green environment. Similarly, RoCE is expected to rise from year to year.

$$RoCE = \frac{P_p}{ce} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \text{Equation 2.3}$$

Where;

RoCE is Return on Capital Employed,

Pp is pretax profits and

ce is Capital Employed

2.3.6.2 Non Accounting Measure

Data for measuring this variable was collected from selected stakeholders using a specifically designed self-administered questionnaire.

Organizational Reputation

Corporate reputation can be seen as a perceptual portrayal or appraisal of the firm by its distinctive constituents (Winn, McDonald & Zietsma, 2008; Meijer & Kleinnijenhuis, 2006) and its diverse social desires or corporate identity characteristics that individuals

credit to organizations. A firm's reputation is an impression of how it is respected by its different partners. Its reputational position can enable the firm to acquire trust and validity in the society, which will aid the accomplishment of its goals and objectives (Baur & Schmitz, 2011; Roper & Fill, 2012).

The function of business in the society has advanced throughout the years, from being predominantly worried about profit for shareholders to a partner and group approach with an emphasis on corporate social responsibility (Covey & Brown, 2001, Steyn, 2003). Reputation can be thought of as an educational sign about the firm's conceivable conduct and quality performance. This expands general society's trust in the firm's products and services, and the investor's trust in the performance of the firm. Corporate reputation could be viewed as "portraying the company's capacity to render valued outcomes to partners" (Fombrun, Gardberg & Sever, 2000).

In this way, it diminishes vulnerability, which permits decreasing transaction costs. As indicated by Melewar (2003), that is the reason, from a strategic perspective, corporate reputation has been of benefit for firms when endeavoring to separate from whatever is left of the business and making potential obstructions to entry for potential contenders. Additionally, a positive reputation is a vital asset for building validity and support among various partners. Research has connected corporate reputation with the change of both the financial outcomes and the firm's value; a positive corporate reputation will probably be related with prevalent performance (Kitchen & Laurence, 2003; Berens, 2004; Brammer & Millington, 2005). More noteworthy information of partner observations about the firm will help characterize a kind of reputational stage where lucidness and harmony between what the firm needs, can, or should do must be considered.

2.4 Empirical Review

Goodwin (2005) notes that an empirical review is a way through which knowledge is gained by analyzing qualitatively and quantitatively results of previously conducted research. This section aims at reviewing previous research in a bid to lay a strong ground work for the study. The review per variable is outlined in the section below.

2.4.1 Green raw materials and Performance of Energy and Petroleum State Corporations in Kenya

To begin with, Ma *et al,* (2018) in their study titled; Green Product Innovation and Firm Performance: Assessing the Moderating Effect of Novelty-Centered and Efficiency-Centered Business Model Design, novelty-centered and efficiency-centered business model design themes all play a moderating effect on the relationship between green product innovation and firm performance, while a fit between green product innovation and novelty-centered design theme is better for firm performance. They established that interaction was significant ($\beta = 0.177$, $P < 0.05$); moreover, the adjusted R2 of model (4) is also higher than that of model (3), indicating that novelty-centered design theme plays a moderating role. As such, green research and design was found to affect firm performance.

2.4.2 Green Manufacturing Technology and Performance of Energy and Petroleum State Corporations in Kenya

Sezen and Cancaya (2013) in their study titled; Effects of green manufacturing and eco-innovation on sustainability performance, investigated the influence of green manufacturing and eco-innovation on corporate sustainability performance (economic, environmental, and social). Their results indicated that the green manufacturing applications have a significant positive impact on performance and social performance. Additionally, eco-process innovation has a significant positive impact on corporate sustainability. However, eco-product innovation was not found to have a significant effect on any of the three types of performance. Regression analysis results indicated that eco-process innovation dimensions have significant effect on the three dimensions of the corporate sustainability performance. Their argument was that Green manufacturing can lead to lower expenditure on raw material, production efficiency gains, reduced environmental and occupational safety expenses, and improved corporate image. All the above can contribute to improved performance.

2.4.3 Green Distribution and Performance of Energy and Petroleum State Corporations in Kenya

Mwaura et al, (2016), in a study titled; Green Distribution Practices and Competitiveness of Food Manufacturing Firms in Kenya, concluded that adoption of green distribution practices positively and significantly influences the competitiveness of Kenya's food manufacturing firms. Competitiveness was strongly and positively influenced by a company's redesign of its logistical systems components to increase efficiency in the delivery of goods (r= .514, P=.000), competitiveness was positively and moderately influenced by use of IT which helped to increase market share, (r = 0.451, P = 0.000), improve the company's financial position (r = 0.451, P = 0.000), and also reduced the distribution costs green distribution (r = 0.228, P = 0.027). An organization's use of local products to reduce transportation costs (r = 0.446, P = 0.000), and the use of green label as an indicator of environmental friendliness (r = .393, P= 0.000) also positively and significantly influenced firm competitiveness. The results indicate there was a positive but moderate relationship between green distribution and firm competitiveness. This results support the work of Ninlawan *et al*. (2010) and Amemba *et al*. (2013).
Further, the result rhymes with those of Dheeraj and Vishal (2012) who contended that companies that have adopted green distribution activities have successfully improved their business on many levels as these activities imply improved efficiency. Redesigning the logistical network particularly enables a firm to minimize the total distribution costs and improve the customer service levels (Ravet, 2013).

Wanjohi (2016) carried out a study titled; The Moderation Effect of Adoption of Green Environment on the Relationship between Organizational Characteristics and Performance of Manufacturing Firms in Kenya. The study, which adopted a similar research design had a sample of 253. The study had four objectives that sought to establish whether adoption of green environment had any significant effect on the relationship between organizational characteristics (Customer orientation, quality emphasis, innovation and management effectiveness) and performance of manufacturing firms in Kenya.

The study established that adoption of green environment moderated the predictive effect of organizational characteristics on firm performance among the manufacturing firms in

Kenya. However, in most of the cases, the moderation reduced the effect of organizational characteristics on firm performance. The study results indicated that R^2changed from .192 to .058 a 30.2% change and P = .002. F= 11.374 for customer orientation, R^2changed from .279 to .058 a 20.8% change and P = .001. F= 18.581 for quality emphasis, while innovation had R^2changed from .230 to .088 a 38.3% change and P = .001. F= 14.310 and lastly management effectiveness had R^2changed from .218 to .077 a 35.3% change and P = .001. F= 13.413.

Study confirmed that organizational characteristics were significantly related to firm performance supporting results of study by Appiah-Adu and Singh, (2008). Study further confirmed that adoption of green environment moderates the relationship between organizational characteristics and firm performance. An interesting finding was that the moderation reduced the importance of organizational characteristics in relation to firm performance Yang et al., (2010). Earlier studies by Anderson, et al., (1999), Progojo (2011), Ketokevi (2004) and Ru-Jen and Chwen (2011) established that this is possible for management practices expected to raise productivity to actually lower it when such management practices are adopted to satisfy external pressures and expectations and not to improve the internal workings of a firm.

Another related study was done by Saman (2013) titled; Effects of Innovation Types on Firm Performance: An Empirical Study on Pakistan's Manufacturing Sector. In the study linear regression analysis was carried out to analyze the effects of four dimensions of innovation on four dimensions of organizational performance. The study looked at a total of 250 manufacturing companies were selected from 9 manufacturing sectors. The study found that innovative performance accounts for major variation in production performance as compared with marketing performance. The significant adjusted R^2 depicted that innovative performance explained 77.9% & 5.7% of the variance in production and market performance respectively. Additionally, standardized coefficient and T values are also significant ($p<0.005$). The results reveal a positive effect of innovation types on firm performance. The results of the said studies indicate a strong positive relationship between innovation and performance. There is also anecdotal evidence that this relationship can be moderated. This study will build on these studies by seeking to establish whether adopting green procurement, which is an innovative

management approach, has an effect on performance of energy and petroleum state corporations.

Another study titled, the impact of integrated practices of lean, green, and social management systems on firm sustainability performance evidence from Chinese fashion auto-parts suppliers, was carried out by Lin Wu *et al*., (2015). The aim was to test the postulate that selected stand-alone practices of lean, green, and Corporate Social Responsibility (CSR) management systems have a positive impact on firm performance. The study established that how the combination of selected practices from these three management systems impacts the performance remains unclear. Based on their case studies, they build an integrated sustainable practices model incorporating the most popular lean, green, and social practices and developed propositions for future tests. Correlation results show clearly that a combination of lean, green, and social practices contributes significantly to 3BL performance, individually or collectively. The result provides strong evidence that companies can improve their 3BL performance through an integrated implementation of lean, green, and social practices.

Shang *et al*., (2010) conducted a GSCM study based on eco-design, green manufacturing and packaging, environmental participation, green marketing, stock and suppliers. The results inferred that the firms which were focusing on green marketing had been successful competitors against the rivals.

Wooi and Zailani (2010) led an examination on Green Supply Chain Initiatives in the Context of SMEs in Malaysia, they discovered the key hindrance in adopting green supply chain initiative, including attitudinal and recognition hindrance, data related obstruction, technical obstruction, resource obstruction and business strategic orientation. Eltayeb and Zailani (2009) surveyed twenty one literature on green supply chain initiatives and inferred that the green supply chain initiatives can be for the most part arranged into three noteworthy components. Lee *et al*., (2009) concerned environmental issues While the works on the assessment and additionally determination of suppliers, they proposed a model for assessing green supplier.

Hua *et al*., (2004) recognized the primary elements of green supply chain management pressure, practice and execution for China manufacturing enterprise using questionnaire survey. Björklund (2011) figured business environment is critical for enterprise

purchasing. He researched the distinctive variables that impact on environment purchasing through E-mail for traffic transportation services, and in addition in the Swedish setting. Balfors et al., (2009) investigate the present practice, issues and chances of green procurement of construction contracts.

2.4.4 Regulatory framework and Green Supply Chain Practices and Performance of Energy and Petroleum State Corporations in Kenya

Eltayeb *et al*., (2010) examines the impact of four drivers; regulations, customer pressures, social responsibility, and expected business benefits on green purchasing in the Malaysian manufacturing industry. They discovered green purchasing is influenced by regulations, client pressure, and expected business benefits, in any case, high social responsibility doesn't constitute a bonafide driver to embrace green purchasing for Malaysian's organizations. Sarkis and Lai (2007) investigated the green supply chain management practice, activities and performance of the car supply chain in China. They demonstrated that these endeavors have encountered high and expanding administrative and market pressures and have strong internal drivers for green supply chain management practice reception. In any case, their green supply chain management execution, particularly with thought of outside connections, is poor. LiuBin et al., (2009) found the performance examination factor between green supply chain practice and venture for China manufacturing enterprise.

2.5 Critic of Existing Literature

Based on literature reviewed, it is clear that from some authors such as Cahil and Ftizpatrick (2006), that green supply chain initiatives support the significant effect of the top four key drivers to green supply chain initiatives, some other studies found no significant effect of these drivers on green supply chain initiatives. Bowen, Cousins, Lamming and Faruk (2001) found no significant relationship between regulations and green purchasing.

Similarly, Sarkis and Lai (2007) found no significant relationships between external pressures (regulatory, market, and supplier pressures) and green supply chain initiatives (green purchasing, eco-design, and customer cooperation). Many studies (Rao, 2002; Zhu & Sarkis, 2004; Zhu et al., 2005, 2007; Chien & Shih, 2007; Darnall et al., 2008;

Holt & Ghobadian, 2009) were mostly focusing on the same variables in manufacturing firms of China, Taiwan, and South-East Asia.

However, majority of the empirical literature reviewed have been carried out in the context of manufacturing firms in developed countries. The studies also focused on individual firms as in case study or product type and the most common was food industry, automotive and electrical and electronics. The researcher was also unable to find a study on green supply chain in energy and petroleum public sector of Kenya's situation. In respect to green supply chain practices there were differing opinions on what should be included. Simpson (2008) recommends a broadening of the scope of the understanding of potential of green procurement practices rather than concentrating on a series of related greening practices without a definite purpose. Despite the relevance of these works, several researchers have also recommended that more empirical research is needed to broaden understanding of the concept and how influence of supplier adoption of green practices can be enhanced (Tate *et al*., 2011)

From the literature analysis, most of the scholars have only focused more on drivers of green supplier such as regulatory and customer pressure highly influenced adoption of green supply chain strategy. Based on the author's knowledge, none of these studies have attempted to assess the effect of green supply chain. In the current research this proposition did hold. The researcher thus identified research gaps which were filled by focusing on influence of green supply chain practices adopted by State Corporation in energy and petroleum sector in Kenya which is a developing country.

2.6 Research gap

From the above literature, it is evident that there has been far less research on influence of green supply chain practices with the systematic analysis, particularly in public sector. From the reviewed literature, previous scholars only focused on some of the variables especially on the influence of adoption of green on firm performance and completely excluded the impact of green supply chain practices on the performance of energy and petroleum state corporations.

There is great concern for corporation more specifically in oil and petroleum sector globally as well as locally, to deal with increased global warming and carbon emissions and embrace sustainable or eco-friendly practices. This affects the entire firm, but more so it impacts the firm's supply chain (Howden, 2004). Empirical evidence through study

that sort to establish the relationship between the green supply chain strategy employed by the large manufacturing firms in Nairobi and their sustainable competitive advantage, found out that, large manufacturing firms in Nairobi had gained and sustained greater competitive advantage, in terms of goodwill, market share, returns on investments and even profitability, as a result of implementing green supply chain strategies (Katua, 2012). Recent studies in Kenya on green or sustainable green supply chain reveal that it is becoming increasingly important for firms to re-focus their business strategy to include green supply chain practices.

Sachan and Datta (2005) found there were very few green supply chain publications in developing and under developed countries and focus should shift now that they are becoming the target of most MNCs either as new market for their products or for sourcing the raw material due to the low cost. Barasa, Namusonge and Iravo (2015) posited that manufacturing companies in developing countries in which Kenya is included are now increasingly taking green procurement practices in their business operations to ensure favorable competition globally. The proposition was supported by their study results.

This has mainly been because of the complexity of green supply practices, cost pressures and regulation uncertainty. Implementing green supply chain is considered as a side task that goes to increases overall cost of production. Some researchers (Hsu & Hu, 2008; Ninlawan *et al*., 2010) have tried to provide a useful framework for green supply chain study and activity flow required for successful implementation of green supply chain practices. This is the gap that this study sought to fill.

2.7 Summary

This chapter reviewed the literature that informs the formation of study variables. In particular, it reviewed the theoretical framework where stakeholder theory, institutional sociology theory, natural resource based theory; theory of innovation and the contingency management theory were reviewed. The theories formed the basis on which the stated objectives were based. The stakeholders' theory outlined the pressure that organizations face from critical stakeholders like customers and financiers, local communities and their workers among others. The pressure is to adopt green supply chain practices in return for stakeholders support. That support translates to good performance.

The Institutional sociology theory opines that, just like human beings, the conduct of organizations is influenced by the performance of peers and organizations that they look

up to. When peer organizations or those that they look up to adopt green, as many already are, they feel obliged to follow soot, in order to “fit”. Often, decisions to follow soot are not well thought out. Such lead to decrease in performance. The study sought to establish the influence of green supply chain practices on performance. The natural resource based theory recognizes that high, sustainable performance depends on proper application of natural resources.

Natural resources-rivers, petroleum deposits, iron ore forests- for the raw materials for energy generation and distribution. If not well applied, the said will diminish putting proper functioning of the energy sector in jeopardy. Green procurement, therefore safeguards the natural resource base which then promotes performance. The study then presented the influence of green procurement practices as argued out by other scholars and researchers. The chapter further presents the empirical review, critique of existing literature and the research gap.

CHAPTER THREE
RESEARCH METHODOLOGY

3.1 Introduction

In this chapter, the methods and approaches that were employed in carrying out the study are highlighted. This comprises the research philosophy, design, study population, sample and sampling procedure, piloting and the analysis of the data. The kind and sources of data, data collection methodologies and assessment of reliability and validity are also presented. The measurements of variables and data analysis techniques were also discussed.

3.2 Research Philosophy

Saunders, Lewis and Thornhill (2009) point out that research philosophy is important in the development of the research background, research knowledge and its nature. Besides, research philosophy can likewise be portrayed as a worldview which includes an expansive system, contains observation, convictions and comprehension of a few hypotheses and practices that are utilized to direct an investigation. The key inquiry in any field of study concerns what constitutes worthy learning in that field. During the time spent building up learning on the investigation, the researcher was guided by one of the numerous philosophical perspectives or methods of insight noted by Flowers (2009) to include: positivism, phenomenology and realism among others. The two principle rationalities that guide social researcher analysts are positivism and phenomenology.

Positivism is logic of science that looks for realities of social phenomena with little respect for the subjective status of an individual (Hargrove, 2004). The investigation adopted the positivist reasoning which advocates for a target understanding of reality utilizing hard information from overviews that are organized, formal, and have a particular and point by point design. This fitted well with the design of the study which is a mixed design approach to explore the connections among the investigation factors objectively and autonomous of the impact of the researcher. Predictions were made based on the already observed and clarified substances and their inter-connections. This methodology empowered the researcher to see the connection between influence of green supply chain practices and firm performance by setting up a causal relationship. Thus, this enabled the researcher to test the hypothesis with regards to public energy and petroleum production and distribution industry in Kenya.

3.3 Research Design

Creswell (2014) defines research design as the entire process of research from conceptualizing the idea, literature review, methodological approach to writing the conclusion. According to Easterby-Smith *et. al* (2008), research design is the way the research is organized, how evidence will be gathered, where the evidence will be found and how the evidence will be interpreted.

Others like Kombo and Tromp (2006) define research design as the glue that holds all the elements of research together. A research design is the plan and structure conceived to obtain answers to research questions (Blumberg, Cooper & Schindler, 2011). Mohibir (2008) defines research design as the grand plan in framing the methods and procedures for the collection and analysis of data, creating a structural approach for the requirement of the research.

The study adopted a descriptive survey research design because it sought to obtain information concerning the current impact of green supply chain practices on firm performance in the public energy and petroleum parastatals in Kenya. A descriptive research design determines and reports the way things are (Mugenda & Mugenda, 2003). Descriptive design aims at describing a phenomenon. In this study, the phenomenon being studied was the influence of green supply chain practices related to firm performance in the energy related state corporations in Kenya. Descriptive research design was used in other related studies such as the moderating effect of adoption of green environment on performance of manufacturing firms in Kenya, (Wanjohi, 2016). Based on the definitions and descriptions given regarding research design, the best suited research design for this study was descriptive.

3.4 Target Population

Mugenda and Mugenda (2003) define a population as an entire group of individuals, events or objects having common characteristics that conform to a given specification. Cox (2010) notes that a target population is the entire set of units for which the study data will be used to make inferences. The population considered in this study was the entire 761 procurement staff in all the energy sector state corporations in Kenya. The distribution of the said staff among the firms is as presented in Table 3.1.

Table 3.1: Target Population

Organization	Lower cadre	Middle management	Senior management	Total
KPLC	220	40	23	283
KENGEN	117	21	16	154
ERC	14	4	2	20
GDC	13	3	2	18
Nuclear Energy Board	10	2	1	13
REA	14	5	2	21
KPRL	85	20	10	115
KPC	46	20	6	72
KETRACO	40	8	4	52
NOC	9	3	1	13
TOTALS	568	126	67	761

Source: Ministry of Energy and Petroleum, 2016

3.5 Sampling Frame

Gill and Johnson (2002) describe a sampling frame as a list of members of the research population from which a random sample may be drawn. The sampling frame for this study consists of all the energy and petroleum state corporations in Kenya as at December, 2016. The list, as provided by the Ministry of Energy, is attached as an appendix. The employment data is disaggregated between the various cadres of employees in the sector. The concentration of this study was the procurement staff of all cadre. Lavrakas (2008) defines a sampling frame as a list of the target population from which the sample is selected and that for descriptive survey designs a sampling frame usually consists of a finite population.

Mugenda and Mugenda (2003) and Kothari (2004) define the term sampling frame as a list that contains the names of all the elements in a universe. Polit and Beck (2003) refer to a sampling frame as the technical name for the list of the elements from which the sample is chosen from.

3.6 Sample and Sampling Technique

Mugenda and Mugenda (2003) point out that the sample size of particular study may be calculated as follows:

$$N_0=\frac{Z^2pq}{d^2}$$ …… Equation (3.1)

Where;

N_0 is desired sample size

Z^2 is the standard normal deviation at required confidence level of 95% in which is set to 1.96.

p is the proportion of procurement staff able to identify influence of green supply chain practices on performance of energy and petroleum state corporations which is set at 0.5 (50%).

$$q = 1 - p$$

d^2 is the margin of error at $\propto$ (0.05)

Therefore

$$N_0=\frac{Z^2pq}{d^2}=\frac{(1.96^2)(0.5)(0.5)}{0.05^2}=384.16$$

This gave a sample size of 384 respondents which will be adjusted as the population will be less than 10,000 using the relationship below.

$$n=\frac{n_0N}{n_0+N}$$ …… Equation (3.2)

n is the desired sample for small population

n_0 is the desired sample size when population is big

N is the population size.

$$n=\frac{(384)(761)}{(384+761)}=255.22$$

The sample size was 255 respondents

To determine the sample size of each category of employees in the procurement department, proportionate stratified random sampling was used.

For Lower cadre (LC)

$$LC=\frac{255\times568}{761}=190 \text{ respondents}$$

For Middle management (MM)

$$MM = \frac{255 \times 126}{761} = 42 \text{ respondents}$$

For senior management (SM)

$$SM=\frac{255\times67}{761}=23 \text{ respondents}$$

3.7 Research Instrument

The study utilized questionnaires to get both quantitative and qualitative data for examination. The data was additionally validated from analysis of findings by use of secondary information. Schwab (2005) characterizes questionnaires as measuring instruments that solicit people to answer a set of inquiries or respondent to an arrangement of statements. Mugenda and Mugenda (2003) and Kothari (2004) characterize a questionnaire as a document that comprises of various questions printed or written in a definitive order on a form or set of structures. Dawson (2002) notes that there are three fundamental sorts of questionnaires; closed ended, open-ended or a mix of both. Closed ended questionnaires are utilized to create insights in quantitative research. As these questionnaires take after a set organization, and as most can be filtered straight into a computer for simplicity of investigation and more prominent numbers can be created.

Numerous questionnaires start with a progression of closed questions, with boxes to tick or scales to rank, and afterward complete with a segment of open questions for more nitty-gritty reaction. Mugenda and Mugenda (2003) and Kothari (2004) concur that questionnaires have different benefits, as; there is ease notwithstanding when the universe is substantial and is generally spread topographically; it is free from the predisposition of the interviewer; answers are in respondents' own words; respondents have satisfactory time to give well thoroughly considered answers; respondents who are not effortlessly

agreeable can likewise be reached conveniently; extensive examples can be made use of and in this manner the outcomes can be made more true and dependable.

In perspective of the points of interest and the need to collect more data, questionnaires were administered to staff in the three cadres in the procurement function to seek their perspectives concerning the influence of green supply chain practices on the firm performance. Secondary data from the state corporations under investigation was collected from yearly reports. Kothari (2004) characterizes secondary data as data that has been collected already, alluding to the data which have already been gathered and examined by another person. Polit and Beck (2003) clarify that secondary research includes the utilization of data accumulated in a past report to test new theories or investigate new connections.

They likewise demonstrate that secondary analysis of existing data is productive and practical in light of the fact that data collection is ordinarily the most tedious and costly piece of an exploration venture. Secondary data was utilized to validate the discoveries from investigation of primary data which were redressed collected using questionnaires. The procedure of utilizing both primary and secondary data to address similar study objectives was intended to enhance the interpretive rationality and enhance both communicative and pragmatic legitimacy of the investigation findings.

3.8 Data Collection Procedures

The researcher collected the data for the study with the assistance of five research assistants. The research assistants were informed on ethical considerations, the need to have higher response rates and how to seek authority from the respondents during the data collection exercise (Wanjohi, 2016). Two hundred and fifty five questionnaires were distributed to the appropriate chosen sampled elements and analyze the documents provided or available on the company websites or in public domain for necessary data.
The lead researcher personally participated in the data collection exercise to ensure necessary guidance and assistance is provided to the research assistants. Respondents were given ample time to fill the question and follow up through calls, email among others to ensure high response rate (Rukia, 2015).

The questionnaires were targeted at the procurement staff of all cadres. The researcher aggregated all staff of each cadre in one list. Thereafter, those to participate in the study

were selected randomly from the list by blindly picking numbers representing the staff as per the list. The questionnaires were self-administered and the respondents were allowed two weeks from the date of dropping to have completed the questionnaires.

In addition to this primary data, secondary data was collected and analysed. This was sourced from historical documents like annual financial reports, newspaper articles and other publications. Secondary data helped in filling data gaps that arose and to check authenticity of the respondents' response (Mugenda, 2013).

3.9 Pilot Study

In this study, a pilot study was carried out to detect weaknesses in study design and instrument, as well as provide proxy data for selection of a probability sample. Bryman and Bell (2003) advocate for the conduct of a pilot before administering the questionnaire to the respondents. They argued that piloting helps to pretest the questionnaire and get feedback as to whether the questionnaire is effective and understood.

Muus and Baker-Demaray (2007) noted that a pilot test should draw subjects from target populations and simulate the procedures and protocols that have been designed for data collection. Before the full study, the researcher undertook a pilot test on 26 respondents. According to Mugenda (2003) a pilot should have at least 10% of the study elements. The pilot subjects were not included in the final study to avoid bias.

3.9.1 Validity of the Research Instrument

Validity is the accuracy and meaningfulness of inferences, which are based on the research results (Bryman, 2001). It refers to the degree to which results obtained from the analysis of the data actually represent the phenomenon under study. Therefore, validity is concerned with how accurately the data obtained in the study represents the variables of the study. If such data is a true reflection of the variables, then inferences based on such data will be accurate and meaningful.

The instruments were rated in terms of how effectively they sampled significant aspects of the purpose of the study. Best and Kahn (1989) suggest that the validity of the instrument is asking the right questions framed in the least ambiguous way. Thus a valid measure depends on collecting accurate data. The content validity of the instrument will be determined by the researcher discussing the items in the instrument with the supervisors, colleagues and other Lecturers in the Institution. The advice that was given

by these people assisted the study to improve the validity of the research instruments and the necessary adjustments were made. For the research instrument to be considered valid the content selected and included in the questionnaire has to be relevant to the variable being investigated (Kerlinger, 1973). The supervisor rated the instruments in terms of how effectively they sample significant aspects of the purpose of the study and thus ensured that significant information will be elicited. This assisted in giving direction of performance in the actual study.

3.9.2 Reliability of Research Instruments

Reliability is the ability of that test to consistently yield the same results when repeated measurements are taken of the same individual under the same conditions (Hair et al., 2013). Essentially, reliability is worried about consistency in the generation of the findings and denotes the requirement that, at least in principle, another researcher, or the same researcher on another occasion, should be able to replicate the original piece of research and achieve comparable evidence or results, with similar or same study population.

Based on Neuman (2007), the reliability of the instrument was tested through use of Crobanch Alpha value. Fraenkel and Wallen (2000) point out that a reliability coefficient of 0.7 or higher is recommended and will be used as the threshold for accepting reliability. That is, to establish the reliability of the questionnaire. The pilot test was carried out in order to ensure that the items reflect the kind of responses the researcher desire to get, that the items was acceptable in terms of their content, and that they adequately covered aspects of the problem which the study particularly wished to explore. Feedback obtained from the pilot assisted the study in revising the instrument of data collection to ensure that it covered the objectives of the study. In this way, the study minimized random errors and therefore made the research as reliable and as valid as possible.

3.10 Data Analysis and Presentation

Sounders, Lewis and Thornhill (2009) point out that the processing of data collected in order to obtain meaningful information comprises data analysis. This is important because the raw data collected does not present meaningful information to many. Data was prepared in preparation for analysis after collecting it from the questionnaires and observations and from secondary sources. It was then edited by handling missing responses, coding the data and categorizing and entering it into a pre-structured SPSS

data template in a computer for quantitative data. For qualitative data, analysis was carried out to determine patterns and establish meaning to the responses given in the open-ended questions (Taylor-Ellen, & Ranner, 2003). The data was presented using graphs and tables for ease of understanding.

3.10.1 Preliminary Analysis and Data Cleaning

The questionnaires were collected by the researcher and keyed into SPSS computer software and subjected to preliminary checks: Firstly, factor analysis was done to reduce the items of questionnaire that were not valid and reliable with the constructs. Secondly, descriptive statistics such as mean, standard deviations, reliability coefficients, and inter-correlations were computed to understand the variability and interdependence of the subscales derived from the factor analysis.

A principal component factor analysis with Varimax rotation was conducted to cluster the variables from the questionnaire into several factors. In order to control the number of factors extracted, a minimum Eigen value of one (1) was used in the factor analysis and Factors with Eigen value less than one was considered insignificant and was excluded. Varimax orthogonal rotation was then used to group variables with large loadings (correlations) for the same factors so that each factor was represented by a specific cluster of variables. Varimax rotation ensured that the factors produced were independent and unrelated to each other. According to Thompson (2004), it is a multivariate statistical procedure that has many uses, three of which are briefly noted here. First, factor analysis reduces a large number of variables into a smaller set of variables (also referred to as factors). Secondly, it establishes underlying dimensions between measured variables and latent constructs, thereby allowing the formation and refinement of theory. Thirdly, it provides construct validity evidence of self-reporting scales.

3.10.2 Test of Multiple Regression Assumptions

Since data was subjected to regression analysis, the following assumptions were checked to ensure that they hold before subjecting the data to parametric tests. These tests included the test for normality, test for Linearity, test for Homoscedasticity, and test for Multicollinearity and the examination of the independence of errors. These are accordingly expanded upon as follows:

Normality

Normality test is used to determine whether the data sets are normally distributed (Saunders et al., 2007). It is assumed that the residuals of variables are normally distributed. That is, the errors in the prediction of value Y (the dependent variable) are distributed in a way that approaches the normal curve. Based on Ghasemi and Zahediasl (2012), the assumption of normality will be especially important when constructing reference intervals for variables and when this assumption does not hold, it is impossible to draw accurate and reliable conclusions about reality. Additionally, if the assumption of normality is violated, interpretation and inference may not be reliable or valid (Razali & Wah, 2011).

This study tested normality using Kolmogorov-Smirnov test and Shapiro-Wilk test. The Kolmogorov Smirnov (K-S) tests the assumption that the sample data are drawn from a normally distributed population. It tests the null hypothesis that the data come from a normally distributed population and the alternate hypothesis that the data come from a population that is not normally distributed. If the results of the test are significant that is $p<0.05$ then rejecting the null hypothesis means rejecting the assumption of normality for the distribution (Field, 2009). However, the tests are sensitive to the size of the sample; with a large sample even small deviations from normality will be reported as significant. As a result, the test should always be used in conjunction with visual inspection of histograms and skewness and kurtosis measures. Skewness should be within the range ±1.96 for the data to pass the normality test. Kurtosis values should be within range of ±1.96 for the case the data was normally distributed.

The other test that was used to assess the normality is the Shapiro–Wilk test. This tests the null hypothesis that a given sample came from a normally distributed population. The test rejects the hypothesis of normality when the p-value is less than or equal to the value of alpha (level of significance which in this study will be set at 0.05). That is, should the value of significance of the Shapiro-Wilk Test result be found to be greater than 0.05, then the data was said to be normal and if it was below 0.05, then the data was said to significantly deviate from a normal distribution. This numerical test was further enhanced with the graphical test of Q-Q plots (Schutzenmeister, Jensen & Piepho, 2012; Field, 2009). Based on the Q-Q plots, when the data is normally distributed, the data points are

close to the diagonal line but when data points are scattered far from the line in a physical non-linear fashion, the data was regarded as not normally distributed.

Linearity

Linearity was tested by creating a scatter plot using SPSS Statistics. The researcher plotted the dependent variable against the independent variable and then visually inspected the scatter plot to check for linearity. Where the relationship displayed in the scatter plot was not linear, transformation of the data was done. The t-Test was used to examine whether there is some significant linear relationship between the independent and dependent variables. (Kothari & Garg, 2014). The decision about the null hypothesis in a two-tailed test was taken by comparing the computed value and critical value of t distribution. The decision criteria was that the null hypothesis was rejected at α x 100% level of significance when the computed value and critical value were lower than $-t\alpha/2$ or larger than $t\alpha/2$. Rejecting a null hypothesis means there is a significant linear relationship between the variables (Kothari & Garg, 2014).

Heteroscedasticity

Heteroscedasticity was minimized or eliminated where possible by ensuring that the data used in hypothesis testing was approximately normal. The data was accurately transformed and that the right functional forms of regression model were selected. Variables were then presented by scatter plot diagrams of the dependent variable (DV) widens or narrows as the value of the independent variable (IV) increases. The inverse of heteroscedasticity is homoscedasticity which indicates that a DV's variability is equal across values of an IV. At each level of the predictor variables(s), the variance of the residual terms should be constant. This was tested using qq plots (Schutzenmeister, Jensen & Piepho, 2012). A Q–Q (quantile-quantile) plot is a type of graphical probability plot. It is applicable in testing heteroscedasticity besides the test for normality. The researcher observed the spread location and in case the plot shows that the residuals are spread equally along the ranges of predictors, then this indicated that the data was deduced to be homoscedastic. However, if data was found to be spread unequally along the range of the predictors, then it was heteroscedastic and thus be subjected to transformation using methods like logs and or Z scores.

Multicollinearity

Multicollinearity is said to occur if there exist high inter-correlations between independent variables (Tabachnick & Fidell, 2007). It has to be dealt with because when it exists, it can wreak havoc on analysis and thereby making interpretations problematic. One of the possible problems Multicollinearity possess is that it makes determining the effect of a given predictor (e.g., perceived fairness) difficult since the effects of the predictors will be confounded as a result of the high correlations amongst themselves.

Multicollinearity was dealt with by first establishing the inter-correlations between the independent variables and those bivariate correlations of 0.9 and higher was seen as good candidates for deletion (Tabachnick & Fidell, 2001, Stevens, 2002). The VIF (Variance Inflation Factor) was conducted. The VIF for a predictor indicates whether there is a strong linear association between itself and all the remaining predictors. VIF is a reciprocal of the tolerance. Larger VIF greater than 10 indicated multicollinearity (Stevens, 2002). In cases where the condition index was used, the criteria was to measure how 'dependent' one independent variable was on another. The variance proportions associated with each variable are observed and according to (Tabachnick & Fidell, 2001), multicollinearity is present if the condition index is equal to or greater than 30 and at least two variance proportions for a particular independent variable are greater than 50.

Independence of errors:

The Durbin-Watson statistic was obtained to examine the independence of errors. The assumption of independence is given by $D = \frac{\sum_{i=2}^{n}(e_i - e_{i-1})^2}{\sum_{i=2}^{n} e_i^2}$ where $e_i = y_i - a - bx_i$ $(i = 1, 2 \ldots., n)$ are residuals. A value of D between 1 and 3 is usually considered to be accepted (Kothari & Garg, 2014). F-test was used to test the overall validity of the model or to test if any of the explanatory variables had a linear relationship with the response variable. Serial correlation was tested using Durbin Watson test.

3.10.3 Descriptive Statistics

Descriptive statistical techniques which were frequencies, mean, standard deviation were used to analyse quantitative data. On the other hand, qualitative data was categorized and reported in emergent themes; measures of central tendency gave expected summary statistics of the variables being tested. The findings are presented by use of frequency distribution tables that give record of a number of times a score or a response occurs.

3.10.4 Inferential Statistics

Multiple regressions and correlation analysis, the significance of each independent variable was tested at a confidence level of 95% and used to analyze the collected data. The regression equation of the study was applied as shown below; the beta (β) coefficients for each independent variable was generated from the model, subjected to a t–test, in order to test each of the hypotheses under study. Inferential statistics were used in testing the hypothesizes H_{01} to H_{05} as guided by methodological literature developed by scholars like Baron and Kenny (1986), Preacher and Hayes (2004), Preacher et al., (2007), Hayes (2012), Hayes (2017) among other related scholars. Specifically, on the basis of statistical equation (equation 3.2) commensurate to the conceptual model that guided the study, linear and multiple regression equations were developed and used in testing the hypothesized effects. These assertions are as expounded upon below:

3.10.5 Testing for Direct effects

In order to achieve objectives 1,2,3,4 and 5, being direct effects, linear regression models were tested for purposes of H_{01}, H_{02}, H_{03}, H_{04}, H_{05},. The test statistics that was computed and derived included the coefficient of determination (R^2); the ANOVA, the beta coefficient (β) and the (p-Values). The significance level (P-Value) for each of the variables should be less than 0.05 to demonstrate that the variable is a significant predictor of the dependent variable (Hair et al., 2013; Field, 2009). The decisions on the tests conducted in respect of the direct effects depicted by H_{01} to H_{04} were on the basis of the significant change in the F statistic parameter.

The following multiple logistic regression model was tested.

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon \quad \ldots\ldots \text{ Equation (3.2)}$$

Where;

Y is odds of performance of energy and petroleum state corporations in Kenya

β_0 is the Y intercept

β_i; where i = 1; 2; 3; 4 represents the independent variable coefficients to be estimated.

X_1 is green raw material acquisition

X_2 is green manufacturing technology

X_3 is green distribution

X_4 is green disposal

ε is the error term

3.10.6 Testing for Moderation

The H_{05} was tested using moderated regression analysis to establish the extent that the moderator variable affected the relationship between the specific green supply chain practices and firm performance. The moderator effect was examined using regression analysis procedures as outlined by Baron and Kenny (1986); Aiken and West (1991). The moderating effect of regulatory framework on green raw materials, green manufacturing technologies, green distribution, and green disposal on firm performance relationship respectively, will be consequently assessed using the following equations.

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_1 * Z + \varepsilon \text{.....} \quad \text{Equation (3.3)}$$

$$Y = \beta_0 + \beta_1 X_2 + \beta_2 X_2 * Z + \varepsilon \text{.....} \quad \text{Equation (3.4)}$$

$$Y = \beta_0 + \beta_1 X_3 + \beta_2 X_3 * Z + \varepsilon \text{.....} \quad \text{Equation (3.5)}$$

$$Y = \beta_0 + \beta_1 X_4 + \beta_2 X_4 * Z + \varepsilon \text{.....} \quad \text{Equation (3.6)}$$

$$Y = \beta_0 + \beta_1 X_5 + \beta_2 X_5 * Z + \varepsilon \text{.....} \quad \text{Equation (3.7)}$$

Where;

Y is the performance of energy and petroleum state corporations in Kenya

β_0 is the Y intercept

β_z is the coefficient of the moderating variable

β_i; where i = 1; 2; 3; 4; 5; being the slope coefficient representing the moderated influence of the performance variables

$X_1 Z$ is green raw material*regulatory framework

X_2Z is manufacturing technology *regulatory framework

X_3Z is green distribution *regulatory framework

X_4Z is green disposal*regulatory framework

ε the error term

The model was advanced on the assumption that there existed a linear relationship between the variables. After data collection, its normality was tested before analysis was done. Mugenda (2003) argues that some data sets rarely meet the assumption of normality. When researchers proceed with statistical tests on such data assuming normality, they end up with questionable inferences (Chandrakandan *et. al* 2011). Chandrakandan *et. al* (2011) further says that Shapiro-Wilk test is the most powerful normality test. As such, the Researcher employed it in this study. Had normality been absent, non-parametric statistical tools would have been applied.

3.10.7 Operationalization of Study Variables

The concepts that formed the independent variable in this study are green organizational practices. According to Bryman and Bell (2003) concepts are mental images or perceptions and therefore, their meaning varies from person to person. To be useful in a study, concepts need to be converted in to variables which can be measured. William and James (2006) argue that concepts are first converted in to indicators which are then converted to variables. The Table 3.2 operationalizes the concepts studied.

Table 3.2: Operationalization of Study Variables

Concept name	Indicators	Variables	Working definition
Dependent variable			
Firm performance	Annual Earnings	ROE	<5%
		ROA	<5%
		ROCE	<5%
	Corporate reputation	Positive Stakeholder feedback	Over 60% Positive feedback
Independent variables			
Supplier's use of Green Research, design and material procurement	Green Green Design	Environmental friendly research Design for environment	Little or no environmental harm during research and design
Supplier's use of Green Manufacturing and distribution	Use green manufacturing	Use of green technology	Use of environmental friendly manufacturing
Product's capacity for Green and disposal	Environmental friendly service Reduced energy use		Minimised environmental impacts during product use

CHAPTER FOUR
RESEARCH FINDINGS AND DISCUSSION

4.1 Introduction

This chapter presents the results of the study on the influence of green supply chain practices on performance of energy and petroleum state corporations in Kenya. The presentation of the results has been done in sections. This first part dwells with analysis of study preliminaries. The second part analysis the data to establish whether the study objectives were met.

4.2 Response Rate

In this study, two hundred and fifty five (255) questionnaires were randomly distributed to sampled procurement staff derived from ten Energy and Petroleum State Corporations and two hundred and fifteen (215) questionnaires were filled returned giving an 84.3% response rate. However, of the 215 returned, a total of 201 were reasonably and adequately completed giving 78.8% response rate. Saunders, Lewis and Thornhill (2007) suggest that a 30-40% response rate is considered adequate. On the other hand, Sekaran (2003) and Mugenda and Mugenda (2003) indicate that a response rate of 30% and greater than 50% respectively is adequate while Hager, Wilson, Pollack and Rooney (2003) also recommend 50% response rate as adequate and thus rendering the response rate for this study as adequaate. Table 4.1 shows the response rate data in this study.

Table 4.1: Response Rate of Questionnaires

Responses	No.	Percentages
Administered questionnaires	255	100%
Returned	215	84.3%
Usable questionnaires	201	78.8%
Unusable questions (not filled, wrongly marked and outliers)	14	5.5%

4.3 Data Preparation and Screening

The survey data was screened for a number of potential problems in relation to missing data according to guidelines provided by Tabachnick and Fidell (2013). On receipt of any completed questionnaire, they were prepared for further screening by numbering to ensure that each and every questionnaire was accounted for. Questionnaires that were left blank or had large missing data were discarded and not included in the analysis.

4.3.1 Missing Values Analysis

Studies have shown that missing values are a common occurrence in social research (Hayes, 2012). As noted by Fichman *et al*. (2005), missing values can seriously affect results of statistical analysis. Consequently, the study attempted to eliminate or reduce missing values right from the field. Each questionnaire was delivered to the procurement staff targeted and a stakeholder and other managers from finance and environment departments targeted for data used to triangulate. Thereafter, a time and date to return and collect the questionnaire was agreed upon. To ensure that the questionnaire was completed, a follow-up phone call was made prior to the second visit. In case the completed questionnaire was still not available, a second visit was arranged to encourage participation. Personalized thank-you notes were delivered when the questionnaires were collected. Missing values were evaluated with respect to both cases and variables. Initially, missing values were evaluated with respect to cases and their distribution as shown in Table 4.2. Most cases had non-missing (94.9%) values and 17 cases (5.1%) had missing values.

Table 4.2: Distribution of the Number of Missing Values on Cases

Number of missing values	Number of cases	Percentage
1	4	1.2
2	9	2.7
3	4	1.2

Thereafter, missing values were assessed with respect to variables. Table 4.3 shows the number of missing values by variables. Specifically, 2 variables had one missing value and one variable had two missing values. These were deemed useable and missing data were replaced with mean substitution before further analysis was conducted (Tabachnick & Fidell, 2013).

Table 4.3: Distribution of the Number of missing Values by Variables

Number of missing values	Number of variables	Percentage
1	2	3.6
2	1	1.8

4.3.2 Analysis of Outliers

An outlier is a point that is far from other observations. Outlier may be due to variation in the measurement and can perhaps show an experimental error (Churchill Jr. & Iacobucci, 2004). The latter is sometimes excluded from the data set. There is high

tendency of outliers in any random distribution, but they are often indicative either of measurement error or that the population suffers hard-tail distribution. Scrutinizing outliers is an important step because skipping initial examination of outliers can distort statistical tests if there happens to be problematic outliers (Hair*et al*., 2010). In particular, it distorts statistics and may lead to results that do not generalize to certain sample except one with the same type of outliers (Tabachnick & Fidell, 2013).

In line with the recommendation of Tabachnick and Fidell (2013) this study used Mahalanobis D^2 measure to identify and deal with multivariate outliers. Additionally, handling multivariate outliers would take care of univariate outliers. However, treating univariate outliers would not necessarily take care of multivariate outliers (Hair*et al*., 2010). Hence, Mahalanobis D^2 were calculated using linear regression methods in SPSS, followed by the computation of the Chi-square value. Given that 4 items were used, 3 represent the degree of freedom in the Chi-square table with $p < 0.001$, (Tabachnick & Fidell, 2013). This means that any case with a probability Mahalanobis D^2 value of less than 0.001 is a multivariate outlier which should be removed. Therefore, cases with a value of less than 0.001 were excluded from further analysis.

4.3.3 Reliability Statistics (Pilot Results)

A pilot study was conducted to pretest the tool used in data collection. Twenty six questionnaires were administered to non-energy and petroleum state corporation employees who were randomly selected. In this study, an internal consistency was done using Cronbach's Alpha to measure how well the items were correlated to each other for all the questionnaires issued to different groups of pilot respondents. The rule of thumb for Cronbach Alpha is that the closer it is to 1, the higher the reliability (Sekaran, 2010). In fact, a value of at least 0.7 is recommended. Table 4.4 indicates the Cronbach Alpha results for variables in this study.

Table 4.4: Reliability Statistics (Pilot Results)

Reliability Statistics	Number of items	Cronbach's Alpha	Comment
Green raw materials	5	.752	Accepted
Green manufacturing technologies	5	.825	Accepted
Green distribution	8	.700	Accepted
Green disposal	6	.769	Accepted
Regulatory framework	8	.789	Accepted
Organizational performance	5	.717	Accepted

As indicated Table 4.4, green raw material acquisition had 0.752, green manufacturing technologies had 0.825, green distribution had 0.700, disposal had 0.769, regulatory frame work had 0.789 and organizational performance had 0.717.

This Cronbach's alpha measures indicated a strong internal consistency among measures of variable items. This implied that respondents who tended to select high scores for one item were likely to select high scores for the others. Similarly, those who select low scores for one item were likely to select low scores for the others. The data collection instrument was therefore reliable and acceptable for the purposes of the study.

4.4 Background Information

Respondents were asked to provide information relating to personal characteristics as well as the firm's profile.

4.4.1 Year of Establishment

Study finding in Table 4.5 indicates that 42.4% of the energy related state corporations in Kenya were established between 1950 and 1970. 36.6% were established between 1971 and 2000 while 21.0% were set up beyond 2001. This indicates that though 42.4% of the firms were set up before human economic activity and the resulting climate change became a big business issue, most of the others were established in the late 1980s and early 2000 when the issue gained a lot of traction. As such, all the firms are expected to be aware of business and environmental risks and opportunities that arise from their operations.

Table 4.5: Year of Establishment

Years	Frequency	Percentage
1950-1970	85	42.4
1971-2000	74	36.6
2001-2012	42	21
Total	201	100

4.4.2 Size of the Organizations

Size was determined using two measures. These were the number of staff and annual procurement budget. Most of the organizations have between 51 and 200 members of staff of different cadre manning their procurement departments. Considering that most procurement departments comprise about 5% of the entire workforce, the institutions studied qualify as big undertakings employing over 100 employees.

Table 4.6: Number of Procurement Staff

Number of staff	Frequency	Percentage
1- 50	35	17.5
51-100	26	13
101-150	51	25.5
151-200	51	25.5
201-250	20	10
250-300	17	8.5
Total	201	100

4.4.3 Annual Procurement Budgets

Data indicates that most of the firms had annual procurement budgets above 3 billion Kenya shillings. This is a huge amount and indicates that their operations are huge. According to Dibia and Onwuchekwa (2015), a firm's size is significantly related to company's social responsibility disclosures, including environmental disclosure. This result is also consistent with the findings of Hackson and Milne (1996) and Adams and Hart (1998) who all opined that small firms are more likely to hide crucial information because of their competitive disadvantage within the industry.

Table 4.7: Annual Procurement Budget

Budget rage(Billion Ksh)	Frequency	Percent
0.2-1	28	14
1.1-2	28	14
2.1-3	58	28.9
3.1-4	46	23
4.1-and above	40	20.1
Total	201	100

4.4.4 Respondents Educational Level

The data was then analyzed to establish the educational attainments of the respondents. As shown in the table below, a majority of respondents had a diploma level of education and above as indicated on Table 4.8.

Table 4.8: Respondents' Educational Attainment

Educational Level	Frequency	Percent
Degree and above	92	46
Diploma	84	42
Certificate	20	10
High school	4	2
Total	201	100

The findings in Table 4.8 indicated that most of the respondents (46%) had either a degree or a higher qualification followed by those with a Diploma (42%) and the least comprising those with a high school certificate (2%).

4.4.5 Respondent's Job Position/Designation

Data as in Table 4.9 showed that majority of the respondents (50.8%) working within procurement department in energy and procurement state corporations in Kenya were of lower cadre while the rest (49.2%) were within top managers and middle managers out of the total 761 employees working in procurement departments. This data correctly reflects similar data released in the National Cohesion and Integration Commission report of 2013. Therefore, majority of the respondents under study were procurement staff who are at operational level.

Table 4.9: Respondent Category of Job position/ designation

Cadre of Staff	Frequency	Percent
Top Manager	28	14.1
Middle Manager	71	35.1
Lower cadre	102	50.8
Total	201	100

4.4.6 Membership to Professional Body

Staff in procurement department in state corporations have subscribed member to professional bodies. Professional bodies help Organizations to promote ethics, integrity and responsibility. To establish this, the study asked the respondent whether they belong to a professional body and thereafter which professional body they ascribe to. According to Table 4.10 majority (71.7%) staff working in procurement departments in studied organizations belong to professional bodies while 28.3% do not belong to a professional body.

Table 4.10: Membership to Professional Body of Respondents

Response	Frequency	Percent
Yes	71	71.7
No	28	28.3
Total	201	100

The study further inquired which Membership body respondent ascribe and Table 4.11 shows that majority 63.3% are member of KISM, 6.3% ascribe to KIM while 2.1% belong to CIPs. This indicates majority respondent have an understanding of current professional requirements and current professional trends such as care for the environment and safety for communities.

Table 4.11: Membership Body Ascribed

Membership body	Frequency	Percent
N/A	57	28.3
CIPS	4	2.1
KIM	13	6.3
KISM	127	63.3
Total	201	100

4.4.7 Importance of Procuring Items Produced Using Clean Technology

When asked the reasons for procuring green items, the respondents noted that they procure green items for the purpose of sustainability (25.9%), to reduce release of green house in the environment (25.9%), to improve organizational image internationally (13.8%), to combat climate change (10.3%) and help in meeting donor requirements (9.8%), indicated in Table 4.12.

Table 4.12: Reasons for Procuring Green Items

Reason	Percent
Sustainability	25.9
It helps offset financial & environmental risk	14.4
Reduce release of green house in the environment	25.9
Combats climate change	10.3
Improves organizational image internationally	13.8
Helps in meeting donor requirements	9.8

4.4.8 Perceived Environmental Research Effects on Procured Items

When asked whether as a procurement practitioner, they placed any value on environmental effects from research done on procured items, a significant majority of 55.7% of the respondents indicated that they placed some value on environmental impacts that arise in the research and design stage in the development of procured items.

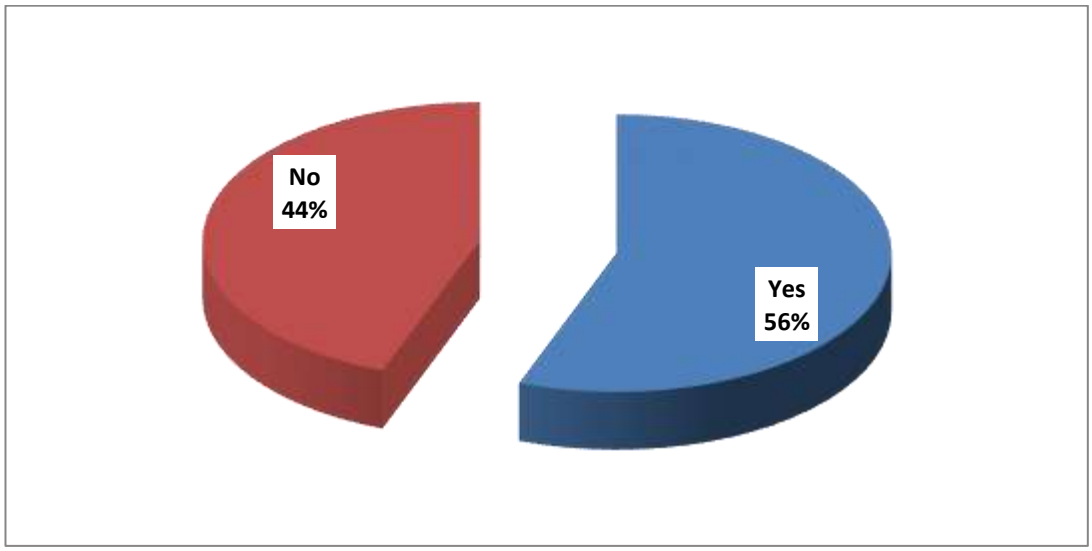

Figure 4.1: Perceived Environmental Research Effects on Procured Items

When those who said they placed value on environmental effects from research done on procured items were asked why they place that value, a greater majority of responses outlined external reasons such as social responsibility, clean development mechanism, customer satisfaction and cost reduction as well as meeting industry standards.

Table 4.13: Reasons for Perceived Environmental Research Effects on Procured Items

Response	**Percent**
Customer satisfaction & cost reduction	7
For social responsibility	16.9
Environmental sustainability	7
Clean development mechanism	12.4
Ensure it meets industry standards	5.5

4.5 Descriptive Statistics

The section discusses the descriptive results derived from data analysis in this study.

4.5.1 Suppliers' Use of Green Raw Materials

As part of the study's objectives, the study sought to establish the suppliers' use of green raw materials. Basing on the findings in Table 4.14, it was not fully established whether the raw materials used in procured items are of importance to the firms (mean = 3.42, SD = 1.057). As well, it was not clearly ascertained if items made of green raw materials are rated higher during procurement (mean = 3.4, SD = 0.965). There is therefore need for further studies on the same to clearly establish if there is focus on green raw materials in the procurement process.

Table 4.14: Green Raw Materials

Items		SD	D	N	A	SA	Mean	Std. Deviation
The raw materials used in procured items is very important to us	Freq.	1	21	54	75	50	3.42	1.057
When considering items to procure, items made of green raw materials are rated higher	Freq.	10	19	31	118	23	3.4	0.965
We do not consider raw materials used to develop procured items as important	Freq.	75	14	73	38	1	3.57	0.996
Green raw materials in procured items is an important part of tender evaluation criteria	Freq.	22	25	33	103	18	3.45	0.975
We would choose items made with green raw materials to those with non-green raw materials more	Freq.	16	37	41	56	51	3.47	1.056
We always carry out background checks on companies to gather information on their raw material acquisition process processes	Freq.	14	39	36	102	10	3.12	1.05
Green raw materials							3.4556	0.77784

However, the respondents confirmed that they consider the raw materials used to develop procured items as important (mean = 3.57, SD = 0.996). In fact, green raw materials in procured items is an important part of tender evaluation criteria (mean = 3.45, SD = 0.975). To further support the above notion, the respondents would choose items made with green raw materials to those with non-green raw materials more (mean = 3.47, SD = 1.056). The results imply that there is emphasis on green raw materials in procured items. Finally, there was doubt if the respondents always carry out background checks on companies to gather information on their raw material acquisition processes (mean = 3.12, SD = 1.05).

4.5.2 Green Manufacturing Technology

The study sought to establish the supplier's use of green manufacturing technology. Table 4.15 illustrates the results. The study established that the use of green manufacturing technology in procured items is very important to the respondents (mean = 4.62, SD = 0.953). Besides, the respondents consider ISO 14001 certification important in prequalification of suppliers (mean = 4.54, SD = 0.985). Furthermore, the respondents carry out adequate pre-factory inspections to understand manufacturing process of procured items (mean = 4.54, SD = 0.908). There is also a comprehensive environmental policy that guides the firms' operations (mean = 4.49, SD = 0.945).

Table 4.15: Green Manufacturing Technology

Items	SD	D	N	A	SA	Mean	Std. Deviation
The use of green manufacturing technology in procured items is very important to us	5	11	28	121	36	4.62	0.953
We consider ISO 14001 certification important in prequalification of suppliers	5	7	30	121	38	4.54	0.985
We carry out adequate pre-factory inspections to understand manufacturing process of procured items	0	0	78	74	49	4.54	0.908
We have a comprehensive environmental policy that guides our operations	0	41	19	84	57	4.49	0.945
We associate more with suppliers with good environmental records	0	7	46	133	15	3.83	1.094
Green Manufacturing Technology						4.548	0.777

There is therefore a higher likelihood that green products are produced in practices of recycling-use and re-usable disposal. Finally, the respondents were of the opinion that they associate more with suppliers with good environment records (mean = 3.83, SD = 1.094). The results suggest that there is emphasis on suppliers that have green manufacturing technology.

4.5.3 Green Distribution

In this section of the analysis, the study sought to establish the supplier's use of green distribution. Table 4.16 highlights the results. Basing on the findings in table 4.16, the respondents consider carbon foot print of procured items as important (mean = 3.51, SD = 1.145). There is a possibility that the firms have engaged in reducing the carbon footprint through their procured items and their engagement with the suppliers. Other than carbon foot print, the supplier distribution network is important in tender evaluation criteria (mean = 3.72, SD = 0.889). However, most of the respondents were in agreement that it is not their business how procured items get to them (mean = 3.69, SD = 0.82).

Table 4.16: Green Distribution

Items		SD	D	N	A	SA	Mean	Std. Deviation
We consider carbon foot print of procured items as important	Freq.	1	36	39	104	21	3.51	1.145
A supplier distribution network is important in tender evaluation criteria	Freq.	1	13	28	138	21	3.72	0.889
It is not our business how procured items get to us	Freq.	35	34	46	83	3	3.69	0.82
Use of minimum packaging is important to us	Freq.	4	23	50	67	57	3.7	1.056
We prefer supplier to use recyclable packaging	Freq.	0	11	43	88	21	3.63	0.934
Procured items are delivered directly to the sites of need	Freq.	1	11	52	79	58	3.71	1.044
We consider items packaged in biodegradable packaging more	Freq.	8	23	19	88	63	3.57	0.987
We insist on supplies getting to central stores before dispatch	Freq.	12	30	26	65	68	3.53	0.967
Green Distribution							3.626	0.776

Furthermore, the use of minimum packaging is important to the respondents (mean = 3.7, SD = 1.056). As well, there is a preference towards suppliers that use recyclable packaging (mean = 3.63, SD = 0.934). In addition, procured items are delivered directly to the sites of need (mean = 3.71, SD = 1.044). As well, the respondents confirmed that

they consider items packaged in biodegradable packaging (mean = 3.57, SD = 0.987). Finally, they insist on supplies getting to central stores before dispatch (mean = 3.53, SD = 0.967).

4.5.4 Green Disposal

The study sought to establish the products capacity for green disposal. Table 4.17 illustrates the results. As shown in the table above, when buying, priority is given to items with longest lifecycle (mean = 3.93, SD = 0.994). It is a bonus for items that are reusable since they are rated highly during tender evaluation (mean = 3.74, SD = 1.083). On the same note, items with potential for recycling are considered more favorably while procuring (mean = 3.63, SD = 0.919).

Furthermore, firms with safe disposal methods for their products are easily prequalified compared to those without (mean = 3.62, SD = 1.07). In fact, items that can be safely disposed locally are the ones that are procured (mean = 3.47, SD = 1.155). Finally, the cost of disposal of items is an important decision factor before procurement (mean = 3.56, SD = 1.048).

Table 4.17: Green Disposal

Items		SD	D	N	A	SA	Mean	Std. Deviation
When buying, priority is given to items with longest lifecycle	Freq.	17	8	46	87	43	3.93	0.994
Items that are reusable are rated highly during tender evaluation	Freq.	8	30	51	60	52	3.74	1.083
Items with potential for recycling are considered more favorably while procuring	Freq.	4	7	44	77	69	3.63	0.919
Firms with safe disposal methods for their products are easily prequalified than those without	Freq.	28	6	49	94	24	3.62	1.07
We procure items that can be safely disposed locally	Freq.	15	31	50	80	25	3.47	1.155
Cost of disposal of items is an important decision factor before procurement	Freq.	18	18	34	99	32	3.56	1.048
Green Disposal							3.7282	0.83983

4.5.5 Regulatory and Policy Framework

In this section of the analysis, the study highlights the results on regulatory framework. The findings are as presented in table 4.18. As evidenced in table 4.18, the procurement department has agreed on annual targets (mean = 4.25, SD = 1.187). Besides, all staff in the department are evaluated annually against set targets (mean = 4.39, SD = 1.087). Other than evaluating staff against set targets, there is timeliness in delivery of procured item (mean = 4.39, SD = 1.079). There is timeliness in the procurement process since it is one of the indicators of improved performance.

Additionally, the quality of procured items is an important consideration when buying (mean = 3.99, SD = 1.167). Furthermore, the price of procured items is very important during tender evaluation (mean = 3.97, SD = 1.097). Finally, the ability of procured items to meet intended needs is a key consideration (mean = 3.85, SD = 1.174).

Table 4.18: Regulatory Framework

Items		SD	D	N	A	SA	Mean	Std. Deviation
We have a comprehensive procurement policy	Freq.	0	37	47	67	50	3.44	1.209
Procurement department has agreed on annual targets	Freq.	21	0	45	103	32	4.25	1.187
All staff in the department are evaluated annually against set targets	Freq.	1	23	51	87	39	4.39	1.087
Timeliness in delivery of procured items is an important indicator of our performance	Freq.	1	5	71	90	34	4.39	1.079
Quality of procured items is an important consideration when buying	Freq.	1	15	67	73	45	3.99	1.167
Price of procured items is very important during tender evaluation	Freq.	8	6	88	75	24	3.97	1.087
Ability of procured items to meet intended needs is a key consideration	Freq.	2	5	65	90	39	3.85	1.174
Regulatory Framework							3.932	0.902

4.5.6 Firm Performance

The results on firm performance are presented in table 4.19. As shown in table 4.19, customers are satisfied with the products and services of their firm (mean = 3.99, SD = 0.864). The customers are satisfied to the extent that customer retention rate is as high or higher than that of competitors (mean = 3.74, SD = 1.12). Furthermore, the organization has good reputation in the sector (mean = 3.78, SD = 1.094) and the products it supplies are considered to be of high quality (mean = 3.9, SD = 1.033). Consequently, the degree of satisfaction concerning financial profitability (mean = 4.06, SD = 0.87) and growth in sales are (mean = 3.75, SD = 1.041).

Table 4.18: Firm Performance

Items		SD	D	N	A	SA	Mean	Std. Deviation
Our customers are satisfied with the products and services of our firm.	Freq.	2	34	67	62	36	3.99	0.864
Our customer retention rate is as high as or higher than that of our competitors.	Freq.	7	28	71	78	17	3.74	1.12
Our organization has good reputation in the sector.	Freq.	6	56	50	81	8	3.78	1.094
The products supplied by the firm are considered high quality.	Freq.	6	12	68	81	34	3.9	1.033
Degree of satisfaction concerning financial profitability	Freq.	16	12	42	102	29	4.06	0.87
Degree of satisfaction concerning growth in sales	Freq.	22	4	25	143	7	3.75	1.041
Firm Performance							3.87	0.731

4.5.7 Aggregate Descriptive Statistics for Variables

The variable descriptive statistics are as shown in Table 4.20, Supplier's use of green raw materials had a mean of 3.4844 and minimum and maximum values of 2.17 and 4.83 respectively its standard deviation is .56063 indicating a spread of just beyond half of a point standard deviation from the mean. Supplier's use of Green manufacturing technology had a mean of 3.9127 and minimum and maximum values of 2.20 and 5.00 respectively and its standard deviation is .60874. Supplier's use of green distribution has a mean value of 3.4816 with minimum and maximum values of 1.00 and 5.0 respectively. It also had standard deviation of .69801. Lastly, product capacity for green disposal had a mean of 3.6215, minimum and maximum values of 1.50 and 5.00 respectively and standard deviation of .81034. Table 4.20 shows that firm performance had a mean of 3.6667 and minimum and maximum values of 1.00 and 4.33.

Table 4.190: Aggregate Descriptive Statistics for Independent Variables

N=201	Min	Max	Mean	Std. Deviation
Product capacity for green raw material	2.17	4.83	3.4844	0.56063
Supplier's use of green manufacturing technology	2.2	5	3.9127	0.60874
Supplier's use of green distribution	1	5	3.4816	0.69801
Supplier's use of green disposal	1.5	5	3.6215	0.81034
firm performance	1	4.33	3.6667	0.46809

4.6 Factor Analysis for the Study Variables

The study carried out principle component analysis by utilizing factor analysis method to describe the variability existing among observed and correlated factors based on potentially lower number of unobserved factors. This method searches for joint variations in responses to unobserved latent variables and such are modeled as linear combinations of the potential factors together with the errors associated. This method aims to find independent latent variables and hence reduce the variables in the data especially when there are a large number of observed variables.

4.6.1 Green Raw Materials

Factor analysis was carried out on supplier's use of green raw materials. In general, the extraction method was principal component analysis and the rotation method was Varimax with Kaiser Normalization and the findings were presented in Table 4.21. The findings show that all the items related to factor 1 and factor 2 as operational factors for supplier's use of green raw materials were significantly loaded on their respective factors thus all were retained for analysis. Furthermore, factor 1 account for a variance 32.705% while all two factors account for cumulative variance of 65.245% of the total variation in leader authenticity. Kaiser- Meyer- Olkin (KMO) Measure of sampling adequacy was greater than 0.5 (0.894), and Bartlett's Test was significant, $\chi 2\ (66) = 2236.15$, $p < 0.001$.

Table 4.201: Green Raw Materials

	Factor 1	Factor 2
The raw materials used in procured items is very important to us	0.589	
When considering items to procure, items made of green raw materials are rated higher	0.519	
We do not consider raw materials used to develop procured items as important	0.666	
Green raw materials in procured items is an important part of tender evaluation criteria		0.736
We would choose items made with green raw materials to those with non-green raw materials more		0.756
We always carry out background checks on companies to gather information on their raw material acquisition process processes		0.68
Total Initial Eigenvalues	% of Variance	Cumulative %
2.725	32.705	32.705
2.705	32.54	65.245
KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	0.894	
Bartlett's Test of Sphericity Approx. Chi-Square	2236.15	
df	66	
Sig.	0.00	
Extraction Method: Principal Component Analysis.		
Rotation Method: Varimax with Kaiser Normalization.		

4.6.2 Green Manufacturing Technology

Factor analysis was carried out on supplier's use of green manufacturing technology. In general, the extraction method was principal component analysis and the rotation method was Varimax with Kaiser Normalization and the findings were presented in Table 4.22. The findings in Table 4.22 show that all the items related to supplier's use of green manufacturing technology were significantly loaded on their respective factors thus all were retained for analysis. Furthermore, supplier's use of green manufacturing technology account for a cumulative variance of 46.738%. Kaiser- Meyer- Olkin (KMO) Measure of sampling adequacy was greater than 0.5 (0.931), and Bartlett's Test was significant, $\chi 2\ (66) = 2633.244$, $p < 0.001$.

Table 4.212: Green Manufacturing Technology

	Factor 1
The use of green manufacturing technology in procured items is very important to us	0.736
We consider ISO 14001 certification important in requalification of suppliers	0.719
We carry out adequate pre-factory inspections to understand manufacturing process of procured items	0.761
We have a comprehensive environmental policy that guides our operations	0.707
We associate more with suppliers with good environmental records	0.634
Total Variance Explained	
Total Initial Eigenvalues	1.832
% of Variance	46.738
Cumulative %	46.738
KMO and Bartlett's Test	
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	0.931
Bartlett's Test of Sphericity Approx. Chi-Square	2633.244
df	66
Sig.	0.00
Extraction Method: Principal Component Analysis.	
Rotation Method: Varimax with Kaiser Normalization.	

4.6.3 Green Distribution

Factor analysis was carried out on supplier's use of green distribution. In general, the extraction method was principal component analysis and the rotation method was varimax with Kaiser Normalization and the findings were presented in Table 4.23.

The findings in Table 4.23 show that all the items related to supplier's use of green distribution were significantly loaded on their respective factors thus all were retained for analysis. Furthermore, factor 1 account for a variance of 33.956% while all two account for cumulative variance of 67.197% of the total variation in supplier's use of green distribution. The Kaiser- Meyer- Olkin (KMO) Measure of sampling adequacy was greater than 0.5 (0.935), and Bartlett's Test was significant, $\chi 2\ (78) = 3297.692$, $p < 0.001$. All items were significant to be subjected for factor analysis

Table 4.223: Green Distribution

	Factor 1	Factor 1
We consider carbon foot print of procured items as important		0.686
A supplier distribution network is important in tender evaluation criteria		0.619
It is not our business how procured items get to us		0.533
Use of minimum packaging is important to us		0.655
We prefer supplier to use recyclable packaging	0.745	
Procured items are delivered directly to the sites of need	0.786	
We consider items packaged in biodegradable packaging more	0.506	
We insist on supplies getting to central stores before dispatch	0.551	
Total Variance Explained		
Total Initial Eigenvalues	% of Variance	Cumulative %
3.114	33.956	33.956
3.021	33.242	67.197
KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	0.935	
Bartlett's Test of Sphericity Approx. Chi-Square		3297.692
df		78
Sig.		0
Extraction Method: Principal Component Analysis.		
Rotation Method: Varimax with Kaiser Normalization.		

4.6.4 Green Disposal

Factor analysis was also carried out on product's capacity for green disposal. In general, the extraction method was principal component analysis and the rotation method was varimax with Kaiser Normalization and the findings were presented in Table 4.24.

The findings in Table 4.24 show that all the items related to factor and factor 2 as operational factors for product's capacity for green disposal were significantly loaded on their respective factors thus all were retained for analysis. Furthermore, factor 1 account for a variance of 38.963% while all two factor account for 77.705% of the total variation in product's capacity for green disposal. The Kaiser- Meyer- Olkin (KMO) Measure of sampling adequacy was greater than 0.5 (0.880), and Bartlett's Test was significant, $\chi 2$ (153) = 3385.61, $p < 0.001$.

Table 4.234: Green Disposal

	Factor 1	Factor 2
When buying, priority is given to items with longest lifecycle	0.676	
Items that are reusable are rated highly during tender evaluation	0.576	
Items with potential for recycling are considered more favorably while procuring	0.651	
Firms with safe disposal methods for their products are easily prequalified than those without		0.797
We procure items that can be safely disposed locally		0.714
Cost of disposal of items is an important decision factor before procurement		0.547
Total Variance Explained		
Total Initial Eigenvalues	% of Variance	Cumulative %
3.413	38.963	38.963
3.374	38.742	77.705
KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	0.88	
Bartlett's Test of Sphericity Approx. Chi-Square	3385.61	
df	153	
Sig.	0.00	
Extraction Method: Principal Component Analysis.		
Rotation Method: Varimax with Kaiser Normalization.		

4.6.5 Firm Performance

Finally, factor analysis was also carried out on Firm performance. In general, the extraction method was principal component analysis and the rotation method was varimax with Kaiser Normalization and the findings were presented in Table 4.25. The findings in Table 4.25show that all the items related for firm performance were significantly loaded on one component thus all the items can be described as one. Furthermore, this accounts for a cumulative variance of 55.264%. The Kaiser- Meyer-Olkin (KMO) Measure of sampling adequacy was greater than 0.5 (0.907), and Bartlett's Test was significant, $\chi 2\ (28) = 1604.619$, $p < 0.001$.

Table 4.245: Firm performance

	Factor 1
Our customers are satisfied with the products and services of our firm.	0.711
Our customer retention rate is as high as or higher than that of our competitors.	0.802
Our organization has good reputation in the sector.	0.803
The products supplied by the firm are considered high quality.	0.772
Degree of satisfaction concerning financial profitability	0.673
Degree of satisfaction concerning growth in sales	0.701
Extraction Sums of Squared Loadings	
Total	4.421
% of Variance	55.264
Cumulative %	55.264
KMO and Bartlett's Test	
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	0.907
Bartlett's Test of SphericityApprox. Chi-Square	1604.619
df	28
Sig.	0
Extraction Method: Principal Component Analysis.	
Rotation Method: Varimax with Kaiser Normalization.	

4.7 Diagnostic Tests

Diagnostic testing has become an integral part of model specification in econometrics. There have been several important advances over the past 20 years. Various diagnostic tests were conducted to ensure that the coefficients of the estimates were consistent and could be relied upon in making economic inferences. As argued by Greene (2002) regression can only be accurately estimated if the basic assumptions of multiple linear regressions are observed.

4.7.1 Test of Linearity

Before carrying out multiple linear regression analysis, the assumption of linearity (that there must be a linear relationship between the outcome variable and the independent variables) which in many cases is tested using scatter plots to depict whether the relationship is linear or curvilinear. The findings in Table 4.26 highlighted the linearity test between the dependent variable (firm performance) and the independent variables. A *p*-value of greater than 0.05 for linearity means that there is no linear relationship. The findings revealed that there is a linear relationship between green supply chain practices and firm performance. This means that the significant linear relationships indicate that the independent variables can be used to predict the firm performance. Thus, there is no violation of the linearity assumption. All deviations from linearity were not significant at 0.01 level of significance. The findings on linearity test were presented in Table 4.26.

Table 4.26: Linearity

			Sum of Squares	df	Mean Square	F	Sig.	R
X_1* Y	Between Groups	(Combined)	156.891	51	3.076	12.875	0.000	0.726
		Linearity	133.854	1	133.854	560.231	0.000	
		Deviation from Linearity	23.036	50	0.461	1.928	0.115	
X_2 * Y	Between Groups	(Combined)	157.25	52	3.024	12.672	0.000	0.740
		Linearity	139.033	1	139.033	582.629	0.000	
		Deviation from Linearity	18.217	51	0.357	1.497	0.079	
X_3 * Y	Between Groups	(Combined)	142.837	26	5.494	21.324	0.000	
		Linearity	126.817	1	126.817	492.241	0.000	
		Deviation from Linearity	16.021	25	0.641	2.487	0.041	
X_4 * Y	Between Groups	(Combined)	108.779	74	1.47	3.883	0.000	0.502
		Linearity	63.998	1	63.998	169.07	0.000	
		Deviation from Linearity	44.781	73	0.613	1.621	0.082	

KEY: X_1 is Supplier's use of green raw materials, X_2 is Supplier's use of green manufacturing technology, X_3 is Supplier's use of green distribution, , X_4 is Product capacity for green disposal, Y=firm performance

4.7.2 Normality Test

Jarque-Bera formalizes this by testing the residuals for normality and testing whether the coefficient of skewedness and kurtosis are zero and three respectively (Brooks 2008). The study used Jarque-Berra's statistic to determine whether the sample data have the skewedness and kurtosis matching a normal distribution. It is a test based on residuals of the least squares regression model. For normal distribution JB statistics is expected to be zero (Gujarati, 2004). This was the result in this study.

Table 4.27: Normality test

Statistic	X_1	X_2	X_3	X_4
Skewness	-.509	-.189	-.752	-.914
Std. Error of Skewness	.176	.174	.182	.182
Kurtosis	-.375	-.301	. 724	-.115
Std. Error of Kurtosis	.351	.346	.361	.362

KEY: *X_1 is Supplier's use of green raw material X_2 is Supplier's use of green manufacturing technology, X_3 is Supplier's use of green distribution, X_4 green disposal, Y=firm performance*

In this study JB statistics values were: green raw materials (0.509 and 0.375), green manufacturing technology (0.189 and 0.301), green distribution (0.752 and 0.724), product capacity for green disposal (0.914 and 0.115). As can be seen, the JB measures are very close to zero and that the variables are very close to normal distribution.

4.7.3 Multi-Collinearity Test

Multi-collinearity is a problem in multiple regressions that develops when one or more of the independent variables are highly correlated with one or more of the other independent variables. If an independent variable is an exact linear combination of the other independent variables, then we say the model suffers from perfect collinearity, and it cannot be estimated by OLS (Brooks 2008). Failure to account for perfect multi-collinearity results into determining regression coefficients and infinite standard errors while existence of imperfect multi-collinearity results into large standard errors. Large standard errors affect the precision and accuracy of rejection or failure to reject the null hypothesis. During estimation, the problem is not lack of multi-collinearity but rather its severity.

According to Gujarati (2004), the standard statistical method for testing data for multi-collinearity is analyzing the explanatory variables correlation coefficients (CC); condition index (CI) and variance inflation factor (VIF). Therefore, in this study, to determine multi-collinearity variance inflation factors (VIF) and tolerance were used. For tolerance, values of less than 0.1 suggest multi-collinearity while for values of VIF that exceed 10 are often regarded as indicating multi-collinearity.

Table 4.28: Collinearity Test for Independent variables

Model	Collinearity Statistics	
	Tolerance	VIF
X_1	.942	1.062
X_2	.586	1.706
X_3	.806	1.240
X_4	.992	1.008
X_5	.895	1.128

Green raw material had VIF of 1.062 and tolerance of .942, green manufacturing technology had VIF of 1.706 and tolerance of .586, green distribution had VIF of 1.240 and tolerance of .806, green disposal had VIF of 1.008 and tolerance of .992 and lastly policy and regulatory framework had VIF of 1.128 and tolerance of .895. This shows that the variables had a VIF that is way less than 10 and tolerance value of more than 0.1 ruling out the possibility of multi-collinearity (Field, 2009). Therefore, the results imply that there was no multi-collinearity problem among independent variables.

4.7.4 Test of Homoscedasticity

The other assumption of multiple linear regression is homoscedasticity. Normally, a scatter plot of residuals predicted values is a good way to check for homoscedasticity. If the data are heteroscedastic, a non-linear data transformation or addition of a quadratic term might fix the problem. The findings in Table 4.29 revealed that basing on Levene statistic, homoscedasticity is not a problem except for all the variables, p-value > 0.05. This essentially means that there is a linear relationship and there is no need to have a non-linear data transformation or quadratic term to fix.

Table 4.29: Homoscedasticity

		Levene Statistic	df1	df2	Sig.
Firm performance	Based on Mean	0.868	3	455	0.458
	Based on Median	1.013	3	455	0.387
	Based on Median and with adjusted df	1.013	3	449.437	0.387
	Based on trimmed mean	0.918	3	455	0.432
green raw materials	Based on Mean	0.34	3	455	0.796
	Based on Median	0.268	3	455	0.848
	Based on Median and with adjusted df	0.268	3	449.78	0.848
	Based on trimmed mean	0.292	3	455	0.831
green manufacturing technology	Based on Mean	0.557	3	455	0.644
	Based on Median	0.621	3	455	0.602
	Based on Median and with adjusted df	0.621	3	449.554	0.602
	Based on trimmed mean	0.581	3	455	0.628
green distribution	Based on Mean	1.905	3	455	0.128
	Based on Median	1.524	3	455	0.208
	Based on Median and with adjusted df	1.524	3	451.243	0.208
	Based on trimmed mean	1.84	3	455	0.139
Green disposal	Based on Mean	1.338	3	455	0.261
	Based on Median	1.688	3	455	0.169
	Based on Median and with adjusted df	1.688	3	440.507	0.169
	Based on trimmed mean	1.48	3	455	0.219

4.8 Inferential Statistics

The section that follows provides a discussion of inferential statistics derived from analysis of data.

4.8.1 Correlation Matrix

Correlation analysis is a method of statistical evaluation used to study the strength of a relationship between two or more numerically measured continuous variables. Correlation analysis gives the Pearson's coefficient value (correlation test) and the significance value (measuring significance of the association). In this study, the Pearson r statistic is used to calculate bivariate correlations Values between 0 and 0.3 (0 and -0.3) indicate no correlation (variables not associated), 0.3 and 0.5 (-0.3 and -0.5) a weak positive (negative) linear association, Values between 0.5 and 0.7 (-0.5 and -0.7) indicate a moderate positive (negative) linear association and Values between 0.7 and 1.0 (-0.7 and-1.0) indicate a strong positive (negative) linear association. The significance of the

relationship is tested at 95% level with a 2-tailed test where a statistically significant correlation is indicated by a probability value of not more than 0.05. This means that the probability of obtaining such a correlation coefficient by chance is less than 5 times out of 100, so the result indicates the presence of an association. All the green procurement measures display weak correlation relationship with firm performance as shown in Table 4.30. As the correlation values are low, chances of multi-collinearity are low between the various independent variables. As such, the entire variables were used in conducting regression analysis.

Table 4.30 indicates that there is a negative relationship between supplier's use of green raw material and performance of energy and petroleum state corporations in Kenya. This relationship is illustrated by the correlation coefficient of -.015 at 0.0000 significant level. This result is in line with the work of Sini Laari in 2016 titled: Green Supply Chain Management Practices and Firm Performance: Evidence from Finland, which showed a negative connection between internal environmental collaboration and ROCE. In that study, only environmental collaboration with customers was found to be directly related to financial performance, measured as perception based indicators.

In contrast, neither internal GSCM practices nor environmental collaboration with suppliers directly resulted in financial performance improvements. Suppliers who use green raw materials tend to ask for a premium price for their products, which affects a company's bottom line. The two have a correlation coefficient of .048 at 0.000 significance level after moderation by regulatory framework.

Table 4.250: Correlation Matrix

		X_1	X_2	X_3	X_4	Z	Y
X_1	Pearson Correlation	1					
	Sig. (2-tailed)						
X_2	Pearson Correlation		1				
	Sig. (2-tailed)						
X_3	Pearson Correlation	.151*		1			
	Sig. (2-tailed)	.049					
X_4	Pearson Correlation	.120	.053		1		
	Sig. (2-tailed)	.121	.489				
Z	Pearson Correlation	-.048**	.025**	.005*		1	
	Sig. (2-tailed)	.000	.000	.044			
Y	Pearson Correlation	-.015**	-.084**	-.113**	.061**		1
	Sig. (2-tailed)	.000	.000	.000	.000		

Where;

X_1 is green raw materials, X_2 is green manufacturing technology, X_3 is green distribution, , X_4 is green disposal, Y=firm performance

The results also show that there is a minute positive relationship between supplier's use of green raw materials and performance of energy and petroleum state corporations in Kenya. This result support Hollos *et al*. (2012) who argue that sustainable supplier collaboration only improves the sustainability of the buying firm while other aspects contribute to economic performance. Use of green raw materials can lead to some cost savings which can positively affect an organizations performance.

The relationship between supplier's use of green manufacturing technology and performance of energy and petroleum state corporations in Kenya was negative with a correlation coefficient of -.084 at 0.000 level of significance.

4.8.2 Multiple Regression Statistics (Hypothesis Testing)

Descriptive statistics for each independent variable are discussed in the following subsections.

4.8.2.1 Influence of Supplier's use of Green Raw Materials on firm Performance

For the influence of supplier's use of green raw material on firm performance, a regression equation model was used. From the findings the correlation coefficient (R) is 0.005 which is a positive, very weak relationship between supplier's use of green raw materials and firm performance and the R-Square value of 0.000 shows that the model accounts for 0.00% of the variation or change in the performance of energy and petroleum state corporations in Kenya.

This implies that supplier's use of green raw materials does contribute to performance of energy and petroleum state corporations in Kenya. This result relates with those found by Unine van den Berg and Hugo van den Berg (2013) in their study The Effect of Greening the Supplier and Innovation on Environmental Performance and Competitive Advantage. In this study, it was found that greening the supplier, which included using green raw materials, does not show a significant correlation with competitive advantage and hence firm performance.

Table 4.3126: Model summary For Green Raw Materials and Firm performance

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df_1	df_2	Sig. F Change
1	.005[a]	.000	-.007	.47131	.000	.004	1	143	.949

a. Predictors: (Constant), X_1

The results of the ANOVA test show a P-value of 0.004 is less than the set level of significance of 0.05 for a normally distributed data as shown in Table 4.32 . The results further revealed that the model had an F-ratio of 0.04 which was significant at 5% level of significance. The findings show that the model is statistically significant in explaining the effect of supplier's use of green raw materials on firm performance.

Table 4.27: ANOVA for Supplier's Use of Green Raw Materials and Firm Performance

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.001	1	.001	.004	.0.004[a]
	Residual	31.766	143	.222		
	Total	31.766	144			

a. Predictors: (Constant), X_1
b. Dependent Variable: Y

Table 4.33 shows the coefficients of the influence of supplier's use of green raw materials on firm performance. The Beta coefficients indicate the extent to which firm performance changes due to a unit change in supplier use of green raw materials.

Table 4.33: Coefficients for Green Raw Materials and Firm Performance

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	3.67	0.236		15.561	0
X1	0.004	0.067	0.005	0.064	0.949

a. Dependent Variable: Y

The equation;

$Y= \beta_0+\beta_1 X_1+\varepsilon$, holding all other factors constant, this becomes,

$$Y_0=3.670+.004X_1$$

The positive Beta coefficients imply that a unit change in the suppliers use of green raw materials results in increased firm performance, in this case, .004 units increase.

4.8.2.2 Effect of Supplier's Use of Green Manufacturing Technology on Firm Performance

Effect of supplier's use of green manufacturing technology had a correlation coefficient (R) of 0.071 which is a positive. Further, the study had R-Square of 0.005 implies the model accounts for 5.00% of the variation or change in firm performance.

Table 4.34: Model Summary for Green Manufacturing Technology and Firm Performance

R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
				R Square Change	F Change	df1	df2	Sig. F Change
.071a	0.005	-0.002	0.46923	0.005	0.727	1	144	0.395

a. Predictors: (Constant), X_2

The results of the ANOVA test show a P-value of 0.004 is less than the set level of significance of 0.05 for a normally distributed data. The results further revealed that the model had an F-ratio of 0.727 which was significant at 5% level of significance. The findings imply the model significantly accounts for the change in firm performance.

Table 4.35: ANOVA for Green Manufacturing Technology and Firm Performance

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	.160	1	.160	.727	.004[a]
Residual	31.705	144	.220		
Total	31.865	145			

a. Predictors: (Constant), X_2
b. Dependent Variable: Y

The coefficients of the influence of supplier's use of green manufacturing technology on firm performance are presented in Table 4.36. The Beta coefficients explain the extent to which firm performance changes due to a unit change in suppliers use of green manufacturing.

Table 4.36: Coefficients for Manufacturing Technology and Firm Performance

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	3.895	0.248		15.726	0.00
X2	-0.054	0.063	-0.071	-0.853	0.395

a. Dependent Variable: Y

The equation;

$Y= \beta_0+\beta_2X_2+\varepsilon$, holding all other factors constant, this becomes,

$$Y_0=3.895-.054X_2$$

This clearly indicates that a unit change in supplier's use of green manufacturing technology led to a .054 units drop in firm performance.

These results on green manufacturing technology contradict those found by Sezen and Cancaya (2013) who found inconclusive results on the impact of green manufacturing applications on economic performance.

4.8.2.3 Influence of Green Distribution on Firm Performance

Influence of supplier's use of green distribution had a correlation coefficient (R) of 0.01 which is positive. The study had R-Square of 0.000 implies the model accounts for 0.00% of the variation or change in the performance of energy and petroleum state corporations in Kenya and this means that supplier's use of green distribution does negatively contribute to performance of energy and petroleum state corporations in Kenya.

Table 4.37: Model Summary for Green Distribution and Firm Performance

R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
				R Square Change	F Change	df1	df2	Sig. F Change
.015a	0	-0.007	0.47231	0	0.033	1	142	0.856
a. Predictors: (Constant), X_3								

Table 4.38 shows results of the ANOVA test. The P-value of 0.003 is less than the set level of significance of 0.05 for a normally distributed data. The results further revealed that the model had an F-ratio of 0.033 which was significant at 5% level of significance. The findings point out that the model significantly explains the change in firm performance given the effect of supplier's use of green manufacturing technology.

Table 4.38: ANOVA for Green Distribution and Firm Performance

	Sum of Squares	df	Mean Square	F	Sig.
Regression	0.007	1	0.007	0.033	.003a
Residual	31.677	142	0.223		
Total	31.684	143			
a. Predictors: (Constant), X3					
b. Dependent Variable: Y					

Table 4.39 shows the coefficients of the influence of supplier's use of green distribution on the dependent variable.

Table 4.39: Coefficients for Supplier's Use of Green Distribution and Firm Performance

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	3.721	0.243		15.338	0.00
X5	-0.012	0.068	-0.015	-0.181	0.003
a. Dependent Variable: Y					

The equation,

$Y= \beta_0+\beta_3X_3+\varepsilon$, holding all other factors constant, this becomes,

$$Y_0=3.721-0.012X_3$$

In this case, a unit change of supplier's use of green distribution led to a .012 units drop in firm performance. This is expected and the cost and time required for green distribution are passed on to the procuring entity.

4.8.2.4 Product's Capacity for Green Disposal on Firm Performance

Table 4.40 shows that effect of product's capacity for green disposal had a correlation coefficient (R) of 0.013 which is positive. From the findings, the model accounts for 1.3% of the variation or change in the performance of energy and petroleum state corporations in Kenya, R = 0.013. This implies that product's capacity for green disposal does contribute to performance of energy and petroleum state corporations in Kenya in a small way.

Table 4.40: Model Summary for Product's Capacity for Green Disposal and Firm Performance

R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
				R Square Change	F Change	df1	df2	Sig. F Change
.113a	0.013	0.006	0.47201	0.013	1.797	1	139	0.182
a. Predictors: (Constant), X_4								

Table 4.41 shows results of the ANOVA test for product's capacity for green disposal. The P-value of 0.002 is less than the set level of significance of 0.05 for a normally distributed data. The results further revealed that the model had an F-ratio of 1.797 which was significant at 5% level of significance. This means that the model significantly explains the effect of supplier's use of product's capacity for green disposal on firm performance.

Table 4.41: ANOVA for Product's Capacity for Green Disposal and Firm Performance

	Sum of Squares	df	Mean Square	F	Sig.
Regression	0.4	1	0.4	1.797	.002a
Residual	30.968	139	0.223		
Total	31.369	140			
a. Predictors: (Constant), X_4					
b. Dependent Variable: Y					

Table 4.42 shows the coefficients of the effect of product's capacity for green disposal on firm performance.

Table 4.42: Coefficients for Effect of Green Disposal on Firm Performance

	Unstandardized Coefficients	Standardized Coefficients			
	B	Std. Error	Beta	t	Sig.
(Constant)	3.926	0.18		21.801	0
X4	-0.066	0.049	-0.113	-1.34	0.002
a. Dependent Variable: Y					

The equation;

$Y= \beta_0+\beta_4X_4+\varepsilon$, holding all other factors constant, becomes,

$$Y=3.926-.066X_4$$

The beta coefficient is -.066. This implies that, a unit change of product's capacity for green disposal led to a .066 units drop in firm performance. This is expected as the extra costs are passed on to the procuring entity.

4.8.2.5 Combined Regression Model Results

Table 4.43 shows that the combined independent variables, which constitute the green supply chain practices can explain 24.9% of the variance in performance of energy and petroleum state corporations in Kenya. This supports the general view that green supply chain practices are not very important in determining performance. it also supports previous studies such as by Senzen & Cakaya (2013).

Table 4.43: Model Summary for Combined Regression Model Results

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.499a	0.249	0.214	60.31114

a. Predictors: (Constant), X_4, X_3, X_2, X_1

The ANOVA test for the combined model has a P-value of 0.000. This is more than the set level of significance of 0.05 for normally distributed data. The results further reveal that the model had an F-ratio of 7.018, which is significant at 0.005 level and shows that the model significantly explains the effect of green procurement practices on firm performance. The results indicate that green supply chain practices have an influence on performance of energy and petroleum state corporations in Kenya.

Table 4.44 Combined ANOVA results

	Sum of Squares	df	Mean Square	F	Sig.
Regression	153172.4	6	25528.74	7.018	.000a
Residual	461954	127	3637.433		
Total	615126.5	133			

a. Predictors: (Constant), X_4, X_3, X_2, X_1

b. Dependent Variable: Y

To establish the direction of the relationship, either directly or inversely, coefficient analysis was done as shown on Table 4.45.

Table 4.45: Coefficients for Overall Regression Model for Direct Effect

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	669.042	55.139		12.134	0
X1	11.818	10.216	0.105	1.157	0.25
X2	-2.444	11.687	-0.022	-0.209	0.835
X3	-20.189	11.383	-0.183	-1.774	0.079
X4	-18.902	7.394	-0.228	-2.556	0.012

a. Dependent Variable: Y

The model before moderation was stated as in Equation 3.3;

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon ,$$

Where;

Y = firm performance,

β_0 = Intersection,

$\beta_{(1-4)}$ = Coefficients of independent variables

$X_{(1-4)}$ = Independent variables

After analysis, the model was transformed as shown below;

$$Y=669.042+11.818X_1-2.444X_2-20.189X_3-18.902X_4$$

4.8.3 Moderating Effect of Regulatory and Policy Framework

To establish the effect of regulatory framework on the relationship between the green supply chain practices and firm performance, data was collected and analyzed. The section below presents the results.

4.8.3.1 Moderated Supplier's Use of Green Raw Materials and Firm Performance

To confirm the level of moderation, the model analysis shown on Table 4.46 was done.

Table 4.46: Model Summary for Moderated Supplier's Use of Green Raw Materials and Firm Performance

R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
				R Square Change	F Change	df1	df2	Sig. F Change
.005a	0	-0.007	0.47131	0	0.004	1	143	0.949
.099b	0.01	-0.004	0.47066	0.01	1.4	1	142	0.239
.147c	0.022	0.001	0.4695	0.012	1.702	1	141	0.004

a. Predictors: (Constant), X_1
b. Predictors: (Constant), X_1, Z
c. Predictors: (Constant), X_1, Z, X_1Z

The findings in Table 4.46 show the moderating effect of regulatory and policy frameworks on the relationship between supplier's use of green raw materials and firm performance of energy and petroleum state corporations in Kenya. The results indicate existence of moderation effect with adoption of green environment. R^2 changed from .000 to .022 after moderation, with p-value of .004. The results indicate that regulations and policy framework has a high moderation effect of on the relationship between supplier's use of green raw materials and firm performance.

This result supports the work by Laosirihongthong (2013) in which he established that the threat of legislation- part of regulatory framework, was a consideration that resulted in companies enhancing their environmental, economic and intangible performance.

Table 4.47: ANOVA for Moderated Supplier's Use of Green Raw Materials and Firm Performance

	Sum of Squares	df	Mean Square	F	Sig.
Regression	327.758	1	327.758	0.075	.785a
Residual	626078.4	143	4378.17		
Total	626406.1	144			
a. Predictors: (Constant), X_1Z					
b. Dependent Variable: Y_0					

Analysis of variance (ANOVA) revealed that moderated supplier's use of green raw materials has an F statistic of .075and the P value of 0. 785 which is greater than 0.05 implying that the mean difference of moderated supplier's use of green raw materials and performance of energy and petroleum state corporations in Kenya was statistically significant at a level of significance of 0.05. This is seen on table 4.48.

Table 4.48: Coefficients for Moderated Supplier's Use of Green Raw Materials and Firm Performance

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	355.95	5.504		64.668	0.000
$X_1 \times Z$	-1.748	6.387	-0.023	-0.274	0.785
a. Dependent Variable: Y					

The model for moderated effect of regulatory and policy frameworks on relationship between supplier's use of green raw materials and firm performance;

$Y=\beta_0+ \beta_1 X_1 Z+\varepsilon$, where

Y = performance of energy and petroleum state corporations,

β_0 = Y Intercept

β_1 = Coefficient of independent variable moderated supplier's use of green raw materials

$X_1 Z$ = independent variable moderated supplier's use of green raw materials becomes;

$$Y= 355.950-1.748X_1 Z$$

This implies that a one unit change in moderated product's capacity for green raw materials leads to performance of energy and petroleum state corporations falling. The greater the value of the independent variable - moderated supplier's use of green raw materials - the lower the n value of firm performance.

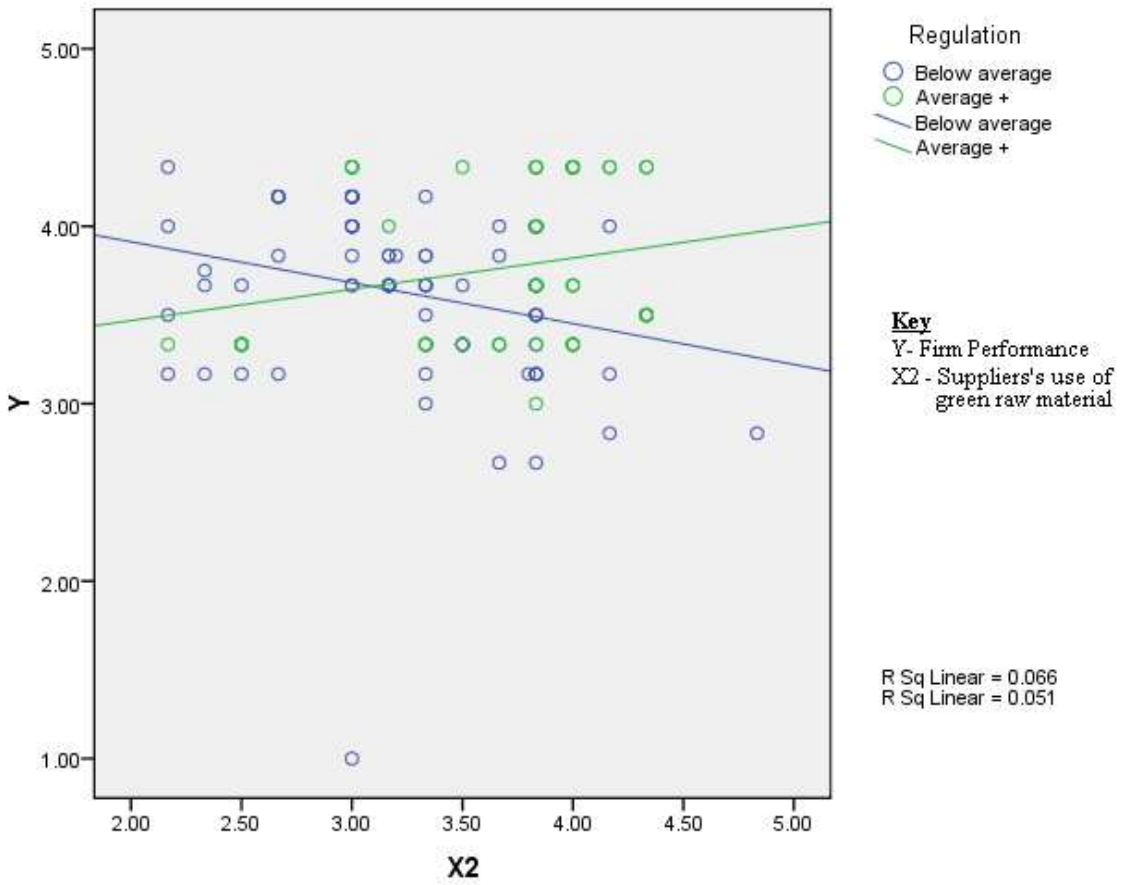

Figure 4.2: Effect of Regulatory and Policy Frameworks on Relationship between Green Raw Materials and Firm Performance

Figure 4.2 shows that regulatory and policy frameworks moderate the relationship between supplier's use of green raw materials and firm performance. The figure shows that a rise in supplier's use of green raw materials in firms that have regulatory and policy frame works (above average firms) raises performance moderately. On the other hand, a rise in supplier's use of green raw materials in below average firms in regulatory and policy frameworks lowers performance.

4.8.3.2 Moderated Supplier's Use of Green manufacturing and Firm Performance

To confirm the level of moderation, the model analysis shown on Table 4.49 was done.

Table 4.49: Model Summary for Moderated Supplier's Use of Green Manufacturing Technology and Firm Performance

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	.071[a]	.005	-.002	.46923	.005	.727	1	144	.395
2	.126[b]	.016	.002	.46827	.011	1.589	1	143	.010
3	.146[c]	.021	.001	.46865	.005	.771	1	142	.031

a. Predictors: (Constant), X_2
b. Predictors: (Constant), X_2, Z
c. Predictors: (Constant), X_2, Z, X_2Z

The findings in Table 4.49 show the moderating effect of regulatory and policy frameworks on the relationship between supplier's use of green manufacturing technology firm performance of energy and petroleum state corporations in Kenya. The results indicate existence of moderation effect with adoption of green environment. R^2 changed from .005 to .021 after moderation, with p- value of .031. The results indicate that regulations and policy framework has a high moderation effect on the relationship between supplier's use of green manufacturing technology and firm performance.

Table 4.50: ANOVA for Moderated Supplier's Use of Green Manufacturing Technology and Firm Performance

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.160	1	.160	.727	.395[a]
	Residual	31.705	144	.220		
	Total	31.865	145			
2	Regression	.508	2	.254	1.159	.017[b]
	Residual	31.357	143	.219		
	Total	31.865	145			
3	Regression	.678	3	.226	1.029	.032[c]
	Residual	31.188	142	.220		
	Total	31.865	145			

a. Predictors: (Constant), X_2
b. Predictors: (Constant), X_2, Z
c. Predictors: (Constant), X_2, Z, X_2Z
d. Dependent Variable: Y

Analysis of variance (ANOVA) revealed that moderated supplier's use of green manufacturing technology has an F statistic of 1.029 and the P<0.032 which is greater than 0.05 implying that the mean difference of moderated supplier's use of green manufacturing technology and performance of energy and petroleum state corporations in Kenya was statistically significant at a level of significance of 0.05. This is seen on table 4.50.

Table 4.51: Coefficients for Moderated Supplier's Use of Green Manufacturing Technology and Firm Performance

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	356.679	5.459		65.337	.000
	X_2Z	-6.380	5.467	-.097	-1.167	.245
a. Dependent Variable: Y						

The model for moderated effect of regulatory and policy frameworks on relationship between supplier's use of green manufacturing technology and firm performance;

$Y=\beta_0+ \beta_2X_2Z+\varepsilon$, where

Y = performance of energy and petroleum state corporations,

β_0 = Y Intercept

β_2= coefficient of independent variable moderated supplier's use of green manufacturing technology

X_2Z= independent variable moderated supplier's use of green manufacturing technology becomes;

$$Y= 356.679-6.380X_2$$

This implies that a one unit change in moderated supplier's use of green manufacturing technology, performance of energy and petroleum state corporations falling by 350.299 units. The greater the value of the independent variable - moderated supplier's use of green manufacturing - the lower the value of firm performance.

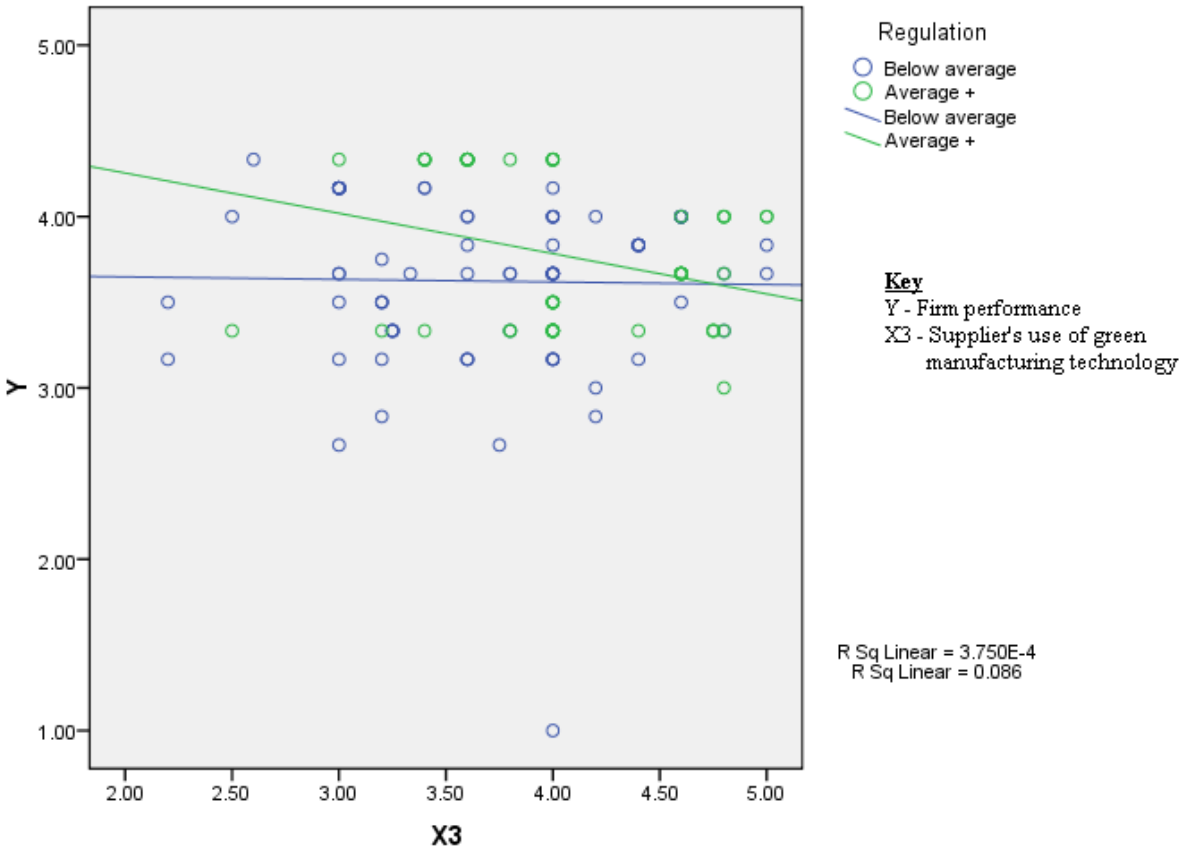

Figure 4.3: Effect of regulatory and policy frameworks on relationship between green manufacturing technology and firm performance

The scatter diagram shows that regulatory and policy frameworks moderate the relationship between supplier's use of green manufacturing technology and firm performance. The figure shows that a rise in supplier's use of green manufacturing technology in firms that have regulatory and policy frame works (above average firms) lowers performance moderately. A rise in supplier's use of green manufacturing technology in below average firms in regulatory and policy frameworks has no impact on performance.

4.8.3.3 Regulatory Framework and Supplier's use of Green Distribution

To confirm the level of moderation, the model analysis shown on Table 4.52 was done.

Table 4.52: Model summary effect of regulatory and policy frameworks on the relationship between supplier's use of green distribution and firm performance

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	.015a	0	-0.007	0.47231	0.000	0.033	1	142	0.056
2	.071b	0.005	-0.009	0.47286	0.005	0.672	1	141	0.014
3	.087c	0.008	-0.014	0.47391	0.003	0.376	1	140	0.005

a. Predictors: (Constant), X_3
b. Predictors: (Constant), X_3, Z
c. Predictors: (Constant), X_3, Z, X_3Z

The findings in Table 4.52 show the moderating effect of regulatory and policy frameworks on the relationship between supplier's use of green distribution and firm performance of energy and petroleum state corporations in Kenya. The results indicate existence of moderation effect with regulations and policy frameworks. R^2 changed from .000 to .008 after moderation, with p- value of .005. The results indicate that regulations and policy framework has a high moderation effect on the relationship between supplier's use of green distribution and firm performance.

Table 4.53: ANOVA Effect of Regulatory and Policy Frameworks on the Relationship between Supplier's Use of Green Distribution and Firm Performance

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.007	1	.007	1.033	.056[a]
	Residual	31.677	142	.223		
	Total	31.684	143			
2	Regression	.158	2	.079	1.352	.004[b]
	Residual	31.526	141	.224		
	Total	31.684	143			
3	Regression	.242	3	.081	2.359	.003[c]
	Residual	31.442	140	.225		
	Total	31.684	143			

a. Predictors: (Constant), X_3
b. Predictors: (Constant), X_3, Z
c. Predictors: (Constant), X_3, Z, X_3Z
d. Dependent Variable: Y

Analysis of variance (ANOVA) revealed that moderated supplier's use of green distribution has an F statistic of 2.359 and the P<0.003 which is greater than 0.05 implying that the mean difference of moderated supplier's use of green distribution and performance of energy and petroleum state corporations in Kenya was statistically significant at a level of significance of 0.05.

Table 4.54: Coefficients for Moderated Effect of Regulatory and Policy Frameworks on Relationship between Supplier's Use of Green Distribution and Firm Performance

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	354.744	5.482		64.711	.000
	X_3Z	-9.989	6.721	-.124	-1.486	.139

a. Dependent Variable: Y_0

The model for moderated effect of regulatory and policy frameworks on relationship between supplier's use of green distribution and firm performance;

$Y=\beta_0+ \beta_3X_3Z+\varepsilon$, where

Y = performance of energy and petroleum state corporations,

β_0 = Y Intercept

β_3= coefficient of independent variable moderated supplier's use of green distribution

X_3Z= independent variable moderated supplier's use of green distribution

$$Y= 354.744-9.989X_3$$

This implies that a one unit change in moderated product's capacity for green distribution, performance of energy and petroleum state corporations falls to 344.755 units. The greater the value of the independent variable, moderated green distribution, the lower the value of firm performance.

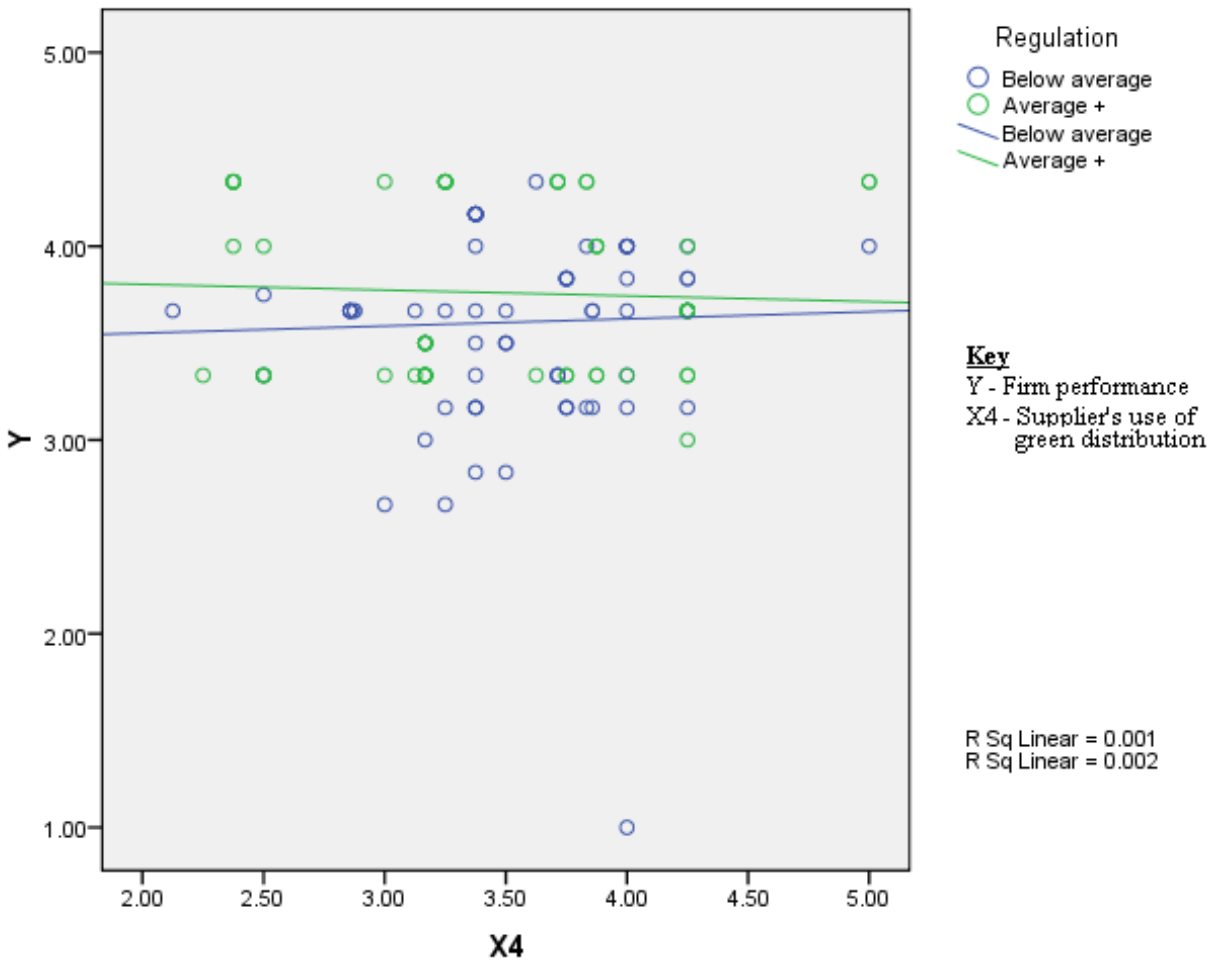

Figure 4.4: Effect of Regulatory and Policy Frameworks on Relationship between Green Distribution and Firm Performance

The scatter diagram shows that regulatory and policy frameworks moderate the relationship between supplier's use of green distribution and firm performance. The figure shows that a rise in supplier's use of green distribution in firms that have regulatory and policy frame works (above average firms) lowers performance moderately. On the other hand, a rise in supplier's use of green distribution in below average firms in regulatory and policy frameworks has very little inverse effect on performance.

4.8.3.4 Moderated Product's Capacity for Green Disposal and Firm Performance

To confirm the level of moderation, the model analysis shown on Table 4.55 was done.

Table 4.55: Model summary of Moderated Product's Capacity for Green Disposal and Firm Performance

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	.113a	0.013	0.006	0.47201	0.013	1.797	1	139	0.182
2	.142b	0.02	0.006	0.4719	0.008	1.063	1	138	0.304
3	.295c	0.087	0.067	0.45714	0.067	10.055	1	137	0.002

a. Predictors: (Constant), X_4
b. Predictors: (Constant), X_4, Z
c. Predictors: (Constant), X_4, Z, X_4Z

The findings in Table 4.55 show the moderating effect of regulatory and policy frameworks on the relationship between product's capacity for green disposal and firm performance of energy and petroleum state corporations in Kenya. The results indicate existence of moderation effect with regulation and policy framework. R^2 changed from .006 to .067 after moderation, with p-value of .002. The results indicate that regulations and policy framework has a high moderation effect on the relationship between product's capacity for green disposal and firm performance.

Table 4.56: ANOVA Model summary of Moderated Product's Capacity for Green Disposal and Firm Performance

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.400	1	.400	1.797	.182[a]
	Residual	30.968	139	.223		
	Total	31.369	140			
2	Regression	.637	2	.318	1.430	.243[b]
	Residual	30.732	138	.223		
	Total	31.369	140			
3	Regression	2.738	3	.913	4.368	.006[c]
	Residual	28.630	137	.209		
	Total	31.369	140			

a. Predictors: (Constant), X_4
b. Predictors: (Constant), X_4, Z
c. Predictors: (Constant), X_4, Z, X_4Z
d. Dependent Variable: Y

Analysis of variance (ANOVA) revealed that moderated product's capacity for green disposal has an F statistic of 4.368and the P<0.006 which is greater than 0.05 implying that the mean difference of moderated product's capacity for green disposal and

performance of energy and petroleum state corporations in Kenya was statistically significant at a level of significance of 0.05.

Table 4.57: Coefficients for Moderated Product's Capacity for Green Disposal and Firm Performance

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	356.074	5.631		63.234	0
	X_4Z	3.838	4.82	0.067	0.796	0.427
a. Dependent Variable: Y						

The model for moderated effect of regulatory and policy frameworks on relationship between product's capacity for green disposal and firm performance;

$Y=\beta_0+ \beta_4X_4Z + \varepsilon$, where

Y = performance of energy and petroleum state corporations,

β_0 = Y Intercept

β_4 = coefficient of independent variable moderated product's capacity for green disposal

X_4Z = independent variable moderated product's capacity for green disposal

$$Y= 356.074+3.838\ X_4$$

This implies that a one unit change in moderated product's capacity for green disposal, performance of energy and petroleum state corporations rises to 359.912 units.

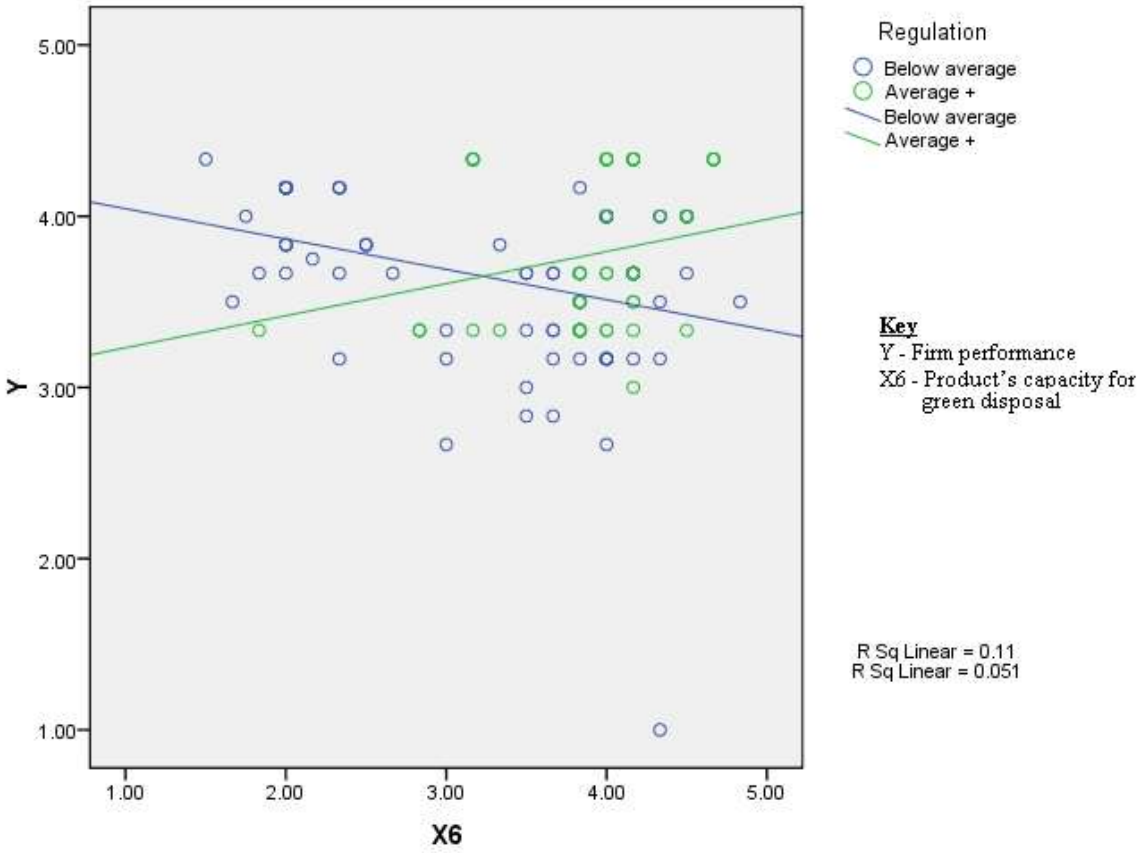

Figure 4.5: Moderated Green Disposal and Firm Performance

As can be seen above, regulatory and policy frameworks moderate the relationship between product's capacity for green disposal and firm performance. The figure shows that a rise in product's capacity for green disposal in firms that have regulatory and policy frame works (above average firms) leads to a raise in performance. Rise in product's capacity for green disposal in below average firms in regulatory and policy frameworks lowers performance.

4.8.3.5 Overall Moderated Regression Model

Table 4.58: Overall for Moderation Test

	Unstandardized Coefficients	Standardized Coefficients			
	B	Std. Error	Beta	t	Sig.
(Constant)	580.447	51.441		11.284	.000
X_1	16.071	8.925	.142	1.801	.074
X_2	13.276	11.235	.122	1.182	.240
X_3	-21.452	10.257	-.194	-2.091	.039
X_4	-16.372	6.754	-.197	-2.424	.017
Z	-1.656	6.013	-.029	-.275	.784
X_1Z	13.710	8.966	.181	1.529	.129
X_2Z	19.083	10.400	.287	1.835	.069
X_3Z	-55.137	15.552	-.642	-3.545	.001
X_4Z	11.799	8.543	.208	1.381	.170

The combined overall model was stated as;

$$Y= \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4+\beta_z+ \beta_{z1}X_1Z+ \beta_{z2}X_2Z + \beta_{z3}X_3Z + \beta_{z4}X_4Z + \varepsilon$$

Therefore becomes;

$$Y = 580.447 +16.071X_1 +13.276X_2 -21.452X_3-16.372X_4-1.656$$
$$+13.710X_1Z + 19.083X_2Z -55.137X_3Z +11.799X_4Z$$

The combined model in Table 4.58 summarizes the results of when there is interaction between the variables and the moderating variable. The result indicates that the contribution of several variables such as green raw materials and green manufacturing technologies continues to be positive in respect of performance before ($16.071X_1$, $13.276X_2$) and after moderation ($13.710X_1Z$, $19.083X_2Z$). Green distribution continues to have a negative overall effect even after moderation ($-21.452X_3$, $-55.137X_3Z$). An interesting observation is on green disposal. Results indicate that while as the variable had a negative influence before moderation ($-16.372X_4$), the effect becomes positive after moderation ($11.799X_4Z$). The later can be attributed to cost savings and revenue generated through reverse logistics.

4.9 The Results of Testing the Hypotheses

The hypotheses outlined in chapter one were tested. The results of the testing of the null hypotheses are reported in the following section.

4.9.1 Results of Hypothesis 1

The testing of this hypothesis relates to the research objective:

To assess the influence of use of green raw materials on performance of energy and petroleum state corporations in Kenya.

The following Null and Alternative Hypothesis were formulated to meet this objective.

Null Hypothesis (H_{01}): Use of green raw materials has no significant influence on performance of energy and petroleum state corporations in Kenya.

Alt. Hypothesis (H_{11}): Use of green raw materials has a significant influence on performance of energy and petroleum state corporations in Kenya.

Model summary results on Table 4.31 indicate a coefficient of determinations (R^2) of .000 at a p value of .005. This implies that other factors remaining constant, green raw materials, explains 0% of changes in performance of energy and petroleum state corporations. Coefficients results in Table 4.33 indicate a beta coefficient of .004. The positive beta coefficient implies that a unit change in use of green raw materials results in a rise in firm performance by 0.004 units. As such the null hypothesis was rejected.

4.9.2 Results of Hypothesis 2

The testing of this hypothesis relates to the research objective:

To assess the influence of use of green manufacturing technology on performance of energy and petroleum state corporations in Kenya.

The following Null and Alternative Hypothesis were formulated to meet this objective.

Null Hypothesis (H_{02})*:* Use of green manufacturing technology has no significant influence on performance of energy and petroleum state corporations in Kenya

Alt. Hypothesis (H_{12}): Use of green manufacturing technology has a significant influence on performance of energy and petroleum state corporations in Kenya

Model summery results on Table 4.34 indicate a coefficient of determinations (R^2) of .005 at a p value of .004. This implies that other factors remaining constant, green manufacturing technology explains 5% of changes in performance of energy and petroleum state corporations. Coefficient results in table 4.36 indicate a beta coefficient of -0 .054. The negative beta coefficient implies that a unit change in use of green manufacturing technology results in a decrease in firm performance by -0.054 units. A such the null hypothesis was rejected.

4.9.3 Results of Hypothesis 3

The testing of this hypothesis relates to the research objective:

To assess the influence of use of green distribution on performance of energy and petroleum state corporations in Kenya.

The following Null and Alternative Hypothesis were formulated to meet this objective.

Null Hypothesis (H_{03}): Use of green distribution has no significant influence on performance of energy and petroleum state corporations in Kenya

Alt. Hypothesis (H_{13}): Use of green distribution has a significant influence on performance of energy and petroleum state corporations in Kenya

Model summery results on Table 4.37 indicate a coefficient of determinations (R^2) of .000 at a p value of .003. This implies that other factors remaining constant, green manufacturing technology explains 0% of changes in performance of energy and petroleum state corporations. Coefficient results in table 4.39 indicate a beta coefficient of -0 .012. The negative beta coefficient implies that a unit change in use of green distribution technology results in a decrease in firm performance by - 0.012 units. As such the null hypothesis was rejected.

4.9.4 Results of Hypothesis 4

The testing of this hypothesis relates to the research objective:

To assess the influence of use of green disposal on performance of energy and petroleum state corporations in Kenya.

The following Null and Alternative Hypothesis were formulated to meet this objective.

Null Hypothesis (H_{04}*):* Use of green disposal has no significant influence on performance of energy and petroleum state corporations in Kenya

Alt. Hypothesis (H_{14}): Use of disposal has a significant influence on performance of energy and petroleum state corporations in Kenya

Model summery results on Table 4.40 indicate a coefficient of determinations (R^2) of .013 at a p value of .182. This implies that other factors remaining constant, green disposal explains 1.3% of changes in performance of energy and petroleum state corporations. Coefficient results in table 4.42 indicate a beta coefficient of -0 .066. The negative beta coefficient implies that a unit change in use of green disposal results in a decrease in firm performance by -0.066units. As such the null hypothesis was rejected.

4.9.5 Results of Hypothesis 5

The testing of this hypothesis relates to the research objective:

To establish whether regulatory framework influences green supply chain practices and performance of energy and petroleum state corporations in Kenya.

The following Null and Alternative Hypothesis were formulated to meet this objective.

Null Hypothesis (H_{05}): Regulatory framework does not significantly influence between green supply chain practices and performance of energy and petroleum state corporations in Kenya

Alt. Hypothesis (H_{15}): Regulatory framework significantly influence between green supply chain practices and performance of energy and petroleum state corporations in Kenya

Model summery results on Table 4.58 indicate a coefficient of determinations (R^2) of .005 at a p value of .004. This implies that other factors remaining constant, green manufacturing technology explains 5% of changes in performance of energy and petroleum state corporations. Overall moderated coefficient results in table 4.59 indicate beta coefficients of 51.441, 8.925, 11.235, 10.257, 6.754, 6.013, 8.966, 10.400, 15.552, 8.5543. As such the null hypothesis was rejected.

CHAPTER FIVE
SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This study aimed at establishing the influence of green supply chain practices on performance of energy and petroleum state corporations in Kenya. The influence of green supply chain practices on performance of energy and petroleum state corporations in Kenya was investigated in this study. The green supply chain practices that were studied are; considering supplier's use of green raw materials, considering supplier's use of green manufacturing technologies, considering supplier's use of green distribution, and considering product's capacity for green disposal. Performance was aggregated and consisted of both financial and non-financial measures. The study had one moderating variable which is regulatory and policy. This section presents a summary of the study findings. From the findings, conclusions are drawn and from which recommendations are given so as to fill the identified gaps within the subject area. In addition, recommendations are given for future research.

5.2 Summary of Findings

Findings of previous studies on whether green supply chain practices affect firm performance gave mixed results based on several factors. These include the intention of the firm - whether the practices were meant to increase efficiency and cut operation costs, or whether they we meant to impress outside publics such as regulator and competitors - in which case, they may add cost of production and lead to wastage. In Kenya, studies indicate the latter scenario is common.

5.2.1 Preliminary Findings

Green supply chain practices were significantly related to firm performance. Unlike in the study carried out by Hollos *et. al* (2012) on Western European firms that revealed that sustainable supplier cooperation has generally positive effects on firm performance across social, green, and economic dimensions, and in which they noted that only green practices have positive significant effects on economic performance, this study revealed that green procurement activities, which encompass supplier cooperation, have a negative relation to firm performance.

Additionally, it was revealed that existence of regulatory and policy framework guiding green supply chain has a significant moderation effect. The responses provided on several

questions gauging the motive for adoption clearly indicate that organizational efficiency which leads to improved performance was not among the reasons for adoption of green environment. There is a feeling that organizations wish to be termed green as it is what is expected of them. Further, there is a great push to look green in order to attract donor funding and green financing. These are external forces, which may not inculcate efficiency and effectiveness in the organization.

Additionally, the study established that green supply chain is a relatively new concept. The response received indicated that most firms became environmentally conscious in the last 10 years. Measures to mitigate their impacts, which are their environmental investments, were instituted thereafter. Such investments are capital intensive at first, adding to costs of production. According to Nalewaik and Venters, (2008), it takes time, at times the whole lifecycle of some green investments for returns to be recouped.

5.2.2 To Asses influence of Use of Green Raw Materials on Performance of Energy and Petroleum State Corporations in Kenya

The first specific objective was to determine the role of considering supplier's use of green raw materials on performance of energy and petroleum state corporations in Kenya. Results revealed that considering supplier's use of green raw materials had positive influence on performance of energy and petroleum state corporations. The test for significance also showed that the influence was statistically significant and hence the alternate hypothesis was accepted.

5.2.3 To Establish Influence of use of Green Manufacturing Technologies on Performance of Energy and Petroleum State Corporations in Kenya

The second specific objective was to establish the influence of considering supplier's use of green manufacturing technologies on performance of energy and petroleum state corporations in Kenya. The results showed that considering supplier's use of green manufacturing technologies negatively influence performance of energy and petroleum state corporations in Kenya.

This showed that influence of considering supplier's use of green manufacturing technology on performance of energy and petroleum state corporations in Kenya was significant and the null hypothesis was accepted.

5.2.4 To Determine Influence of Green Distribution on Performance of Energy and Petroleum State Corporations in Kenya

The third specific objective was to determine influence of supplier's use of green distribution on performance of energy and petroleum state corporations in Kenya. Results revealed that considering suppliers use of green distribution has a significant influence on performance energy and petroleum state corporations in Kenya. This means that the influence was significant and the alternate hypothesis was accepted.

5.2.5 To Ascertain the Influence of Green Disposal on Performance of Energy and Petroleum State Corporations in Kenya

The fourth specific objective was to determine influence of product capacity for green disposal on performance of energy and petroleum state corporations in Kenya. Results revealed that considering product capacity for green disposal had negative influence on performance of energy and petroleum state corporations in Kenya. This means that the influence was significant and the null hypothesis was accepted.

5.2.6 To Establish Whether Regulatory Framework influences between Green supply chain Practices and Performance of Energy and Petroleum State Corporations in Kenya

The fifth specific objective was to establish whether regulatory and policy frameworks influences between the green supply chain practices and performance of energy and petroleum state corporations in Kenya. Results revealed that regulatory frameworks had a moderate influence on relationship between green supply chain practices and performance of energy and petroleum state corporations in Kenya. This means that the influence was significant and the alternate hypothesis was accepted.

5.3 Conclusions

This section summarizes conclusions of the study per objective

5.3.1 To assess the influence of use of green raw materials on performance of energy and petroleum state corporations in Kenya

The research results indicated that use of green raw materials impacted positively on performance in the energy and petroleum state corporations in Kenya. This can be

attributed to the fact that green raw materials, such as recyclable materials can be reused hence lowering production cost.

5.3.2 To establish the influence of use of green manufacturing technologies on performance of energy and petroleum state corporations in Kenya

It was established that green manufacturing technology lowers performance in the energy and petroleum state corporations in Kenya. This is attributable to the high production costs associated with green manufacturing.

5.3.3 To determine the influence of suppliers' use of green distribution on performance of energy and petroleum state corporations in Kenya

Use of green distribution was found to have a negative relationship with performance in the energy and petroleum state corporations. This was attributed to the high costs that accompany green distribution.

5.3.4 To ascertain the influence of green disposal on performance of energy and petroleum state corporations in Kenya

Green disposal was also found to lower performance in the energy and petroleum state corporations. This can be attributed to the high cost of green disposal which eats on to the performance.

5.3.5 To establish the influence of regulatory framework between green supply chain practices and performance of energy and petroleum state corporations in Kenya

The study found that regulatory framework moderates the relationship between green supply chain practices and performance in the energy and petroleum state corporations. This is expected because legal guidelines on environmental conservation must be followed.

The conclusion drawn from the findings is that green supply chain practices have a significant effect on performance of energy and petroleum state corporations in Kenya. However, due to the external motives which have led to adoption of green supply chain practices, the effect has been negative. This means that adoption of green supply chain practices leads to a decrease in performance often times. Henceforth, it seems that integrating green supply chain practices will become an important management undertaking due to the concern caused by global climate change. Public bodies will have

a greater responsibility in charting course to be followed by the private enterprises in this area. Green practices have potential significance power for improving financial performance thus better returns to both private and public sectors. To achieve this, organizations should ensure that their motivation for adopting green environment is internal efficiency and zot image or pressure from external sources such as donors.

5.4 Recommendations

The following recommendations are given based on the findings of the study per objective:

5.4.1 To assess the influence of use of green raw materials on performance of energy and petroleum state corporations in Kenya

This is another important aspect that procuring entities should be concerned about. Green raw materials do not indicate a high probability of a product being green, but also indicates sustainable availability of a product. Cases of specific products running out due to production stoppages resulting from depletion of raw materials are reduced. This can hamper projects or impact energy generation or distribution very negatively. Organizations should adapt use of green raw materials in their production processes.

5.4.2 To influence role of use of green manufacturing technologies on performance of energy and petroleum state corporations in Kenya

Use of green manufacturing technology entails using energy and raw materials efficient production technologies with minimum impacts to the environment. By considering whether supplier's use green manufacturing technology during the procurement, a firm benefit by buying cheaper goods and services due to their lower cost of production.

5.4.3 To determine influence of suppliers' use of green distribution on performance of energy and petroleum state corporations in Kenya

Distribution channel is an important aspect in determining the cost of goods and hence affects a firm's performance. Organization should use green distribution can lead to cost savings due to pooled and bulk transport and hence economies of scale, reduced warehousing costs and reduction in breakages and storage losses. These are in addition to consumer, stakeholders and financing partners' confidence, which contribute to the bottom line.

5.4.4 To ascertain influence of green disposal on performance of energy and petroleum state corporations in Kenya

This is an important performance aspect in today's environmentally conscious world. An organization avoids image damage and incurring huge disposal costs. It also avoids litigation that can arise out of harm caused by such waste to the environment or communities. If reverse logistics is done, a firm can recoup its investment thereby increasing performance. Reverse logistics includes delivering the used products to other firms who can make use of them at a cost.

5.4.5 To establish whether regulatory framework influences between green supply chain practices and performance of energy and petroleum state corporations in Kenya

Strong regulatory and policy framework hedges the organizations from simple application of costs and benefits criteria when making decisions on green supply chain practices. Presence of regulatory and policy frameworks improves the chances that a firm will stick with green practices even when such practices increase their cost of doing business. Proactively adopting green supply chain practices can reduce pressure from regulatory bodies like NEMA.

5.5 Areas for Further Research

The main focus of this study is on the energy and petroleum state corporations in Kenya. There is need to carry out a similar study in other sectors of the economy, especially the private sectors which is a major economic player in the Kenyan economy. Also, there is need to carry out a deeper investigation in establishing if similar results can be reported among the non-governmental, not for profit organizations.

REFERENCES

Adams, C. A. & Hart, G. F. (1998). The Changing Portrayal of the Employment of Women in British Banks and Retail Companies Corporate Annual Reports. *Accounting, Organizations and Society, 23*(8), 781-812.

Aguilera, R. F; Eggert, R. G; Lagos, G. C. C and Tilton, J. E. 2009. Depletion and Future Availability of Petroleum Resources. *The Energy Journal, 30*(1), 141-174.

Aiken, L. S., & West, S. G. (1991). *Multiple Regression: Testing and Interpreting Interactions.* Newbury Park: Sage

Al Khidir, T. A. & Zailani, S. H. M., 2011. Greening of the Supply Chain Through Supply Chain Initiatives Towards Environmental Sustainability. s.l., s.n

Ameknassi L., Aït-Kadi D., & Rezg, N. (2016). Integration of Logistics Outsourcing Decisions in a Green Supply Chain Design: A Stochastic Multi-Objective Multi-Period Multi-Product Programming Model. *Int. J. of Prod. Econ., 182*(Dec. 2016), 165–184.

Amemba, C.S., Nyaboke, P.G., Osoro, A. & Mburu, N. (2013). Elements of green supply chain management. *European Journal of Business and Management, 5*(12), 51-61.

Amenta, E. (2005). *State-Centered and Political Institutionalists Theory: Retrospect and Prospect. Handbook of Political Sociology: States, Civil Societies, and Globalization*. New York, NY: Cambridge University Press.

Ameta, E., & Ramsey, K.M. (2002). *Institutional Theory, Handbook of Politics*, Springer

Amy, H.I., He-Yau, K., & Chang-Fu, H. (2009). A Green Supplier Selection Model For High-Tech Industry, *Expert Systems with Applications, 36*(4), 7917-7927.

Anderson, S.W., Daly, J.D., & Johnson, M.F. (1999). Why Firms Seek ISO 9000 Certification: Regulatory Compliance or Competitive Advantage? *Production and Operations Management, 8*(1), 28-43.

Andrews, K. (2001). *The Concept of Corporate Strategy*. Richard D. Irwin, Home-wood.

Appiah-Adu, K., & Singh, S. (2008). Customer Orientation and Performance: A Study of SMEs. *Management Decision, 36*(6), 385-394.

Athavaley, A. (2009). What Do Labels Really Tell You? Household Products Start to Come Clean on Ingredients. *The Wall Street Journal*, (2009) 233-250

Barasa, P.W., Namusonge, G.S. & Iravo, M.A. (2015). Contributions of Supply Chain Management Practices on Performance of Steel Manufacturing Companies in Kenya. *Unpublished Doctoral Thesis. Jomo Kenyatta University of Agriculture and Technology*. Nairobi.

Baron, R. B., & Kenny, D. A. (1986). The Moderator-Mediator Distinction in Social Psychological Research: Conceptual, Strategic, and Statistical Considerations. *Journal of Personality and Social Psychology, 51*(6), 1173-1182.

Basheka, C.B. (2008). Re-orienting the African Public Sector Through Effective Public Procurement Systems: A Theoretical Perspective, *A Paper Presented at the International Association of Schools and Institutes of Administration, Held from 14th-18th July 2008, Kampala, Uganda*

Baur, D., & Schmitz, H. P. (2011). Corporations and NGOs: When Accountability Leads to Co-optation. *Journal of Business Ethics, 106*(1), 9-21.

Benito G, J., & Benito G-, Ó. (2005). Environmental Proactivity and Business Performance: *An Empirical Analysis Omega*, *33*(1), 1-15.

Berens, G. (2004). Corporate Branding: The Development of Corporate Associations and Their Influence on Stakeholder Reaction. *Doctoral Dissertation, Erasmus University Rotterdam. Rotterdam, Netherlands*.

Best, *J. W., &* Kahn, J. V. (*1989*). *Research in Education (6th Edition*). Englewoods Cliffs, N.J. Prentice-Hall.

Bharvirkar, R. D. B., & Alan, K. (2003). No Emissions Trading and Episodic Air Quality Violations In Maryland. *Final Report Prepared for Power Plant Research Program.*

Blackburn, J. (2012). Valuing Time in Supply Chains: Establishing Limits of Time-Based Competition. *Journal of Operations Management, 30*(5), 396–405.

Blumberg, R., Cooper, D. R. & Schindler, P. S. (2011). *Business Research Methods (11th ed.)*. Irwin: McGraw-Hill

Bobis, V., & Steniszewski, J. (2009). Making the case for Sustainable "Green" Procurement. Retrived from: www-935.ibm.com/service/us/gbs/bus/pdf/sustainable_procurement_bobis_ Steniszewski.pdf

Bowen, F. E., Cousins, P. D., Lamming, R. C., & Faruk, A. C. (2001). The role of supply management capabilities in green supply. *Production and Operations Management, 10*(2), 174-189.

Bowman E. H.,& Haire M. (1975). A Strategic Posture toward Corporate Social Responsibility, *California Management Review*, *18*(2), 49-58

Brammer, *S. &* Millington, *A. (*2005*).* Corporate Reputation and Philanthropy: An Empirical Analysis. *Journal of Business Ethics, 61*(1), 29-44.

Brammer, S., & Walker, H. (2011). Sustainable Procurement Practice in the Public Sector: An International Comparative Study. *International Journal of Operations and Production Management*, *31*(4), 452-476.

Bryman *A &* Bell *E (*2003*). Business Research Methods.* UK: Oxford University Press.

Bryman A. (2001). *Social Research Methods*. Oxford: Oxford University Press.

Cahil, M. & Ftizpatrick, T. (2006). *Environmental Issues and Social Welfare*. bepress.com.

Cabral, I., Grilo, A., & Cruz-Machado, V. (2012). A Decision Making Model for Lean, Agile, Resilient and Green Supply Chain Management, *International Journal for Production Resources, 50*(17), 4830-4845.

Carr, A. S., & Pearson, J. N. (1999). Strategically Managed Buyer-Supplier Relationships and Performance Outcomes. *Journal of Operations Management, 17* (5), 497-519.

Chakravarthy, B.S. (1997). A New Strategy Framework for Coping with Turbulence, *Sloan Management Review, 38*(2), 69-83.

Chandler, M. E. J. (1962). The Lower Tertiary Floras of Southern England...: By Marjory Elizabeth Jane Chandler. *Flora of the Pipe-clay Series of Dorset (Lower Bagshot). British Museum.*

Chandrakandan,K., Venkatapirabu,J., Sekar, V. & Anandakumar, V. (2011). *Tests and Measurements in Social Research.* New Delhi: A.P.H Publishing Corporation

Chen, A. J., Watson, R. T., Boudreau, M. C., & Karahanna, E. (2010) Organizational adoption of Green IS & IT: An institutional perspective. *ICIS 2009 Proceedings, Paper 142.*

Chen, I. J., & Paulraj, A. (2004). Towards a Theory of Supply Chain Management: The Constructs and Measurements. *Journal of Operations Management, 22*(2), 119-150. http://dx.doi.org/10.1016/j.jom.2003.12.007

Charted Institute of Procurement and Supply [CIPS] (2013). The Definitions of Procurement and Supply Chain Management. Retrieved From *https://www.cips.org/Documents/Knowledge/Procurement-Topics-and-Skills/13-SRM-and-SC-Management/Supplier-Relationship Management/definitionsofprocurementandscm.pdf*.

Chenhall, R.H. (2003). Management Control Systems Design Within Its Organizational Context: Findings From Contingency-Based Research and Directions for the Future Account. *Organizational Sociology*. 28(2/3): 127-168.

Chien, M.K., & Shih, L.H. (2007). An Empirical Study of The Implementation of Green Supply Chain Management Practices in the Electrical and Electronic Industry and Their Relation to Organizational Performances. *International Journal of Environmental Science and Technology*, 4(3), 383-394.

Choi, T.Y., & Krause, D.R. (2006). The Supply Base and Its Complexity: Implications for Transaction Costs, Risks, Responsiveness, and Innovation, *Journal of Operations Management, 24*(5), 637-652.

Christopher, J., Sarens, G., & Leung, P. (2009). A Critical Analysis of The Independence of the Internal Audit Function: Evidence from Australia. *Accounting, Auditing & Accountability Journal*. *22*(2), 200-220.

Christopher, M., & Holweg, M. (2011). "Supply Chain 2.0": Managing supply chains in the era of turbulence. *International Journal of Physical Distribution & Logistics Management, 41*(1), 63-82.

Churchill Jr., G. A., & Iacobucci, D. (2006). *Marketing Research - Methodological Foundations.* New York: Dryden Press.

Clemens, E.S., & Cook, J.M., (1999). Politics and Institutionalism: Explaining Durability and Change. *Annual Review of Sociology*. *25*(1), 441–466.

Comincioli, N., Poddi, L., & Vergalli, S. (2012). *Does Corporate Social Responsibility Affect the Performance of Firms?*, Universities of Brescia and Ferrara.

Commoner, B. (1992). The Failure of the Environmental Effort, *Current History*, *91*(564), 176.

Covey, J., & Brown, D. (2001). Critical Cooperation: An Alternative Form of Civil Society-Business Engagement. *IDR Reports*, *17*(1), 1-18.

Cox, B. K (2010). *Public Research Institutes in Europe: Changing Environments and Strategic Responses.* London: Ivy press

Creswel, J.W. (2014). *Qualitative Inquiry and Research Design*. California: Sage

Crozier M., Thoenig J.C., (1976), The Regulation of Complex Organized Systems, *Administrative Science Quarterly*, 547-570.

Darnall, N., Jolley, G. J., & Horvath, A. (2008). Environmental Management System and Green Supply Chain Management: Complements for Sustainability?, *Business Strategy and the Environment, 17*(1), 30-45.

Dawson, C. (2002). *Practical Research Methods*, New Delhi: UBS Publishers' Distributors

Demeter, K. (2012). Time-Based Competition—The Aspect of Partners Proximity. *Decision Support Systems, 54*, 1533–1540.

Department Of Energy (2003) Electric Power Annual, *Energy Information Administration.*

Dey, A., LaGuardia, P., & Srinivasan, M. (2011). Building Sustainability in Logistics Operations: A Research Agenda. *Management Research Review, 34*(11), 1237-1259.

Dheeraj, N. & Vishal,N. (2012). An Overview of Green Supply Chain Management in India. *Research Journal of Recent Sciences*. *1*(6), 77-82.

Dibia, N.O., & Onwuchekwa, J.C. (2015). Determinants of Environmental Disclosure in Nigeria: A Case of Oil And Gas Companies. *International Journal of Finance and Accounting* ,*5*(12) 145-152.

Ding, H., Guo, B., & Liu, Z. (2011). Information Sharing and Profit Allotment Based on Supply Chain Cooperation. *International Journal of Production Economics*, *5*(133), 70-79

Donaldson, T., & Preston, L.E. (2005). The Stakeholder Theory of the Corporation. *Journal of Management, 20*(1), 65-91.

Easterby-smith, M., Thorpe, R., & Jackson, P. R. (2008). *Management Research.* London: Sage Publications Ltd.

Eduardo, T. (2004). *Effective IFMIS Procurement and Management implementation workshop*, Nairobi.

Ellram, L. M., Tate, W. L., & Carter, C. R. (2007). Product-Process-Supply Chain: An Integrative Approach to Three-Dimensional Concurrent Engineering. *International Journal of Physical Distribution & Logistics Management*, *7*(37), 305–330

ElTayeb, T. K., Zailani, S., & Jayaraman, K. (2009). The Examination on the Drivers for Green Purchasing Adoption Among Ems 14001 Certified Companies in Malaysia. *Journal of Manufacturing Technology Management*, *21*(2), 206-225.

Eltayeb, T.K., Zailani, S. (2009). Going Green Through Green Supply Chain Initiatives Towards Environmental Sustainability Operate. *Supply Chain Management*, *4*(2), 93-110

European Union, (2016). What is Green Public Procurement? *Technical Report, European Union, Brussels, Belgium. Accesses from http://ec.europa.eu/environment/gpp/pdf/national_gpp_strategies_en.pd on 13/12/2016*

Faisal, M. N., Banwet, D. K., & Shankar, R. (2006). Supply Chain Risk Mitigation: Modeling the Enablers. *Business Process Management Journal*, (12), 535–552.

Fichman, R., Keil, M., & Tiwana, A. (2005). Beyond Valuation: Real Options Thinking in IT Project Management, *California Management Review*, *47*(2), 74–96

Field, A. (*2009*). *Discovering Statistics Using SPSS*. 3rd Edition, Sage Publications Ltd., London.

Fine, C.H., (1998). *Clock Speed: Winning Industry Control in the Age of Temporary Advantage*. Massachusetts : Perseus Books Reading,.

Flowers, P. (2009).Research Philosophies ,Importance and Relevance. *Unpublished Msc Research Thesis Paper*. Cranfield School of Management.

Fombrun, C. J., Gardberg, N. A., & Sever, J. M. (2000). The Reputation Quotient: A Multi-Stakeholder Measure of Corporate Reputation. *Journal of Brand Management, 7* (4), 241-255.

Fraenkel, J. R., & Wallen, N. E. *(*2000*). How to Design and Evaluate Research in Education.* Boston: McGraw-Hill.

Freeman, C. (1974). *The Economics of Industrial Innovation,* Harmondsworth: Penguin Books

Freeman, R.E (1984). *Strategic Management: A stakeholder Approach*, Boston: Pitman

Freeman, R.E. (2014). *Strategic Management: A Stakeholder Approach*. Cambridge: Cambridge University Press

Friendman, A., & Miles, S., (2006). *Stakeholders: Theory and Practice*. New York: Oxford University press USA.

Ghasemi, A., & Zahediasl, S. (2012). Normality Tests for Statistical Analysis: A Guide for Non-Statisticians. *International Journal of Endocrinology and Metabolism*, *5*(10), 486-489.

Ghobadian, A., Viney, H., & Holt, D. (2001). Seeking Congruence in Implementing Corporate Environmental Strategy. *International Journal of Environmental Technology and Management*, *1*(4), 384-401.

Gmelin, H. & Seuring, S. (2014a). Achieving Sustainable New Product Development by Integrating Product Life-Cycle Management Capabilities. *International Journal of Production Economics*, *12*(154), 166-177.

Gmelin, H. & Seuring, S. (2014b). Determinants of A Sustainable New Product Development. *Journal of Cleaner Production*, *6*(69), 1-9.

Goffin, K., Lemke, F., & Szwejczewski, M. (2006). An exploratory Study of 'Close' Supplier-Manufacturer Relationships. *Journal of Operations Management*, (24), 189–209.

Goh, C. W., & Suhaiza, Z. (2010). Green Supply Chain Initiatives: Investigation on The Barriers in the Context of Smes In Malaysia, *International Business Management*, *4*(1): 20-27

Goodwin, C. J. (2005). *Research in Psychology: Methods and Design*. USA: John Wiley & Sons, Inc.

Gore, A. (1992). *Earth in the Balance.* Boston : Houghton-Mufflin.

Green, K., Morton, B., & New, S. (2010). Purchasing and Environmental Management: Interactions, Policies, and Opportunities. *Business Strategy and the Environment*, *5*(3), 188-197.

Gujarati, D.N. (2004). *Basic Econometrics*, 4th Edition, McGraw-Hill

Guide, V.D R., & Wassenhove, L.N.V. (2009). The Evolution of Closed-Loop Supply Chain Research. *Operations Research, 57*(1), 10-18.

Gunasekaran, A., Lai, K.-H., & Cheng, T. C. E. (2004). Responsive Supply Chain: A Competitive Strategy In A Networked Economy. *International Journal of Management Science*, (36), 549–564

Hackston, D., & Milne, M. J. (1996). Some Determinants of Social And Environmental Disclosures in New Zealand Companies. *Accounting, Auditing and Accountability Journal, 9*(1), 77-108.

Hager, M. A., Wilson, S., Pollak,T.H., & Rooney,P.M. (2003). Response Rates for Mail Surveys of Nonprofit Organizations: A Review and Empirical Test, *Nonprofit and Voluntary Sector Quarterly, 32*(2), 252-267.

Hair Jr., J. F., Hult, G. T. M., Ringle, C., & Sarstedt, M. (2013). *A Primer On Partial Least Squares Structural Equation Modeling*. SAGE Publications, Incorporated.

Hair, J. F., Black, W. C., Balin, B. j., & Anderson, R. E. (2010). *Multivariate Data Analysis*: Maxwell Macmillan International Editions.

Hamel,G., & Prahalad, C.K.(1994). *Competing for the future*, Harvard business school press,

Hargrove, J. (2004) Positivism, Critical Inquiry and Constructivism: Three Theoretical Approaches and Their Use in Studying Interdisciplinary Design Education. *Analytical Essay*. DDN 702.

Harland, C.M. (1996) Supply Chain Management, Purchasing and Supply Management, Logistics, Vertical Integration, Materials Management and Supply Chain Dynamics. In: Slack, N (ed.*) Blackwell Encyclopedic Dictionary of Operations Management*. UK: Blackwell.

Hart, S. & Ahuja, G. (1995). Does it Pay to be Green? An Empirical Examination of the Relationship between Emission Reduction and Firm Performance. *Business Strategy and the Environment Journal*. (31), 74-87.

Hayes, A,. (2012). Is Environmental Regulation Bad for Competition? *Journal of Regulatory Economics 36*(1), 1-28.

Hayes, A. F., & Preacher, K. J. (2012b). Direct and Indirect Effects Of A Multi-categorical Causal Agent In Statistical Mediation Analysis. *Manuscript submitted for publication*

Hayes, A. F., & Rockwood, N. J. (2017). Regression-based Statistical Mediation and Moderation Analysis in Clinical Research: Observations, Recommendations, and Implementation. *Behaviour Research and Therapy*, (98), 39-57.

Hervani, A. A., Helms, M. M., & Sarkis, J. (2005). Performance Measurement for Green Supply Chain Management. Benchmarking: *An international journal, 12*(4), 330-353.

Hoffman, A. J., & Marc, J. V. (2002). *Organization, Policy and the Natural Environment: Institutional and Strategic Perspectives*. Stanford: Stanford University Press.

Hollos, D., Blome, C., & Foerstl, K., (2012). Does Sustainable Supplier Co-operation Affect Performance? Examining Implications for the Triple Bottom Line. *International Journal of Production Research, 50*(11), 2968–2986.

Holmberg, S. (2000). A Systems Perspective on Supply Chain Measurements. *International Journal of Physical Distribution & Logistics Management*, (30), 847–868.

Holt, D., & Ghobadian, A. (2003). Greening the Supply Chain-Critical Factors Driving Operational Activity. *Paper presented at Innovating for Sustainability October 12-15, 2003 11th International Conference of Greening of Industry Network, San Francisco.*

Holt, D., & Ghobadian, A. (2009). An Empirical Study of Green Supply Chain Management Practices Amongst Uk Manufacturers. *Journal of Manufacturing Technology Management*, *20*(7), 933-956.

Holweg, M., Disney, S., Holmström, J., & Småros, J. (2005). Supply Chain Collaboration. *European Management Journal*, (23), 170–181.

Howden, S.M., Crimp, S. (2004). Effect of Climate Change on Electricity Demand in Australia, Proceedings of Integrating Models for Natural Resource Management Across Disciplines, Issues and Sales. *Paper presented at MODSIM 2001 International Congress on Modeling and Simulation*, Canberra, Newzealand.

Hsu, C.W., & Hu, A.H. (2008). Green Supply Chain Management In The Electronic Industry, *International Journal of Environmental Science Technology*, *5*(2), 205-216.

Hui, I.K., Chan, A.H.S., & Pun, K.F. (2001). A Study of Environmental Management System Implementation Practices. *Journal of Cleaner Production*, *9*(3), 269-276.

Hui, W.S., Othman, R., Omar, N.H., Rahman, R.A., & Haron, N.H. (2011). Procurement Issues in Malaysia. *International Journal Public Sector Management*, *24*(6), 567-593.

Hursen, C., Chun S.H., Hwang, H.J., & Byun, Y.H. (2015). The Proceedings of 5th World Conference on Learning, Teaching and Educational Leadership Supply Chain Process and Green Business Activities: Application to Small and Medium Enterprises. *Procedia Social and Behavioral Sciences* (186), 862–867.

International Energy Agency. (2015). *Key world energy statistics*. IEA, Paris.

Islam, J., & Hu, H. (2012). A Review of Literature on Contingency Theory in Managerial Accounting. *African Journal of Business Management*, *6*(15), 5159-5164.

Jüttner, U. (2005). Supply Chain Risk Management. *The International Journal of Logistics Management*, (16), 120-141.

Katua, J. K. (2012). Green Supply Chain Strategy and Sustainable Competitive Advantage of Large Manufacturing Firms in Nairobi, Kenya. *Unpublished MBA thesis, Nairobi: University of Nairobi*

Keay, M. (2007). *Energy: The long view*. Oxford: Oxford Institute for Energy Studies, London.

Kennard, M. (2006); *Sustainable procurement, commercial management, shaping the change,* Lewis, H. and Gretsakis, J. (2001), *Design Environment: A Global Guide to Designing Greener Goods,* Greenleaf Publishing, Sheffield.

Kerlinger, F.N. (1973). *Foundations of Behavioral Research*. 2nd edition. New Delhi, Delhi Surjeet Publications

Khan, O., & Creazza, A. (2009). Managing the Product Design-supply Chain Interface. International *Journal of Physical Distribution and Logistics Management*, (39), 301–319.

Khan, O., Christopher, M., & Burnes, B. (2008). The Impact of Product Design on Supply Chain Risk: A Case Study. *International Journal of Physical Distribution and Logistics Management, 38*, 412–432.

Khan, O., Christopher, M., & Creazza, A. (2012). Aligning Product Design with The Supply Chain: A Case Study. *Supply Chain Management: An International Journal*, (17), 323–336.

Khidir, T. A., & Zailani, S. H. M. (2011). *Greening of the Supply Chain Through Supply Chain Initiatives Towards Environmental Sustainability.* Business Review, (21), 12-21

King, A. A., & Michael, J. L. (2001). Does it Really Pay to be Green? *Journal of Industrialcology*, 102–119.

Kipchilat, G.T. (2006). An Evaluation of the Impact of the Public Procurement Regulations on Procurement in Kenyan Public Universities. *Unpublished MBA Project, Egerton University, Nakuru Kenya.*

Kitchen, P. J., & Laurence, A. (2003). Corporate Reputation: An Eight-Country Analysis, *Corporate Reputation Review*, *6*(2), 103-117.

Koçoğlu, I., İmamoğlu, S. Z., İnce, H., & Keskin, H. (2011). The Effect of Supply Chain Integration on Information Sharing: Enhancing the Supply Chain Performance. *In procedia social and behavioural sciences, Proceedings of the 7th International Strategic Management Conference (pp. 1630–1649). Vienna: Springer-Verlag.*

Kombo, T., & Tromp, K. (2006). *Techniques of Social Research*. New Delhi: New Age Publications (Academic).

Kothari *C.R. &* Garg *G* (2014). *Research Methodology, Third Edition*, New. Age International Publishers, New Delhi.

Kothari, C. (2004). *Research Methodology*. India: New Age Publications (Academic)

Kothari, *C.R. (*2004*). Research Methodology Methods and Techniques. 2nd Edition,* New Age International Publishers, New Delhi.

Koufteros, X.A., Cheng, T.C.E.. & Lai, K.H. (2007). Black-box and Gray-box'' Supplier Integration in Product Development: Antecedents, Consequences and the

Moderating Role of Firm Size. *Journal of Operations Management*, (25), 847–870.

Krikke, H., Blanc, L.L., & Van de Velde, S. (2004). Product Modularity And The Design of Closed-Loop Supply. *California Management Review, 48*(2), 6–19.

Kristianto, Y., Gunasekaran, A., Helo, P., & Sandhu, M. (2012). A Decision Support System for Integrating Manufacturing and Product Design into the Reconfiguration of the Supply Chain Networks. *Decision Support Systems*, (52), 790–801.

Kumar, S., Teichman, T., & Timpernagel, T. (2012), A Green Supply Chain is a Requirement for Profitability, *International Journal of Production Research*, *50*(5), 1278-1296.

Lardenoije, E. J., Van Raaij, E. M., & Van Weele, A. J. (2005). Performance Management Models and Purchasing: Relevance Still Lost. In *Researches in Purchasing and Supply Management, the 14th IPSERA Conference*, (pp. 687-97).

Lebas, M.J. (1995). Performance Measurement and Performance Management, *International Journal of Production Economics*, *41*(13), 23-35.

Lean, H,H., Saleh, N.M., Sohail, M.S., Saufi, N.A.A., Daud, S., & Hassan, H. (2016). Green Growth and Corporate Sustainability Performance. *Procedia Economics and Finance*, *35*, 374–378.

Lewis, *H.,&* Gretsakis, *J. (*2001*), Design Environment: A Global Guide to Designing Greener Goods.* Sheffield: Greenleaf Publishing.

Lin W., Nachiappan, S., Muhammad, D., Abdulrahman , Chang Liu , Kee-hung, L., & Kulwant, S. P. (2015). The Impact of Integrated Practices of Lean, Green, and Social Management Systems on Firm Sustainability Performance-Evidence from Chinese Fashion Auto-Parts Suppliers. *Sustainability*, (7), 3838-3858.

Lisa, I. (2010). Compliance culture. A conceptual framework. Journal of management and organization, *19*(7), 702-714.

Liu, B., & Zhu, Q. (2009). Empirical Study on Practices and Performances of Green Purchasing among Manufacturing Enterprises, *Chinese Journal of Management*, *6*(7), 924-929.

Logamuthu, & Zailani, S. (2010). Factors Influencing the Implementation of Green Productivity Practices and its Effect on the Organisational Performance: A Comparison Study Between EMS 14001 and ISO 9000 Certified Companies in Malaysia. *Asian Journal of Information Technology*, *9*(2), 45-53.

Luce, R.A, Barber, A.E. & Hillman, J. (2001). Good Deeds and Misdeeds. *Business and Society*, *40*(4), 397–415.

Ma, Y., Yin, Q., Pan, Y., Cui, W., Xin, B., & Rao, Z. (2018). Green Product Innovation and Firm Performance: Assessing the Moderating Effect of Novelty-Centered and Efficiency-Centered Business Model Design, *Sustainability*, 1-13

Manaktola, K., & Jauhari, V. (2007). Exploring Consumer Attitude and Behaviour Towards Green Practices in The Lodging Industry in India. *International Journal of Contemporary Hospitality Management*, *19*(5), 364-377.

Mandoza-Fong, J.R., & Cortes-Robles, G. (208). *Green Production Atributes and its Impact in Company Sustainability,* Springer International Publishing

Maria, B. (2011). Influence from the Business Environment on Environmental Purchasing Drivers and Hinders of Purchasing Green Transportation Services, *Journal of Purchasing and Supply Management*, *17*(1), 11-22.

Masters, G.M. (2004). Renewable and Efficient Electric Power Systems. New Jersey: Wiley InterScience.

Matos, S., & Hall, J. (2007). Integrating Sustainable Development in the Supply Chain: The Case of Life Cycle Assessment in Oil and Gas and Agricultural Biotechnology. *Journal of Operations Management*, *25*(6), 1083-1102.

McWilliams, A., & Siegel, D. (2001a). Corporate Social Responsibility: A Theory of the Firm Perspective. *Academy of Management Review*, (26), 117-127.

McWilliams, A., & Siegel, D. (2001b). Profit-Maximizing Corporate Social Responsibility. *Academy of Management Review*, (26), 504-505

Meijer, M. M., & Kleinnijenhuis, J. (2006). News and Corporate Reputation: Empirical Findings from the Netherlands. *Public Relations Review*, (32), 341–348.

Melewar, T. C. (2003). Determinants Of The Corporate Identity Construct: A Review of the Literature. *Journal of Marketing Communications*, *9*(4), 195-220.

Miao, X., & Xi, B. (2007). CAS-Based Social Network Analysis for Collaborative Management in the Green Supply Chain Network System. *International Journal of Networking and Virtual Organisations*, *4*(4), 446 – 458.

Mitchell, R. K., & Agle, B. R. (1997). Stakeholder Identification and Salience: Dialogue and Operationalization. In J. Weber & K. Rehbein (Eds.), *International Association for Business and Society 1997 Proceedings: 365-70. Destin, Fla.: International Association for Business and Society.*

Mitchell, R. K., Agle, B. R., & Wood, D. J. (1997). Toward a Theory of Stakeholder Identification and Salience: Defining the Principle of Who and What Really Counts. *Academy of Management Review*, (22), 853-86.

Muma, B. O., Nyaoga, R. B., Matwere, R. B. & Nyambega, E. (2014). Green Supply Chain Management and Environmental Performance Among Tea Processing Firms in Kericho County- Kenya. *International Journal of Economics, Finance and Management Sciences. 2*(5), 270-276.

Mazumder, S.A. (2010). Green Supply Chain as a Competitive Advantage Enabler in the FMCG Sector. Business Process Council (BPC) *World Conference*, Mumbai

Mwaura, W.A., Letting, N., Ithinji, G., & Orwa, H.B. (2016), Green Distribution Practices and Competitiveness of Food Manufacturing Firms In Kenya, *International Journal of Economics, Commerce and Management, 4*(3), 189-207.

Mohan R., and Sahay, B.S. (2006). 3PL Practices: an Indian perspective. *International Journal of Physical Distribution & Logistics Management 36*(9), 666-689.

Mugenda, O. M., & Mugenda, A. G. (2003). *Research Methods: Quantitative and Qualitative Approaches*. Nairobi: African Centre for Technology Studies.

Mugenda, O. M., & Mugenda, A. G. (2008). *Research Methods: Quantitative and Qualitative Approaches*, Acts Press, Nairobi Kenya

Mugenda, O., M., & Mugenda, A. G. (2003). *Research Methods: Quantitative and Qualitative Approaches*. Nairobi, Acts Press

Muus, K., & Baker – Demaray, T. (2007). *Tips on Quantitative Research: Article Development*. New Delhi. Tata McGraw's Hill

Nasiche, F., & Ngugi, G. K. (2014). Determinants of Adoption of Green Procurement in the Public Sector: A Case Study of Kenya Pipeline Company. *International Journal of Social Sciences and Entrepreneurship, 1*(11), 351-372.

Neuman, *W.L. (*2007*) Basics of Social Research Methods Qualitative and Quantitative Approaches. 2nd Edition,* Allyn and Bacon, Boston

Ninlawan, C., Seksan, P., Tossapol, K., &Pilada W. (2010).The Implementation of Green Supply Chain Management Practices in Electronics Industry. *Proceedings of the International Multi Conference of Engineers and Computer Scientists, Hong Kong*

Odhiambo, M.N. (2008). Financial Depth, Savings and Economic Growth in Kenya: A Dynamic Causal Linkage, *Economic Modeling*, *25*(4).

Omariba N.E. 2013. Green Supply Chain Management Practices And Supply Chain Performance In Mobile Phone Firms In Kenya. *Unpublished thesis, University Of Nairobi.*

Palmer, J. (2000). *Helping SMEs Improve Environmental Management. In R. Hillary (Eds.), Small and medium-sized enterprises and the environment*, Sheffield: Greenleaf.

Parthasarathy, G., Hart, R., Jamro, E., & Miner, L. (2005) Value of Sustainability: Perspectives of a Chemical Manufacturing Site. *Clean Technologies and Environmental Policy*, (7), 219-229.

Penrose, E. T. (1959). The *Theory of the Growth of the Firm*, Cambridge, MA.

Petersen, K. J., Handfield, R. B., & Ragatz, G. L. (2003). A Model of Supplier Integration into New Product Development. *The Journal of Product Innovation Management*, (20), 284–299

Pierson, P., & Theda S. (2002). *Historical Institutionalism in Contemporary Political Science. Political Science: The State of the Discipline*. New York, NY: W. W. Norton.

Pickett-Baker, J., & Ozaki, R. (2008). Pro-environmental Products: Marketing Influence on Consumer Purchase Decision. *Journal of Consumer Marketing*, (25), 281-293.

Polit, D.F., & Beck, C.T. (2003) *Nursing Research Principles and Methods*. *7th Edition*, Lippincott Williams and Wilkins, Philadelphia.

Porter, M. E. *(*1980). *Competitive Strategy: Techniques for Analyzing Industries and Competitors.* New York: Free Press

Porter, M. E., & Van der Linde, C. (1995). Toward a New Conception of the Environment-Competitiveness Relationship. *The Journal of Economic Perspectives*, *9*(4), 97-118.

Porter, M.E., & Van der Linde,C. (1995). Green and Competitive: Ending the Stalemate. *Harvard Business Review*, *75*(5), 120–134.

Preacher, K. J., & Hayes, A. F. (2004). SPSS and SAS Procedures for Estimating Indirect Effects in Simple Mediation Models. Behavior *Research Methods, Instruments, and Computers*, (36), 717-731.

Preacher, K. J., Rucker, D. D., & Hayes, A. F. (2007). Assessing Moderated Mediation Hypotheses: Theory, Methods, and Prescriptions. *Multivariate Behavioral Research*, (42), 185-227.

Preston, L. E., & O'Bannon, D.P. (1997). The Corporate Social - Financial Performance Relationship: A Typology and Analysis, *Business and Society*, 36 (4), 419-430

Preuss, L. (2001). In Dirty Chains? Purchasing and Greener Manufacturing. *Journal of Business Ethics*, *34*(3), 345-359.

Prigogine, L. (1984). Order Out of Chaos. New York, NY: Random House. *Neuman, W.L. (2007) Basics of Social Research Methods Qualitative and Quantitative Approaches. 2nd Edition, Allyn and Bacon, Boston*

Pun, K.F. (2006). Determinants of Environmentally Responsible Operations: A Review, *International journal of Quality and reliability management*, *23*(3), 279-297.

Pusa, S. R. K., & Rajshekar, N. (2004). *Airbus: Flying High with A380. New York*, NY: ECCH Collection. The European Case Clearing House.

Qinghua, Z., Joseph, S., & Kee-hung, L., (2007). Green Supply Chain Management: Pressures, Practices and Performance within the Chinese Automobile Industry. *Journal of Cleaner Production*, *15*(11-12), 1041-1052.

Quin, D., & Jones, T.M. (1995). An Agent Molarity View of Business Policy. *Academy of Management Review*, 20, 22-42.

Quinn, J.B. (1985), Managing Innovation: Controlled Chaos, *Harvard Business Review*, *6*(3), 73-84.

Rao, P. (2002), Greening the Supply Chain: A new Initiative in South East Asia, *International Journal of Operations and Production Management*, *22*(6), 632-655.

Ravet, D. (2013). Delivering Sustainability through Supply Chain Distribution Network Redesign. *Central European Business Review Research Papers, 2*(3), 22-29.

Razali, N. M., & Wah, Y. B. (2011). Power Comparisons of Shapiro-Wilk, Kolmogorov-Smirnov, Lilliefors and Anderson-Darling Tests. *Journal of Statistical Modeling and Anlytics*, (2), 21-33.

Reid, G.C., & Smith, J.A. (2000). The Impact of Contingencies on Management Accounting System Development. *Management Accounting Resources, 11*(4), 427-450.

Republic of Kenya, Kenya Gazette Supplement Acts (2005). *Public Procurement and Disposal Act, 2005, Supplement No. 77, Act No. 3,* Government Press, Nairobi.

Roper, S., & Fill, C. (2012). *Corporate reputation: brand and communication*. Essex: Pearson Education Limited.

Ru-Jen, L., & Chwen, S. (2012). Why do Firms Adopt/Implement Green Practices? An Institutional Theory Perspective. *Precedia- Social and Behavioral Sciences,* (57), 533-540.

Russo, M., & Fouts, P. A. (1997). A Resource Based Perspective on Corporate Environmental Performance and Profitability. *Academy Management Review, 40*(3), 534–559.

Sachan, A., & Datta, S. (2005). Review of supply chain management and logistics research International Journal of Physical Distribution & Logistics Management, *35*(9), 21-33.

Saman, U.M. (2013). Effects of Innovation Types on Firm Performance: An Empirical Study on Pakistan's Manufacturing Sector. *Procedia-Social and Behavioral Sciences*, *98*(2), 62–76.

Saunders, M., Lewis, P., & Thornhill, A. (2007). *Research Methods for Business Students. London:* Financial Times, Prentice Hal

Saunders, M., Lewis, P., & Thornhill, A. (2009). *Research Methods for Business Students* (5th Ed.). Harlow: Pearson Education Limited.

Saunders, *T. L.* (*2009*). Research Methods for Business Students, 5th Edition, Prentice. Hall

Schumpeter, J. (1943). *Capitalism, Socialism and Democracy*. London: Allen and Unwin.

Schumpeter, J. (1939). *Business Cycles* (2 Vols.). New York: McGraw-Hill

Schumpeter, J. (1934). *The Theory of Economic Development*. Cambridge: Harvard University Press

Schützenmeister, A., Jensen, U., & Piepho, H. (2012). *Checking Normality and Homoscedasticity in the General Linear Model Using Diagnostic Plots. Communications in Statistics, Simulation and Computation*. (41), 141-154.

Schwab R.G., & Sutherland D. (2005) Building Indigenous learning communities. *CAEPR Discussion Paper No. 225,* accessed from http*://www.anu.edu.au/caepr/Publications/dP/ 001_dP 5.*pdf>

Sekaran, U., & Bougie, R. *(*2010*). Research Methods for Business A skill-building Approach (5th ed.).* Haddington: John Wiley & Sons.

Sekaran, U., (2003). *Research Methods for Business: A Skill Building Approach*. Singapore: John Willey & Sons, Inc

Seksan, P., Ninlawan, C., Tossapol, K., & Pilada, W. (2010) The Implementation of Green Supply Chain Management Practices in Electronics Industry. *In: Proceedings of the International Multi Conference of Engineers and Computers Scientist (IMECS). March 17 – 19 2010, Hong Kong*

Senzen, B. & Cenkaya, Y.S. (2013). Effects of Green Manufacturing and Eco-Innovation on Sustainability Performance, *Social and Behavioral Sciences, 99,* 154- 163.

Seuring, S., (2004). Industrial Ecology, Life Cycles, Supply Chains: Differences and Interrelations Bus. *Strategy Environ*., *13*(5), 306-319.

Shang, K.C., Lu, C.S., & Li, S. (2010). A Taxonomy of Green Supply Chain Management Capability among Electronic Related Manufacturing Firms in Taiwan, *Journal of environmental management*, (91), 1218-1226.

Shi, H., Chertow, M., & Song, Y. (2010). Developing Country Experience with Eco-Industrial Parks: A Case Study of the Tianjin Economic-Technological Development Area in China. *J. Clean. Prod*., *18*(3), 191-199.

Simpson, D., Samson, D. (2010). Environmental Strategy and Low Waste Operations: Exploring Complementarities. *Business Strategy and the Environment 19*(2), 104–118.

Simpson, D., & Samson, D. (2008). *Developing strategies for Green Supply Chain Management. Production/Operations Management*: Australia: University of Melbourne.

Simpson, D. (2010). Use of Supply Relationships to Recycle Secondary Materials. *International Journal of Production Research, 48*(1), 227 – 249.

Simpson, D., Power, D., & Samson, D. (2007). Greening the Automotive Supply Chain: A Relationship Perspective. *International Journal of Operations & Production Management*, *27*(1), 28-48.

Spicer, B. H. (1978). Investors, Corporate Social Performance and Information Disclosure: An Empirical Study, *The Accounting Review, 53*(1), 94-111.

Spicer, B. H. (1978). Market Risk, Accounting Data and Companies' Pollution Control Records, *Journal of Business Finance & Accounting*, (5), 1-17.

Stalk, G., & Hout, T.M. (1990). Competing Against Time: *How Time-based Competition is Re-shaping Global Markets*, The Free Press, New York, NY.

Stalk, G., Jr., & Hout, T. M. (1990). *Competing Against Time: How Time-based Competition is Reshaping Global Markets*. New York, NY: Free Press.

Staniszewski, J., & Bobis, V. (2009). Making the Case for Sustainable "Green" Procurement. *Retrieved from www-935.ibm.com/services/us/gbs/bus/pdf/sustainable_procurement_bobis_staniszewski.pdf*

Stern, A.J., & Tim, H. (2000). *The Process of Business/ Environmental Collaborations: Partnering for Sustainability.* Quorum Books

Stevens, J. (2002). *Applied Multivariate Statistics for the Social Sciences*, Lawrence Erlbaum Associates, New Jersey

Stevens, J. (2002). *Applied Multivariate Statistics for the Social Sciences*, 4th Edn. Mahwah, NJ: Erlbaum

Steyn, B. (2003). From Strategy to Corporate Communication Strategy: A Conceptualisation. *Journal of Communication Strategy*, *8*(2), 168-183.

Sundbo, J. (1998). *The Theory of Innovation: Enterpreneurs, Technology and Strategy*, Denmark, Elga Publishinh

Sung, R. J. (2010). The Impact of Green Supply Chain Practices on Supply Chain Performance. *Unpublished MA, University of Nebraska at Lincoln Available at http://digitalcommons.unl.edn/businessdiss/*

Sutinen, J. G., & Kuperan, K. (1999). A socio-economic Theory of Regulatory Compliance. *International Journal of Social Economics*, *26*(1/2/3), 174-193.

Tabachnick, B. G., & Fidell, L. S. (2001). *Using Multivariate Statistics,* (*4th Edn*.) Needham Heights, MA: Allyn and Bacon

Tabachnick, *B. G., &* Fidell, *L. S. (*2007*). Using Multivariate Statistics (5th ed.).* New York Allyn and Bacon.

Tabachnick, B.G., & Fidell, L.S. (2013). *Using Multivariate Statistics*. Pearson, Boston.

Tan, K. C., Lyman, S. B., & Wisner, J. D. (2002). Supply Chain Management: A Strategic Perspective. *International Journal of Operations & Production Management*, (22), 614–631.

Tarig, K. E., & Suhaiza, Z. (2010). Investigation on the Drivers of Green Purchasing Towards Environmental Sustainability in the Malaysian Manufacturing Sector, *International Journal of Procurement Management*, *3*(3), 316-337.

Tate, W., Ueltschy, M., Mollenkopf, D., & Stolze, H. (2011). Green, Lean, And Global Supply Chains, *International Journal of Physical Distribution & Logistics Management*, *40*(1/2), 14-41.

Taylor-Ellen, P., & Ranner, M. (2003). *Analyzing Qualitative Data, Program Development & Evaluation,* University of Wisconsin.

Teisman, G. van Buuren, A., & L. Gerrits, L. (2009a). *Managing Complex Gvernance Systems, Dynamics, Self-Organization and Coevolution in Public Investments*. Routledge. New York, London.

Teisman, G.R., Gerrits, L., & van Buuren, A. (2009b). An Introduction to Understanding and Managing Complex Process Systems. . *In: Teisman, G., A. van Buuren & L. Gerrits, 2009: Managing complex governance systems. Routledge. New York, London.*

Teisman, G., & Klijn, E. H. (2008). Complexity Theory and Public Management - An Introduction. *Public Management Review*, (10), 287-297.

Theyel, G. (2001). Customer and Supplier Relations for Environmental Performance, *Greener Management International*, (35), 61-69

Thompson, B. (2004). *Exploratory and Confirmatory Factor Analysis: Understanding Concepts and Application*. Washington, DC: American Psychological Association.

Toke *L. K.*, Gupta *R. C.*, Dandekar *M, (*2010*).* Green Supply Chain Management; ... Review of Sustainable Supply Chain Management Research*, Proceedings of the 2010 International Conference on Industrial Engineering and Operations Management Dhaka, Bangladesh, January 9 – 10*, 2010.

Toke, L.K., Gupta, R.C., & Dandekar, M. (2012) An Empirical Study of Green Supply Chain Management in Indian", *Int. Journal of Applied Sciences and Engineering Research*, *1*(2), 230-255.

Tseng, M.L., Chiu, A. S. F., Tan, R. R., & Siriban-Manalang, A. B. (2014). Sustainable Consumption and Production for Asia: Sustainability Through Green Design and Practice. *Journal of Cleaner Production,* (40), 1-5.

Tzschentke, N., Kirk, *D. &* Lynch, P. *(*2008*).* Going Green: Decisional Factors in Small Hospitality Operations, *International Journal of Hospitality Management,* (27), 126-133.

United Nations Environmental Programme (UNEP)(2014) *Green Economy Assessment Report – Kenya. Nairobi: UNEP.*

Vachon, S., & Klassen, R.D. (2006). Extending Green Practices Across the Supply Chain. *International Journal of Operations & Production Management*, (26), 795-821.

Vachon, S., & Klassen, R.D. (2007). Supply Chain Management and Environmental Technologies: The Role of Integration. *International Journal of Production Research*, *45*(2), 401-423.

Van de Ven, A. H., & Drazin, R. (*1985*). Alternative Forms of Fit in Contingency Theory. *Administrative Science Quarterly*, *30*(4), 514-539.

Van Hoek, R. I. (1999). From Reversed Logistics to Green Supply Chains. *Supply Chain Management, 4*(3):129-135.

Van Nunen, & Rob, Z. (2004). E-Enabled Closed-Loop Supply Chains. *California Management Review,* 46(2): 40-54.

Varnäs, A., Berit, B., & Charlotta, F.E. (2009). Environmental Consideration in Procurement of Construction Contracts: Current Practice, Problems and Opportunities in Green Procurement in the Swedish Construction industry, *Journal of Cleaner Production, 17*(13), 1214-1222.

Victor, B., & John, S. (2009). *Making the Case for Sustainable 'Green' Procurement*, IBM , New York

Wang, H., & Li, J. (2008). Untangling the Effects of Over Exploration and Over Exploitation on Organizational Performance: The Moderating Role of Environmental Dynamism. *Journal of Management, 34*(5), 925-951.

Wanjohi, P., et al. (2016). The Moderating Effect of Adoption of Green Environment on the Relationship between Organizational Characteristics and Performance of Manufacturing Firms in Kenya, *(Doctoral dissertation) retrieved* *http://ir.jkuat.ac.ke/bitstream/handle/123456789/2348/Peter%20Wanjohi%20-%20PhD%*

Wanyonyi, M.W. (2013). Supply Chain Strategies and Green Logistics Performance at Unilever in Kenya, *Unpublished Thesis*, University of Nairobi

Warde, P., & Lindmark, M. (2006). Energy and Growth in the Long Run. *In Proceedings of XIV International Economic Congress, Helsinki, August 2006.*

Wilkerson. T. (2005). *Best Practices in Implementing Green Supply Chain*, Logistics Management Institute

Williams, D., & James, S. (2006). On and Off the Net: Scales for Social Capital in an Online Era. *Journal of Computer-Mediated Communication, 11*(2), 11-31.

Williamson, D., Lynch-Wood, G., & Ramsay, J. (2006). Drivers of Environmental Behaviour in Manufacturing SMEs and the Implications for CSR. *Journal of Business Ethics*, (67), 317–330.

Wilmshurst, T., & Frost, G., (2000). Corporate Environmental Reporting: A Test of Legitimacy Theory. *Accounting, Auditing, and Accountability Journal, 13*(1), 10-26.

Winn, M. I., Macdonald, P., & Zietsma, C. (2008). Managing Industry Reputation: The Dynamic Tension between Collective and Competitive Reputation Management Strategies. *Corporate Reputation Review*, *11*(1), 35-55.

Woods, M., (2009). A Contingency Theory Perspective on the Risk Management Control System within Birmingham City Council. *Management Accounting Resources, 20*(1), 69-81.

Yang, C.L., Lin, S.P., Chan, Y., & Sheu, C. (2010). Mediated Effect of Environmental Management on Manufacturing Competitiveness: An Empirical Study. *International Journal of Production Economics*, *123*(1), 210-220.

Zeng, S. X.,. Meng, X.H., Yin, H.T., Tam, C.M., & Sun, L. (2010). Impact of Cleaner Production on Business Performance. *Journal of Cleaner Production*, *18*(10), 975–983.

Zhang, J., Nault, B.R., & Tu, Y. (2015) A Dynamic Pricing Strategy for a 3PL Provider with Heterogeneous Customers. *Int J Prod Econ* (169), 31–43.

Zhu, Q., Sarkis, J., & Geng, Y. (2005). Green Supply Chain Management in China: Pressures, Practices and Performance. *International Journal of Operations and Production Management*, *25*(5/6), 449–69.

Zhu, Q., Sarkis, J., & Lai, K. (2007b). Green Supply Chain Management: Pressures, Practices And Performance within the Chinese Automobile Industry. *Journal of Cleaner Production*, *15*(11), 1041–52.

Zhu, Q., Sarkis, J., & Lai, K.H. (2007a). Initiatives and Outcomes of Green Supply Chain Management in China. *Journal of Environmental Management*, *85*(1):179–89.

Zhu, Q, & Sarkis, J. (2004). Relationships between Operational Practices and Performance Among Followers of Green Supply Chain Management Practices in Chinese Manufacturing Enterprises. *Journal of Operations Management*, (22), 265–89.

Zhu, Q. H., & GemgY., (2001). Study on the Effect of Enterprises Green Purchasing, *China Soft Science*, (11),71-74.

Zhu, Q., & Sarkis, J. (2004), Relationships between Operational Practices and Performance among Early Adopters of Green Supply Chain Management Practices in Chinese Manufacturing Companies, *Journal of Operations Management*, *22*(3), 265-289.

Zhu, Q., & Sarkis, J. (2007). The Moderating Effects of Institutional Pressures on Emergent Green Supply Chain Practices and Performance. *International Journal of Production Research*, *45*(18/19), 4333-4355.

Zhu, Q., & Sarkis, J. (2006). Green Supply Chain Management in China: Pressures, Practices and Performance, *International Journal of Operations and Production Management*, *25*(5), 449-468.

Zhu, Q., Sarkis, J., & Lai, K. (2007). Green Supply Chain Management: Pressures, Practices and Performance Within the Chinese Automobile Industry, *Journal of Cleaner Production*, *15*(11/12), 1041-1052.

Zhu, Q., Sarkis, J., & Lai, K-H. (2008). Confirmation of a Measurement Model for Green Supply Chain Management Practices Implementation, *International Journal of Production Economics*, *111*(2), 261-273.

Zhu, Q., Sarkis, J., & Lai, K-H. (2012). Examining the Effects of Green Supply Chain Management Practices and their Mediations on Performance Improvements", *International Journal of Production Research, 50*(5), 1377-1394.

Zsidisin, G. A., & Smith, M. E. (2005). Managing Supply Risk with Early Supplier Involvement: A Case Study and Research Propositions. *The Journal of Supply Chain Management,* (41), 44–57.

APPENDICES

Appendix I: Letter of Authorization

Joel Omusebe,
P.O Box 620000-00200, Nairobi

JKUAT

Cell: 0721815461

The Chief Executive,

Organization's Name.....

Address.....

Dear Sir/Madam,

Reference: Questionnaires

I am a student at Jomo Kenyatta University of Agriculture and Technology undertaking a Doctorate of Philosophy degree in Business Administration. As part of the academic requirements, am required to undertake a research in a relevant field to my course. My research study is titled; Effect of adoption of green procurement practices on performance in energy and petroleum related state corporations in Kenya. I recognize your role as the head of this organization and wish to request your permission and help in carrying out this study. Please, find attached ____ questionnaires to be filled by your procurement staff as discussed. In case of any enquiry, kindly contact me on line given

Thank you for your help.

Yours faithfully,

Joel Omusebe

Appendix II: Questionnaire

A. Company bio data

1. Organization's name? _____
2. Year of first operation _____
1. Average annual procurement budget (Ksh) _____
2. Number of procurement staff? _____
3. What is your company's mandate?

   _____

   _____
4. Your highest education level attained. Primary [ ] Secondary school [ ] Diploma [ ] Degree [ ] Post graduate [ ]
5. Are you a member of a professional body? Yes [ ] no [ ] if yes, which?----------

B. Kindly tick the appropriate box in the section below. Your response will range from strongly disagree (SD), Disagree (D), Neutral (N), Agree (A) to strongly agree (SA). Give one answer per question.

No.	Question	SD	D	N	A	SA
	The process of research and design of procured items is of great importance to us	[ ]	[ ]	[ ]	[ ]	[ ]
2.	We do enough audit on product development process of procured items	[ ]	[ ]	[ ]	[ ]	[ ]
3.	Enough R&D information is included as a tender condition	[ ]	[ ]	[ ]	[ ]	[ ]
4.	A lot of R&D data of procured items is part of tender evaluation criteria	[ ]	[ ]	[ ]	[ ]	[ ]
5.	If it is found that there was pollution in the research process to develop a product, our decision to buy is stopped	[ ]	[ ]	[ ]	[ ]	[ ]

6.	We always carry out background checks on companies to gather information on their processes	[ ]	[ ]	[ ]	[ ]	[ ]

Answer the questions below by writing down your response

Why do you think it is important for procured items to be produced using clean technology?

As a procurement practitioner, do you place any value on environmental effects from research done on procured items? Yes [ ] no [ ]

If yes above, why?

C. Kindly tick the appropriate box in the section below. Your response will range from strongly disagree (SD), Disagree (D), Neutral (N), Agree (A) to strongly agree (SA). Give one answer per question.

No.	**Question**	**SD**	**D**	**N**	**A**	**SA**
1.	The raw materials used in procured items is very important to us	[ ]	[ ]	[ ]	[ ]	[ ]
2.	When considering items to procure, items made of green raw materials are rated higher	[ ]	[ ]	[ ]	[ ]	[ ]
3.	We do not consider raw materials used to develop procured items as important	[ ]	[ ]	[ ]	[ ]	[ ]
4.	Green raw materials in procured items is an important part of tender evaluation criteria	[ ]	[ ]	[ ]	[ ]	[ ]
5.	We would choose items made with green raw materials to those with non green raw materials more	[ ]	[ ]	[ ]	[ ]	[ ]
6.	We always carry out background checks on companies to gather information on their processes					

Answer the questions below by explaining your response

Why do you think it is important for procured items to be produced using clean technology?

In your organization, do you consider procured items made of environmental friendly raw materials better those without? Yes [ ] no [ ]

If yes above, why?

Would considering if procured items were manufactured in environmentally safe ways affect your work as a procurement practitioner? Yes [ ] no [ ]

If yes above, how?

D. Kindly tick the appropriate box in the section below. Your response will range from strongly disagree (SD), Disagree (D), Neutral (N), Agree (A) to strongly agree (SA). Give one answer per question.

No.	Question	SD	D	N	A	SA
1.	The use of green manufacturing technology in procured items is very important to us	[ ]	[ ]	[ ]	[ ]	[ ]
2.	We consider ISO 14001 certification important in prequalification of suppliers	[ ]	[ ]	[ ]	[ ]	[ ]
3.	We carry out adequate pre-factory inspections to understand manufacturing process of procured items	[ ]	[ ]	[ ]	[ ]	[ ]
4.	We have a comprehensive environmental policy that guides our operations	[ ]	[ ]	[ ]	[ ]	[ ]
5.	We associate more with suppliers with good environmental records	[ ]	[ ]	[ ]	[ ]	[ ]

Answer the questions below by explaining your response

Why do you think it is important for procured items to be produced using clean technology?

As a procurement practitioner, do you place any value on environmental effects from how procured items are manufactured? Yes [ ] no [ ]

If yes above, why?

E. Kindly tick the appropriate box in the section below. Your response will range from strongly disagree (SD), Disagree (D), Neutral (N), Agree (A) to strongly agree (SA). Give one answer per question.

No.	Question	SD	D	N	A	SA
1.	We consider carbon foot print of procured items as important	[ ]	[ ]	[ ]	[ ]	[ ]
2.	A suppliers distribution network is important in tender evaluation criteria	[ ]	[ ]	[ ]	[ ]	[ ]
3.	It is not our business how procured items get to us	[ ]	[ ]	[ ]	[ ]	[ ]
4.	Use of minimum packaging materials is important to us	[ ]	[ ]	[ ]	[ ]	[ ]
5.	We prefer suppliers to use recyclable packaging					
6.	Procured items are delivered directly to the sites of need	[ ]	[ ]	[ ]	[ ]	[ ]
7.	We consider items packaged in biodegradable packaging more					
8.	We insist on supplies getting to central stores before dispatch	[ ]	[ ]	[ ]	[ ]	[ ]

Answer the questions below by yes or no and where yes, explain your answer

a) In your opinion, does direct delivery of procured items to needed sites have any environmental impacts? yes [ ] no [ ]

If yes, explain how?

b) How does direct delivery of procured items to needed sites affect your role as a procurement manager?

F. Kindly tick the appropriate box in the section below. Your response will range from strongly disagree (SD), Disagree (D), Neutral (N), Agree (A) to strongly agree (SA).

Give one answer per question.

No.	Question	SD	D	N	A	SA
1.	Environmental impacts of procured items is a key requirement when buying	[ ]	[ ]	[ ]	[ ]	[ ]
2.	New products procured must have better environmental impacts than previously used ones	[ ]	[ ]	[ ]	[ ]	[ ]
3.	We request suppliers to explain how products affect environment during use	[ ]	[ ]	[ ]	[ ]	[ ]
4.	We study environmental impacts of products procured while in use	[ ]	[ ]	[ ]	[ ]	[ ]
5.	We insist on products with newer, greener technology	[ ]	[ ]	[ ]	[ ]	[ ]

Kindly answer the yes or no questions below followed by an explanation as indicated

a) Does environmental impacts from use of procured items ever discussed when drawing product specifications? Yes [ ] no [ ]

If yes, how does the discussion affect future procurement?

b) In your opinion, should environmental impacts from use of procured items be an import aspect of product specifications? Yes[ ] no[ ]

If yes, why?

G. Kindly tick the appropriate box in the section below. Your response will range from strongly disagree (SD), Disagree (D), Neutral (N), Agree (A) to strongly agree (SA). Give one answer per question.

No.	Question	SD	D	N	A	SA
1.	When buying, priority is given to items with longest lifecycle	[ ]	[ ]	[ ]	[ ]	[ ]
2.	Items that are reusable are rated highly during tender evaluation	[ ]	[ ]	[ ]	[ ]	[ ]
3.	Items with potential for recycling are considered more favorably while procuring	[ ]	[ ]	[ ]	[ ]	[ ]
4.	Firms with safe disposal methods for their products are easily prequalified than those without	[ ]	[ ]	[ ]	[ ]	[ ]
5.	We only procure items that can be safely disposed locally	[ ]	[ ]	[ ]	[ ]	[ ]
6.	Cost of disposal of items is an important decision factor before procurement					

Kindly answer the yes or no questions below followed by an explanation as indicated

a) Does environmental impacts from disposal of procured items ever discussed when drawing product specifications? Yes [ ] no [ ]

If yes, how does the discussion affect future procurement?

b) In your opinion, should environmental impacts from disposal of procured items be an import aspect of product specifications? Yes[ ] no[ ]

If yes, why?

H. Kindly tick the appropriate box in the section below. Your response will range from strongly disagree (SD), Disagree (D), Neutral (N), Agree (A) to strongly agree (SA). Give one answer per question.

No.	Question	SD	D	N	A	SA
1.	We have a comprehensive procurement policy	[ ]	[ ]	[ ]	[ ]	[ ]
2.	Procurement department has agreed on annual targets	[ ]	[ ]	[ ]	[ ]	[ ]
3.	All staff in the department are held to account on their annual set targets	[ ]	[ ]	[ ]	[ ]	[ ]
4.	Timeliness in delivery of procured items is an important indicator of our performance	[ ]	[ ]	[ ]	[ ]	[ ]
5.	Quality of procured items is an important consideration when buying	[ ]	[ ]	[ ]	[ ]	[ ]
6.	Price of procured items is very important during tender evaluation	[ ]	[ ]	[ ]	[ ]	[ ]
7.	Ability of procured items to meet intended needs is a key consideration	[ ]	[ ]	[ ]	[ ]	[ ]
8.	We consider public opinion very significantly when undertaking procurement processes	[ ]	[ ]	[ ]	[ ]	[ ]

I. Kindly tick the appropriate box in the section below. Your response will range from strongly disagree (SD), Disagree (D), Neutral (N), Agree (A) to strongly agree (SA). Give one answer per question.

No.	Question	SD	D	N	A	SA
1.	Green product research and design of procured significantly items affects firm performance	[ ]	[ ]	[ ]	[ ]	[ ]
2.	Green raw materials in procured items significantly affects firm performance	[ ]	[ ]	[ ]	[ ]	[ ]
3.	Green manufacturing of procured items significantly affects firm performance	[ ]	[ ]	[ ]	[ ]	[ ]
4.	Green distribution of procured items significantly affects firm performance	[ ]	[ ]	[ ]	[ ]	[ ]
5.	Green product operation outcomes of procured items significantly affects firm performance	[ ]	[ ]	[ ]	[ ]	[ ]
6.	Disposal requirements of procured items significantly affects firm performance	[ ]	[ ]	[ ]	[ ]	[ ]

Kindly provide answers on the space provided below the question

Our organization's impacts on the environment include (Give a maximum of 5):

Does the organization have measures to reduce these impacts? Yes [ ] No [ ]

If yes, how?

Do you think the procurement department has a role(s) in tackling the environmental impacts above?

Yes [ ] No [ ]

If yes, what is that role(s)

J. Kindly tick the appropriate box in the section below. Your response will range from strongly disagree (SD), Disagree (D), Neutral (N), Agree (A) to strongly agree (SA). Give one answer per question.

No.	Question	SD	D	N	A	SA
1.	This company contributes actively and voluntarily to the social improvement, economic and the environmental of society.	[ ]	[ ]	[ ]	[ ]	[ ]
2.	This company stands behind its products and services with good price and good quality that meet consumer needs	[ ]	[ ]	[ ]	[ ]	[ ]
3.	This company treats customers courteously, communicates with them and takes care of their safety and health.	[ ]	[ ]	[ ]	[ ]	[ ]
4.	This company generates respect, admiration esteem and confidence.	[ ]	[ ]	[ ]	[ ]	[ ]
5.	This company is recognized, has excellent leadership, is innovative, and seeks constant overcoming.	[ ]	[ ]	[ ]	[ ]	[ ]
6.	This company is a company with values that obeys the laws, transparent and respects people and the environment.	[ ]	[ ]	[ ]	[ ]	[ ]

K. Kindly tick the appropriate box in the section below. Your response will range from strongly disagree (SD), Disagree (D), Neutral (N), Agree (A) to strongly agree (SA). Give one answer per question.

No.	Question	SD	D	N	A	SA
1.	Environmental consideration is a significant factor in decision making in all processes in this organization	[ ]	[ ]	[ ]	[ ]	[ ]
2.	We very well know our environmental impacts throughout our value chain	[ ]	[ ]	[ ]	[ ]	[ ]
3.	Procurement department always seek advice on environmental impacts of any project as required by law	[ ]	[ ]	[ ]	[ ]	[ ]
4.	All functional areas always seek my advice on environmental impacts of their activities	[ ]	[ ]	[ ]	[ ]	[ ]
5.	When there is a conflict between cost of a project and its environmental impacts, the environment always wins	[ ]	[ ]	[ ]	[ ]	[ ]
6.	Mostly, environmental considerations do not form any part in the procurement process	[ ]	[ ]	[ ]	[ ]	[ ]

L. Kindly tick the appropriate box in the section below. Your response will range from strongly disagree (SD), Disagree (D), Neutral (N), Agree (A) to strongly agree (SA).

Give one answer per question.

No.	Question	SD	D	N	A	SA
1.	This firm's assets have significantly increased in the last 3 years	[ ]	[ ]	[ ]	[ ]	[ ]
2.	Our annual surplus/profits have been improving considerably in the last 3 years	[ ]	[ ]	[ ]	[ ]	[ ]
3.	Our working capital has been improving year after year	[ ]	[ ]	[ ]	[ ]	[ ]
4.	We have reported losses/deficit in the last 3 years	[ ]	[ ]	[ ]	[ ]	[ ]
5.	Our development budgets have consistently gone up in the last 3 years	[ ]	[ ]	[ ]	[ ]	[ ]
6.	Our sales/customer reach has significantly risen in the last 3 years	[ ]	[ ]	[ ]	[ ]	[ ]

M. Kindly provide answers on the space provided below the question

Do you think it's important for the procurement department to differentiate products on level of greenness? If so, why?

What do you consider as the key indicators of a well performing procurement department?

Do you think buying green products impacts on the achievement of the above indicators? If so, how?

In your opinion, does;

i) Considering whether there was green research and design of products to be procured affect procurement management in energy and petroleum related state corporations in Kenya? Yes [ ] No [ ]

If yes, how?

ii) Considering whether there was green raw material acquisition during production of products to be procured affect firm performance in energy and petroleum related state corporations in Kenya? Yes [ ] No [ ]

If yes, how?

iii) Considering whether there was green manufacturing of products to be procured affect firm performance in energy and petroleum related state corporations in Kenya? Yes [ ] No [ ]

If yes, how?

iv) Considering whether there was green distribution of products to be procured affect firm performance in energy and petroleum related state corporations in Kenya? Yes [ ] No [ ]

If yes, how?

v) Considering whether there will be green operation and use of products to be procured affect firm performance in energy and petroleum related state corporations in Kenya? Yes [ ] No [ ]

If yes, how?

vi) Considering whether there will be green end life/disposal of products to be procured affect firm performance in energy and petroleum related state corporations in Kenya? Yes [ ] No [ ]

If yes, how?

N. If your organization carries out the activities below, kindly indicate the year when they started

No.	Activity	Year started
	Consider environmental impacts of the research and development phase of procured items	
	Consider presence of harmful raw materials eg. Asbestos in procured items	
	Consider carbon footprint of procured items	
	Consider environmental performance of procured items	
	Considering environmental impacts of disposing procured items after use	

THANK YOU

Appendix III: Questionnaire for Stakeholders

I am a post graduate student at Jomo Kenyatta University of Agriculture and Technology. Currently, I am collecting data in order to finalize my research project. I kindly request you to take a few minutes to fill questionnaire. The information so collected will treated with confidence and will only be used for this academic study. You can reach me for clarification on **Joel: 0721815461**

I would like that you tell me, how much you agree with the following statements about this organization according to the following scale, SD-strongly disagree, D-disagree, N-neutral, A-agree, SA-strongly agree

No.	Question	SD	D	N	A	SA
1.	This company contributes actively and voluntarily to the social improvement, economic and the environmental of society.	[ ]	[ ]	[ ]	[ ]	[ ]
2.	This company stands behind its products and services with good price and good quality that meet consumer needs	[ ]	[ ]	[ ]	[ ]	[ ]
3.	This company treats customers courteously, communicates with them and takes care of their safety and health.	[ ]	[ ]	[ ]	[ ]	[ ]
4.	This company generates respect, admiration esteem and confidence.	[ ]	[ ]	[ ]	[ ]	[ ]
5.	This company is recognized, has excellent leadership, is innovative, and seeks constant overcoming.	[ ]	[ ]	[ ]	[ ]	[ ]
6.	This company is a company with values that obeys the laws, transparent and respects people and the environment.	[ ]	[ ]	[ ]	[ ]	[ ]
7.	This company supports good causes that benefits society and environment.	[ ]	[ ]	[ ]	[ ]	[ ]

Give appropriate answers to the following questions

a) In your opinion, what needs to be improved in how this organization relates with you?

b) If you were to rate how this organization relates with you between 1 and 10, 10 being the highest, what mark would you give?

Appendix IV: Questionnaire for Finance Manager

I am a post graduate student at Jomo Kenyatta University of Agriculture and Technology. Currently, I am collecting data in order to finalize my research project. I kindly request you to take a few minutes to fill questionnaire. The information so collected will treated with confidence and will only be used for this academic study. You can reach me for clarification on **Joel: 0721815461**

I would like that you tell me, how much you agree with the following statements about this organization according to the following scale, SD-strongly disagree, D-disagree, N-neutral, A-agree, SA-strongly agree

No.	Question	SD	D	N	A	SA
1.	In the last 3 years, has there been a steady improvement on the following;	[ ]	[ ]	[ ]	[ ]	[ ]
2.	Sales	[ ]	[ ]	[ ]	[ ]	[ ]
3.	Return on Assets	[ ]	[ ]	[ ]	[ ]	[ ]
4.	Expenditure	[ ]	[ ]	[ ]	[ ]	[ ]
5.	Customer base	[ ]	[ ]	[ ]	[ ]	[ ]
6.	Assets	[ ]	[ ]	[ ]	[ ]	[ ]
7.	Surplus	[ ]	[ ]	[ ]	[ ]	[ ]
8.	Return on capital employed					
9.						

In your opinion;
Does green procurement affect performance?
Yes [ ] No [ ] Don't know [ ]

If yes, how?

Kindly fill the table below with figures in millions of Kenya shillings

Year/Variable	2012	2013	2014
Total Sales			
Total Assets			
Total expenditure			
Share Capital			

THANK YOU

Appendix V: Questionnaire for Environment Manager

I am a post graduate student at Jomo Kenyatta University of Agriculture and Technology. Currently, I am collecting data in order to finalize my research project. I kindly request you to take a few minutes to fill questionnaire. The information so collected will treated with confidence and will only be used for this academic study. You can reach me for clarification on **Joel: 0721815461**

I would like that you tell me, how much you agree with the following statements about this organization according to the following scale, SD-strongly disagree, D-disagree, N-neutral, A-agree, SA-strongly agree

No.	Question	SD	D	N	A	SA
1.	Environmental consideration is a significant factor in decision making in all processes in this organization	[ ]	[ ]	[ ]	[ ]	[ ]
2.	We very well know our environmental impacts throughout our value chain	[ ]	[ ]	[ ]	[ ]	[ ]
3.	The top management always seek advice on environmental impacts of any project as required by law	[ ]	[ ]	[ ]	[ ]	[ ]
4.	All functional areas always seek my advice on environmental impacts of their activities	[ ]	[ ]	[ ]	[ ]	[ ]
5.	When there is a conflict between cost of a project and its environmental impacts, the environment always wins	[ ]	[ ]	[ ]	[ ]	[ ]
6.	Mostly, environmental considerations do not form any part in the procurement process	[ ]	[ ]	[ ]	[ ]	[ ]
7.	I believe that procurement decisions are not significantly related to environmental conservation	[ ]	[ ]	[ ]	[ ]	[ ]

In your opinion;
What is green procurement?

Do you see green procurement practiced in your organization?
Yes [ ] No [ ] Don't know [ ]

If yes, how?

Does your organization have an environmental policy?

Yes [ ] No [ ] Don't know [ ]

If yes, what are its main focus areas?

List 3 legal guidelines important in your work

1.

2.

3.

How do the above affect your work?

Kindly fill the table below by marking on yes or no

Item	yes	no
I don't think environmental impacts at product development level should be an important issue when procuring it		
Use of green raw materials should be an important procurement criteria		
Manufacturer's use of green manufacturing technology should be included when prequalifying suppliers		
It would be good to consider environmental impacts of items procured and choose those with less lifetime environmental impacts		
I would advise against buying products that have negative environmental impacts during end life/disposal		

Answer the questions below

In your opinion,

Does integrating environmental concerns in to procurement decisions affect the following:

i) Cost of procured items? Yes [ ] No [ ]

If yes, how?

ii) Quality of procured items? Yes [ ] No [ ]

If yes, how?

iii) Timeliness of delivery of procured items? Yes [ ] No [ ]

If yes, how?

iv) Do you think considering environmental concerns while procuring can affect an organization's performance? Yes [ ] No [ ]

If yes, how?

Kindly fill the table below by indicating the year when the said processes started. If not, leave blank

Year/Variable	From (year)
ISO 14001	
Annual environmental audits	
Supplier audits	
EIA	

THANK YOU

Appendix VI: List of Energy Related State Corporations in Kenya

No.	Name	Total Staff	Procurement Staff
1	Rural Electrification Authority	300	21
2	KETRACO	400	52
3	Geothermal Development Corporation	1100	18
4	Kenya Power Company	8000	283
5	Kenya Pipe Line Company	1685	72
6	KENGEN	2700	154
7	Energy Regulation Authority	50	20
8	Kenya Petroleum Refineries	1000	115
9	National Oil Corporation	675	13
10	Nuclear Board	53	13
	TOTAL		761