INFLUENCE OF GREEN SUPPLY CHAIN MANAGEMENT PRACTICES ON PERFORMANCE OF PRIVATE OIL AND GAS FIRMS IN KENYA: MODERATING ROLE OF GOVERNMENT REGULATIONS

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A RESEARCH THESIS SUBMITTED TO THE SCHOOL OF POSTGRADUATE STUDIES IN PARTIAL FULFILMENT OF THE REQUIREMENTS OF THE DEGREE OF DOCTOR OF PHILOSOPHY DEPARTMENT OF MANAGEMENT SCIENCE (PROCUREMENT AND LOGISTICS) OF KISII UNIVERSITY

OCTOBER, 2023

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DEDICATION

This thesis is devoted to my wife Pauline Kwamboka, children Edwin Maraga, George Morara and Winnie Moraa, for the tireless sacrifice, priceless moral support and family time given to me when writing the entire thesis.

ACKNOWLEDGEMENT

I thank God for my good health during this thesis writing. To my supervisors, Dr. Densford Maendo, Dr. Enock Musau and Dr. James Waribu, thank you for your patience, guidance and help throughout this thesis writing period. I greatly appreciate their timely comments and contributions. I am thankful to all the respondents, especially the top management who participated in the study for their contributions that supported the study as well as the thesis writing. Thanks to all the teaching staff at Kisii University, specifically those in the school of Business and Economics, for helping me this far. I appreciate the key role you all played. To my friends who supported me morally as well as financially to make this journey possible, thank you.

ABSTRACT`

Globally, the oil and gas industry account for the major environmental tragedies leading to creation of reliability issues from policy makers and trust concerns from the community. The general objective of this research was to establish the influence of green supply chain management practices on performance of private oil and gas firms in Kenya: moderating role of government regulation. The study specific objectives included; to establish the influence of green procurement on performance of private oil and gas firms; to establish the influence of green distribution on performance of private oil and gas firms; to establish the influence of green manufacturing on performance of private oil and gas firms; to establish the influence of reverse logistics on performance of private oil and gas firms, to establish the influence of waste management on performance of private oil and gas firms and to establish the moderating influence of government regulation in the relationship among GSCM practices and performance of private oil and gas firms in Kenya. The guiding theories included; the resource-based view, the natural resource-based view, the stakeholder theory and the institutional theory. The study was guided by the positivist philosophy. The research utilized a descriptive design. Target population was one thousand eight hundred and fifty employees working for the seventy-two private oil and gas firms in Kenya. The study used stratified random sampling that gave a representative sample. Primary information was gathered using a sample size of four hundred and seventy employees, using self-constructed questionnaires which were dropped and collected after two weeks. A pilot test was conducted at National oil of Kenya, using ten percent of the sample size. The validity of the instrument was attained by adapting existing scales; and through the opinion of experts in supply chain management and measurement and evaluation; Reliability of the tools was tested using Cronbach's alpha value. An alpha value of 0.7 or above gave a suitable and satisfactory reliability. To test the strength of the relationship amongst variables, the Pearson's product moment correlation was employed. Quantitative data was analyzed using both descriptive (mean, standard deviation, minimum, maximum, skewness, kurtosis). Multiple and simple regression analysis measured direct effects of variables. Hierarchical regression analysis tested the moderation effect of variables. Analyzed information was presented through statistical parameter estimates and tables. The study findings showed that all the research green supply chain management practices had a positive and significant influence on firm performance. The results further showed a significant moderating effect of government regulation on the relationship between green supply chain management practices and firm performance. The study concluded that private oil and gas firms' utilization of green supply chain management practices, enhance their performance. Further, the research concluded that the private oil and gas firms should comply to government regulations to attain success. The study recommended that private oil and gas firms should adopt green supply chain management practices to improve their economic, environmental and social performance. Future research should involve all employees implementing green supply chain management practices in private oil and gas firms to enrich the output of this research.

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LIST OF ABBREVIATIONS AND ACRONYMS

ANOVA   Analysis of Variance

CIS   Commonwealth of Independent States

CFA   Confirmatory Factor Analysis

DEA   Data envelopment analysis

EM   Environmental Management

EMCA   Environmental Management and Coordination Act

EPRA   Energy and Petroleum Regulatory Authority

GHG   Greenhouse gas

GP   Green Procurement

GD   Green Distribution

GM   Green Manufacturing

GMM   Generalized Method of Moments

GSCM   Green Supply Chain Management

GR   Government Regulation

HHI   Herfindahl Hirschman Index

IEA   International Energy Agency

IEO   International Energy Outlook

ICT   Information Communication Technology

ISO	International Standards Organization
KAM	Kenya Association of Manufactures
KPC	Kenya Pipeline Corporation
KPRL	Kenya Petroleum Refineries Limited
MSWM	Municipal Solid Waste Management
Mtoe	Millions of tonnes of oil equivalent
NEMA	National Environment Management
NOCK	National Oil Corporation of Kenya
NRBV	Natural Resource Based View
NSE	National Security Exchange
PLS	Partial Least Square
RBV	Resource Based View
RL	Reverse logistic
SEM	Structural Equation Modelling
SCM	Supply Chain Management
SMEs	Small and Medium Enterprises
SPSS	Statistical Package of the Social Sciences
SWM	Solid Waste Management
UK	United Kingdom

UN	United Nations
UNEP	United Nations Environmental Program
UNSD	United Nations Sustainable Development
WM	Waste Management
WHO	World Health Organization

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

The Petroleum industry, commonly known as the oil and gas sector, comprises the exploration processes, extraction, refining, transportation, storage and marketing of petroleum products. The oil and gas sector is divided into upstream, midstream as well as downstream segments. The upstream comprises the exploration and the production sections. The midstream section includes the transportation as well as the storage. The downstream section deals with refining as well as marketing. The sector refines crude oil as well as processes natural gas into various products; gasoline, kerosene, premium, liquefied petroleum gas, lubricants and fuel oil. The industry is important in the economy as well as the society. The sector is key in contributing to society services including; distribution, electricity, lubricants, warming, shipping, petrochemicals and industrial chemical products (Geisler & Wickramasinghe, 2015).

Historically, the oil and gas industry, has not been responsible and accountable for the environmental and social challenges. Their main objective for the longest time has been to make profits at the expense of the environment and social challenges (Bergquist, 2020). It is only in the 1990s that these organizations started looking at environmental performance as well as social accountability (Bergquist, 2020). Around this time, firms started innovative production techniques which eliminated the old production methods in order to satisfy consumer needs. Conversely, this led to another new challenge to business firms as the customers started becoming more environmentally conscious (Gandhi & Vasudevan, 2019). Even then, profitability and minimization of operational overheads, continued to motivate private oil and gas firms to adopt some GSCM in the supply chain for sustainability (Zulkefli *et al*., 2019). This called for greater

sustainable progress on energy planning, analysis as well as policy formulation concerning the private oil and gas industry to confront environmental challenges (IEA, 2017).

The oil and gas firms globally, account for the major environmental tragedies leading to creation of reliability issues from policymakers as well as trust concerns from the community (Mojarad *et al*., 2018). The United Kingdom through their UK Environmental Agency report, reveals that Oil and gas companies use unconventional methods to regain access to petroleum reserves. Though there is growth potential, the unconventional techniques lead to ecological and social problems including spills, health and safety management risks, huge GHG emissions, depletion of earth resources as well as land and water destruction (UK Environmental Agency, 2018). Despite having established GHG emission reduction regulations in the EU and associated policies in Japan, overarching regulations are largely stalled in major economies, such as the US and Canada. In China the state has come up with a number of government initiatives meant for green growth in the oil and gas sector including; circular economy promotion law (2008), public participation in environment law (2015) and atmospheric pollution prevention and control law (2015) among others. Big oil companies like Shell, Chevron and Mobil profess to be championing environmental protection and social responsibility, but there is evidence that their main agenda is to make profits and pay less attention to environmental and social issues (Anis & Saddiqui, 2015).

Regionally, most oil firms in Iraq, for example, were found to neglect the ecological and social challenges in their oil value chains for the pursuit of the economic value (Ibrahim *et al.,* 2019). The study, further, showed that paying no attention in addressing the environmental dimension, negatively affected the success of oil firms after sometime. In Nigeria, the oil sector is plagued by corruption indicating that firms in this sector are pursuing profitability as opposed to the environment and social challenges (Akali & Imam, 2016). Rentizelas (2018) notes that oil

companies which selected their vendors that strictly followed government regulations of social responsibility guidelines, in Oman, resulted into reduced organizational risks. The social challenges require that oil companies plough back profits the firms make to benefit the society.

In the Kenyan situation, multinational companies are exiting Kenya due to unfair competition. The Herfindahl-Hirschman index (HHI) for the oil and gas sector in Kenya decreased from 0.162 to 0.0902 between 2011 and 2019, resulting from the entry of independent oil firms (EPRA Report, 2020). This index implies there is fierce competition amongst firms in the petroleum sector. The underdeveloped independent petroleum firms who do not have any regard for safeguarding the environment, ethics and business social responsibility sprung up to the detriment of the Multinational companies who are exiting from the Kenyan market. Independent oil firms' main concern is to make profits through unethical behavior of fuel adulteration that led to unfair competition. The unfair competition leads to squeezed profit margins and environmental inefficiency. From the firms' activities, toxic emissions as well as hazardous waste are produced into the environment. Several incidents including equipment failure, contaminate the environment and the community through wells blowouts, spills, pipeline leaks including tanker accidents and explosions as well as drilling injuries (Kamol *et al.*, 2019).

The increased level of consciousness about global warming, decrease of non-renewable resources as well as pollution, demand that private oil and gas corporations adopt and implement green practices into their supply chains. The continuous and expansive exploration as well as exploitation of the oil and gas resources, frequently cause environmental degradation that leads to sustainable challenges which require urgent mitigation (Ceptureanu *et al.*, 2018). The Kenyan Ministry of Energy and petroleum report (2016) states that a legal framework exists requiring all companies to implement and adopt sustainable business practices.

The problem in the private oil and gas industry, arise from the exploration, extraction, transformation, distribution, marketing as well as the disposal activities. These operational functions cause negative effects on the environment such as solid waste, hazardous toxins, pollution, environmental destruction, exhaustion of raw materials, decrease of natural resources and the concentration of greenhouse gas (GHG) emissions and pollution (Sarkis & Dou, 2017).

The negative effects of spills, GHG emissions and pollution, accidents and fire explosions affect communities, the environment, workers, equipment, air, water, wildlands, wildlife habitats and animals. The transportation, distribution, marketing and disposal of oil and gas products, mainly affect communities living close to the exploitation fields and along the transport corridors on their health and safety, that of their animals and the environment, making their daily lives unbearable and irreversible. In the host communities, the quality of life is affected by emissions of dangerous gases and toxic materials, interruption of the ecologies and decrease of natural resources that deliver to the communities.

The oil and gas industry firms have put some great effort to minimize the effects of their activities on the environment to enhance economic progress as well as improve social performance without success (Bharvirkar *et al.,* 2003). The problem of environmental destruction has continued unabated due to the growing demand for energy consumption that is ever increasing in developing nations, weak enforcement of laws and lack of implementation of policies, continuous distribution of oil products using fleets that use fossil fuels that produce pollution, inadequate emission standards for the oil retail sector, job-related safety as well as the health Act not yet fully operationalized, lack of a body that can actually process waste generated by the oil and gas sector and oil treatment facilities that don't meet international standards.

1.1.1 Green Supply Chain Management Practices

Green supply chain management (GSCM) concept has evolved from environmental management (EM) and Supply Chain Management (SCM). Choi and Hong (2002) refer supply chain as a network of consumers and sellers whose emphasis is to look at how a company organizes partner processes including technology as well as abilities to enhance its competitive edge. A supply chain has a pivotal role in an organization's global attractiveness. Growing ecological awareness is critical to humanity as well as the business community. Efforts to minimize the impact resulting from the business functions on the environment has been termed as green supply chain management. GSCM is brought about by the accelerated destruction of the environment (Ahi & Searcy, 2012). GSCM is the integration of ecological-friendly practices into every stage of the value chain activities including sourcing and selection, product design as well as development including manufacturing and packaging, shipping, storage and retrieval, the after-sale services and the end-of-product life management (Choi, 2017). Over the years, many companies have been adopting GSCM due to its significance in building competitive advantage and company reputation.

The tenets of greening the value chain include to decrease as well as eradicate wastages and hazardous chemicals including emissions, reducing energy consumption as well as solid waste along the value chain. It is also to reduce destruction to resources as well as the environment, in the supply chain, where organizations do businesses to reap economic value and enable sustainable growth of the communities. Previous studies have established that GSCM is very close to sustainability as well as the incorporation of economic, environmental and social structures in establishments (Brindley & Oxborrow, 2014). Further, Past studies have revealed that business ecofriendly strategies are positively related to various dimensions of firm performance.

Globally, the introduction of green supply chain management growth. as a concept, has widely

gained acceptance in various countries, majorly, the first world countries. Germany, UK and Canada for instance have adopted and implemented green supply chain management practices to enable them achieve desired economic, environmental and social sustainability as well as low-carbon footprint development. A study by Tijiani (2014) investigated sustainability in the Oil and Gas Supply Chain in the UK oil and gas industry. The results showed that application of sustainability amongst the petroleum industry value chain in the UK led to enhancement of economic performance as well as ecological performance that, in turn, led to increased competitiveness of the firms.

In China, a study by Shinn (2016) revealed that environmental dilapidation is quite high in the petroleum sector even though the country boasts of a stringent legislation on environmental conservation by oil firms. Evidence shows that most of the oil companies in China, do not comply with the legislation leading to severe ecological destruction. A study in the Palm oil sector in both China and India agreed with previous research outcomes that the oil and gas sector pursued profitability at the expense of ecological preservation and social accountability (Schleifer & Sun, 2018).

A study with survey evidence from Greece by Trivellas, Georgios and Reklitis (2020) established the influence of green distribution management on Sustainable corporate and supply network Performance of Agriculture foodstuff processing industry. Findings showed that frequent communication, production of goods and delivery remain strong factors that influence sustainable value chain performance and that ecofriendly packaging was connected to financial as well as social performance dimensions. The results further showed that there was no connection between ecofriendly warehousing and green logistics emissions with the performance results.

Regionally, Abba *et al* (2021) studied GSCM practices on performance of listed oil & gas

companies in Nigeria: a moderating role of internet of things. The results showed that green practices had a statistically significant relationship on firm performance. Saad *et al* (2021) studied the role of GSCM practices on environmental performance in the hydrocarbon industry of Bahrain and showed that green purchasing as well as internal environmental management including customer ecological collaboration showed a positive relationship with environmental performance.

Akali and Imam (2016) conducted a study on GSCM practices and performance on the oil sector plagued with corruption in Nigeria. The outcome showed there was no positive relationship with environmental performance. Ibrahim *et al* (2019) studied GSCM and the performance of petroleum organizations in Iraq and showed a positive relationship with economic performance and a negative outcome on the environmental and social performance. It further indicated that paying no attention in addressing the environmental dimension, negatively affected the success of oil firms after sometime.

Augustine (2020) assessed the influence of green procurement on performance and established that green purchasing was an important enabler of firm success at Bayport savings & loans as well as Ghana's water company limited. Further, it established that there was no clear uniqueness among ecofriendly purchasing strategies at the companies as far as performance was concern, vendor partnerships as well as challenges

In Kenya, Omusebe *et al* (2018) assessed the role of supplier's use of green supply chain management innovations in manufacturing firms and performance of the energy and petroleum state parastatals in Kenya. Results showed that use of green production technology as one of the criteria for vendor selection in awarding tenders showed a negative outcome on company performance.

Boss and Gupta (2015) noted that to address social issues caused by the oil sector, the companies should provide employment to the people from the community, construct infrastructure and social amenities within the community as well as involve the people of that area to participate in policy development. The study was based on the cost implication in adopting green practices which might affect the oil and gas performance if not handled properly. A case study conducted in the University of Nairobi by Ndua and Were (2018) examined the effect of GSCM practices and performance and established a positive association between reverse flows and Kenyan public universities

Chrisostom and Monari (2018) conducted research on the influence of green logistics management on performance of motorized organization of Kenya. The study found that ecofriendly logistics administration showed a moderate positive relationship indicating significant connection with the performance. Research established some ecofriendly purchasing practices, for example green logistics administration exhibited significant influence on performance of motorized organizations.

Notwithstanding the many deliberations on the positive influence of GSCM on performance, most of these studies have different outcomes and contradictory findings. Whether positive or negative, the results are still contentious. It is also not clear whether the GSCM practices accelerate the coordinated development of the environment as well as the economy of the regions. Comparable research carried out by Akali and Imam (2016) in Nigeria and Ibrahim *et al* (2019) in Iraq environments, established mixed findings revealing the significance of further research to fortify understanding of GSCM practices on performance. This research focuses on studying GSCM practices on performance of private oil and gas firms in Kenya.

Green procurement (GP) is a procedure of formally presenting and incorporating ecological issues and features into the buying process, aiming to purchase materials and services that have a low

ecological effect, that is, goods which are ecofriendly and made by incorporating ecofriendly procedures. Green procurement includes ecofriendly practices which decrease the origin of the waste as well as enhance regeneration for bought out materials. Ecofriendly buying ensures responsibility for green issues in several processes, acquiring procedures, and plans. Therefore, ecological procuring gives assurance that bought items achieve sustainable characteristics, like non-injurious elements, recyclability as well as reusability (Foo *et al*., 2019). Environmental buying is majorly collaborating with vendors. Integrating environmental thinking into the buying process permits organizations to offer design specifications to providers which, at a minimum, should contain ecological concerns for ecofriendly bought materials (Shao & Ünal, 2019).

The execution of green procurement is initially implemented through GSCM practices (Hajikhani *et al*., 2012). Meaning that ecological concerns may be connected with procurement preparation, scheduling as well as practicing. Ecofriendly buying includes procuring of materials which have ecological footprints as well as the collaboration with vendors for eco-friendly goals. For the suppliers' ecofriendly objectives to be realized, it requires the purchasing organizations to cooperate with vendors in sharing data, have combined research as well as training (Laosirihongthong *et al.,* 2013). At the same time, it is easier to incorporate ecofriendly elements into various procurement phases if the vendors are compliant and are certified by ISO 14001, ISO 9001 as well as EMS bodies (Esfahbodi *et al*., 2016). During the selection stage of the suppliers, the buyer gives eco-design requirements to vendors for the procured goods, so that the bought items contain ecofriendly features for the intended project (Esfahbodi *et al*., 2016). Green procurement sub-practices/ indicators comprise ecofriendly labeling, ecological collaboration with providers, vendor green audits, seller ecological management accreditation system as well as second-tier vendor ecological assessment. To enhance performance, green purchasing liaises

with vendors to manufacture green and ecofriendly goods. It is vital to buy from the organizations that are adopting GSCM practices. In addition, supplier pre-qualification is an essential way for establishments to lessen ecological effects of business activities (Tseng & Chiu, 2013).

Green distribution is incorporating ecological problems to inter-organizational programs in the value chain network. Simply, green transportation is a sustainable delivery of materials as well as services. Ghobakhaloo *et al* (2013) note that green delivery forms part of an important element of GSCM to bring about effective ecological impact during its application. More awareness about the environment has catapulted organizations to embrace green deliveries. Some of these practices range from minimizing usage of fossil fuels as well as greenhouse gases that are inputs for the conversion and delivery processes in order to reduce their effects on the ecology. Green delivery is an arrangement for environmental packaging with clients (Hamdy *et al.,* 2018) improving carriage logistics as well as shipping systems (Esfahbodi *et al*., 2016; Laar, 2016) and tracing as well as scanning levels of emissions from product deliveries (Esfahbodi *et al.,* 2016).

To develop green distribution, organizations should consider fuels, types of delivery, infrastructure and the type of operations (Al-Odeh & Smallwood, 2012). Automobiles that use petrol and diesel release carbon dioxide that leads to global warming including acid rain. They further note that to enhance organizational performance, enterprises must embrace use of alternative fuels other than fossil fuels and modes of transport like rail. Delivery points should be close to customers to cut down on distance travelled by fleets to reduce miles driven. This will improve firms' activities, minimize waste and improve resource utilization efficiency leading to improved profits and better competitive advantage. Organizations should use solar, hydro or wind to power warehousing storage facilities than using electricity, additionally optimizing assets. Renewable energy minimizes energy use and pollution.

Green manufacturing incorporates procedures that emit reduced amount of pollution as well as make less total conversion material waste. The primary goal of green manufacturing is to conserve energy and prevent pollution. This is accomplished by reducing or completely removing hazardous substances produced as by-products during the manufacturing process. Majorly, the main reason for ecofriendly conversion is to cut down on the resources utilized aiming at decreasing the quantity of wastes through application of suitable materials, best procedures as well as cleaner technologies (Wang & Dai, 2017; Wibowo *et al.,* 2018). According to Mittal and Sangwan (2014) adoption of ecofriendly production procedures allow corporations to be more aware of their responsibility to safeguard the environment by changing operating procedures on disposal to adhere and conform to ecological sustainability rules.

Green manufacturing is a method of conversion whose input has greater effectiveness and low ecological impacts (Amemba *et al.,* 2013). During green conversion, organizations improve their outputs and obtain high ecological performance (Wibowo *et al*., 2018). When firms adopt green manufacturing, discharges including refuse from the conversion process are treated as well as disposed of by high-tech ecofriendly guided equipment. In addition, by use of cleaner technologies activities like reprocessing, recycle, process improvement, releases and refuse are minimized, altered as well as prevented (Ghobakhloo *et al.,* 2013). Environmental manufacturing enhances firm performance by implementing green innovations and systems, coming up with good manufacturing designs, modification of the prevailing procedures and making it easier to repair machines with new spares to boost their strength and longevity. The greening of manufacturing activities enables companies to decrease energy use, incorporate lean production to reduce wastage in the production process and reduce time in the production cycle, thus leading to the production of organic materials (Hajmohammad *et al*., 2013).

Reverse Logistics comprise product returns performed by the customers to the vendor enterprises with a goal of recouping and possibly creating value from the unutilized products or parts. Murphy (2012) terms reverse flows as a way of designing, implementing including controlling well-organized, low-cost movement of unprocessed stock, unfinished goods, final goods as well as related advice originated by the customer towards the supplier for the aim of recovering or generating value or appropriate disposal. The sub-variables that constitute reverse logistics include product recall/return, material salvage, reprocessing and waste discharge as well as remanufacturing (Muma *et al.,* 2014).

Commercial returns practices need enterprises to recall already used materials including packaging materials at the customers' sites and take back supplies for the reproduction aims (Bachev, 2018). The process of recalling the used materials and packages for reuse, recycle and remanufacturing offer the best outcomes since reverse logistics is established to have a positive relationship with ecological efficiency (Muma *et al*., 2014). Sustainability cannot easily be attained in the value chain if there is no suitable organization of material recovery practices as ecofriendly flows plan to attain sustainable improvement (Chin *et al.,* 2015).

Hasan (2013) notes that to improve firm performance, vendors are persuaded to accept back packaging materials. This action has a potential of greening the value chain by decreasing the quantity of packaging materials released to the waste system by organizations. Ashby *et al* (2012) note that managing wastes as well as doing waste exchanges, help in reducing expenses, improve competitiveness and increase ecological efficiency in reverse logistics. Additionally, they found out that reverse logistics offers the greatest opportunity to reuse the unused products and parts that have been returned by the customers, where the returned products are utilized as inputs for the production of new products. This way, reverse logistics seriously aims to decrease materials in the

onward systems in such a way that when some materials move back, reprocessing and reusing are possible. The disposition options reveal reverse logistics in enterprises leading to environmental outcome, profitability, and sales growth.

Waste management has a common accountability for services that are associated to waste administration, collecting waste, transporting from the origin to the disposal site, salvaging the collected waste, recycling some waste and finally disposing of waste which cannot be put to any usable condition (Gabrielli *et al*., 2017). Hill *et al* (2015) note that for an organization to build greater competitive advantage, have better outcomes and increased returns as opposed to others found within a similar industry, then, that enterprise should have the best practice about waste management.

Srivastava (2007) notes that waste management is not only regarded as a precious resource from the perspective of conserving the environment as postulated by UNEP (2018) but an important resource as well from the cost perspective through which enterprises can make earnings through investments and have high returns. Whereas discarding of wastes emit small levels of discharges, salvage of the wastes as well as secondary treatment of the same, leads to the decrease of releases in other segments of the economy such as transport as well as agriculture (UNEP, 2018).

Practices to manage waste and enhance performance include; proper waste handling and disposal; waste that has residual value to be recycled as well as reused; cut down on waste that emanate from firms and use ecological management system (EMS). Offering inducement promotions on reusing of waste is an enormous motivator towards increased reusing behavior in the persistent struggle against ecological dilapidation and the wellbeing of humankind (Zhao & Nie, 2018).

1.1.2 Performance of Private Oil and Gas Firms.

Organizational performance refers to a guideline to making decisions on business investment and development in the future, apart from showing the current position and its effectiveness in the sector (Clarke, 2015). It is how well an establishment attains its market as well as financial goals including objectives. This study looks at private oil and gas performance in three dimensions; environment, economic and social performance. Both financial measures (earnings, profit margin, return on assets) and non-financial measures (customer satisfaction, market share, category ownership) are utilized to measure environmental, economic and social performance (Hill, 2017; Rugman & Verbeke, 2017).

On environment Performance, operations in the petroleum industry are a major cause of ecological degradation. Studies from all over the globe have outcomes that indicate that lack of green value chain application in the oil industry has led to serious ecological destruction. (Anis & Saddiqui, 2015). It is also evident that many organizations only think about environmental protection after achieving their economic value (Mojarad *et al.,* 2018). In Nigeria, the oil sector is plagued by corruption indicating that firms in this sector are pursuing profitability as opposed to the environment and social challenges(Akali & Imam, 2016). In Kenya, most independent oil and gas firms have no regard for environment protection and social accountability due to their activities of product adulteration and corruption. Their main aim is to pursue economic viability and not environmental or social protection. These studies clearly indicate there is selective application of green value chain practices in the petroleum sector creating a gap that needs to be filled.

Global GHG emissions increased by 1.5 % annually between 2009 and 2018 to record 51.8 GtCO2e in 2018 without land use emissions. In 2018 alone, GHG release grew by 2.0% and has been increasing since the financial crisis of 2009 unabated. Fossil CO2 releases from energy

utilization and industry, topped the total global GHG release, reporting 37.5 GtCO2e in 2018. The upsurge in fossil CO2 emissions is occasioned by high energy demand which grew by 2.9 % worldwide in 2018 (International Energy Agency, 2018).

Greenhouse gases in Kenya are mostly from the transport sector and industries that use fossil fuels. In 2018, Kenya's transport sector utilized 75% of oil and gas products leading to more GHG emissions (EPRA Report, 2019). The increase in demand for oil and gas products leads to more emissions of GHG from transport vehicles and industries that use fossil fuels. The high demand of fossil fuels also leads to accumulation of waste oils that increase GHG emissions. Adoption of GSCM practices and a commitment towards decarbonization in all the oil and gas activities will enhance environmental efficiency.

Measurement indicators for environmental performance in the oil and gas firms include; reduced energy use, decreasing waste oil, reducing pollution as well as emissions (Laari, 2016), improved environmental health and decrease in the rate of injuries occurring at the work place (Das, 2018). Environmental efficiency measures support enhancement of an organization's ecological state (Esfahbodi *et al*., 2016)

On the economic front, Ngugi and Kihara (2019) established that major oil companies realized their expenses increased due to their failure to adopt green practices leading to low profitability. Properly used economic dimension, creates sustainable development (Anis & Siddiqui, 2015). This occurs only when companies in the petroleum industry employ prudent methods of resource utilization as well as meeting the requirements of the society. Most oil producing countries generate a lot of proceeds from the petroleum activities. Overdependence of the incomes resulting from oil exploitation has led to low environmental efficiency caused by pollution and ecological destruction but the social dimension is catered for by placement opportunities for the people in the

society (Anis & Siddiqui, 2015). When companies in the oil sector minimize their operating expenses, they make profits. If the firms in the oil and gas sector institute appropriate organizational practices that include green practices, then, they have the capacity to gain improved economic value through minimization of operating costs (Small, 2017).

In the Kenyan situation, multinational companies are exiting Kenya due to unfair competition. The Herfindahl-Hirschman index (HHI) for the oil and gas sector in Kenya decreased from 0.162 to 0.0902 between 2011 and 2019, resulting from the entry of independent oil firms (EPRA Report, 2020). This shows that there is fierce competition amongst firms in the petroleum sector, all pursuing the economic value at the expense of the environment and social challenges. Underdeveloped Independent petroleum firms who do not have any regard for safeguarding the environment, ethics and business social responsibility sprung up to the detriment of the Multinational companies who have exited from the Kenyan market. Independent oil firms' main concern is to make profits through unethical behavior of fuel adulteration that led to unfair competition. The unfair competition leads to squeezed profit margins and environmental inefficiency.

Measurement indicators for economic performance in the oil and gas firms include; reduced costs for items procured, minimized expenses for energy use, reduced expenses for treating wastes, decreased expenses for waste disposal as well as minimized penalties for ecological incidents (Das, 2018); increased profits (Laari ,2016) and improved market share.

On the social dimension, the petroleum industry is risky and hazardous (Kvalheim & Dahl, 2016). Evidence shows that organizations who do not address the social issues properly, have suffered several challenges with communities where they operate in. The conflicts that occur between the oil firms and the community impact negatively on the operations of the companies (Nanok &

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Onyango, 2017; Anis & Siddiqui, 2015). There have always occurred disagreements between the political class, the community as well as the oil firms which lead to meddling of the activities of the oil industry including the exploration as well as production activities (Mwabu, 2018). The said conflicts lead to shortages of workers and lead to limited access to the oil industry operating and production locations. The four social obligation strategies in the petroleum sector involves ecological management, communal relations, ethics and governance and social, health including operational safety challenges (Raufflet *et al.,* 2014). The social challenges normally occur due to structural integrity issues, fires, explosions due to product flammability, accidents and injuries. There are social concerns that are caused by the upstream, midstream and downstream that should be addressed in the entire oil and gas value chain network through application of GSCM.

Several incidents have occurred; the Pipe Alpha Oil Rig fire in 1988 killed 167 people; Gulf of Mexico spill in 2010 that affected biodiversity (Bigliani, 2013); a leakage in Amuay refinery in Venezuela killed 39 people (Castagra.org, 2015). Others include; pipeline explosion in Lunga Lunga Kenya that claimed 100 lives; worker physical injuries from drilling (occupational safety) in Turkana, Kenya (Kamol *et al,* 2019); Molo spill fire explosion in Kenya that claimed 113 lives and 200 more injured in 2009 and the pipeline leakage in Kiboko Makueni, that affected sources of water, caused diseases to people, affected land for irrigation and fish ponds in 2019. A rational link has been established among major oil and gas disasters and lack of sustainable practices.

Measurement indicators for social performance in the oil and gas firms is reflected through; improving both product and firm reputation, guarding and keeping employees safe as well as healthy at the workplace, guaranteeing client loyalty including satisfaction (Zailani *et al.,* 2012b); improving healthcare infrastructures to firms that are adjacent to the company and enhancing jobs/service openings to local population (Das, 2018).

These studies have established that there is insufficient GSCM literature in all the performance dimensions in the oil value chain. Hence the need to apply GSCM practices in all activities of the oil industry. Further, apart from the financial pursuit, the oil industry is slowly embracing environmental preservation due to the impact of its activities, but not the social issues in the Kenyan context. This study will provide new information concerning the social sustainability in the oil value chain as a body of new knowledge.

This study was conducted in the private oil and gas firms since it is the single largest polluter of the environment and could integrate majority of the green supply chain management practices. Mojarad *et al* (2018) observe that the petroleum companies globally account for the major ecological tragedies leading to creation of reliability issues from policy makers as well as trust concerns from the community. The private oil and gas sector is also a major player in the economic role, by greatly contributing to the gross domestic product (GDP) and the overall job creation in Kenya. Omusebe *et al* (2018) studied the role of suppliers' utilization of green manufacturing innovations on firm performance in the energy and petroleum parastatals in Kenya. This research recommended a study to be conducted in the private oil and gas sector in Kenya.

1.1.3 Government Regulations

A moderating variable from a meta-analysis research is mostly picked from the control variables found within the empirical literature but not like the standard moderators (Golicic & Smith, 2013). A moderator is a third variable that affects both the direction and correlation of a predictor variable as well as the predicted variable. It can weaken or improve the direction of the association between a dependent variable and the independent variable. It does also change the direction of association between two variables to be either negative or positive. A linear regression analysis will be used to test the moderating effect of government regulation and establish whether the variable

strengthens or weakens the association among GSCM practices and private oil and gas performance. A moderator influence can be epitomized as an interaction between an explanatory variable and the criterion variable. The moderator will be supported when the interaction of the explanatory as well as the moderator on the result of the variable is significant (Saad *et al*, 2013). The reason for the moderation is to discover some hidden effects on the association between the predictor and the predicted variable.

Hierarchical regression will be utilized to examine the moderating influence of government regulations on the association among GSCM rehearses and the performance of private oil and gas companies in Kenya. Previous literature reveals a number of indicators like company size as well as sector kind that impact the implementation of green practices as well as organizational performance (Abdulrahman *et al*., 2014). In the case of this study, the moderating variable will be government regulations which will be code centered on the applicable sample on the association among GSCM practices and performance of oil firms.

The government of Kenya enacted the Environmental Management Coordination Act (EMCA) and operationalized it in the year 1999 with an amendment in 2015. It is an Act of parliament that leads to the creation of suitable legal and institutional framework for safeguarding the environment with all matters pertaining thereto.

Government regulations in Kenya, govern diverse sections of businesses in the economy including the oil and gas sector which is among the best contributors to GDP. In the oil industry, legislations are critical to the firms' activities and are meant to preserve the environment from dangerous activities. Oil and gas companies get pressured by stakeholders, such as the final consumers who would like to procure green products as well as the increasing legislations that create environmental standards for the products (Hu & Hsu, 2010). Government regulations indicators

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for this study include, compliance, policy guidelines, legal regime and enforcement.

1.2 Statement of the Problem

Application of GSCM practices lead to reduced GHG emissions, pollution, reducing energy consumption, reduced costs of operations, improved profits, reduce injury rates at the workplace, ensuring less customer complaints.

However, globally, the oil and gas industry accounts for the major environmental tragedies leading to creation of reliability issues from policy makers and trust concerns from the community. For instance, Oil leakage in Amuay refinery in Venezuela killed 39 people (Castagra.org, 2015). The Pipe Alpha Oil Rig fire in 1988 killed 167 people; Gulf of Mexico spill in 2010 affected the biodiversity (Bigliani, 2013). In Kenya, private oil and gas firms are performing poorly in economic, environmental and social dimensions. The oil and gas firms are the greatest emitters of GHG (62%) in Kenya (UNEP, 2016). The country's GHG emissions increased from 7.82 million tonnes to 16.15 million tonnes between 2011 and 2019 (EPRA Report, 2020). Pipeline explosion in Lunga Lunga claimed 100 lives, Molo spill explosion claimed 113 Kenyans in 2009 (NEMA, Report, 2010). The sector produces 60 million litres of waste oil annually but only 5% is disposed of properly (NEMA Report: 2019). Nearly 2.4 million people die annually due to air pollution associated ailments (WHO, 2015). The HHI for the oil sector decreased from 0.162 to 0.0902 from 2011 to 2019 signaling a highly competitive environment a fact that compromises firm profitability as the competition is stiff and oligopolistic in nature in the industry. Entry of Independent oil and gas firms caused unfair competition and product adulteration that led to customer complaints (EPRA Report, 2020). The movement of gross margin profits per annum prior to as well as after price regulation revealed a reduction in gross profit margin between 2009 and 2015 for Total Energy, Rubis, NOCK and Hash Energy who are all key players in the sector (KIPPRA, 2015).

Abba *et al* (2021) studied GSCM practices on performance of listed oil & gas companies in Nigeria moderated by internet of things. The study used a purposive non-probability sampling method. Study was not anchored on any theory. Study addressed variables; cooperation with customers, internal environment management, investment recovery, eco-design and internet of thing as a moderator. The results showed that green practices had a statistically significant relationship on firm performance. Gunarathne (2021) studied the influence of GSCM Practices on Performance of the Industrial Segment within Sri Lanka. The study used a small sample size of 150 respondents. The study addressed variables; internal environment management and eco-design. The study established there was positive and significant connection amongst GSCM strategies on performance of the production industry. Saad, Syed and Ahmed (2021) studied the role of green supply chain management practices on environmental performance in the hydrocarbon industry of Bahrain: moderated by green innovation. The sample was drawn by use of simple random sampling technique. The study addressed variables; internal environment management, green purchasing, customer environmental cooperation. Results showed that green purchasing and internal ecological management including customer ecological collaboration showed a positive association with ecological performance. Green innovation positively moderated the study. A study by Rutere (2020) looked at green distribution and its influence on performance of production organizations in Kenya. The study used an exploratory study design and random sampling technique utilizing a mixed methodology. Study was anchored on NRBV theory. The study results showed that green delivery had significant effect on performance of industrial companies.

These studies create methodological, conceptual, theoretical, and moderation gaps. It is against this background the present study is conducted to establish the influence of GSCM practices on performance of private oil and gas firms in Kenya: moderated by government regulations.

1.3 Objectives of the Study

1.3.1 General Objective

The general objective of this research was to establish the influence of green supply chain management practices   on performance of private oil and gas firms in Kenya: Moderating role of government regulations.

1.3.2 The Specific Objectives

(i) To establish the influence of green procurement on performance of private oil and gas firms in Kenya.

(ii) To establish the influence of green distribution on performance of private oil and gas firms in Kenya.

(iii) To establish the influence of green manufacturing on performance of private oil and gas firms in Kenya.

(iv) To establish the influence of reverse logistics on performance of private oil and gas firms in Kenya

(v) To establish the influence of waste management on performance of private oil and gas firms in Kenya.

(vi) To establish the moderating influence of government regulation in the relationship among GSCM practices (green procurement, green distribution, green manufacturing, reverse logistics, waste management) and performance of private oil and gas firms in Kenya.

(via) To establish the moderating influence of government regulation on the relationship between green procurement and performance of private oil and gas firms in Kenya.

(vib) To establish the moderating influence of government regulation on the relationship

between green distribution and performance of private oil and gas firms in Kenya.

(vic) To establish the moderating influence of government regulation on the relationship between green manufacturing and performance of private oil and gas firms in Kenya.

(vid) To establish the moderating influence of government regulation on the relationship between reverse logistics and performance of private oil and gas firms in Kenya.

(vie) To establish the moderating influence of government regulation on the relationship between waste management and performance of private oil and gas firms in Kenya.

1.4 Hypotheses of the Study

H_{01}: Green procurement does not have a statistically significant influence on performance of private oil and gas firms in Kenya

H_{02}: Green distribution does not have a statistically significant influence on performance of private oil and gas firms in Kenya

H_{03}: Green manufacturing does not have a statistically significant influence on performance of private oil and gas firms in Kenya

H_{04}: Reverse logistics does not have a statistically significant influence on performance of private oil and gas firms in Kenya

H_{05}: Waste management does not have a statistically significant influence on performance of private oil and gas firms in Kenya

H_{06}: Government regulation does not have a statistically significant moderating influence on the relationship between GSCM practices (green procurement, green distribution, green manufacturing, reverse logistics, waste management) and performance of private oil and gas firms in Kenya.

H_{06a}: Government regulation does not have a statistically significant moderating influence on the

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relationship between green procurement and performance of private oil and gas firms in Kenya

H$_{06b}$: Government regulation does not have a statistically significant moderating influence on the relationship between green distribution and performance of private oil and gas firms in Kenya

H$_{06c}$: Government regulation does not have a statistically significant moderating influence on the relationship between green manufacturing and performance of private oil and gas firms in Kenya

H$_{06d}$: Government regulation does not have a statistically significant moderating influence on the relationship between reverse logistic and performance of private oil and gas firms in Kenya

H$_{06e}$: Government regulation does not have a statistically significant moderating influence on the relationship between green procurement and performance of private oil and gas firms in Kenya

1.5 Significance of the Study

Outcomes from this study will assist in policy formulation by private oil and gas firms with environmental management challenges to embrace green practices to address the issue. Further, the findings from the study will offer information to the Ministry of Energy and Petroleum to enable policy formulation about environmental challenges affecting the petroleum sector. Additionally, the results and recommendations from this study will be important in knowledge addition to the field of GSCM which are of interest to researchers as well as academicians seeking to do more research on GSCM practices not included in the current study. Finally, the results will be important to the practitioners to create policy guidelines on GSCM practices to improve firm performance.

1.6 Scope of the Study

The study was carried out in all the 72 private oil and gas firms registered by EPRA, by December 2019, in Kenya. The study was undertaken at Nairobi City County where the firms have their headquarters. The study sought to establish the influence of GSCM practices on performance of private oil and gas firms in Kenya, moderated by government regulations. Before the advent of green value chain, ecological consideration was not included in the oil and gas activities. The reason was that GHG emissions and pollution were low because of the few industries during that time. Green supply chain brought in sustainable extraction of resources from the environment. Today, the oil and gas companies in Kenya and globally, account for the major environmental tragedies leading to creation of reliability issues from policy makers as well as trust concerns from the community. From this viewpoint, environmental protection should take center stage in oil and gas activities in Kenya. The research assessed the moderating influence of government regulation as the moderating variable. The study dependent variable was firm performance. The research centered on only five practices; green procurement; green distribution; green manufacturing; reverse logistics and waste management which were the independent variables. The study surveyed all the private oil and gas firms in Kenya in its geographical scope. On its time scope, the study took two months from October, 2022 to November, 2022 to gather primary information involving 470 questionnaires top managers, managers, supervisors and procurement staff as respondents.

1.7 Limitation of the Study

Several limitations were encountered during the study but were insignificant to affect the results and were not included. Departmental heads and supervisors did not cooperate to offer information freely for fear of putting their jobs on the line owing to suspicion on the exact motive of the study. The researcher explained that the information was for academic purpose only and wrote an official letter to seek permission from the top management of the companies to solve the challenge. On the

issue of non-response on data collection instruments, the self-report replies had a risk of getting exaggerated, leading to collecting erroneous data. Responses entirely depended on the participants' honesty. Non-availability of the participants and responsiveness, was expected to be a limitation encountering the study. It was an uphill task delivering the questionnaires to participants or getting feedback in time for the study due to their busy schedules. To solve this, the research assistants did frequent follow ups, resent any lost questionnaires through emails or hard copies to the respondents. On limited access to confidential documents specifically GSCM practices, the researcher did a formal request to top management to have permission to gather extra information from the authorized personnel. Lack of proper and accurate records about greening activities in the private oil and gas firms, limited enough secondary data. To solve this, the researcher collected as much primary data as possible from the private oil and gas sector.

This research was majorly limited to private oil and gas firms in Kenya. The findings might not be suitable to be generalized to other sectors of the economy. This may be solved by more similar empirical research conducted in other sectors in the country as well as other parts of the world. This research was limited to a mixed methodology comprising the positivist philosophy, descriptive & inferential statistics with research objectives limited to questionnaires. Other researchers can build on this by studying green value chain through qualitative or quantitative methodology. Instead of using questionnaires, other studies could use interviews, observation or focused groups. Since private oil and gas firms are prevalent in most economies in the world, a cautious compilation of a representative sample to cater for the adoption of green value chain is required. A similar study in different sectors and countries worldwide would deliver data information for comparison purposes. To conclude, this study utilized objective measures instead of subjective procedures to establish firm performance. On the other hand, many other researches

have conveyed strong relationships among objective procedures and subjective procedures.

1.8 Assumptions of the study

The research assumed that participants could provide honest responses when filling the questionnaires. The sample size utilized for this research was a true representative of the study population. It was assumed that by selecting top managers, managers, supervisors and procurement staff as respondents was founded on them being responsible for green supply chain management practices adoption. It was assumed that the theoretical framework utilized could offer a good foundation for this research. That the data collected was adequate to achieve the objectives of the study. The research assumed that all private oil and gas firms had adopted GSCM practices. That the data collected by the study was applicable to the area of GSCM practices on performance.

1.9 Operational Definitions of Terms.

Economic performance: Ability of an organization to be successive in accruing profits to the shareholders, through inventions and effective resource utilization and cost minimization incidents (Das, 2018: Laari ,2016)

Environmental performance: The measurable results of a firm's management of its ecological aspects whose outcome will achieve decrease in pollution and GHG emissions, save energy use and reduce waste (Laari, 2016)

Green distribution: Refers to sustainable delivery of materials and services that leads to reduction of GHG emissions and pollution (Muma *et al.,* 2014: Esfahbodi *et al.,* 2016)

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Green manufacturing: A production process that pollutes less and creates less overall production waste leading to environmental efficiency and green products and less carbon footprints (Shrivastava, 2017)

Green procurement: well-planned purchasing process that incorporates environmental thinking that leads to reduction of waste and likelihood of reusing and recycling materials to reduce costs and improve profits (Zhu *et al.*, 2008)

Internet of things   Means the ability to make everything around us connected to the internet with an intelligent behavior with autonomy and privacy that allows collection and sharing of data (Gubbi, 2013)

organizational Performance: Attainment of goals and objectives by a firm within given timelines with regard to economic, environmental and social performance (Clarke, 2015).

Private company   A firm held under private ownership. Private companies may issue stock and have shareholders, but their shares do not trade on public exchanges and are not issued through an initial public offering (IPO).

Reverse logistics: Product returns by customers to vendors with a goal of recovery and possibly creating value from the unutilized products or parts through reusing and recycling that leads to waste reduction, minimizing costs of raw materials and

increase profits (Bachev, 2018)

Social performance: A concept quantifying results of green practices about improving both product and firm reputation, guarding and keeping employees safe and healthy at the work place, guaranteeing client loyalty including customer satisfaction. (Zailani *et al.,* 2012).

Waste management: These are the activities and actions required to manage waste from its inception to its disposal to cut down on waste, costs, GHG emissions and pollution (Gabrielli *et al*., 2017)

CHAPTER TWO

LITERATURE REVIEW

2.1 Theoretical Literature Review

2.1.1 Resource Based view Theory

Resource Based view (RBV) theory was proposed by Penrose in 1959, who cited those unused managerial resources as the primary driver of growth. The theory was published by Wernerfelt in 1984 (Wernerfelt,1984). The theory postulates that organizations can create sustainable competitive edge by utilizing distinctive internal strategic resources and enhance performance. Enterprise resources are viewed to include; physical resources such as cash, inventory, vehicles, equipment, buildings and machines; intangible assets do not exist in physical form and include; goodwill, reputation, patents, attributes, knowledge and skills, processes, account receivables as well as transformation (Agyapong, 2019). Ownership of skills as well as capabilities in the entire value chain to go green is a significant component in embracing environmentally friendly strategies. Lai, Cheng and Tang (2010) attest that owning of skills is an asset which is within the RBV scope. The theory considers internal strategic resources to be a significant foundation for building a continuous competitive edge in an enterprise (Namjoo & Keramati, 2018).

RBV assumes that a company in an industry can be diverse regarding the strategic assets they manage. Further, the theory assumes that the said resources cannot be transferred amongst other firms across the industry, meaning that heterogeneity can continue for long. But it is well known that there exists mobility for most of the resources in the value chain.

The resource-based view gives an important outline on how to attain a continuous competitive edge. However, it has been criticized; RBV only looks at the internal factors of a company but not factors from outside the organization such as the market demand. This means that even if the

organization is endowed with resources and has the capacity to attain a competitive edge over others, lack of demand will affect it since the model disregards the importance of the consumer. The theory does not have the capacity to perform empirical research to assess achievements.This is because the organizations are diverse and it is difficult and not possible to put together a standardized sample for the study. RBV, though known by scholars to be thebest in advocating for competitiveness in establishments, it overlooks the importance of the firm's link with the wider environment. RBV is mostly concerned with the tangible resources. But it is very clear that both tangible as well as non-physical assets can build a competitive edge in organizations. According to Shi *et al* (2012) it is not clear how particular categories of GSCM practices convert to be an organization's strategic assets that will finally turn to a competitive edge as well as a performance enhancement.

The theory is relevant to the private oil and gas sector because it can help firms put into use existing resources like human resource expertise and skills, incomes, green innovations, modern equipment and clean technologies, supplier collaboration and funds to add to their capacity to build competitive advantage of the firm. RBV is a rational theory to be utilized in the study of GSCM because of its emphasis on clarifying how organizations put into use key resources to enhance corporate performance. RBV is utilized in this research to test resource use and management by private oil and gas firms. The RBVsupports and is applied to the specific objectives' green procurement, green distribution, green manufacturing, reverse logistics and waste management.

2.1.2 Natural Resource Based View (NRBV) Theory

NRBV was developed by Hart in 1995. The theory states that a firm develops a competitive edge by relating to the biophysical ecosystem. This means that competitive advantage is created through the relationship between internal capacities and the external environment. The connection

between the external and internal environment of a firm creates cost leadership as well as quality differentiation (Porter, 2015). It further asserts that if an asset or a group of resources can make a firm to build competitive advantage, then that resource cannot be substituted, is rare and valuable, not replicable and is not possessed by other firms. Investigations undertaken in the area of NRBV have established backing on NRBV main doctrines (Cousins *et al*., 2019). Companies should not settle on short-term economic value as well as competitive edge alone but can strategize into the future as well. Hence, firms should embrace GSCM in both the short term and long term.

NRBV puts forward three assumptions that are critical for a resource to be called strategic (Shi *et al*., 2012). The resource should be particular (Specific) to the organization, second, the asset must be causally ambiguous or tacit and, thirdly, the resource must be socially complex. Criticism of this theory include; the necessity that the resource should be specific to the firm has been criticized. It has been argued, from the relational view perspective, that an enterprise's capability can be created outside the company borders by putting together resources available in dissimilar value chain participants(Dyer & Singh, 1998). Both causal ambiguity and the social complexity of assets of anorganization cannot easily be imitated by competing firms. The spread out and implicit manner of the capability makes it hard to notice in practice, thus, hard to replicate easily (Shi *et al*., 2012). Accordingly, an organization is offered a chance for continued sustained competitiveness throughan inimitable causally ambiguous asset.

Criticism of this theory include; it lacks the capacity to expound how the assets combine to impact ecological performance. The theory is incapable in clarifying how companies build resources as well as the abilities in shareholder integration that can permit for enhanced product stewardship in organizations. Another limitation is that the theory is unable to shed light on how a continuous competitive edge can be sustained through the capability of clean technologies.

The theory is relevant to this study because current environmental issues in Kenya and the world have brought about examination of human economic actions particularly in the oil and gas sector. As we go into the future, population growth will triple. With this increase, demand for oil product will increase and put more pressure on the natural resources. This growth in population and the pressure on natural resources thereof, leads to environmental unsustainability (Gore, 1992). At this rate, man'sactivities must be checked lest the planet's natural resource ecosystem is destroyed beyond redemption. Thus, environmental sustainability should be achieved through NRBV. The theory is also relevant in acquiring environmentally-friendly raw materials since the natural world is a major success component in the oil & gas industry. This study will utilize the NRBV as a theoretical lens to ground it. The NRBV supports and is applied to the specific objective green procurement.

2.1.3 Institutional theory

DiMaggio and Powell introduced institutional theory in the mid-1980s, postulating that organizations endeavor to adjust to the adjacent environment by abiding by legitimacy principles and controls on one part while pursuing communal alignment on the other part. The theory looks at the effect of external forces on an organization. These forces can be political, economic, suppliers, customers, regulatory bodies, competitors and social or sector norms that can alter the business practice. The forces can be coercive from government and regulators (Yang, 2016); mimetic from competitors (Williams *et al*., 2009) and normative from professional groups, customers or sector norms.

This theory assumes that institutions are governance structures, embodying rules of social conduct. That groups and organizations conforming to these rules are accorded legitimacy, a condition contributing to their survival. The theory assumes that institutions are characterized by inertia/ that

organizations become similar due to isomorphism after sometime (Ketchen & Hult, 2007).

The key criticism of the institutional theory include; presuming that establishments are passive and insignificant, that is, it is unable to offer solutions to strategic behavior, although the rules are complied with. Secondly, the state is unable to enforce laws due to resistance from the society. In addition, the instability of the theory through regular changes of the rules and regulations.

Institutional theory is relevant to this research since the petroleum sector is affected by internal as well as external forces that impact its performance such as normative forces, mimetic forces and coercive forces). Rules and guidelines from the government are classified under the institutional theory which help in the adoption of GSCM practices. The pressure which is being applied by investors and shareholders has forced producers to demonstrate their legitimacy through adoption and implementation of GSCM practices (Zhu and Sarkis, 2007). Companies that bow down to these pressures and adopt GSCM, gain legitimacy and are undoubtedly to have control and thus, increase their performance, The institutional theory is one of the instruments to comprehend various types of outside elements that pressure firms to implement or do away with a bundle of undertakings or practices. The institutional theory supports and is applied on the specific objectives of green distribution and green manufacturing.

2.1.4 Stakeholder Theory

Freeman started the stakeholder theory in 1984 in the area of management and is conceivably one of the best noticeable and surely understood theory in business administration. The theory postulates that the spirit of corporations is based on erecting relationships as well as generating value to the stakeholders (Freeman & Dymitriyev, 2017). Stakeholders are people with the ability to influence the organization's performance and at the same time are affected by the company's performance on the enterprise's objectives (Ngugi & Kihara, 2019). The organization's major

stakeholders include the workforce, customers, shareholders and the community (Freeman & Dymitriyev, 2017). Stakeholder theory suggests that the pressures emanating from either the partner or the stakeholder will in overall force enterprises to carry out particular types of environmental practices (Easley & Lenox, 2006). It further posits that companies' activities might influence both interior and exterior stakeholders of a company. The corporates' activities normally refer to external actions which are enormous to firms in trying to attain goals for their businesses. Meanwhile, activities of some of these establishments enable expansion of stakeholders' push on firms to lessen negative impacts as well as enhance positive impacts on others (Sarkis *et al*., 2011).

Preservation of a health environment and ecological balance is everybody's concern. To promote environmental awareness in the oil and gas sector, they need the help of different stakeholders such the government, workforce, customers, shareholders and the community (Freeman & Dymitriyev, 2017). The oil firms understand that stakeholders are concern about the environment and wasteful business practices. The theory stresses the interconnected relationships between a business and the stakeholders. The theory puts forward that there exists a positive connection between stakeholders' forces and the implementations of company ecofriendly practices like GSCM. Each stakeholder force undertakes an important measure to regulate a firm's ecological practice. Both the internal and external stakeholder forces are critical motivations for the acceptance and adoption of some ecofriendly management practices like GSCM. This way, the stakeholder theory forces are able to act as a precursor for private oil and gas firms to implement some GSCM practices which will enhance their environmental performance. The environmental efficiency boosts their competitive edge which lead to high private oil and gas market share, increased value/returns to stakeholders.

The assumption of the stakeholder theory is that businesses can only be considered successful when they deliver value to the majority of their stakeholders.

The theory has been criticized in the following ways; it is difficult for management to please all stakeholders at the same time due to diverse interests held by different participants. For instance, different stakeholders can require to know the failure or success of the company, but management might not satisfy these opposing views simultaneously. Additionally, the theory only looks at the stakeholders leaving out other factors that influence performance. Further, stakeholders are unable to influence decision making 100% all the time because stakeholder power levels are different. Lastly, the theory assumes that business success in organizations is the work of the society and not the company itself.

The stakeholder theory is relevant to the study because of its focus on interdependence as well as connectedness of the pillars of sustainability. The private oil and gas firms have stakeholders with interests about their operations. Some of the stakeholders comprise workers, shareholders, government, investors, customers and suppliers. The oil and gas industry has a framework on how to be governed in line with this theory on behalf of the investors. Thus, it's the obligation of the management to ensure that implementation and adoption of green practices is accomplished for the interest of stakeholders. This fact conforms to this theory. The theory is still relevant for application in GSCM research because firms nowadays embrace GSCM to react to constant forces emanating from various stakeholders. This theory will be the fundamental theory to clarify the connection between any corporate environmental practices such as GSCM practices with firm performance, specifically the environmental performance. Thus, the stakeholders' theory is a good theoretical lens for this study. This theory supports and is applied on the specific objectives of reverse logistics and waste management.

2.2 Empirical Review.

2.2.1 Green Procurement on Performance

Augustine (2020) assessed the influence of green procurement on performance and established that green purchasing was an important enabler of firm success at Bayport savings & loans as well as Ghana's water company limited. Further, it established that there was no clear uniqueness among ecofriendly purchasing strategies at the companies as far as performance is concern, vendor partnerships as well as challenges. The study was anchored by the RBV and the relational view theory. The study used objectivism philosophy and was quantitative in nature. Both descriptive and explanatory study designs were employed. Target population was all the staff of the two companies from which a sample size of 160 participants were drawn, 80 staff from each company. The convenient sampling method was employed. A structured questionnaire was utilized to gather primary information from 160 respondents. Previous information was gathered from the companies' archives. SPSS analyzed the collected data. The study concluded that green purchasing has a significant positive relationship with performance. The study recommended that the administration of the two companies should embrace continuous improvement on the green strategies application to enable effectiveness as well as efficiency on the firms' operations. The study, however, identified some gaps; such as used a small sample of 160, used a convenient sampling technique, used both primary and secondary data, addressed one variable, green procurement, anchored by the RBV and the relational view theory, used both descriptive and explanatory study designs. The present study uses stratified random sampling technique, a sample of 470 respondents, study is anchored on RBV, NRBV, Institutional and stakeholder theories, uses primary data a descriptive survey design.

A study conducted in Kenya by Omusebe *et al* (2017) looked at impact of green procurement on

the performance as well as effective purchasing administration in the public Sector, and established that implementing green purchasing improves performance in areas of costs, lead time as well as quality that are critical in purchasing administration in organizations. The study was anchored by Institutional sociology theory. Overall, the study concluded that the literature review showed that sustainability continues to be a critical corporate consideration today and in the future. The study recommends that purchasing administrators should continue implementing green purchasing as far as the present guidelines permit, as they continue lobbying for ecofriendly policies to be enacted. Additionally, in-depth research is required to be carried out to originate the precise empirical influence of implementing green purchasing strategy on effective purchasing administration in the community. The study identified some gaps including; study was a review of literature and not physical research, the study did not test hypotheses using inferential statistics., did not use a moderator and the study was anchored by Institutional sociology theory. The present study utilizes government regulation as a moderator, study is field research, uses inferential statistics to test hypotheses and study is anchored on RBV, NRBV, Institutional and stakeholder theories.

Karim *et al* (2017) did a study in Saudi Arabia entitled, does green procurement improve organizational performance? The research utilized a conceptual model where information was gathered by a questionnaire survey. The study was quantitative in nature and anchored on stakeholder theory. It employed correlationas well as multivariate regression-based path analysis to explore the association between systematic random sample of 400 purchasing managers placed in public as well as private entities across manyfields. The result showed that combined sustainable procurement (SP) practices exhibited a significant relationship with the firm's performance. Further, the findings showed no evidence of significant direct effect combinedmeasures of SP ecofriendly practices on the financial performance but there was an indirect effect of SP practices

through the company non-financial performance on financial performance which showed a statistically significant relationship. The study concluded that for sustainability in procurement to prevail, stakeholders should be part and parcel of the whole purchasing process to enable sustainable purchasing program to proceed ahead. The study recommended that the government should solve difficulties arising from lack of finance, guidelines as well as policy. That individual stakeholders should raise awareness on sustainable progress through simple purchasing guidelines, programs, adverts as well as journals. The study identified gaps including; study utilized systematic random sampling was anchored on stakeholder theory. The present study uses a stratified random sampling and is anchored on RBV, NRBV, Institutional and stakeholder theories

Sarhaye and Marendi (2017) conducted a study on the role of green procurement and performance of industrial production companies. Coca-Cola being the case study. It was a qualitative study with a descriptive study design. It was anchored by the systems theory and legitimacy theory. The target population was 642 participants from which a sample size of 64 staff working for Coca-Cola were drawn through a stratified random sampling technique. Data was collected through an open ended as well as closed ended questionnaire. An analysis was performed by SPSS version 23. The study was qualitative in nature and examined through content analysis. Findings revealed existence of a positive link between recall flows and Coca-Cola's performance. In conclusion it is imperative to select supplier based on their capacity to contain pollution that leads to a safe ecosystem. The research recommended that Coca-Cola organization implement ecofriendly purchasing strategies throughout their activities as well as processes. Study identified gaps including; study was qualitative in nature, used a small of 64 participants, used open ended and closed ended questionnaires, was case study research and anchored by the systems theory and legitimacy theory. The present study uses quantitative method, inferential statistics, a sample size of 470 respondents,

uses structured questionnaires and is anchored on RBV, NRBV, Institutional and stakeholder theories

Kimira, Getuno and Kiarie (2016) assessed the impact of green procurement practices on performance and the competitiveness of industrial conversion companies utilizing Unilever limited as a case. The study employed a descriptive design. A census study due to a small population of 60 participants were used. Primary information was gathered through a questionnaire. Both inferential as well as descriptive statistics were utilized for analysis. The results showed that a statistically significant association between company competitiveness and ecofriendly procurement existed. In conclusion, the study showed that adoption of green purchasing leads to enhanced performance and improved competitiveness of manufacturing organizations. The study recommended that suppliers should be looped into and developed by companies into strategic green partners in the value chain. The study identified gaps including; used a small sample of 60 participants, employed census design, was a case study, used a single variable- green procurement and had no moderating variable. The present study used a sample of 470 respondents, government regulation as a moderating variable, was anchored by RBV, NRBV, Institutional and stakeholder theories.

Pembere (2016) conducted research on green procurement practices and organizational performance of Nairobi Security Exchange (NSE) listed firms in Nairobi. There were 64 NSE listed companies in Nairobi. The study was census in nature. Study was grounded on institutional, RBV and stakeholder theories. Primary information was gathered utilizing a data gathering tool, the questionnaire. Sixty-four questionnaires were distributed to 64 NSE firms and only 47 were duly filled and returned. Examination was done through SPSS software. Regression examination was employed to ascertain the link between ecofriendly purchasing and supply chain success. Findings

showed that embracing green purchasing enhances value chain performance in organizations as seen in better services to clients, reduced ordering expenses as well as inventory reduction. The study recommends that top management personnel of the NSE firms adopt ecofriendly purchasing innovations to enable them benefit the direct impact of the value chain performance. In addition, the study suggests similar studies to be conducted in other sectors of the economy within Kenya. However, the study had some gaps; the study was census and case study, used a small sample of 64 participants, study was grounded on institutional, RBV and stakeholder theories and study had no moderating variable. The present study used a sample of 470 respondents, government regulation as a moderating variable and was anchored by RBV, NRBV, Institutional and stakeholder theories

A case study conducted in the East African Breweries Limited (EABL) in Kenya by Nderitu and Ngugi (2014) examined the impact of green procurement and organizational performance of the industrial production companies. The study employed a descriptive design with both primary as well as secondary data utilized. Study was anchored on globalization theory and organizational theory. The target population was 122 participants from which a sample size of 37 respondents were drawn. Descriptive as well as inferential techniques were employed for examination Multiple linear regression analysis was performed to ascertain the relationship. Results showed that ecofriendly purchasing features contribute to enhanced firm performance as well as employees training on green concepts helped improve performance. The study concluded that firms should develop ICT infrastructure, retain competent professional employees, invest in vendor management systems and be strategic in their investments to green purchasing for them to gain positive impacts of ecofriendly purchasing. A comparable study should be conducted in other sectors of the economy in Kenya. However, study was a case study, used a small sample of 37,

used both primary and secondary data, was anchored on globalization theory and organizational theory and had no moderating variable. The present study used a sample of 470 respondents. government regulation as a moderating variable, only primary data and anchored on RBV, NRBV, Institutional and stakeholder theories.

2.2.2 Green Distribution on Performance

A study by Rutere (2020) studied green distribution and its influence on performance of production organizations in Kenya. The study used an exploratory study design utilizing a mixed methodology. This study was informed by natural resourced based view theory. Out of 943 production organizations 330 were drawn through random sampling andutilized. The instrument for data gathering was the questionnaire. The study results indicated that ecofriendly distribution exhibited significant influence on the success of industrial companies. In conclusion, firms were advised to focus more on collaboration with suppliers to boost reuse of wrapping materials. The study recommended that eco-labeling should be embraced by firms to give information on the effects of the product usage on the environment. However, there were gaps; the study used an explanatory study design, used a single variable- green distribution and was not moderated, the study was informed by natural resourced based view theory. Present study used descriptive study design, government regulation as a moderator and was anchored on RBV, NRBV, Institutional and stakeholder theories.

A literature review conducted in the United Kingdom by Saada (2020) on green distribution in green supply chain management performance and established that most global businesses choose to release gas from their markets than focus in adopting ecofriendly technologies in logistics. They did a comprehensive literature review. It utilized the data envelopment analysis (DEA) model which is taken to be an efficient approach to assess performance and effectiveness of green

strategies in logistics as well as transportation. The study concluded that data envelopment analysis should be taken as an efficient technique to examine performance as well as effectiveness of green practices in distribution. The DEA model measures the efficacy of the value chain on expenses, human resources, outcomes, energy as well as carbon releases. In addition, selection of ecofriendly suppliers will enhance performance and increase green practices adoption by companies. However, the study had some gaps; it utilized the data envelopment analysis (DEA) model, study was a literature review and not actual field study, study did not have a moderator nor anchoring theories. Present study used inferential statistics, government regulation as moderator and was anchored on RBV, NRBV, institutional and stakeholder theories.

A study with survey evidence from Greece by Trivellas, Georgios and Reklitis (2020) established the influence of green distribution management on Sustainable corporate and supply network Performance of Agriculture foodstuff processing industry. The study undertook a field study that gathered information through a questionnaire from 134 top management companies from the agriculture foodstuff processing industry. Study findings showed that frequent communication, production of goods and delivery remain strong factors that influence sustainable value chain performance. The findings further indicated that ecofriendly packaging was connected to financial as well as social performance dimensions. The results further showed that there was no connection between ecofriendly warehousing and green logistics emissions with the performance results. The study recommends a comparable study conducted in other industries not included in this research. The gaps identified included; the study utilized a small sample 134 respondents, did not use inferential statistics to test hypothesis and was not anchored on any theory, had one variable-green distribution. Present study used a sample of 470 respondents, used inferential statistics, was anchored by RBV, NRBV, institutional and stakeholder theories.

Chrisostom and Monari (2018) conducted research on the influence of green logistics management on performance of motorized organization of Kenya. It utilized a correlational technique. From a total of 305 departmental heads of the legal automotive firms in Kenya, fisher's model was utilized to get a sample of 170 heads of department. Data collection was done through questionnaires as well as an interview guide to gather primary information. Statistical information was examined by descriptive as well as inferential measurements. Coefficients of the regression model were found by running a multiple regression examination. The study found that ecofriendly logistics administration showed a moderate positive relationship indicating significant connection with the performance. Research established some ecofriendly purchasing practices, for example green logistics administration exhibited significant influence on performance of motorized organizations. The study recommends a similar study be conducted in other industries. The study had some research gaps; the study used a small sample of 170 respondents, the study used both interview and questionnaire to collect data, study did not use a moderating variable. Present study used sample of 470 respondents, used primary data, used questionnaires to collect data and government regulation as moderating variable.

Kirunga and Kihara (2018) studied the influence of green distribution on environmental performance of chemical production companies in Kenya. The research was conducted on 27 registered companies in the area of chemical production. The study was anchored in the Resource Dependence theory, Stakeholder theory, Institutional theory and Transaction cost theory. The study was quantitative in nature. It utilized a census survey design. Data was gathered using a semi-structured questionnaire. The study utilized both correlation and regression techniques. Analysis was performed through the SPSS, version 21. The study also utilized thematic examination of information from open-ended questions. Mean as well as frequencies   and percentages were

employed to describe population parameters. The study results showed that green distribution had a significant influence on performance of environment dimension of the chemical production companies in Kenya. In conclusion, the study asserts that ecofriendly storage has a positive and significant association with ecological performance of the chemical production companies in Kenya. The study recommends that green packaging practices like recyclable materials, vehicles with fossil fuel efficacy, ecofriendly storage facilities as well as green labeling should be encouraged by both chemical and non-chemical productions firms through heavy investments to green their activities. However, gaps were identified; used census survey, used a small sample of 27 respondents, a single variable was utilized (green distribution), moderation was not done and the study was anchored in the Resource Dependence theory, Stakeholder theory, Institutional theory and Transaction cost theory. The present study used a sample of 470 respondents, government regulation was moderating variable and was anchored by RBV, NRBV, institutional and stakeholder theories.

A study in Kenya by Mwaura *et al* (2016) studied the influence of green distribution on performance of foodstuff production organizations within Kenya. The study employed a descriptive design coupled with cross-sectional technique. The Resource Based Theory (RBT). The study targeted all the 130 food producing companies which were legally registered members of KAM (Kenya Association of Manufacturers). The research employed a census survey method for data gathering. Initial data was gathered utilizing a questionnaire which was semi-structured. Construct validity was scrutinized by running factor analysis. Criterion validity was tested by performing a multivariate linear regression. The result from the study revealed that ecofriendly distribution practices exhibited a significant influence with the company's competitiveness coupled with decreased cost as well as increased effectiveness. In addition, utilizing ecofriendly packaging

sub-variables led toimproved sales, the value and distribution of materials cheaply that lead to higher revenue margins.Further, the results showed that technology impacted transportation techniques since more organizations utilized internet as a delivery channel that led to better information provision. The study recommended that to improve ecological sustainability, production companies in Kenya, should be motivated to adopt ecofriendly distribution strategies. Future research should be conducted to establish how green delivery practices impact performance of companies in the service sector. However, the study identified gaps; used a small sample of 130 respondents, the research employed a census survey method, used a single variable-green distribution, did not use a moderator and was informed by the Resource Based Theory (RBT). The current study was anchored on RBV, NRBV, Institutional and stakeholder theories. used a sample of 470 respondents and government regulation was used as a moderator.

2.2.3 Green Manufacturing on Performance

Wadhah *et al* (2020) conducted a comprehensive critical assessment, in the United Kingdom, on lean and green manufacturing with their association with performance and established that, it was not feasible that lean and ecofriendly practices are compatible as well as being able to be utilized in a single production process, since the results about it are still inconclusive. On the other hand, the lean- green production process is an emerging idea without ample evidence of its adoption. The study conducted a SLR which comprised the exact, transparent and explicit as well as reproducible approach for the assessment of lean and green production on performance. The study concludes that lean and green adoption as stand-alone systems aren't generally adequate to ascertain the equilibrium among the sustainability dimensions of environmental, economic and social ones needed in the current market. The study recommends that for better results lean and green strategies should be combined into one production approach. The study gaps include; used a single variable (green manufacturing), was not anchored on any theory and did not use any

moderator variable. The present study was anchored on RBV, NRBV, Institutional and stakeholder theories, used government regulation as a moderator, used green procurement, green distribution, green manufacturing, reverse logistics and waste management as independent variables.

A study conducted by Bisoyi *et al* (2019) studied green manufacturing on its technique, performance and its rationality and established that ecofriendly production decreases operating costs due to the organization eliminating wastes. The study utilized the pull model, Kanban and Single Minute Exchange of Die (SMED) in all under Just-in-Time technique. The study concluded that energy use for product production should be tapped from renewable energy sources for understanding the idea of sustainability. Future studies should be based on wider concepts on GSCM practices which can be quantified inside a manufacturing entity. However, the study identified gaps; used pull model, Kanban and SMED technique, did not use multiple regression or inferential statistics to test hypotheses, did not use moderating variable and anchoring theories. The present study used inferential and descriptive methods, used government regulation as a moderator and was anchored by RBV, NRBV, Institutional and stakeholder theories.

Singh and Thakkar (2018) did a comprehensive literature review on green manufacturing (GM) and performance within the small and medium enterprises sector in India. For this research, a detailed literature assessment was undertaken from 90 several respected publications spread over two decades. Study was not anchored on any theory. The research was not moderated by any variable. Findings revealed that green manufacturing involves all sections to decrease the environmental footprints through best use of existing resources as well as minimize waste. Additionally, the study revealed that embracing green production was unsuccessful due to limited knowhow on its initiation as well as lacking awareness of what ecofriendly manufacturing is all about including how to adopt and implement it. Small and Medium enterprises' contribution to environmental issues together, is

as much as that from the big industrial polluters, but the SMEs are reluctant to embrace a changed behavior towards greening their activities. These SMEs are very slow to embrace changes but are angling towards improved green practices. The study concluded that embracing and implementing green manufacturing in the Indian SMEs require dissemination of more knowledge to the participants on ecological training through campaigns, conferences and seminar discussions. However, gaps were identified; the study was on literature review and not a field study, used a small sample with 90 participants, was longitudinal, was not anchored on any theory and study did not use a moderating variable. Present study used government regulation as a moderator, was anchored by NRBV, NRBV, Institutional and stakeholder theories, was an actual field study, used 470 respondents as a sample and used a cross-sectional technique.

Otundo (2018) studied the influence of green manufacturing on the economic performance of Kenya's' manufacturing firms. The study utilized a descriptive research design. Study was informed by resource dependence theory, and institutional theory. The study had a target population of 757 staff from all the manufacturing firms in Mombasa County. A purposive sampling approach was utilized to draw a sample size of 70 respondents. Primary information was gathered using a questionnaire which was semi-structured.The data was analyzed using SPSS and presented through descriptive statistics techniques comprising the mean, percentages, frequencies as well as the standard deviations. The results showed that embracing ecofriendly manufacturing improves the company's financial performance; in manufacturing costs and output, supply expenses as well as efficiency in environmental administration programs and new business alliances. The study reached a general conclusion that most of the companies are aware of the impact of design for utilization of original materials, production, distribution, design for product use as well as after their useful life on performance. It further concluded that adoption of GSCM practices by

manufacturing firms is at the infant stage of adoption in Mombasa County. The study recommended that NEMA should enforce the environmental law to organizations in the coastal region to adopt green practices due to its benefits to the corporate and the natural ecosystem. Gaps were identified; the study used a purposive sampling, study used a small sample of 70 participants and study was informed by resource dependence theory, and institutional theory. The present study used government regulation as a moderating variable, was anchored on RBV, NRBV, Institutional and stakeholder theories, used 470 respondents as a sample and used stratified random sampling with a proportionate technique

A study in Kenya by Omusebe *et al* (2018) studied the role of vendor's utilization of green manufacturing innovations on company performance in the energy as well as oil & gas state parastatals within Kenya. The research utilized a descriptive approach. Study used the following theories: complexity theory, NRBV, social economic theory, stakeholder theory, theory of innovation, economic approach theory, institutional sociology theory and contingency management theory, Information was gatheredfrom secondary and primary sources. The research utilized 255 participants drawn out of the 761through a proportionate stratified sampling technique for the study. The study was census in nature. Findings showed through utilization of the ecofriendly production technology as one of the criteria for vendor selection in awarding tenders returned a negative influence on company performance. In conclusion, the result showed that by monitoring utilization of the vendor's ecofriendly production technology was meant to improve the firm's image, appeal to green funders as well as comply with the regulationsbut not to boost organizational efficiency nor social responsibility. The study recommended that another or a similar study be undertaken particularly in the private sector which plays a major economic role in Kenya. The study identified gaps; study used a census technique, study used both secondary and

primary data, study used a mixed methodology and did not use institutional and RBV theories. Present study used a quantitative methodology, used only primary data, and among others use institutional and RBV theories.

Mukonzo and Odock (2017) conducted a case study in the cement production segment to assess the influence green manufacturing has on performance of a company. This research utilized a case study design. Study was anchored by institutional and stake holder theories. The study used secondary data gathered from 2011 to 2014. The secondary data wasfrom historical records. The gathered information was put into correlation and regression examination. Findings showed a significant association among green production practices adoptedby a firm and its performance in operations. Further results indicated that the production factory complied with the EMCA, 1999. The findings also found that most ecological issues faced by the cement firm were as a result of ecological laws as well as regulations not adequately enforced. The study concludes there should be greater emphasis on the adoption of ecofriendly production projects which can eradicate and control all types of pollution emanating from manufacturing firms. Gaps included; the study utilized a case study design, did not use moderation variable, study used secondary data gathered from 2011 to 2014 hence longitudinal in nature and study was anchored by institutional and stakeholder theories. Present study utilized a sample from a population, government regulation as a moderator, was anchored on RBV, NRBV, Institutional and stakeholder theories, was cross-sectional in nature and used primary data

2.2.4 Reverse Logistics on Performance

Afum, Sun and Kusi (2019) investigated reverse logistics, stakeholder influence and supply network performance in the production industry in Ghana. The study adopted the causal research design since it assists in forecasting phenomenon as well as create a cause-effect association amongst concepts of concern. The study was anchored by the stakeholder theory. PLS as well as SEM techniques were

performed to evaluate hypotheses throughthe numerical software SMART PLS 3. Instruments for gathering information, majorly a structured questionnaire was employed to gather information from 193 departmental managers through a stratified sampling method. The questionnaires were self-administered after being pre-tested to achieve clarity as well as functionality as regards the format of questions. The study results showed that stakeholder variables exhibited strong impact of embracing reverse logistics. Ecological regulation did not influence adoption of reverse logistics. The findings further showed that embracing RL strongly impacts the value chain of production companies of Ghana which in turn reduces lead time including minimizing purchasing primary resources required for conversion. The study concludes that companies embrace reverse logistics in reaction to diverse stakeholders' pressure. Gaps were identified; the study used a causal research design, a small sample of 193 respondents and anchored by the stakeholder theory. The present study utilized a sample of 470 respondents, government regulation as a moderator was anchored by RBV, NRBV, Institutional and stakeholder theories and used descriptive design

Quantitative research in Ghana's mineral water production sector by Afum, Sun and Kusi (2019) investigated reverse logistics and performance: moderated by competitive edge. The study adopted the causal research design with a quantitative methodology since it assists in forecasting phenomenon as well as create a cause-effect association amongst concepts of interest. It was anchored by Resource Based View Theory. The instrument for data collection was a structured questionnaire. Information was collected from 187 respondents from Ghanaian bottled and sachet production companies through stratified sampling. Hypotheses were tested utilizing PSL-SEM through SMART-PLS 3 software. The results indicated by embracing commercial returns impacts significantly on competitive edge as well as company performance. Further, the results revealed that competitive edge positively and significantly impacted company performance. In addition, the results showed that competitive edge significantly mediated among reverse flows and company

achievement. The study concludes that bottled and sachet production companies that incorporate commercial returns strategies into their value chains are in a good position to develop a competitive edge and enhance performance. The study recommends that future comparable studies be carried out utilizing a mixed methodology to prompt robust thought- provoking outcomes. Gaps manifested; study used a small sample of 187 respondents. Data was analyzed through SMART-PLS 3 software, study moderated by competitive advantage and anchored by RBV. Present research utilized a sample of 470 respondents, government regulation as a moderator, was anchored by RBV, NRBV, Institutional and stakeholder theories, research used descriptive design and used SPSS software used for analysis of data.

Omwenga, Ngacho and Muya (2019) studied the influence of Reverse Logistics on competitiveness of plastic packaging conversation organizations within the county of Nairobi. The research utilized a descriptive research design. Study was informed by the resource-based view. The study employed a census technique because of a small target population of 180 managers and their assistants from 22 firms, which was not enough for sampling.Primary data gathered from all the 22 firms in question, utilized a questionnaire as an instrument for data collection. The study employed descriptive statistics of mean as well as standard deviationto analyze data. The research found out that RL practices showed a positive and significant influence when it comes to the competitiveness of plastic packaging production organizations. The study concluded that with and effective and standardized commercial returns process, gives an organization the requisite competitive edge above other competitors that leads to a big market share in the industry they operate in due to their superior process and meeting clients demand in an ever-changing environment. The researchers put forward a recommendation to the administration of plastic packaging production establishments to improve on their taking on reverse practices. The study identified gaps; the study

used a small sample of 180 respondents. The study employed a census technique and study was informed by the resource-based view. The current study used a sample of 470 respondents, was anchored by RBV, NRBV, Institutional and stakeholder theories, used descriptive design and used a sample to represent the whole.

Mwaura *et al* (2016) studied the influence of reverse logistics and performance of foodstuff production organizations within Kenya. The study employed a descriptive design with a cross-sectional survey approach. A cross-sectional study survey was carried out among 130 food producing companies which were legally registered members of KAM (Kenya Association of Manufacturers). The research employed a census survey method. Initial data was gathered utilizing a questionnaire which was semi-structured. Construct validity was scrutinized by running factor analysis. Criterion validity was tested by performing a multivariate linear regression. The findings showed reverse logistics had a significant effect on the competitiveness of the foodstuff processors within Kenya. The research concluded that existence of a positive association amongstreverse logistics sub-variables and organizational competitiveness. Firms that had implemented reverse logistics did it because of pressure from government. The study recommends that company administrators should appreciate ecological concerns and implement reverse recalls strategies. It further recommends that state agencies and other stakeholders in the production sector should conduct civic awareness promotions on the benefits of environmental preservation to motivate the society to be active agents towards implementation of commercial returns strategies. Gaps identified; study used census and a cross-sectional study survey, used a small sample of 130 respondents and did not have any moderating variable and anchoring theory. Present study is anchored on RBV, NRBV, Institutional and stakeholder theories, used a sample of 470 respondents, used government regulation as a moderator and employed sample of the population.

From Malasyia, Khor *et al* (2016) investigated Reverse Logistics: A Contingent Role of Institutional force for E&E production sector and organizational performance. The study employed a descriptive research design. Information was gathered through a survey approach from top management of enterprises who produce electronic as well as electrical equipment and are ISO 14001 accredited. Theorized connections were tested through regression models. The findings showed that involving institutional forces make the disposition options led to improved performance in other situations. Enhanced ecological as well as economic performance was derived from the recovery of valuable items at the time of product repair and reproduction undertakings while product reuse and disposal accomplishments do not help in enhancing performance in case of the regulatory forces' presence. The study concluded that reverse logistics administration is evolving as a business practice that helps the goal of sustainable manufacturing and utilization. A comparable study should be conducted in other sectors of the economy in other jurisdictions. However, gaps were identified; the study did not use a moderating variable, sample size used not indicated and study had one variable (reverse logistics), was not anchored in theory. The present study used inferential statics, study was quantitative, used government regulation as moderator, study used multiple variables and study was anchored on RBV, NRBV, Institutional and stakeholder theories.

2.2.5 Waste Management on Performance

Bowan *et al* (2020) studied municipal solid waste management on performance of Wa Municipality in Ghana. This paper evaluates MSWM performance in Ghana, using the Wa Municipality as a case study. The study employed an explanatory as well as an interpretive in-depth study which was analyzed by in themes. Further, framework as well as category formation methods were utilized to examine information gathered via documentary scrutiny, questionnaires and memory work including passive observations as well as semi-structured one on one interviews

emanating from MSWM investors participating in the case research area via purposive sampling method. The study used an analytical approach to analyze policies as well as laws guiding waste administration in Ghana. A thorough search of available policy documents of SWM was done and found 18 documents were retrieved. The study results showed that Ghana boasts of a good SWM institutional framework, adequate and strong legislation, available bylaws and policies as well as programs. However, performance is hampered by inadequate funding, unprofessional staff, lack of law enforcement and non-compliance to legislation. In addition, stakeholders only do waste gathering without focusing on waste minimization, treatment as well as end of life disposal. Ghana also lacks technical capacity in both their national assembly as well as the private sector to enable a sustainable MSWM. The study concluded that firming up a suitable infrastructure towards sustainable MSWM in Ghana will enhance MSWM performance for the realization of SWM objectives including; safeguarding community health and the environment, preservation of resources as well as creation of jobs. The study recommended that enforcement of the regulations governing waste management and inclusion of the private sector in WM matters should be done. The study identified gaps; the study used a small sample of 18 respondents, the study was census in nature. The study used explanatory and interpretive methods and a purposive sampling, was a case study inclined more to qualitative study design, data was collected by both interviews and questionnaires. The present study used descriptive design, used a big sample of 470 respondents, used stratified sampling with a proportionate technique, used questionnaire to collect data, used a sample and study was quantitative in nature

Chummun (2019) conducted research on the influence of waste management on environmental performance within Africa; a degree of accountable management. The study did a review of literature with a qualitative methodology. The results showed that EMS like ISO 14001 adoption

by organizations   significantly enhances ecological performance in the waste management sector in Africa. EMS also minimizes the creation of wastes as well as risks linked with business operations that affects the company's profits. In conclusion, the research asserts that there is a positive link amongst the firm culture, ecological awareness and the pro-ecological behavior. The study recommends that Africa should embrace the circular economy and social economic openings and others to enhance ecological performance and encourage responsible administration in waste management. Future research should be conducted on the e-waste model or regenerative circular economy. However, gaps were identified; used a qualitative methodology, study was a literature review and not field research, had no mediating variable nor a grounding theory. The present study was quantitative, was a field study, used government regulation was moderating variable and was anchored by RBV, NRBV, institutional and stakeholder theories.

A qualitative study from Sweden by Zhao and Nie (2018) investigated waste management on green supply chain performance: A case of how for-profit enterprises can utilize waste management practice. It utilized an abductive study technique to avoid biasness and make it open to have an iterative procedure to develop fresh theories. This was a case study design. Both primary and secondary information were gathered from various literature available in journals and records from books as well as semi-structured interviews and observations including document collection. The study found out that waste administration is significant to help and engage in many aspects inside a for-profit enterprise especially in operations, the staff and the players including the environment. The study had gaps; study was census in nature, study used an abductive study technique, used both primary and secondary data, utilized semi-structured interviews and observations, did not use theories or moderating variable. The present study used a sample of the whole population, study used deductive study technique, study used primary data, government regulation was moderating

variable and study was anchored by RBV, NRBV, institutional and stakeholder theories.

Gathong'a (2018) investigated waste management and organizational performance and limitations of waste projects in the City County of Nairobi. The study employed a descriptive survey design. Zero Waste Theory and Integrated Waste Management Theory anchored the study. This was a survey study utilizing descriptive design techniques. Information was gathered using aquestionnaire as well as interview schedules. A sample size of 199 people comprising 10 managersand 189 staff participated. The researcher utilized purposive sampling and systematic sampling including simple random sampling approaches. The data was presented through tables. ANOVA was utilized to determine the overall statistical significance. The results revealed that project funding was inadequate, employees were not involved in project planning to make informed decisions, there lacked effective control measures, employees were unqualified and the public were not well trained on how well they should handle waste. In conclusion, the number of finances for the work was inadequate and the project was having unskilled project workers and the society is not informed on proper waste disposal methods. The study recommended that organizations provide funds, train employees and involve them in the planning decisions, give back feedback onstatus of projects for better reviews and involve professionals to assist in efficient SWM. However, the study identified some gaps: used both questionnaire and interview schedules, used a small sample of 199 respondents, utilized purposive and systematic sampling techniques including simple random sampling approaches and Zero Waste Theory and Integrated Waste Management Theory anchored the study. Present study used questionnaire to collect data, used sample of 470 respondents, study used stratified random sampling with a proportionate technique, government regulation was moderating variable and study was anchored by RBV, NRBV, institutional and stakeholder theories.

Kimeu (2015) studied the influence of waste management on organizational performance of hotels and restaurants at the coast, particularly Mombasa County. The research utilized a census survey study design whose data was gathered through questionnaires and verified with observation specifications. The study was grounded by the RBV, the institutional theory, stakeholder theory and the

resource dependence theory. The target population was 43 hotel managers. The collected data was then analyzedby performing descriptive as well as inferential statistics comprising means including standard deviations as well as frequencies. The result showed that the model utilized, exhibited a moderateability to explain the impact of waste management in enhancing operational performance in the accommodation industry. The study concluded that organizations should develop policies as well as enabling principles. A recommendation to implement wastemanagement practices; waste minimization, waste gathering & depositing, salvaging and reprocessing as well as waste composting to enable enhance firm operational performance. Gaps were identified; the study was census in nature, used a small sample of 43 respondents, used both questionnaires and observation to collect data and the study was grounded by the RBV, the institutional theory, stakeholder theory and the resource dependence theory. The current study used government regulation as moderating variable, study was anchored by RBV, NRBV, institutional and stakeholder theories, used a sample of 470 respondents and the study used questionnaire to collect data.

A study in Malasyia on the healthcare sector by Roslan (2014) studied the influence of waste management on company performance, and established that waste management has a close association to a firm'sperformance. The study used a Structural Model Equation (SEM) method. Data collection was done utilizing structured questionnaires and analyzed by SPSS version 17 to provide descriptive statistics comprising means, the standard deviation as well as frequencies. Questionnaires were distributed to managers in the healthcare industry. Exploratory factor examination, reliability scrutiny and confirmatory factor investigation were deployed to measure construct validity as well as reliability. SEM utilizing AMOS 6.0 was in hand to test the measurement equation. In conclusion, the study showed that waste management is related to company performance. However, there were gaps identified; study did not use a moderating

variable and study was not grounded by any theory, used Structural Model Equation (SEM) method utilizing AMOS 6.0 and used exploratory factor analysis. The current study used government regulation as moderating variable, was anchored by RBV, NRBV, institutional and stakeholder theories and used PCA analysis

2.2.6 Government Regulations on Performance

A study from Indonesia conducted by Antin *et al* (2020) investigated the role of government rules on long term business performance and their impact on the success of SMEs. Acensus survey design was employed. The study was exploratory in nature taking one year of study.Respondents were drawn from 160 SMEs. Saturation sampling technique was utilized where the whole population members participated SEM-PLS approach was used for analysis utilizing Smartpls software, version 3.0. Saturated sampling has zero or small error rates. The findings showed that application of state guidelines lead to significant effect on GSCM and thus, a significant effect on financial as well as ecological performance. The study concluded that,if the government regulations are strong, GSCM practice will also be strong. Gaps were; the study used a small sample 160 respondents. study used a qualitative methodology, the study was exploratory in nature and used census survey design, a moderating variable and theories were not used by the study. The present study used a sample of 470 respondents and study was anchored by RBV, NRBV, institutional and stakeholder theories and government regulation was the moderating variable.

An empirical study from Indonesia on private hospitals by Sandra *et al* (2018) studied government regulation and stakeholders' enterprise orientation for obtaining firm performance. The collected data from 105 private hospitals from Jakarta city and the adjacent regions for analysis. A pretest was carried out to test validity and reliability. Data was gathered using a structured questionnaire followed by a survey technique. The data was analyzed and processed by utilizing SPSS and

structural equation model (SEM). The results showed government rules as well as laws, showing a significant moderation effect on business environment that helps the development of the hospital sector. The study concluded that government regulation and policies significantly impacted the hospital business environment positively. Hence future research should utilize a bigger sample for generalization of the results. The gaps included; study used a small sample of 105 respondents, did not use any theory to ground the study and utilizing SPSS structural equation model (SEM). The present study used a sample size of 470 respondents, used RBV, NRBV, institutional theory and stakeholder theory.

Maryam and Hossein (2018) conducted a study on green product improvements and ecological performance through mediating effect of government guidelines and established that the government should enforce rules and guidelines with a lot of care to avoid companies going for practices that are more profitable than embracing practices that offer little total ecological performance. Further, it showed that under certain situations stringent rules can make companies hesitate innovating and go ahead to produce one standardized product apart from many different products meant for various segments of the market. The study was qualitative in nature. SPSS version 22 was used to analyze data. Study concluded that companies apply practices that are more profitable than embracing practices that offer little total ecological performance. The study recommended that government should enforce rules and guidelines with a lot of moderation on companies. Future studies to be undertaken on the ranking of ecological practices. Gaps identified include; the study was qualitative in nature and not anchored in theory. The current study investigates, a quantitative study anchored by RBV, NRBV, institutional and stakeholder theories.

A study by Xuefei, Wang and Chen (2018) studied the influence of government ecological regulation on performance, and established that the application of environmental regulation over

a short period of time, negatively affected GSCM growth while in a long time, the application showed a positive effect on GSCM growth. Further, industrial invention positively enhanced green development. In addition, technological innovation had a mediation effect in the causal chain. A spatial Durbin model (SDM) under the unified analysis framework was used for investigation. In conclusion, the study noted that ecological regulation motivates GSCM development in the long run directly while indirectly through the mediating role of innovation in technology. Study recommended that governments must enforce ecological regulations in their operations to be ecofriendly to enhance performance as well as decrease pollution at the same time. Gaps identified include; SDM and unified analysis framework was used for analysis, used technological innovation as a mediating variable and there was any anchoring theory, The current study investigates, a quantitative study anchored by RBV, NRBV, institutional and stakeholder theories and government regulation as a moderating variable

Empirical research by Feng and Chen (2018) used a spatial Durbin model to analyze Government Environmental Regulation, Green Innovation, and Industrial Green Performance. The study period was from 2007 to 2015. It used panel data from 30 provinces and industries in different regions in China. A spatial Durbin model (SDM) that is under the unified analysis framework was used for investigation. The study established that there was a sharp changing trend in the Republic of China's whole industrial ecofriendly growth performance. Further, it showed a positive spatial link between industrial ecofriendly growth performance in various regions in China. The study concluded that in the absence of ecological regulation, ecofriendly craft innovation showed an inhibitory effect on manufacturing green growth performance but environmental product innovation showed a promotional effect. The study recommends an expansion of the same study to other periods for comparison purposes. Gaps include; the study used a Spatial Durbin Model

and unified analysis framework for analysis, the study was longitudinal that used panel data from 30 provinces and industries, was not anchored on theory and did not have a moderating variable. The current study investigates, a quantitative study anchored by RBV, NRBV, institutional and stakeholder theories, used government regulation as a moderating variable and descriptive and inferential statistics for analysis.

Ndolo *et al* (2017) investigated the Role of Government Health and Safety Regulations on the Petroleum Value Chain network. A mixed methodology, with a purposive sampling which selected 180 respondents from 36 oil companies. Social Regulation Theories anchored the study. Instruments (questionnaire) for information gathering were used and analyzed by statistical package for the social sciences (SPSS) version, 24. Both inferential and descriptive techniques were employed. The research results showed a positive link between government health as well as safety policies and the oil and gas value chain administration. The study concluded that government health as well as safety policy is important in the petroleum industry like in distribution, fuel operations, refining and inspections of the service stations. The study recommends that when creating policies all stakeholders should participate to enable sustainable petroleum value chain administration. The gaps include; the study used a small sample of 180 respondents and used a mixed methodology with purposeful sampling technique. Social Regulation Theories anchored the study. The present study investigates, a quantitative method with a stratified random and a proportionate technique, study anchored by RBV, NRBV, institutional and stakeholder theories and government regulation as a moderating variable.

Raravi (2014) studied government policies and regulations and how they affect performance of SME's (manufacturing) in India. The study used a questionnaire to collect data. A multiple linear model with regression analysis was applied. The research used a descriptive study design. The

target population was 322 production companies from which a random sample of 150 was drawn. Data was collected using a well-structured questionnaire. Each questionnaire had 34 questions. SPSS was utilized to evaluate the dataset as well as test hypotheses. The questions were linked to the Likert scale. The Karl Pearson's Correlation examination as well as Multiple Linear Regression examination were utilized. The study established that government regulation had a significant positive connection with increase of company performance. The study concluded that major internal areas like inspection procedures, product regulatory framework, rules and guidelines in the sector must be well organized to enable enhanced market as well as financial performance through state policies to support SMEs to perform even better. A comparable study can be conducted in other dimensions of performance that those in the current study. However, a gap was noted; the study used a small sample through random sampling of 150 respondents. The present study uses 470 respondents that was drawn by stratified random sampling with a proportionate technique.

Yang and Chwen (2011) investigated the impact of environmental regulations on green supply chain performance in Taiwan and China. The study employed a case study design. It was longitudinal research that utilized field interviews to get information. The study focused on 6 production companies from which data was gathered using a semi-structured questionnaire. The findings showed that EU enforcement of guidelines boost ecofriendly partnerships amongst production companies in different stages of development based at various positions in the global value chains. Further, it showed that an organization's environmental management plan impacts its guideline compliance practice. In addition, it showed that the process as well as progress of ecofriendly cooperation would be clarified and well understood through the institutional hypothesis view. In conclusion, companies with aggressive environmental practices were better

prepared to comply with the guidelines as compared with the ones with a reactive ecological strategy. Such a study can be replicated for comparison purpose in other jurisdictions. Gaps were identified; the study was longitudinal in nature the research was a case study nature and utilized field interviews to collect information. Present study was a case study with a cross-sectional technique and utilized questionnaires to collect data.

2.2.7 Organizational Performance

Gunarathne (2021) studied the influence of GSCM Practices on Performance of the Industrial Segment within Sri Lanka and established there was significant positive connection amongst GSCM strategies on performance of the production industry. The study used a sample size of 150 firms which had already implemented GSCM practices. Data was collected using a questionnaire. SEM technique was used to analyze the relationship between variables. The study addressed variables; Green Purchasing, Eco Design, Internal Management Environment, Reverse Logistics and Investment Recovery. The study concluded that with higher GSCM practices embrace, the better the performance. The study recommended that for better outcomes from adoption of GSCM practices, require close coordination among various management levels of the business. This study focused on the association between green practices and performance of ecological, operational as well as financial areas, creating a gap on the social and economic dimensions that require similar research. The study created gaps; study used a small sample of 150 objects, study used variables; the study addressed variables; Green Purchasing, Eco Design, Internal Management Environment, Reverse Logistics and Investment Recovery as constructs. Study was not anchored by theory. The study did not have any moderating variable. The current study utilizes government regulation as moderator, is anchored on RBV, NRBV, Institutional and stakeholder theories, uses sample of 470 and addresses variables green procurement, green distribution, green manufacturing, reverse logistics and waste management

Abba *et al* (2021) studied GSCM practices on performance of listed oil & gas companies in Nigeria: a moderating role of internet of things. The study was not anchored on any theory. The study utilized a cross-sectional survey design. The study was quantitative in nature with a sample size of 365 employees from 7 firms drawn through purposive non-probability sampling technique. Data gathered through questionnaires was analyzed through SmartPLS 3 by doing Partial Least Square - Structural Equation Modelling (PLS-SEM) examinations. PLS-SEM was used to test hypotheses. The study addressed variables; cooperation with customers, internal environment management, investment recovery and eco-design. The internet of things positively moderated the association. The results showed that green practices had a significant association on firm performance. The study concluded that incorporation of Internet of Things into green supply chain management strategy framework is comparatively fresh as well as a promising field in numerous segments specifically PDS, incorporated Internet of Things adoption/GSCM framework suggested in this research requires to be fortified via improvement as well as authenticated across dissimilar economies. The study recommended further study to be conducted on the incorporation of sector 4.0 adoption with GSCM strategy and companies' performance in PDS might assist the growth in creative techniques of adopting GSCM strategy to achieve the requirements of the industry as well as the international PDS markets. However, the study identified gaps including; study used internet of thing as a moderating variable, study utilized a cross-sectional survey design and study addressed variables; cooperation with customers, internal environment management, investment recovery and eco-design. The present study addresses variables green procurement, green distribution, green manufacturing, reverse logistics and waste management, it utilizes government regulation as moderating variable, study is anchored on RBV, NRBV, Institutional and stakeholder theories.

Saad, Syed and Ahmed (2021) did a study on the role of green supply chain management practices on environmental performance in the hydrocarbon industry of Bahrain: Testing the moderation of green innovation. The study utilized primary data collected through a questionnaire from a sample size of 540 participants. The sample was drawn by use of simple random sampling technique. The instruments of data collection were distributed to the supply chain department employees as respondents. The smartPLS tool was used for data analysis to check reliability and validity including testing the hypotheses. The study addressed variables; Internal Environmental Management, Green Purchasing, Customer Environmental Cooperation. Results showed that green purchasing as well as internal ecological management including customer ecological collaboration showed a positive association with ecological performance. Green innovation positively moderated the study. The study concluded that regulators should create real and effective policies linked to the adoption of supply chain practices which enhance ecological performance. The study recommended that data should be gathered by use of reliable multiple sources to assure the attainment of information in adequate amounts as well as precise in quality. Gaps identified include; study used green innovation as moderating variable, study addressed variables; internal environment management, green purchasing, customer environmental cooperation and used simple random sampling technique. The present study utilizes government regulation as a moderating, study addresses green procurement, green distribution, green manufacturing, reverse logistics and waste management, sample was by stratified random technique

Vijayvargy and Saumyaranjan (2021) did an assessment of green supply chain practices for sustainable organizational performance for the automotive sector; IOP conference series: earth and environmental science: moderated by internet of things. The information was gathered from 100 participants drawn through a random sampling technique. The sample was collected through an

online database. A five-point Likert scale was adopted with a structured questionnaire. The survey information was examined using descriptive statistics and bivariate correlation including OLS linear regression. The study addressed variables; internal environment management, green purchasing, customer cooperation, eco-design and investment recovery. The internet of thing positively moderated the association. The results showed that GSCM practices posted a positive influence on firm performance that improved ecological as well as enhance profitability and productivity as well. The study recommended that government ought to regulate GSCM practices by coming up with ecological preserving policy as well as establishing a green awareness-awakening training campaign for the automotive industry. Further studies should focus more on sectors like green procurement and client collaboration on environmental concerns. The study identified gaps; the study used a small sample of 100 participants drawn through a random sampling technique, the sample was collected through an online database, used internet of thing as a moderator, study addressed variables; customer cooperation, internal environment management, investment recovery, eco-design and green purchasing. Study was not anchored by any theory. Current study uses 470 respondents, stratified random technique, government regulation as moderator, collected data through questionnaires, is anchored by RBV, NRBV, Institutional and stakeholder theories and addresses variables; green procurement, green distribution, green manufacturing, reverse logistics and waste management

A study in South Africa conducted by Mafini and Muposhi (2017) assessed the effects of GSCM practices and performance of SMEs and found that adopting ecofriendly purchasing exhibited a positive incentive outcome emanating from the cooperation among SMEs and the surrounding environment. The study was quantitative in nature and covered a convenient sample consisting 312 small and medium enterprises (SMEs) within Gauteng province. Data examination utilized a

procedure in a two-step process containing a confirmatory factor explanation to test a psychometric property of the measurement scale as well as SEM to test the suggested hypotheses. The study addressed green procurement, green manufacturing green logistics. The study concluded that SMEs, can improve financially due to the effect of improvement of ecological collaboration that partly arise from the adoption of green strategies. The study recommended that sector specific research looking at production SMEs due to diverse industries that may be subjected to empirical researches. Gaps emerged from the study; study used convenient sampling technique to draw 312 participants and data examination utilized a procedure in a two-step process containing a confirmatory factor explanation to test a psychometric property of the measurement scale and the study addressed variables; green procurement, green manufacturing green logistics. The present study uses stratified random sampling with a proportionate technique, addresses green procurement, green distribution, green manufacturing, reverse logistics and waste management and is moderated by government regulation

A case study conducted in the University of Nairobi by Ndua and Were (2018) examined the effect of GSCM practices and performance and established a positive association between reverse flows and Kenyan public universities. The study utilized a descriptive study design. A census survey for all the 143 staff who participated in the study was utilized. The study targeted six colleges from the University of Nairobi. Collected information was examined through descriptive statistics. Primary information was gathered through a questionnaire. Reliability as well as validity were pretested through a pilot study. Information was analyzed through descriptive statistics. The study concluded that commercial returns positively impacted the performance of universities in Kenya. The study recommended that universities management in Kenya, should boost appropriate use of resources as well as recycling. However, gaps emerged; study used a small sample of 143

participants and the study was a case study and had no moderation variable and no theory anchored the study. Present study uses 470 respondents, uses stratified random sampling technique, government regulation as moderator, is anchored by RBV, NRBV, Institutional and stakeholder theories and addresses variables; green procurement, green distribution, green manufacturing, reverse logistics and waste management

2.3 Summary of Research Gaps

Notwithstanding the many deliberations on the positive influence of GSCM on performance, most of these studies have different outcomes and contradictory findings. Whether positive or negative, the results are still contentious (Afum et al., 2019; Omusebe et al., 2018; Karim et al., 2017). So far, little research has delivered clear empirical evidence on the correct influence the green supply chain management practices have on the firms' performance, specifically within the Kenyan private oil and gas context.

The study literature established that majority of studies focused on qualitative and mixed methodology approaches while few were based on a quantitative methodology, Others utilized small samples, for instance, sample size 150 respondents (Gunarathne, 2021); sample size of 100 respondents (Vijayvargy & Saumyaranjan, 2021) while current study utilizes 470 participants. The small sample size studies' results cannot be generalized. Other studies were case studies (Ndua & Were, 2018) and others used different sampling techniques like purposeful sampling, convenient sampling (Otundo, 2018).

This methodological gap requires research to be conducted with a quantitative approach utilizing descriptive and inferential statistics and stratified random sampling with a proportionate technique.

In addition, literature showed that most studies in green supply chain management used one GSCM

variable instead of multiple GSCM variables concurrently. From the literature, one study used variables; cooperation with customers, internal environment management, investment recovery and eco-design instead of those used in current study; green procurement, green distribution, green manufacturing, reverse logistics and waste management (Abba *et al*., 2021), creating a theoretical gap. Majority of the studies undertaken have not used government regulation as a moderator to influence company performance, in particular, the Kenyan private oil and gas context, creating a moderation gap.

Mojarad, Atashbari and Tantau (2018) note that the petroleum companies globally account for the major ecological tragedies leading to creation of reliability issues from policy makers as well as trust concerns from the community. According to the Ministry of Energy and petroleum report (2016) a legal framework exists requiring companies to implement and adopt sustainable business practices such GSCM, hence with the pressure from stakeholders the oil industry should go green complemented by government regulation. From developed countries, for example, EU enforcement of guidelines boost environmental partnerships amongst production companies in different stages of development based at various positions in the global value chains.

Table 2.1 Summary of the Literature Reviews and the Knowledge Gaps

Author (s)	Research focus	Research major finding	Research gaps	Current Research
Gunarathne (2021)	The impact of GSCM Practices on Performance of the Industrial sector within Sri Lanka	There was significant positive connection amongst GSCM strategies on performance of the production industry	-Study was not anchored on theory -Study did not have a moderating variable -Study used a small sample of 150. -Utilizes Green Purchasing, Eco Design, Internal Management Environment, Reverse Logistics and Investment Recovery as constructs	-Utilizes government regulation as moderator -Study anchored on RBV, NRBV, Institutional and stakeholder theories. -Uses sample of 470 -Address green procurement, green distribution, green manufacturing, reverse logistics and waste management
Abba *et al* (2021)	GSCM practices and performance of listed oil & gas companies in Nigeria: a moderating role of internet of thing.	The results showed that green practices had a significant relationship on firm performance	-Study used internet of thing as a moderating variable, -Study used purposive sampling technique -Study addressed variables; cooperation with customers, internal environment management, investment recovery and eco-design. -Study not anchored on theory	-Uses government regulation as moderating variable -Study uses stratified random with a proportionate sampling technique -Study addresses green procurement, green distribution, green manufacturing, reverse logistics and waste management -Study anchored on RBV, NRBV, Institutional and stakeholder theories.

Saad *et al* (2021)	The role of green supply chain management practices on environmental performance in the hydrocarbon industry of Bahrain: Testing the moderation of green innovation.	Results showed that green purchasing as well as internal ecological management including customer ecological collaboration showed a positive association with ecological performance. Green innovation positively moderated the study	-Study used green innovation as moderating variable, -Study addressed variables; internal environment management, green purchasing, customer environmental cooperation the sample was drawn -Study used simple random sampling technique.	-Utilizes government regulation as moderating variable -Study address green procurement, green distribution, green manufacturing, reverse logistics and waste management -Sample drawn by stratified random technique
Vijayvargy and Saumyaranjan (2021)	Assessment of Green Supply Chain Practices for Sustainable Organizational Performance for the Automotive Sector; IOP Conference Series: Earth and Environmental Science.	The results showed that GSCM practices posted a positive influence on firm performance that improved ecological as well as enhance profitability and productivity as well	-Used a small sample of 100 respondents -Used a random sampling technique, -The sample was collected through an online database, -Used internet of thing as a moderator -Study was not anchored by any theory. -Study addressed variables; customer cooperation, internal environment management, investment recovery, eco-design and green purchasing.	-Study uses 470 respondents -Used stratified random sampling technique -Used government regulation as moderator -data collected via questionnaires -Study anchored on RBV, NRBV, Institutional and stakeholder theories. -Address green procurement, green distribution, green manufacturing, reverse logistics and waste management

Mafini and Muposhi (2017)	Assessed the effects of GSCM practices and performance of SMEs	Adopting ecofriendly purchasing exhibited a positive incentive outcome emanating from the cooperation among SMEs and the surrounding environment.	-Study used a convenient sample technique -Study addresses green procurement, green manufacturing green logistics. Study not having a moderating variable -Study not grounded on theory	-Uses stratified random sampling with a proportionate technique -Address green procurement, green distribution, green manufacturing, reverse logistics and waste management -Study moderated by government regulation -Study anchored on RBV, NRBV, Institutional and stakeholder theories
Ndua and Were (2018)	examined the effect of GSCM practices and performance; A case study of University of Nairobi	established a positive association between reverse flows and Kenyan public universities.	-Study used 143 respondents. -Study was census in nature -The study was a case study. -Not anchored in theory -Didn't have moderating variable	-Study used s sample size of 470 respondents -Study used a sample -Study used many firms -Government regulation was moderator -Study anchored on RBV, NRBV, Institutional and stakeholder theories.
Augustine (2020)	Assessment of Green Procurement Practice on Organizational Performance	-Ecofriendly purchasing is a significant enabler of firm performance -There was no cleardistinctiveness among ecofriendly purchasing practices and performance	-Study used a small sample of 160 respondents -Study used a convenient sampling technique - Used both primary and secondary data -Anchored by the RBV and the relational view theory,	-Study used stratified random sampling. -Sample was 470 respondents -Study anchored on RBV, NRBV, Institutional and stakeholder theories -Used only primary data -Study used

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			-Used both descriptive and explanatory study designs.	descriptive survey design
Omusebe *et al* (2017)	Examined the impact of embracing green procurement practice on effective purchasing administration in the public Sector	-Implementing green purchasing improves performance in areas of costs, lead time as well as quality	-Study was a review of literature and not field research, -The study did not test hypotheses using inferential statistics -Study did not use a moderator -The study was anchored by Institutional sociology theory.	-Study was field research -Uses inferential statistics to test hypotheses -Uses government regulation as a moderator -Study was anchored on RBV, NRBV, Institutional and stakeholder theories
Karim *et al* (2017)	Investigated whether green procurement practices enhance organizational performance.	-Exhibited a significant relationship with the firm's performance -Showed no evidence of significant direct effect combined measures of SP ecofriendly practices on the financial Performance	-Study utilized systematic random sampling -Study was anchored by the stakeholder theory	-Study used a stratified random sampling --Study is anchored on RBV, NRBV, Institutional and stakeholder theories

Sarhaye and Marendi (2017)	Role of green purchasing and performance of industrial production companies. Coca-Cola being the case study.	Showed a positive association among recall logistics and theperformance of Coca- Cola company	-Study is qualitative -Study did not use inferential statistics -Study had a small sample of 64 respondents -used open ended and closed ended questionnaires, -Was case study research -Anchored by the systems theory and legitimacy theory.	-Study is quantitative -Study used inferential statistics -Study used a sample of 470 respondents -Study used structured questionnaires -Study was anchored on RBV, NRBV, Institutional and stakeholder theories
Kimira, Getuno andKiarie (2016)	Assessed the impact of green purchasing and the competitiveness of industrial conversion companies using Unilever limited as acase.	Showed a statistically significant association among company competitiveness andecofriendly procurement	-Study used a small sample of 60 respondents -Employed census design, -Was a case study -Used a single variable- green procurement -Had no moderating variable.	-Used a sample of 470 respondents -Used government regulation as a moderating variable -Study was anchored on RBV, NRBV, Institutional and stakeholder theories

Pembere (2016)	Investigated green procurement practices and organizational performance of NSE listed firms in Nairobi	Adopting green purchasing enhances value chain performance in organizations as seen in better services to clients, reduced ordering expenses as well as inventory reduction	- Study had a small sample of 64 respondents -Study was census and a case study, -Study was grounded on institutional, RBV and stakeholder theories -Study had no moderating variable.	-Used a sample of 470 respondents -Used government regulation as a moderating variable Study was anchored on RBV, NRBV, Institutional and stakeholder theories
Nderitu and Ngugi (2014)	examined the impact of green purchasing and organizational performance of the industrial production companies. A case of EABL.	green purchasing features contribute to enhanced firm performance as well as employees training on green concepts helped improve performance	-The study did not use inferential statistics -Utilized a small sample of 37 respondents -Study was a case study, -Used both primary and secondary data, -Study was anchored on globalization theory and organizational theory -Study had no moderating variable	-Used a sample of 470 respondents -Used government regulation as a moderating variable -Study used only primary data -Study was anchored on RBV, NRBV, Institutional and stakeholder theories
Dubey *et al* (2013)	Assessed green procurement as the main practice to greater performance	revealed that with a concerted effort and prudent administration of green buying deriveseconomic benefits for organizations	-The study used an explanatory study design -Was not moderated, -The study was informed by natural resourced based view theory	-Used descriptive study design -Study used government regulation as a moderator -Study was anchored on RBV, NRBV, Institutional and stakeholder theories

Wadhah *et al*. (2020)	Examined the lean and green manufacturing practices with theirassociation with Sustainability.	-Lean and ecofriendly practices are not compatible as well as able to be utilized in a single production process, since the results about it are still inconclusive -The lean-green production process is a new idea without ample evidence of its adoption.	-Used a single variable (green manufacturing), -Study was not anchored on any theory a Study did not use any moderator variable	-Study was anchored on RBV, NRBV, Institutional and stakeholder theories -Study used government regulation as a moderator -Study used green procurement, green distribution, green manufacturing, reverse logistics and waste management
Bisoyi *et al*. (2019)	Evaluation of Green Manufacturing: It's Technique, Significance and Rationality	green production decreases operatingcosts due to the organization eliminating wastes	-Used pull model, Kanban and SMED technique, - Did not use multiple regression or inferential statistics to test hypotheses, -Did not use moderating variable Not used anchoring theories	-Used inferential and descriptive methods -Used descriptive study design -Study used government regulation as a moderator -Study was anchored on RBV, NRBV, Institutional and stakeholder theories

Singh and Thakar (2018)	Investigated green manufacturing (GM) practices in SMEs of India -a literature review	Green manufacturing helps to decrease the environmental footprints through best use of existing resources as well as minimize waste	-The study was on literature review and not a field study, -Used a small sample with 90 participants -Study was longitudinal -Study was not anchored on any theory -Study did not use a moderating variable.	-Study used government regulation as a moderator -Study was anchored on RBV, NRBV, Institutional and stakeholder theories -Study was actual field study -Study used 470 respondents as a sample -Study was cross sectional in nature
Otundo (2018),	Examined the effect of green production strategies on economic success of Kenya's' industrialfirms	Embracing ecofriendly manufacturing improves the company's financial performance; in manufacturing costs and output, supply expenses and efficiency in environmental administration programs and new business alliances	-The study used a purposive sampling, -Study used a small sample of 70 participants -Study was informed by resource dependence theory, and institutional theory.	-Study used government regulation as a moderator -Study was anchored on RBV, NRBV, Institutional and stakeholder theories -Study used 470 respondents as a sample -Study used stratified random sampling with a proportionate technique

Mukonzo and Odock (2017)	Assessed the influence of green manufacturing andperformance of a company, case of Cement Manufacturing in Kenya	The findings also found that most ecological issues faced by the cement firm were as a result of ecological laws as well as regulations not adequately Enforced	-The study utilized a case study design, -Did not use moderation variable, -Study used secondary data gathered from 2011 to 2014, -Study was longitudinal in nature -Study was anchored by institutional and stakeholder theories	-Study utilized a sample from a population Study used government regulation as a moderator -Study was anchored on RBV, NRBV, Institutional and stakeholder theories -Study was cross-sectional -Study used primary data
Afum, Sun andKusi (2019)	Investigated ReverseLogistics, Stakeholder Influence and Supply Networksuccess in the production industry in Ghana	-The study results showed that stakeholder variablesexhibited a strong impact of embracing reverse logistics. -Ecological regulation did not influence adoption of RL.	-The study used a small sample 193 respondents the study used a causal research design -Study anchored by the stakeholder theory	-Utilized a sample of 470 respondents -Study used government regulation as a moderator -Study was anchored by RBV, NRBV, Institutional and stakeholder theories -Research used descriptive design

Afum, Sun andKusi (2019)	Investigated reverse logistics (RL) and performance of water production companies within Ghana: moderated by the competitive edge	-Embracing commercial returns influence significantly competitive advantage as well ascompany performance -The results revealedthat competitive edge positively and significantly impacted company Performance	-The study used a small sample of 187 respondents -Study adopted the causal research design -Data was analyzed through SMART-PLS 3 software, -Study moderated by competitive advantage -Study was anchored by RBV.	Study utilized a sample of 470 respondents -Study used government regulation as a moderator -Study was anchored by RBV, NRBV, Institutional and stakeholder theories -Research used descriptive design -SPSS software used for analysis of data.
Omwenga, Ngacho and Muya (2019)	Studied the effects of Reverse Logistics Practices on competitiveness of plastic packaging conversation organizations in the county of Nairobi	The RL practices showed a positive and significant influence when it comes to the competitiveness of plastic wrapping production firms.	-The study used a small sample of 180 respondents -The study employed a census technique and -Study was informed by the resource-based view	-Study used a sample of 470 respondents, -Study was anchored by RBV, NRBV, Institutional and stakeholder theories -Research used descriptive design -Used a sample to represent the whole

Mwaura *et al*(2016)	Assessed the impact of reverse flow strategies and competitiveness of foodstuff production organizations within Kenya	The findings showedthat commercial returns have a statistically significant impact on the competitiveness of the food processors in Kenya	-Used a small sample of 130 respondents, -The research employed a census survey method, -Did not use a moderator a -Informed by the Resource Based Theory (RBT). Study did not have any moderating variable Study didn't have anchoring theories	-Study was anchored on RBV, NRBV, Institutional and stakeholder theories -Study used a sample of 470 respondents -Government regulation was used as a moderator -Employed sample of the population
Khor *et al* (2016)	investigated Reverse Logistics: A Contingent Role of Institutional force for E&E production sector	The findings showed that involving institutional forces make the disposition options led toimproved performance in othersituations.	-The study did not use inferential statistics -The study was qualitative in nature -Study did not use a moderating variable, -Details of sample size used not indicated -Study had one variable (reverse logistics), -Was not anchored in theory.	-Study used inferential statics. -Study was quantitative -Used government regulation as moderator -Study used multiple variables -Study was anchored on RBV, NRBV, Institutional and stakeholder theories

Rutere (2020)	Assessed green distribution and itsimpact on success of production organizations of Kenya	Green distribution had a positive as well as significant impact on performance of industrial companies.	-The study used a mixed methodology -The study did not use inferential statistics -Study did not use the moderating variable -Study anchored on NRBV	-Study is quantitative in nature -Study uses inferential statistics -Study uses government regulation as moderator -Study is anchored on RBV, NRBV, Institutional and stakeholder theories. -.
Saada (2020)	Conducted a literature review on green transportation in green supply chain management	Selection of ecofriendly suppliers will enhance performance and Increase green practices adoption by companies	Study utilized the data envelopment analysis (DEA) model, -Study was a literature review and not actual field -Study, study did not have a moderator nor anchoring theories.	-Present study used inferential statistics, -Government regulation as moderator -Study was anchored on RBV, NRBV, institutional and stakeholder theories.
Trivellas, Georgios and Reklitis (2020)	Assessed the connection of green transportation administration on Sustainable corporate and supply network Performance of Agriculture foodstuff processing Industry	-Ecofriendly packaging was connected to financialas well as social performance dimensions. There was no connection between ecofriendly warehousing and green logistics emissions with the performance results	-The study utilized a small sample 134 respondents, -Did not use inferential statistics to test hypothesis -Did not have a theory inferential statistical method	-Study used a sample of 470 respondents -Study used inferential statistics -Anchored by RBV, NRBV, institutional and stakeholder theories.

Chrisostom and Monari (2018)	Impact of ecofriendly logistics management on the success of motorized organization of Kenya	The study found thatecofriendly logistics administration showed a moderatepositive relationship indicating a significant connection with performance.	-The study used a small sample of 170 respondents, -The study used both interview and questionnaire to collect data, -Study did not use a moderating variable.	-Study used sample of 470 respondents -Study used only primary data -Study used only questionnaires to collect data. -Government regulation used as moderating variable
Kirunga andKihara (2018)	Examined green distribution concept on ecological efficiency of chemical production companies in Kenya	Green delivery concepts have a significant influence on the performance ofthe environment dimension of the chemical production companies in Kenya.	-Used census survey and used a small sample of 27 respondents, -Study was not moderated -The study was anchored in the Resource Dependence theory, Stakeholder theory, Institutional theory and Transaction cost theory.	-Study used a sample of 470 respondents -Government regulation was moderating variable -Study was anchored by RBV, NRBV, institutional and stakeholder theories.

Bowan *et al,* (2020)	Did a study on municipal solid waste management and performance (MSWM) of firms	-The study results showed that Ghana boasts of a good SWM institutional framework, adequate and strong legislation, available bylaws and policies as well asprograms	-purposive sampling used -The study used a small sample of 18 respondents, the study was census in nature. -The study used explanatory and interpretive methods It was a case study inclined more to qualitative study design -Data was collected by both interviews and questionnaires.	-Study used stratified and proportional sampling -Use 470 respondents Study used descriptive design. Study is quantitative in nature -Study used questionnaires to collect data
Chum mun (2019)	Investigated ecological efficiency in the waste administrative sectorin Africa; a degree of accountable administration	-EMS like ISO 14001 adoption by organizations significantly enhances ecological performance in the waste management sector in Africa -EMS also minimizes the creation of wastes as well as risks linked with business operations that affects the company's profits.	-Used a qualitative methodology. -Study was a literature review and not field research Had no mediating variable -Had no grounding theory	-Study was quantitative -Study was a field study -Government regulation was moderating variable -Study was anchored by RBV, NRBV, institutional and stakeholder theories.

Zhao and Nie(2018)	Investigated waste management and green value network: A case of how for- profit enterprises can utilize waste administration	Waste administration is significant to help and engage in many aspects inside a for-profit enterprise especially in operations, the staff and the players including the environment.	-Study was census in nature, -Study used an abductive study technique, -Used both primary and secondary data, -Utilized semi-structured interviews and observations, -Did not use theories -Did not use moderating variable.	-Study used a sample of the whole of the population -Study used deductive study technique -Study used primary data -Government regulation was moderating variable -Study was anchored by RBV, NRBV, institutional and stakeholder theories.
Gathonga (2018)	investigated organizational limitations and success of garbage administration assignments in theCity County of Nairobi	The results revealed that project funding was inadequate, employees were not involved in project planning to make informed decisions, there lacked effective control measures,	-Used both questionnaire and interview schedules, -Used a small sample of 199 respondents, -Utilized purposive and systematic sampling techniques including simple random sampling approaches	-Used questionnaire to collect data -Used sample of 470 respondents. -Study used stratified random sampling with a proportionate technique -Government regulation was

		employees were unqualified and the public were not well trained on how well they should handle waste.	Informed by Zero Waste Theory and Integrated Waste Management Theory -Study not moderated	moderating variable -Study was anchored by RBV, NRBV, institutional and stakeholder theories
Kimeu (2015)	Influence of waste administration practices on operational success of hotels and restaurant the coast, particularly Mombasa county	The model utilized, exhibited a moderate ability to explain the impact of waste management in enhancing operational performance in the hotel industry	-The study was census in nature, used a small sample of 43 respondents, -Used both questionnaires and observation to collect data. -The study was grounded by the RBV, the institutional theory, stakeholder theory and the resource dependence theory.	-Government regulation was moderating variable -Study was anchored by RBV, NRBV, institutional and stakeholder theories -Used a sample of 470 respondents Study used questionnaire to collect data.

Roslan (2014)	Assessed waste management practices and business performance	Waste management has a close association to a firm's performance.	-Study did not use a moderating variable -Study was not grounded by any theory, -Used Structural Model Equation (SEM) method utilizing AMOS 6.0 and -Used exploratory factor analysis	-Government regulation was moderating variable -Study was anchored by RBV, NRBV, institutional and stakeholder theories -Used a sample of 470 respondents -Used PCA analysis
Suzy (2015)	Studied a Proposed Model for Industrial Waste administration practices and Its influence on Business success Organizational Performance	Adoption of waste management practices influences the company financial performance	study used a small sample of 105 respondents, -Did not use any theory to ground the study and	Study used a sample of 470 respondents -Study was anchored by RBV, NRBV, institutional and stakeholder theories

Antin *et al* (2020)	Investigated the role of government rules on long term business development and their impact on the success of SMEs	The findings showed that application of government regulations lead to a significant influence on GSCM and thus, a significant influence on financial as well as ecological performance.	-The study used a small sample 160 respondents. -Study used a qualitative methodology, -The study was exploratory in nature -Used census survey design, -No moderating variable-Theories were not used by the study.	-The present study used a sample of 470 respondents and -Study was anchored by RBV, NRBV, institutional and stakeholder theories -Study was descriptive -Study was quantitative in nature -Government regulation was the moderating variable
Dewi *et al* (2018)	Examined government regulation and stakeholders' enterprise orientation for obtaining firm performance	The findings show that government rules and laws have a significant moderation on the business environment that helps the development of the hospital sector.	-The study did not use inferential statistics -The study lacked enough details on the methodology utilized since it was not easy to determine how data was gathered, examined, tested to ascertain the power of association as well as the level of significance.	-Study used inferential statistics -The study collected primary data using questionnaires

Xuefei, Wang and Chen (2018)	Assessed the influence of ecological regulation and industrial inventions on green development	The study results showed that application of environmental regulation over a short period of time, negatively affected GSCM growth while the application showed a positive effect after sometime. Further, technological innovation positively enhances green development.	- SDM and unified analysis framework was used for analysis, -Used technological innovation as a mediating variable -There was no any anchoring theory,	-The current study investigates, a quantitative study -Study anchored by RBV, NRBV, institutional and stakeholder theories -Government regulation as a moderating variable
Feng and Chen(2018)	Environmental control, green technology and Industrial ecofriendly growth: A literature review centered on the Spatial Durbin Model	It was found that there was a sharp changing trend in the Republic of China's whole industrial ecofriendly growth performance. Further, it showed a positive spatial link between industrial ecofriendly growth performance in various regions in China.	-The study used a Spatial Durbin Model and unified analysis framework for analysis, -The study was longitudinal that used panel data from 30 provinces and industries, -Study was not anchored on theory -Study did not have a moderating variable.	-The current study investigates, a quantitative study anchored by RBV, NRBV, institutional and stakeholder theories, -Used government regulation as a moderating variable -Uses descriptive and inferential statistics for analysis.

Shafique, Asghar and Rahman (2017)	Influence of GSCM concepts on Performance: Mediating influence of both Institutional forces and Ecofriendly Innovation	The results showed that institutional force positively impacted the company performance which was proved as well as accepted by this study. The institutional forces moderated the effect of GSCM and firm performance.	-Lack of enough data information collected because respondents were busy -The study was moderated by institutional forces and green innovation	Present study used government regulation as a moderator -Study wrote a letter to organization of data gathering
Mwaura *et al* (2016)	Conducted research on green delivery strategies as well as effectiveness of foodstuff production firms in Kenya	-Ecofriendly distribution practices exhibit a significantly positive impact on the company's competitiveness coupled with decreased cost as well as increased effectiveness	-Used a small sample of 130 respondents, -The research employed a census survey method, used a single variable- green distribution, -Did not use a moderator -Informed by the Resource Based Theory (RBT).	-The current study was anchored on RBV, NRBV, Institutional and stakeholder theories. - Used a sample of 470 respondents -Government regulation was used as a moderator - Study uses multiple theories.
Shafique, Asghar and Rahman (2017)	Influence of GSCM concepts on Performance: Mediating influence of both Institutional forces and ecofriendly Innovation	The results showed that institutional force positively impacted the company performance which was proved as well as accepted by this study. The institutional forces moderated the effect of GSCM and firm performance.	-Lack of enough data information collected because respondents were busy (appointment was not made) The study was moderated by institutional forces and green innovation	Present study used government regulation as a moderator -Study wrote a letter to organization of data gathering

Hossein, Meghdad andRahman (2016)	Assessed the government position in GSCM throughhypotheses	The findings showed that with government stewardship and coercion, private firms are able to adopt GSCM which in turn enhance performance.	--Study was not anchored on theory	-Study anchored by RBV, NRBV, institutional and stakeholder theories -Government regulation as a moderating variable
Raravi (2014)	conducted a study on government guidelines that are influencing performance of SME's in the production sector in India	The findings showed that government regulation had a significantly positive connection with the increase of company performance	the study used a small sample through random sampling of 150 respondents.	The present study uses 470 respondents that was drawn by stratified random sampling with a proportionate technique

Source: Researcher, 2021

2.4 Conceptual Framework

The conceptual framework refers to a graphical depiction explaining the major objects studied, such as the key factors, variables/concepts as well as the presumed relationships amongst the variables (Wanjohi, 2016). It is a concise explanation of concepts being studied and conveyed through a graphical or pictorial representation of the key variables of the research (Mugenda, 2008). Its aim is to assist the person reading to easily find the suggested relationships among the variables and how they relate to the research study. Variables are the characteristics or properties that are to be studied. The conceptual framework is generally developed based on the literature review of existing studies and theories about the topic. The hypothesized framework resulting from the studied literature is as presented in Figure 2.1 below.

2.4 Conceptual Framework

Independent Variables   Dependent Variable

Green Supply Chain Management Practices   **Firm Performance**

Green Procurement
•Sustainable packaging material
•Supplier ecological collaboration
•Supplier green audits
•Green product purchasing

H_{01}

Green Distribution
•Ecofriendly packaging materials
•Power warehouses with solar energy
•Modes of transport used
•Eco-labelling of products

H_{02}

Green Manufacturing
•A void toxic and hazardous raw materials
•Understand product end users
•Design for green production
•A void high damage rate and high logistic costs during delivery

H_{03}

Reverse Logistics
•Waste handling and disposal
•Remanufacturing
•Returns policy and procedure
•Return of packaging materials

H_{04}

Waste Management
•Utilization of environmental management system (EMS)
•Reduce, reuse and recycle (3Rs)
•Inducement promotions on reuse
•Regulatory compliance

H_{05}

Firm Performance
• Cost reduction
•Improved return on equity
•Reduced GHG and pollution
•Save energy consumption
•Reduced workplace injuries
•Reduced customer complaints.

$H_{01} - H_{05}$

$H_{06\ (a-e)}$

Government Regulations
•Policy guidelines
•Legal Regime
•Enforcing laws and rules
•Complying with laws or rules

Moderating variable

Figure 2.1: Conceptual Framework

Source: Researcher, 2021

The overall intention of this research was to establish the influence of green supply chain management on performance of private oil and gas firms in Kenya: moderating role of government regulations. The relationship amongst the explanatory variables, the response variable as well as the moderating variable are shown in figure 2.1. The GSCM practices are the explanatory variables which influence the response variable directly as disclosed by the direct arrow from the explanatory variables to the response variable. The moderating variable is the government regulations which moderate the influence of explanatory variables on the response variable. A moderating variable influence the effect of the explanatory variables on the response variable by either minimizing or enhancing the effect of the explanatory variables on the response variable. The GSCM practices in figure 2.1 above, indicate a direct relationship to organizational performance.

In this study, the conceptual framework integrated the following green supply chain management practices; green procurement, green manufacturing, green distribution, reverse logistics and waste management as shown in Figure 2.1 above. These explanatory variables when combined can either influence or have an effect on organizational performance. The response variable in the conceptual framework above, is the organizational performance conceptualized through cost minimization, enhanced profitability; reduced pollution, reduced energy use, reduced customer complaints and reduced injury rates at the workplace.

Green supply chain management practices are the explanatory variables in this research which include; Green procurement conceptualized as sustainable packaging materials, supplier selection, supplier development and green product purchasing; Green distribution conceptualized as ecofriendly packaging materials, storage facilities lighting, modes of delivery used and eco-labelling; Green manufacturing conceptualized as design for use of raw material, design for product use, design for production, design for distribution; Reverse logistics conceptualized as proper waste disposal, remanufacturing, waste management and exchanges and return of packaging materials. Waste management conceptualized as

environment management system (EMS), reduce, reuse and recycle (3Rs), inducement promotions and regulatory compliance. Government regulation is the moderating variable conceptualized as complying with laws or rules, policy framework, legal regime and enforcing laws and rules.

CHAPTER THREE

RESEARCH DESIGN AND METHODOLOGY

3.1 Research Philosophy

A study philosophy outlines the beliefs as well as values which direct the design of gathering and examining data in a study, whose selection is contemplated to be the philosophical principle (Ryan & Gemma, 2018). Positivism philosophy is underpinned by five principles which are the reason for the choice of this approach which comprise; there are no differences in the logic of inquiry across sciences; the research should aim to explain and predict; research should be empirically observable through human senses and the deductive reasoning should be used to develop hypotheses to be tested during the research process; science is not the same as common sense and the common sense should not be allowed to bias the research findings; science must be value-free as possible and be judged only by logic.

Science is the underlying ground for positivism that include the following aspects; science is deterministic, that the role of the researcher in a scientific approach is to discover specific nature of cause and effect relationship; science is mechanistic, the mechanical nature of scientific method is explained in a way that a researcher develops hypotheses to be proved or disproved through application of specific research methods; science uses methods, chosen methods are applied mechanically in order to operationalize theory or hypothesis. Application of methodology involves selection of sample, measurements, analysis and reaching conclusions about hypotheses (Wahyuni in Sing, 2019); science deals with empiricism, science only deals with what is seen or measured, and from this perspective science can be assessed as being objective.

This study was guided by the positivist philosophy. The aim of the research was to establish the relationship amongst GSCM practices and performance of private oil and gas firms in Kenya. Studies

inclined towards this study philosophy are intended to test hypotheses that are drawn from the literature (Halfpenny, 2015). The premises for this study, were generated from the literature. The positivist studies are generally quantitative in nature and their importance is attributed to the scope of their results' generalizability (Kivunja & Kuyuni, 2017). Quantitative data was collected through a structured questionnaire. The concepts in the research were operationalized to guarantee clarity of descriptions and its importance was to clarify the causal relationships amongst GSCM practices on performance of private oil and gas firms.

Generally, positivist researches are deductive in nature. Deductive studies begin by using broad theories including assumptions, and later scientifically test the hypotheses through big samples. Thus, this study was deductive in nature, theory testing as well as theory generating and was purposed at generalizing the outcomes (Kivunja & Kuyuni, 2017). The study was guided by the positivists reasoning that supports a broad comprehension of reality using solid data drawn from overviews which are planned, formal as well as contain specific step by step procedure (Matta 2015). This fitted well with the architecture of the current research which was a mixed design methodology to establish the relationship between the investigative variables objectively. The role of the researcher in positivism studies is only limited to collecting data, examining it as well as interpreting it by use of an objective method. For this study, it was deemed that the research report was written by the third person whose outcome was observable as well as quantifiable. As a strength, the positivist paradigm puts great emphasis on accurate sampling, stipulating the kind of data collected and how objectively they are examined and interpreted. Other research philosophies include; interpretivist, pragmatist and realistic research philosophies which are out of scope this research. The positivist research philosophy agrees with these characteristics, and thus, the relevant philosophy for the study. Positivist research philosophy and quantitative methodology was conducted by Mafini and Muposhi (2017).

3.2 Research Design

The study was descriptive in nature with a survey technique since it aimed at attaining information regarding the influence of GSCM practices on performance of private oil & gas firms in Kenya. The researcher utilized the descriptive study design because it comprised information gathering, the measurements, the classifications, the analysis, the comparisons as well as the interpretation to offer a report summary in the form of measures of central tendency. The key characteristics of this research design included; neutrality, where the results were free from bias and neutral; reliability, where the research was able to ensure and indicate how questions are developed; validity, where it calculated the expected results and estimated the truthfulness; generalization, where the results obtained from the research were applicable to a population and not just to a limited sample (Wahyuni, 2012). Further, the descriptive research design was suitable to be used where the participants had homogeneous characteristics.

According to Kothari (2014) descriptive study design is appropriate on investigations opting to determine the connection amongst variables while the third element, the study concept, is specified by the survey design, thus permitting triangulation to take place; starting from evaluation of records, to the examination of the real happenings and to how it is viewed by the participants associated to the process (Hubbard, Haig & Parsa, 2019). This design used questionnaires as well as inferential statistics to assess the significant relationship amongst variables. The same descriptive research design was utilized in studies by Kinanga (2015) who established that the descriptive research design was suitable to use especially where the participants had homogeneous characteristics.

3.3 Study Area

This research targeted 72 private oil and gas firms approved and registered by Energy and Petroleum Regulatory Authority (EPRA), in 2019, in Kenya. The location of the study was at the Nairobi City County, the capital city of Kenya. The private oil and gas firms whose investors need

returns, required their management to embrace performance improvement practices such as GSCM practices. The selected area was suitable because it offered relative ease of data collection from the study variables, since all the private oil and gas firms have their headquarters in the Nairobi City County. The area was also chosen because it experiences as well as is influenced by the same operations and ecological conditions surrounding the County, thus approximately homogeneous, considering its climate, social-political and economic functions including population as well as cultural orientations.

The study was conducted in the private oil and gas firms since it is the single largest polluter of the environment and could integrate majority of the green supply chain management practices. The sector's activities are the biggest contributors of environmental challenges in society (Mojarad *et al*., 2018). The private oil and gas segment is also a major player in the economic role in Kenya. The sector contributes greatly to the country's gross domestic product (GDP) and the overall job creation.

3.4 Target Population

Target population is referred to as a whole group of objects for which research information is used to draw conclusions reached on the basis of evidence and reasoning (Cox, 2010). The study focused on all private oil and gas firms within Kenya. According to Energy and Petroleum Regulatory Authority (EPRA) report of 2019, there are 72 registered private oil and gas firms in Kenya. The target population was 1850 employees who worked for the 72 oil and gas firms. According to the Ministry of Environment and Forestry (2017) organizations should observe environmental conservation procedures as well as sustainable practices such as green supply chain management practices. Table 3.1 below shows categories of the target population.

Table 3.1 Category Target Population

Employee Categories	Category Target Population	Category %
Top Management	149	8
Managers	338	18
Supervisors and procurement staff	1363	74
Totals	**1850**	**100**

Source: EPRA, 2021

The 72 private oil and gas firms are reflected in appendix III.

3.5 Sample and Sampling Design

Saunders, Lewis and Thornhill (2008) note that sampling is a significant procedure in a study since it is not easy to carry out research on the whole target population due to cost implications and time constraints. Sampling design is determining a representative number of participants (sample) from a target population for the research (Saunders *et al*., 2012)

3.5.1 Sampling Frame

The sampling frame is a list comprising the entire sampling components used to define the researcher's objects of interest (Zikmund *et al*., 2013). It defines a set of elements from which research can draw a sample of the target population. The sampling frame for this study was 1850 employees from the 72 private petroleum companies registered by the Energy and Petroleum Regulatory Authority. The unit of analysis was the individual firms in the oil and gas sector which were seventy-two in number. The study was conducted in the private oil and gas firms since it is the single largest polluter of the environment and could integrate majority of the green supply chain management practices. The sector also contributes to GDP of the country and creates jobs.

3.5.2 Sample Size

A sample is a number of subjects or observations included in research. Sekeran (2003) notes that a researcher has to take a decision whether to utilize the whole population or a sample when carrying out research. The sample size ought not be very big or very small to satisfy requirements of reliability and efficiency including flexibility as well as representativeness.

This study used a sample size computed as per Yamane, Taro (1967) formula below;

$$n = \frac{N}{1 + N(e)^2}$$

Where;

n = sample size

N = target population

e = sampling error / margin of error

Confidence level was set at 95% or the outcome accuracy level at 5%. Hence the sample size was;

$$n = \frac{1850}{1 + 1850(0.05)^2}$$

$$= 329$$

Calculating for non-response;

The above sample size might lead to a non-response bias. To calculate for non-response and avoid errors, 30% non-response rate was added to the sample size (Knaub, 2017). If 329 was taken to be 70%, then 100% was equal to 329/0.7 = 470.

The study used a sample size of 470 respondents from the target population. The unit of analysis was each one of the 72 oil and gas firms while the unit of observation was 470 respondents. This collaborated well with Barasa (2015) who utilized the Yamane, Taro formula with a stratified sampling technique to arrive at the sample size of 398 respondents. Kitonga *et al*., (2016) used the Yamane formula with a stratified sampling technique to get a sample size of 328 respondents. Table 3.2 shows sample size of the study.

Table 3.2 Sample size

Employee Categories	Proportionate Sample Size
	$n = \dfrac{\textit{Category target population}}{\textit{Total target population}} \; x \; \textit{Sample Size}$
Top Management	38
Managers	86
Supervisors and procurement staff	346
Totals	**470**

Source: EPRA, 2021

Sample size for the 72 private oil and gas firms is reflected in appendix IV.

The confidence level was set at 95% or the outcome accuracy level at 5% because traditionally researchers have used either the 0.05 (5% level) or the 0.01 (1% level), although the choice is largely subjective. The lower the significance level, the more conservative the statistical analysis and the more the data must diverge from the null hypothesis to be significant. The study used the sampling error/ margin of error of alpha = 0.05 because it's the standard alpha. Further, the research utilized the margin of error (confidence interval) of 0.05 at the confidence level of 95% rather than 0.01 at the confidence level of 99%, because a lower margin of error indicates higher confidence levels in the produced results.

3.5.3 Sampling Procedure

The study used stratified random sampling to pick 470 employees from the target population of 1850 employees. From the categories, top management, managers and supervisors & procurement staff, proportionate sampling was used to choose the number of employees per individual category. Stratified sampling is a probability sampling technique where the investigator categorizes the target population into strata, then randomly picks the final elements proportionally from dissimilar strata. This offered a chance of selecting an individual element in a specific stratum in a population. This study comprised strata; top management, managers, supervisors and procurement staff from the 72 private oil companies. The study used stratified random sampling because it offered a

representative sample of the entire population. To allocate samples in each of the stratum, proportionate sampling was used. This sampling procedure is consistent to a research by Marangu, Lyiria and Rukangu (2015) used a probability sampling approach to examine the effect of HRM practices on the development of Sacco organizations in Meru County, Kenya.

3.6 Data Collection

Data collection is the process of gathering and measuring information on variables of interest, in an established systematic fashion that enables one to answer stated research questions, test hypotheses and evaluate outcomes (Schwab, 2005). Data collection methods include interviews, questionnaire and surveys, observation, documents and records, focus groups and oral histories. The research used questionnaires to collect primary data.

3.6.1 Research Instrumentation

This study used questionnaires to gather descriptive information for analysis. The questionnaires for this study were both structured and semi-structured to enable capturing of primary information from different variables of this research. This questionnaire was prepared to look at particular objectives and test the hypotheses (Frezatti *et al.,* 2014). The questionnaire was used because it is flexible to permit pre-testing, reliable and consistent as well as addresses issues of time and cost.

The researcher used the four-stage questionnaire development format put forward by Lee *et al* (2016). The stages included; 1. Item generation 2. Pre-pilot study 3. Pilot study 4. Large scale data examination. This study's questionnaire comprised eight sections: general information, organizational performance, green procurement, green distribution, green manufacturing, reverse logistics, waste management and government regulation. All the study constructs were measured through a Five-Point-Likert-Scale whose choices and corresponding scores contained: Strongly disagree (1), Disagree (2), Neither agree or Disagree (3), Agree (4) and Strongly Agree (5)

The questionnaire was used to gather primary data. Primary data is the original field information collected from the target population. Primary information was gotten by utilizing a questionnaire intended to collect data from respondents who included 470 employees from all the 72 private oil and gas companies. The field information gave empirical data about green purchasing; green distribution; green manufacturing; reverse flows as well as waste management variables and putting them together define the predictor concept as a composite scale.

3.6.1.1 Validity of the Research Instruments

The validity of the instrument is the capability of the tool to quantify an anticipated conception (Al-Shboul *et al*., 2017). Validity is the degree that a test measure, actually measures what is anticipated to be measured and does as the design is intended to accomplish (Cheng, 2014). It also denotes an extent to which a particular measure does not contain systematic as well as random errors (Patrescu, 2017). The researcher used content validity to ascertain whether the research tool measured the content of the concept. The key purpose of validity examination was to offer a study tool which permitted the investigator to achieve the goals of the research. Principal component analysis (PCA) was also conducted. Loading value of at least 0.4 for the results was acceptable. Chadha and Gagandeep (2013) noted that if the study is actually measuring which it was intended to measure, then, that is validity. Construct validity was used to ascertain whether the study tool measured the concepts as well as the theories of the research and was improved by the utilization of a Five-Point-Likert- Scale instruments to shun the monotony of queries.

Before starting information gathering, content validity was ascertained through extensive survey literature, deliberations by the researcher with associates, supervisors and research professionals from the study field on the objects within the research instrument as well as pre-test all the survey discussions as per recommendations put forward by Lee (2016). Discussions came up with information to enhance validity and enabled the needed adjustments including improvement of the

study tools. The information chosen and incorporated in the research instrument was appropriate to the concept studied to enable validity of the tool. Content validity results are sown below.

3.6.1.2 Validity of Instruments (Pilot Study) Results

Content validity was determined by the research's supervisors who established that the instrument's items mirrored the true content of the study objects. Criterion validity determined that the sample size was representative enough to offer the right outcome of the examination. During the re-alignment of the tool's items with the topic, construct validity was executed. The correlation matrix measured construct validity. Construct validity was established too by performing factor analysis while Criterion validity was measured by execution of a multivariate linear regression.

From the pilot results, all the seven variables had the KMO value more than the proposed value of 0.5 (Kaiser 1970, 1974). The Bartlett's Test of Sphericity outcome (Bartlett, 1954) for all the seven variables were significant, having a corresponding p-values = .000, that were smaller than the significance level of 0.05, showing that the data was adequate, the variables were correlated and thus, suitable for factor analysis. As shown in section 4.5 (Confirmatory factor analysis), it is confirmed that all the sub-variables were established to be appropriate for factor examination.

Table 3.3: Validity of Instruments (Pilot Study) Results

Variables	Number of items	Items excluded	Items retained
Green Procurement	7	0	7
Green Distribution	6	2	4
Green Manufacturing	6	0	6
Reverse Logistics	6	1	5
Waste Management	6	1	5
Government Regulation	6	1	5
Firm Performance	7	1	6
	44 (100%)	6 (13.7%)	38 (86.3%)

Source: Pilot Results 2022

Table 3.3 shows entries were 44 (100%). Those excluded were 6 (13.7%). The valid ones retained

for factor analysis were 38 (86.3%).

3.6.1.3 Reliability of the Research Instruments

Reliability refers to a degree an instrument tool, an observation as well as any quantification

process, yields a similar outcome on recurrent trials (Lalit & Shyamkumar, 2020). It is the degree

to which a test remains consistent in producing the same results repeatedly from a research

instrument used in the same environment (Hair *et al.*, 2013). Data reliability is evaluated by

different techniques; test-retest reliability; internal consistency reliability and parallel form

reliability as well as inter-rater reliability.

This study used internal consistency to measure the reliability. This is because internal consistency

measures the degree to which various test objects that investigate similar concepts produce similar

outcomes (Toke and Kalpande, 2019). Billy Gray *et al* (2013) note that reliability is majorly

ensuring that the technique used for data collection enables consistent findings. Reliability of a

tool for this study was tested using Cronbach's alpha value. A greater alpha coefficient figure

indicated availability of consistency on objects measuring concerned variables. The alpha values

range from zero to one. Meaning 0 is a tool that has many errors while 1 is a near perfect instrument

without errors. An alpha of 0.7 or above is agreed upon to be a suitable and satisfactory reliability

accepted (Toke & Kalpande, 2019).

A pilot study was conducted at the National oil of Kenya to establish the instrument's reliability.

The reason for conducting a pilot test was to detect faults and errors in the research instruments

before being administered and used in the main study. A pilot study pinpointed the flaws in the

design including instrumentation and provided feedback that was used for corrective action. The

pilot study was conducted to improve clarity as well as readability of elements, minimize item

difficulty and authenticate utilization of suitable terminologies (Rahman et. el., 2017). The pilot study was carried out prior to administering the research instruments to the respondents. In addition, pretests of the research tool were conducted to receive responses about the effectiveness and validity of the questionnaire.

Mugenda (2003) notes that 10% of the research objects are sufficient for a pilot study. The number of objects for the pilot study were (10% of 470=47) participants. The pilot study objects were drawn from National oil of Kenya.The subjects used in the pilot study were not part of the main study. The reason to avoid drawing the pilot subjects from the target population was to eliminate bias and inaccuracy of the research results, thus making the study reliable and valid.

The pilot study was conducted at National oil of Kenya because it has similar characteristics like those found in the main study area. National oil of Kenya experiences and is influenced by similar operations and ecological conditions (homogeneous) such as climate, social-political, economic functions, population and cultural orientations like the ones found in the main study area. The companies trade in the same products. National oil is headquartered in Nairobi City County, which simplified pilot data collection.

3.6.1.4 Statistics Reliability Test Results for Research Instruments (Pilot Study)

The data collection instruments were pretested through a pilot study. Forty-seven questionnaires were distributed to National oil top managers, managers, supervisors and procurement staff. The study used internal consistency with Cronbach's Alpha to quantify how best the objects were correlated to one another for all questionnaires distributed to various respondents of the pilot study. An alpha of 0.7 or above is agreed upon to be a suitable and satisfactory reliability accepted (Green Jr *et al*., 2013).

Table 3.4: Reliability Statistics Test Results (Pilot Study)

Variable	Cronbach's Alpha	Number of items	Decision
Green Procurement	0.750	7	Retained
Green Distribution	0.760	4	Retained
Green Manufacturing	0.855	6	Retained
Reverse Logistics	0.720	5	Retained
Waste Management	0.763	5	Retained
Government Regulation	0.714	5	Retained
Firm Performance	0.876	6	Retained
Average	**0.777**	**Total** 38	

Source: Pilot Results 2022

Table 4.4 showed that green procurement had 0.750, Green Distribution had 0.760, Green Manufacturing had 0.855, Reverse Logistics had 0.720, Waste Management had 0.763, Government Regulation had 0.714 and Firm Performance had 0.876 with an average Alpha of 0.777. All these Cronbach's Alpha objects revealed a strong internal consistency among variable objects. Hence, the information gathering tools were reliable and suitable for further analyses.

3.6.2 Data Collection Procedure

For this research, before commencement of data collection, the researcher sought and got the introduction letter from the University including authorization from the Ministry of Energy. Authorization for gathering information was sought for, from authorities to enable data collection from the licensed oil and gas firms. The researcher gathered data with the help of two assistants. The assistants were appraised on ethical consideration issues, ways to capture more responses, and how to communicate with participants when seeking clarifications on the data gathering process (Wanjohi, 2016).

Four hundred and seventy (470) questionnaires were picked and distributed to the respondents by the assistants during the time of information gathering. The respondents were allowed two weeks

to give feedback through the questionnaires which were returned after being filled. If after two weeks the questionnaires would not have been filled and returned at the required time, the period would be extended. Cheng (2014) notes that this approach is suitable bearing in mind the length of the research instrument, accessibility to participants and topographical spread of the target population. The principal researcher himself took part in the exercise of information gathering to manage the process and gave guidance to the assistants. The research respondents were allowed adequate time to respond to the questions but were monitored and reminded via emails including calls to enable capture more feedback.

3.7 Data Analysis

Data preparation commenced with inspection of the tools that included removal of objectionable questionnaires that revealed incompleteness, small variances, missing pages and unqualified respondents. Data editing checked missing, invalid and inconsistent entries. Data coding arranged data into different themes. For data analysis, the study used SPSS, version 22. After coding, data were entered (transcribed) into a computer program. Data cleaning reviewed data consistency since the inconsistencies might originate from faulty logic, unnoticed and extreme values. Quantitative data was analyzed by using descriptive and inferential statistics.

3.7.1 Descriptive Statistics

Data analysis was performed by the help of SPSS version 22.0 by utilizing descriptive statistics. Descriptive statistics provided the profile of the respondents, that is, frequencies and their corresponding percentages. Descriptive statistics (maximum, minimum, mean, standard deviation, skewness and kurtosis) were used. Included were tables, percentages, frequencies and figures.

This study used the arithmetic mean technique to calculate the averages of descriptive statistics by summing up all the data values and dividing by the total number of data items. This method is

rigidly defined, based on all observations, easy to comprehend and simple to compute. The approach is sensitive to extreme values and cannot be useful for time series data. The data was presented using tables and statistical parameter estimates

3.7.2 Inferential Statistics

3.7.2.1 Correlation Analysis

The correlation procedure was utilized to examine the extent of association existing between two concepts (Gagandeep and Chadha, 2013). Correlation analysis was conducted to establish the direction as well as the strength of associations amongst the variables to be measured. This examination allowed the valuation of the degree to which an explanatory variable was linearly connected to the criterion variable. Correlation examination measures the extent as well as the direction of the association between two individual variables.

A worked-out correlation value produces a figure which ranges between -1 and +1. The figure is termed as a correlation value (r) that shows an association that exist between one variable and another. This connection is critical due to their interpretation. Statistic (+1) shows that there exists a positive association between one variable and another or a variable increases as the other increases too. The figure (-1) refers to an existence of a negative association between a variable and another being compared with. It also suggests that, if a variable decreases, another variable being compared with also decreases (Fowler, 2014). When a relationship does not occur between one variable and another then the coefficient is the same as zero. If the coefficient is 0.1 to 0.29 the relationship is weak. When the coefficient is 0.3 to 0.59 the relationship is moderate. When the coefficient is 0.6 to 0.7, the relationship is strong. This was done to all 72 private oil firms in the petroleum sector. Ghanbari (2014) notes that to carry out examination of data using Pearson's product-moment correlation is centered on a supposition that information will be distributed normally as well as the concepts will be continuous.

3.7.2.2 Factor Analysis

The feedback from the questionnaire was entered into SPSS for initial scrutiny. To minimize the objects in the questionnaire which were not valid and reliable with the concepts, factoranalysis was carried out. The purpose of factor analysis is to reduce many individual items into a fewer number of dimensions. It also simplifies data, such as reducing the number of variables in regression models. Additionally, to understand the inconsistency as well as the interdependence within the subscales as a consequence of factor analysis, descriptive measurements comprising the means, the standard deviations and reliability coefficients includinginter-correlations, were worked out.

Varimax rotation which is part of the principal component analysis (PCA) was done to group the concepts derived from the survey into various factors. To manage how many factors to be mined, at least one (1) Eigenvalue was utilized when doing factor analysis. The Eigenvalue is a measure of how much of the common variance of the observed variables a factor explains. Any factor with an Eigenvalue ≥ 1 explains more variance than a single observed variable. Any factor having Eigenvalue not reaching one, was termed unimportant and was left out.

Varimax orthogonal rotation was on hand to cluster constructs having high correlations for similar factors in order for every factor to be symbolized by a particular set of variables. Varimax rotation technique confirmed the independence as well as being unrelated to the factors created. Analysis of two variables at the same time (multivariate analysis) has several benefits. The first benefit is that it minimizes big quantities of concepts to a lesser cluster of the variables. It does offer the concept validity proof of self-reporting measures. Further, it is important in discovering the fundamental dimensions amongst measured variables and hidden concepts thus permitting the creation and fine-tuning of theory.

3.7.2.3 Regression Analysis

Linear as well as Multiple regression examination were used to establish the influence of the explanatory variables on the dependent variable. Cheng (2014) notes that the variable being predicted is the criterion variable while the variables utilized for the prediction of the criterion variable are explanatory variables. Linear and multiple regression analysis were used in this study. Simple linear regression models were used to determine the influence of GSCM practices on performance of private oil and gas firms as shown below;

$$Y = \beta_0 + \beta_1 X_1 + \varepsilon.$$

Where;

Y= firm performance

β_0 = regression intercept

β_1 is the coefficient of green procurement

X_1 is green procurement

ε = error term

$$Y = \beta_0 + \beta_2 X_2 + \varepsilon$$

Where;

Y = firm performance

β_0 is regression intercept

β_2 is the coefficient of green distribution

X_2 is green distribution

ε is error term

$$Y = \beta_0 + \beta_3 X_3 + \varepsilon$$

Where;

Y is firm performance

β_0 is regression intercept

β_3 is the coefficient of green manufacturing

X_3 is green manufacturing

ε is error term

$Y = \beta_0 + \beta_4 X_4 + \varepsilon$

Where;

Y is firm performance

β_0 is regression intercept

β_1 is the coefficient of reverse logistics

X_4 is reverse logistics

ε is error term

$Y = \beta_0 + \beta_5 X_5 + \varepsilon$

Where;

Y is firm performance

β_0 is regression intercept

β_5 is the coefficient of waste management

X_5 is waste management

ε = error term

Below is the multiple regression model to be used for testing the influence of GSCM practices on performance of private petroleum companies within Kenya

$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \varepsilon$

Where;

Y is firm performance

β_0 is regression intercept

$\beta_1 - \beta_5$ are the coefficients of GSCM practices

X_1 = green procurement

X_2 = green distribution

X_3 = green manufacturing

X_4 = reverse logistics

X_5 = waste management

ε = error term

3.7.2.4 Test for Moderating Effect of Government Regulation

A moderating variable from a meta-analysis research is mostly picked from the control variables

found within the empirical literature but not like the standard moderators (Golicic & Smith, 2013). A moderating variable influences the direction and strength of an association between an explanatory and a criterion variable. A moderator does indicate when an association can hold. It can be quantitative as well as qualitative. A moderator is a third variable that affects both the direction and correlation of a predictor variable as well as the predicted variable. Hierarchical regression examinations were carried out to test for the moderating effect of government regulations on the association among GSCM practices and private oil and gas firms' performance.

In the hierarchical regression, the criterion variable was kept raw whereas the explanatory variables as well as the moderating variable were mean centered. The mean centering was done because centering the independent variables as well as the moderator variable assisted in minimizing the problem of multicollinearity (Chauhan *et al*., 2017).

A moderator influence could be epitomized as an interaction between an independent variable and the dependent variable. The moderator is supported when the interaction of the explanatory as well as the moderator on the result of the variable is significant (Saad *et al*., 2013). Most of the moderator variables measure causal relationship using regression coefficients. The moderator variable, if found to be significant, can cause an amplifying or a weakening effect between x and y. In ANOVA, the moderator variable effect is represented by the interaction effect between the dependent variable and the factor variable. The reason for the moderation is to discover some hidden effects on the association between the predictor and the predicted variable.

Hierarchical regression models shown below.

Model - I $\quad Y = \beta_0 + \beta_1\, X_1 + \beta_2\, X_2 + \beta_3\, X_3 + \beta_4\, X_4 + \beta_5\, X_5 + \varepsilon$

Model - II $\quad Y = \beta_0 + \beta_1\, X_1 + \beta_2\, X_2 + \beta_3\, X_3 + \beta_4\, X_4 + \beta_5\, X_5 + Z + \varepsilon$

Model - III $\quad Y = \beta_0 + \beta_1\, X_1 + \beta_2\, X_2 + \beta_3\, X_3 + \beta_4\, X_4 + \beta_5\, X_5 + \beta_6 XZ + \varepsilon$

Y = firm performance
β_0 = regression intercept
$\beta_1 – \beta_5$ are the coefficients of GSCM practices
β_6 = coefficient of government regulation
X_1 = green procurement
X_2 = green manufacturing
X_3 = green distribution
X_4 = reverse logistics
X_5 = waste management
XZ= interaction term
Z = government regulation
ε = error term

Below is the model for the overall moderation.

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 XZ + \varepsilon$$

Where;
Y   is firm performance
β_0 is regression intercept
$\beta_1 – \beta_5$ are the coefficients of GSCM practices
β_6 is the coefficient of government regulation
X_1 = green procurement
X_2 = green manufacturing
X_3 = green distribution
X_4 = reverse logistics
X_5 = waste management
Z = government regulation
ε = error term

3.7.3 Assumptions of Linear Regression

3.7.3.1 Linearity

This study used scatter diagrams to test for linearity assumption to ascertain the association

between the predictor and criterion variables. Data was put in SPSS software to construct a scatter

plot. A probability (P-P) plot graphical test was used to test for the linearity assumption. The P-P

plot uses a graph to visually check the goodness of fit of a specific distribution. The interpretation

of the P-P plot was that when data points were near the diagonal line, the data was said to be linear.

If the data were dispersed away from the diagonal line, then the data were taken not to be linear.

If the assumption of linearity is not achieved, then the estimations from the regression as well as the regression coefficients including standard errors plus the numerical significance tests might be biased (Keith, 2006). In case the association between the predictor and criterion variables is non-linear, then the outcome of the linear examination increases or reduces estimates of the correct association and make type I as well as type II risk errors bigger.

3.7.3.2 Normality

In multiple regression, normality is assumed to have variables that are normally distributed. Normality is also assumed to be achieved when the scores in a continuous concept is dispersed around a mean (Silverman, 2016). When values of the residuals are plotted and produce an approximately normal curve, it shows that the errors are normally distributed (Keith, 2006). This study used Scatter diagrams to test for normality assumptions to ascertain the association between the predictor and criterion variables. Data was put in SPSS software to construct a scatter plot. A probability (P-P) plot graphical test was used to test the normality assumption. The P-P plot uses a graph to visually check the goodness of fit of a specific distribution. The interpretation of the P-P plot was that when data points were near the diagonal line, the data was said to be normally distributed. If the data were dispersed away from the diagonal line, then the data was taken not to be normally distributed. When the supposition of normality does not hold, interpretations and conclusions might not be reliable as well as valid (Razali & Wah, 2011).

3.7.3.3 Multicollinearity

Multicollinearity occurs when explanatory variables in a regression model get highly interrelated or associated (Ali *et al*., 2013). With multicollinearity, it is difficult to fit the model as well as deduce the findings, if the degree of inter-correlations or associations amongst explanatory variables is big enough. Multicollinearity also minimizes the accuracy of the coefficient estimates, that wanes the numerical power of the regression model and the p-values might not be trusted. If

the supposition of multicollinearity is violated, it will lead to misleading as well as unusual results, exaggerated standard errors including a minimized power of the regression coefficients which will require a bigger sample size (Jaccard *et al*., 2006).

A statistical software was used to compute a VIF for every predictor variable. If the result of the computation was 1, it showed that there existed no association between that explanatory variable and the others. VIFs within 1 and 5 revealed modest inter-correlation which was not severe enough to require corrective action. VIFs above 5 indicated major stages of multicollinearity that led to poor coefficient estimates as well as doubtful p-values. VIF values larger than 10 reveals severe multicollinearity. That is, when VIF is greater than 10 or tolerance is lower than 0.1, there is significant multicollinearity that needs to be corrected. VIF can be calculated using formula:

$$VIF_i = \frac{1}{1 - R_i^2} = \frac{1}{\text{Tolerance}}$$

Where R_i^2 represented the unadjusted coefficient of determination for regressing the ith independent variable on the remaining ones. The reciprocal of VIF is known as tolerance. Either VIF or tolerance was used to detect multicollinearity, depending on personal preference. If R_i^2 was equal to 0, the variance of the remaining independent variables could not be predicted from the ith independent variable. Therefore, when VIF or tolerance was equal to 1, the ith independent variable was not correlated to the remaining ones, which meant that multicollinearity did not exist in the regression model. In this case, the variance of the ith regression coefficient was not inflated.

3.7.3.4 Homoscedasticity and Heteroscedasticity

Heteroscedasticity is a systematic variation in the scatter of residuals over the range of measured values. It is an issue due to the ordinary least square (OLS) regression presuming that the residuals are obtained from a population with a constant variance. The variables were shown through scatter

plot graphs of the criterion variable which were expected to widen or narrow while the predictor variable value tended to increase. For Homoscedasticity, ordinary least square (OLS) regression assumes that all residuals are drawn from a population that has a constant variance. This was tested by Q-Q plot (Schutzenmeister, Jensen & Piepho, 2012). Through a visual inspection of the dispersed area, if the error terms were similar across the ranges of the independent variables, the data was ascertained to be homoscedastic. If the spread of the data were found to be uneven across the range of the explanatory variables it was heteroscedastic which required transformation through logs as well as Z scores techniques. Uneven variances in samples leads to biased and skewed test results.

3.7.3.5 Test for Outliers

An outlier is a value that deviates significantly from other values in a random sample from a population. Outliers implicitly affect the means as well as the standard deviations of the sample which lead to overrating or underrating values (Kwak & Kim, 2017). This study used data visualization, in particular, the scatter plot technique through observation to identify outliers. Below is a summary of research objectives, hypotheses and analytical methods.

Table 3.5 Summary of Research Objectives, Hypotheses and Analytical Methods

Objective	Hypothesis (H_{O1})	Analytical Model	Interpretations of Results
To establish the influence of green procurement on performance of private oil and gas firms in Kenya	H_{01}: Green procurement does not have a statistically significant influence on private oil and gas firms' performance in Kenya	Linear regression analysis $Y = \beta_0 + \beta_1 X_1 + \varepsilon$ Where Y=organizational performance β_0 = regression intercept β_1 is the coefficient of greenprocurement ε = error term	R^2 – 0.0 – 0.29 – Weak 0.3 – 0.59 - Moderate 0.6 > - Strong $F_{calculated} > F_{critical}$ -Reject (p< 0.05) - Reject $T_{calculated} > T_{critical}$-Reject
To establish the influence of green distribution on Performance of private oil and gas firms in Kenya.	H_{02}: Green distribution does not have a statistically significant influence on success of private oil and gas firms in Kenya.	Linear regression analysis $Y = \beta_0 + \beta_2 X_2 + \varepsilon$ Where Y=organizational performance β_0 = regression intercept β_2 is the coefficient of greendistribution ε = error term	R^2 – 0.0 – 0.29 – Weak 0.3 – 0.59 - Moderate 0.6 > - Strong $F_{calculated} > F_{critical}$ -Reject (p< 0.05) – Reject $T_{calculated} > T_{critical}$-Reject
To establish the influence of green manufacturing on performance of private oil and gas firms in Kenya.	H_{03}: Green manufacturing does not have a statistically significant influence on performance of private oil and gas firms	Linear regression analysis $Y = \beta_0 + \beta_3 X_3 + \varepsilon$ Were Y=organizational performance β_0 = regression intercept β_3 is the coefficient of greenmanufacturing ε = error term	R^2 – 0.0 – 0.29 – Weak 0.3 – 0.59 - Moderate 0.6 > - Strong $F_{calculated} > F_{critical}$ -Reject (p< 0.05) – Reject $T_{calculated} > T_{critical}$-Reject
To establish the influence of reverse logistics on performance of private oil and gas firms in Kenya.	H_{04}: Reverse logistics does not have a statistically significant influence on performance of oil and gas firms in Kenya.	Linear regression analysis $Y = \beta_0 + \beta_4 X_4 + \varepsilon$ Where Y=organizational performance β_0 = regression intercept β_4 is the coefficient of reverse logistics ε = error term	R^2 – 0.0 – 0.29 – Weak 0.3 – 0.59 - Moderate 0.6 > - Strong $F_{calculated} > F_{critical}$ -Reject (p< 0.05) - Reject $T_{calculated} > T_{critical}$-Reject
To establish the influence of waste management on performance of private oil and gas firms in Kenya	H_{05}: Waste management does not have a statistically significant influence on performance of private oil and gas firms in Kenya.	Linear regression analysis $Y = \beta_0 + \beta_5 X_5 + \varepsilon$ Where Y=organizational performance β_0 = regression intercept β_5 is the coefficient of wastemanagement ε = error term	R^2 – 0.0 – 0.29 – Weak 0.3 – 0.59 - Moderate 0.6 > - Strong $F_{calculated} > F_{critical}$ -Reject (p< 0.05) - Reject $T_{calculated} > T_{critical}$-Reject

| To establish the moderating influence of government regulation on the association between GSCM practices and performance of private oil and gas firms in Kenya | **H06:** Government regulation does not have a statistically significant moderating influence on the relationship between GSCM practices and private oil and gas firms' performance in Kenya | Hierarchical regression $Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 XZ + \varepsilon$
 Y is firm performance
 β_0 is regression intercept
 $\beta_1 - \beta_5$ are the coefficients of GSCM practices
 β_6 is the coefficient of government regulation
 X_1 = green procurement
 X_2 = green manufacturing
 X_3 = green distribution
 X_4 = reverse logistics
 X_5 = waste management
 XZ = interaction term
 Z = government regulation
 ε = error term | $R^2 - 0.0 - 0.29 -$ Weak
 $0.3 - 0.59$ - Moderate
 $0.6 >$ - Strong
 $F_{calculated} > F_{critical}$ -Reject
 $(p < 0.05)$ - Reject
 $T_{calculated} > T_{critical}$-Reject |

Source: Researcher, 2021

3.8 Ethical Considerations

This research addressed ethical issues including; information privacy and data safety, anonymity, consent that is voluntary from the participants, publication information, disclosure and non-disclosure of critical research information and getting a letter from NACOSTI.

During the entire period of the research procedure, ethics was of paramount importance. Ethical matters were strictly observed (Cooper *et al*., 2012). During the study, information privacy and data safety, were a priority including anonymity to respondents. Data collected for this study was only accessed by the author of the research throughout the retrieval, recording, analysis and interpretation. There was no disclosure of responses from respondents to the public. Respect for the individuals was upheld through fair handling and being autonomous as well as provided basic information to give honest and quality answers. Authorization from Kisii university, the Ministry of Energy and Forestry and NACOSTI was given to conduct the research.

CHAPTER FOUR

DATA ANALYSIS AND DISCUSSION OF FINDINGS

4.1 Response Rate

A response rate, mostly stated in percentages, in a study, is the ratio between the respondents who filled the questionnaire and the participants in the sample. According to Taherdoost (2016) response rate is the size that collects data comprising all sample participants of the target population. This research targeted to reach 470 respondents who comprised top managers, managers, supervisors and procurement staff. The responses were presented in table 4.1 below.

Table 4.1 Response Rate

Sample size	Number questionnaires	Percentage
Questionnaires distributed	470	100
Questionnaires Returned	376	80
Questionnaires not returned	94	20
Questionnaires not used	18	3.8
Questionnaires used	358	76.2

Source: Field Data, 2022

The output in table 4.1 showed that four hundred and seventy (470) questionnaires were distributed to the targeted respondents. Out of these, three hundred and seventy-six (376) were answered and returned. This represented 80% of the total questionnaires distributed. Ninety-four (94) respondents did not return their questionnaires. This represented 20% of the total number of questionnaires distributed. Eighteen (18) questionnaires were incomplete and thus, were not used in the analysis. This represented 3.8% of the total questionnaires given out to respondents. The number of questionnaires used in the analysis were three hundred and fifty-eight (358) which represented 76.2%. This was a good response rate for the study. Garg and Kothari (2014) observed that a response rate above 70%, is suitable to carry out data examination. Thus, this response rate was considered sufficient for the research.

The response rate in table 4.1 was high despite the type of firms (oil and gas) and the sensitivity of the information gathered. The high response rate resulted from the assurance given to respondents through personalized letters sent to them, explaining the purpose of the research and indicating high confidentiality of the information they gave out. The utilization of well-trained research assistants and the frequent follow-ups through phone calls to respondents highly contributed to the high response rate.

4.2 Data Cleaning and Screening

Data cleaning is important before being subjected to data examination. Data cleaning is conducted with an aim of detecting as well as removing likely errors and inconsistencies from the study information in order to improve its value (Rahm & Do, 2000). Data cleaning as well as screening is a process where large data is taken through a preliminary assessment on its accuracy, finding unusual patterns as well as missing information to enable evaluate whether available data satisfies the statistical assumptions associated with the multivariate technique of analysis (Hair Jr. *et al*, 2020). Data cleaning reviewed data consistency since the inconsistencies could arise from faulty logic, unnoticed as well as extreme values.

Data preparation commenced with inspection of the tools that included removal of undesirable questionnaires that revealed incompleteness, small variances, missing pages and unqualified respondents. Data editing corrected unreadable, incomplete and inconsistent as well as vague responses. Data coding arranged data into different themes. All the 358 usable questionnaires were coded and entered into an excel worksheet. After coding, data were entered into SPSS, version 22 where analysis of missing values, examination of outliers, normality as well as multi-collinearity tests were conducted.

4.2.1 Examination of Errors of Data Entry.

Information contained in the filled-out usable instruments was transcribed into SPSS software

version 22, for additional examination. Eighteen (18) non usable questionnaires, were categorized as errors of data entry.

4.2.1.1 Examination of the outliers.

The outlier is a value that deviates significantly from other values in a random sample from a population. They are unusual data points in a dataset. Outliers can be triggered by wrong entries or differences in the measurements (Tabachnik & Fidel, 2013). Availability of outliers affect the statistical reliability as well as the validity of a study (Hair Jr *et al*, 2010). Garson (2012) notes that outliers cannot be generalized to the population and can cause inaccurate outcomes as well as poor deductions about the population. Outliers implicitly affect the means as well as the standard deviations of the sample which lead to overrating or underrating values (Kwak & Kim, 2017). The research variables; green procurement, green manufacturing, green distribution, reverse logistics, waste management, and company performance had some outliers. This study used data visualization method, specifically, the scatter plot technique through observation to identify outliers. The identified outliers in this research, fell within the predicted array of values. They were all retained for examination.

4.2.1.2 Examination of Out of the Range Observations.

Eighteen values were established to have values which were out of range. The observations were non-usable and were made missing and, thus, not available for examination in this research.

4.2.1.3 Analysis of Missing Data

Missing data occur due to failure of some respondents not filling out some sections of the questionnaires. These are values which are significant to the research but are not available for examination due to the failure of being captured, are erroneous or omitted by respondents and the only way left out for the researcher, is to discard the inaccurate information (Batista & Monard, 2003). Data can go missing due to incomplete data entry, equipment malfunction or lost

questionnaires. In any dataset there are usually some missing data. In this study, the total number of missing data was eighteen (18) and represented 3.8 % of the sample size. During analysis, missing data can lead to erroneous conclusions derived from the data gathered (Tabachnick & Fidel, 2013). Missing data can also be the basis for biased statistical examination leading to erroneous data estimates for the research. Out of the 376 survey instruments returned, eighteen (18) were established to contain missing information and were omitted.

4.3 Demographic Statistics of Respondents

Demographic statistics are measures of the characteristics of a population. In this study, demographic analysis was based on gender, age, highest education level, employment duration and terms of employment. These factors are important in explaining the extent to which individual as well as organizational factors might influence the adoption of green supply chain management practices. Demographic data offers information about respondents as well as defining the individuals who are in the study, and are a representative sample of a target population with an intention to generalize the outcome of the research. Demographic features were broadly recognized as having a significant effect on the way respondents answer questions as well as their performance in an establishment. Demographic features have an effect on whether shareholders may be resolute to their commitments or not (Ongeti, 2014).

4.3.1 Profile of Respondents

The total information concerning every issue that makes the foundation on which the interpretations are arrived at, was attained. The information was imperative to the research for the reason that it assisted the person who reads to comprehend certain matters which might be significant in the examination. In this study, among the demographic characteristics about respondents were; on gender, age in years, highest education level, number of years in current employment and terms of employment in their current positions.

Table 4.2 Demographic Characteristics of the Respondents

Characteristics	Description	Frequency	Percentage
	Male	234	65.4
Gender	Female	124	34.6
	Total	**358**	**100**
	18-25	16	4.5
	26-33	66	18.4
	34-41	130	36.3
Age in years	42-49	125	35
	50-57	13	3.6
	58-65	8	2.2
	Total	**358**	**100**
	Secondary	17	4.7
	College	120	33.5
Educational Level	Undergraduate	196	54.7
	Masters	25	7.1
	Total	**358**	**100**
	1-6	67	18.7
	7-11	169	47.2
Number of years in current employment	12-16	115	32.1
	17 and above	7	2
	Total	**358**	**100**
	Regular	335	93.6
Terms of employment in current position	Contract	23	6.4
	Total	**358**	**100**

Source: Field Data, 2022

The study assessed the gender of respondents. The study outcome showed that 234 (65.4%) were male while 124 (34.6%) were female and consequently low gender inequality. This showed that the two-thirds gender rule was attained. These results gave the gender composition among private oil and gas firms. This was important in establishing the extent to which the gender composition could influence the adoption of GSCM practices in private oil and gas firms in Kenya. It also showed how the oil and gas firms followed the values of gender balance, implying that both genders were involved in decision making.

The age in years of respondents who participated in the study was analyzed. The research outcome showed that 16 (4.5%) of those who filled out usable questionnaires for the study, had 18-25 years,

66 (18.4%) had 26-33 years, 130 (36.3%) had 34-41 years, 125 (35%) had 42-49 years, 13 (3.6%) had 50-57 years and 8 (2.2%) had 58-65 years. The result further disclosed that none of the respondents working in private oil and gas firms had 66 years and above. These results indicated that those who filled out the questionnaires and were involved in the research were of various ages, thus, the outcome was not biased based on the ages of the research's respondents. The outcome further showed that majority of the employees in the private oil and gas firms are youthful under the age of 50 years and made of 337(94.2%) respondents. This showed that the older generation are more knowledgeable and experienced with greening practices while the youthful generation are more open to technology and change. They are easily adaptive to change. Further, people of different ages bring different viewpoints to the workplace, helping to increase innovation and creative problem-solving.

The study analyzed the highest education level for the respondents. This was the academic qualifications of those who answered the questionnaires that were usable in the study. The research outcome indicated that 17 (4.7%) of the respondents had secondary level education, 120 (33.5%) possessed college level of education, 196 (54.7%) had undergraduate level of education, 25 (7.1%) had masters. The results revealed that none of the respondents employed in private oil and gas firms had primary or doctorate level of education. The findings showed that the staff were knowledgeable enough to comprehend the GSCM practices adopted by the private oil and gas firms to improve performance dimensions. Further, the outcome revealed that the respondents had good academic qualifications to be involved in the research and give quality information. Good academic qualifications offer the respondents the capacity as well as the competence to draw knowledgeable decisions that are important for reliable outcomes.

The number of years in current employment of respondents in the study was assessed. The findings

showed that 67 (18.7%) of those who filled out the questionnaires and were part of the study had worked for between 1-6 years at the firms, 169 (47.2%) staff had worked for 7-11 years, 115 (32.1%) employees had worked for 12-16 years and 7 (2%) respondents had worked for over 17 years. These findings showed that majority respondents had worked for more than 6 year 291 (81.3%), implying that they had a comparatively long period of connection with the private oil and gas firms to know the activities going on in the firms. Further, the relative long period of employment, offered these staff enough knowledge and experience about the strategies as well as policies adopted by the firms to improve performance, and were suitable to be involved in the study to provide useful information about GSCM practices adopted by their organizations. Experienced staff make good decisions, are more effective as well as time conscious in their chores.

Terms of employment on the current position of employee was also investigated. The outcome showed that 335 (95.6%) were regular employees and 23 (6.4%) were on contract terms. This indicated majority of employees were permanent and pensionable. Long term employees have immersed themselves in the company culture and social activities and are loyal. Regular employees stay long in the organization and are knowledgeable about the activities of the organization that cannot be gained in a short term stay and hence could be nominated to participate in the study than contract employees.

4.4 Descriptive Analysis

The study examined the data gathered based on the study objectives. The research sought to establish the influence of government regulations on the relationship between green supply chain management practices and performance of private oil and gas firms in Kenya. Under descriptive statistics, Maximum, Minimum, Mean (M), Standard deviation (SD), Skewness and Kurtosis were used. The research findings were presented using tables and statistical parameter estimates as shown below.

4.4.1 Green Procurement

The study assessed green procurement used by private oil and gas firms whose outcome is described in Table 4.3.

Table 4.3 Descriptive Statistics Results on Green Procurement

Statements	N	Min	Max	Mean	Std. Dev.	Skewness	Kurtosis
Use of recyclable packaging materials is encouraged by your company	358	1	5	4.22	1.096	-.104	-.656
Company buys from suppliers who comply with environmental rules and laws.	358	1	5	4.17	1.122	-.040	-.644
Company provides design guidelines on green requirements to suppliers for bought items	358	1	5	4.26	1.148	-.214	-.743
Company cooperates with suppliers to enable achieve green goals through supplier collaboration and green trainings	358	1	5	4.14	1.075	-.014	-.727
Company develops green training materials and trains their staff handling procurement in the company.	358	1	5	4.23	1.120	-.041	-.749
Company purchases fuel efficient devices and equipment	358	1	5	4.10	1.082	-.045	-.558
Company selects suppliers with ISO certification and conduct green audits amongst them.	358	1	5	4.18	1.116	-.012	-.702
Overall Score				**4.19**	**1.108**	**-0.0671**	**-0.6830**

Source: Field Data, 2022

The study findings in table 4.3 indicated that respondents agreed (M=4.22, SD=1.096) that during procurement of materials and services, their firms prefer suppliers to use recyclable packaging materials to lessen wastes. Respondents also agreed (M=4.17, SD=1.122) that their firms purchased goods and services from suppliers who are environmentally compliant It was further admitted (M=4.26, SD=1.148) that the companies provide design guidelines on green requirements to suppliers for purchased materials and services (M=4.26, SD=1.148). Respondents further admitted (M=4.14, SD=1.075) that their companies collaborated with suppliers to enable them achieve green goals through supplier relationship and ecofriendly activities. Additionally, respondents admitted

(M=4.23, SD=1.120) that their companies have a policy to develop green training materials to specifically train their staff to acquire more green knowledge to enable them handle ecofriendly procurement processes and activities. Furthermore, respondents agreed (M=4.10, SD=1.082) that their firms purchased fuel efficient devices and equipment to reduce GHG emissions and pollution. Similarly, respondents agreed (M=4.18, SD=1.116) that the companies prequalified and selected suppliers with ISO certification and conducted green audits amongst them to enable purchase green products.

From the overall mean score of 4.19, green procurement had an influence on firm performance, hence significant. This result is confirmed by Laosirihongthong *et al* (2013) who observe that green purchasing comprises procuring of materials which have environmental footprints as well as the collaboration with suppliers for environmental goals. Purchasing green products in the business leads to reducing GHG emissions, conserving energy, reducing waste and improve sustainability. Esfahbodi *et al*., *(*2016) confirms the results by observing that it is easier to incorporate ecofriendly elements into various procurement phases if the vendors are compliant and are certified by ISO 14001, ISO 9001 as well as EMS bodies. Meaning that green materials are bought from green sources.

Skewness of the green procurement items fell within the range -2 and +2 implying that the data was approximately symmetrical (Hair *et al*., 2022). The distribution lacked outliers and extreme skewness. Skewness aggregate score of -0.0671, indicated that there was a slightly longer tail to the left than to the right. Implying that the answers tending towards one were few than the ones tending towards five. The green procurement items showed a kurtosis < 3, implying that the distribution was light tailed containing a platykurtic shape. This disclosed that the data was approximately symmetrical, meaning that there were no outliers and lacked extreme kurtosis values (Garson, 2020)

The overall standard deviation value of 1.108 showed that all the green procurement sub-variables were not spread. Implying that there was a high internal consistency that could measure the same concept (green procurement).

4.4.2 Green Distribution

The study assessed green distribution used by private oil and gas firms whose outcome is described in Table 4.4.

Table 4.4 Descriptive Statistics Results on Green Distribution

Statements	N	Min	Max	Mean	Std. Dev.	Skewness	Kurtosis
Company uses ecofriendly packaging materials and distribution containers/ Company uses biodegradable packaging materials.	358	1	5	4.45	1.190	-.090	-.669
Company storage facilities are certified as ecofriendly through ecological management certification, for example ISO 14000	358	1	5	4.46	1.220	-.003	-.668
Company ensures that all products are eco-labelled for customers to know whether they are ecofriendly or not	358	1	5	4.43	1.137	-.098	-.736
Company encourages fuel efficient types of delivery to customers to save energy	558	1	5	4.50	1.201	-.068	-.709
Overall Score				**4.46**	**1.187**	**-0.06475**	**-0.6955**

Source: Field Data, 2022

The research findings showed that respondents agreed (M=4.45, SD=1.190) that during product distribution their firms utilize ecofriendly packages as well as distribution containers to customers to avoid sending more waste to the waste system. Additionally, respondents admitted that (M=4.46, SD=1.220) that their companies' warehouses are certified as ecofriendly by ecological management certification bodies, for instance ISO 14000. Respondents agreed (M=4.43, SD=1.137) that during materials distribution, their firms ensure that all products are eco-labelled for customers to know whether they are ecofriendly or hazardous. Further, majority respondents agreed (M=4.50,

SD=1.201) that their firms use fuel efficient types of delivery to customers to save on energy consumption as well as reduce pollution.

From the overall mean score of 4.46, green distribution had an influence on firm performance hence, significant. This result is confirmed by Al-Odeh & Smallwood, (2012) who observes that to develop green distribution, organizations should consider the kind of fuels they use, the modes of transport, the infrastructure and the type of operations. Organizations which use renewable energy and non-fossil fuels, conserve energy and reduce GHG emissions and pollution. Ghobakhaloo et al (2013) agrees with the results by observing that green distribution forms part of an important element of GSCM to bring about effective ecological impact during its application. Hamdy *et al.,* (2018) agrees with the results by observing that green delivery is an arrangement for environmental packaging with clients. This implies that biodegradable packages reduce waste and improves the environment.

Skewness of the green distribution items fell within the range -2 and +2 implying that the data was approximately symmetrical (Hair *et al*., 2022). The data lacked outliers and extreme skewness. Skewness aggregate score of -0.06475, indicated that there was a slightly longer tail to the left than to the right. Implying that the answers tending towards one were few than the ones tending towards five. The green distribution items showed a kurtosis < 3, implying that the distribution was light tailed containing a platykurtic shape. This disclosed that the data was approximately symmetrical, meaning that there were no outliers and lacked extreme kurtosis values (Garson, 2020)

The overall standard deviation value of 1.187 showed that all the green distribution sub-variables were not spread. Implying that there was a high internal consistency that could measure the same concept (green distribution).

4.4.3 Green Manufacturing

The study assessed green manufacturing used by private oil and gas firms whose outcome is described in table 4.5.

Table 4.5 Descriptive Statistics Results on Green Manufacturing

Statements	N	Min	Max	Mean	Std. Dev.	Skewness	Kurtosis
Company gives priority to returned materials for production than using virgin raw materials.	368	1	5	4.09	1.047	-.090	-.669
Company is totally dedicated to green manufacturing.	358	1	5	4.18	1.100	-.003	-.668
Company encourages use of renewable energy during production.	358	1	5	4.09	1.109	-.098	-.736
Company designs products that cannot lead to high damage rates, high delivery costs and with low carbon footprints	358	1	5	4.20	1.134	-.068	-.709
Company monitors and controls unsafe and dangerous emissions by using filters and other methods.	358	1	5	4.13	1.067	-.026	-.642
Workers are involved and undertake trainings on green production to improve their understanding on the consequences of their activities on the natural surroundings.	358	1	5	4.02	1.042	.090	-.607
Overall Score				**4.11**	**1.083**	**-0.0325**	**-0.6718**

Source: Field Data, 2022

The study findings indicated that the respondents agreed (M=4.09, SD=1.047) that their firms prioritized use of returned materials as inputs or production than virgin raw materials to save energy and cut down on costs. It was further agreed (M=4.18, SD=1.100) that the firms were totally dedicated to green manufacturing to lessen wastes and conserve energy consumption. In addition, respondents agreed (M=4.09, SD=1.109) that the firms use renewable energy (solar, hydro, wind) during production. Further, majority respondents admitted (M=4.20, SD=1.134) that their firms design products that do not lead to high damage rates, high delivery costs and have low carbon footprints. Respondents agreed (M=4.13, SD=1.067) that the firms use filters and other techniques to monitor and control unsafe and dangerous emissions that might affect employees' health and that

of the community. It was further agreed (M=4.02, SD=1.042) that the employees are involved and undertake trainings on green production to improve their understanding on the consequences of their activities in the natural surroundings to avoid injuries at the work place and firms to sustain green jobs.

The overall mean score of 4.11, shows green manufacturing had influence on firm performance and hence, significant. The results are confirmed by Wibowo *et al* (2018) who note that the main reason for green manufacturing is to cut down on the resources utilized, aiming at decreasing the quantity of wastes. Through recycling of returned materials, reduction of wastes and production costs occur. Encouraging use of renewable energy during production reduces energy use and GHG emissions and pollution. In addition, Mittal and Sangwan (2014) confirm the results by observing that adoption of green manufacturing procedures allows corporations to be more aware of their responsibility to safeguard the environment by changing operating procedures on disposal to adhere and conform to ecological sustainability rules. Implying that companies adhere to manufacturing of green products.

Skewness of the green manufacturing items fell within the range -2 and +2 implying that the data was approximately symmetrical (Hair *et al*., 2022). The distribution lacked outliers and extreme skewness. Skewness aggregate score of -0.0325, indicated that there was a slightly longer tail to the left than to the right. Implying that the answers tending towards one were few than the ones tending towards five. The green manufacturing items showed a kurtosis < 3, implying that the distribution was light tailed containing a platykurtic shape. This disclosed that the data was approximately symmetrical, meaning that there were no outliers and lacked extreme kurtosis values (Garson, 2020)

The overall standard deviation value of 1.083 showed that all the green manufacturing sub-variables were not spread. Implying that there was a high internal consistency that could measure the same concept (green Manufacturing).

4.4.4 Reverse Logistics

The study examined reverse logistics used by private oil and gas firms and the output is shown in table 4.6 below.

Table 4.6 Descriptive Statistics Results on Reverse Logistics

Statements	N	Min	Max	Mean	Std. Dev.	Skewness	Kurtosis
There is a proper system in place for disposal of all forms of materials e.g. hazardous materials	358	1	5	4.27	1.083	-.026	-.642
Company encourages recycling and reusing of returned materials that have residual value.	358	1	5	4.13	1.090	.090	-.607
Company has a policy on products and packages return or take back	358	1	5	4.26	1.110	-.248	-.763
Company has installed drop of points for collection of returned packages	358	1	5	4.17	1.106	-.198	-.930
The company encourages waste exchanges	358	1	5	4.15	1.040	-.186	-.825
Overall Score				**4.20**	**1.086**	**-0.1136**	**-0.7534**

Source: Field Data, 2022

The results from table 4.6 showed that respondents agreed (M=4.27, SD=1.083) that their firms have instituted proper system for the disposal of all forms of materials, for example, hazardous materials to lessen toxins, GHG emissions and pollution. Respondents admitted (M=4.13, SD=1.090) that the firms recycled and reused returned materials that have residual value. Additionally, respondents agreed (M=4.26, SD=1.110) that the firms have a policy on products and packages return or take back from customers for product and reputation (M=4.26, SD=1.110). Similarly, respondents agreed (M=4.17, SD=1.106) that the firms have installed drop of points for ease collection of returned packages for either recycling or reusing purposes. Further, the respondents admitted (M=4.15, SD=1.040) that the firms practice waste exchanges with other firms.

Overall, the aggregate mean score of 4.20 discloses that reverse logistics had influence on firm

performance and thus significant. Bachev (2018) confirms this study results by observing that reverse logistics practices need enterprises to recall already used materials including packaging materials at the customers' sites and take back supplies for the reproduction aims. Recalling materials encourages recycling and reusing of returned materials that have residual value. This cuts down on costs of production and improves company and product reputation. The results is also confirmed by Muma *et al*., (2014) who note that the process of recalling the used materials and packages for reuse, recycle and remanufacturing offer the best outcomes since reverse logistics is established to have a positive relationship with environmental efficiency. The action of recalling materials and packages, has a potential of greening the value chain by decreasing the quantity of packaging materials released to the waste system by a firm.

Skewness of the reverse logistics items fell within the range -2 and +2 implying that the data was approximately symmetrical (Hair *et al*., 2022). The distribution lacked outliers and extreme skewness. Skewness aggregate score of -0.1136, indicated that there was a slightly longer tail to the left than to the right. Implying that the answers tending towards one were few than the ones tending towards five. The reverse logistics items showed a kurtosis < 3, implying that the distribution was light tailed containing a platykurtic shape. This disclosed that the data was approximately symmetrical, meaning that there were no outliers and lacked extreme kurtosis values (Garson, 2020)

The overall standard deviation value of 1.086 showed that all the reverse logistics sub-variables were not spread. Implying that there was a high internal consistency that could measure the same concept (reverse logistics).

4.4.5 Waste Management

The study examined waste management used by private oil and gas firms and the results outcome was indicated in table 4.7 below.

Table 4.7 Descriptive Statistics Results on Waste Management

Statements	N	Min	Max	Mean	Std. Dev.	Skewness	Kurtosis
Company minimizes the garbage generated through environmental management system (EMS) procedure.	358	1	5	4.60	1.228	-.167	-.923
The company recycles or reuses the waste which have residual value	358	1	5	4.67	1.164	-.018	-.585
Company gives special inducement promotions on reusing of waste	358	1	5	4.63	1.163	-.005	-.725
Company observes regulatory compliance through laws and regulations to manage waste	358	1	5	4.64	1.164	-.116	-.680
Company practices proper disposal of waste materials	358	1	5	4.51	1.149	-.083	-.774
Overall Score				**4.61**	**1.174**	**-.0778**	**-.7374**

Source: Field Data, 2022

The results show respondents agreed (M=4.60, SD= SD=1.228) that their firms have environmental management system (EMS) procedures in place to minimize the garbage generated to reduce waste and pollution. In addition, respondents admitted (M=4.67, SD=1.164) that the firms recycle and reuse the waste which has residual value to save energy and costs. Similarly, the respondents agreed (M=4.63, SD=1.163) that the firms give special inducement promotions on reusing of waste. Additionally, it was agreed (M=4.64, SD=1.164) that the firms observe regulatory compliance through laws and regulations to manage waste in order to avoid penalties for non-compliance. Many other respondents agreed M=4.51, SD=.149) that their companies are practicing proper disposal of waste materials to minimize costs, waste and pollution.

Overall, the mean score 4.61 shows waste management had influence on firm performance and hence, significant. This research finding is supported by Hill *et al* (2015) who observe that a firm builds greater competitive advantage, have better outcomes and increased returns as opposed to its peers in the industry, because it has the best practice about waste management. By managing waste,

the firms conduct proper disposal of waste materials that leads to regulatory compliance. Similarly, in agreement with the results, Srivastava (2007) adds that waste management is an important resource from the cost perspective through which enterprises can make earnings through investments and have high returns from recycling and reuse of waste. Recycling leads to energy conservation and cost reduction and profitability.

Results further disclosed that the skewness values fell within the range of -2 and +2 indicating that the data was normally distributed (Hair *et al*., 2022). This implied that the distribution lacked outliers and extreme skewness values. Skewness with an overall score of -0.0778, showed that there was a slightly longer tail to the left than to the right. Implying that the answers tending towards one were few than those tending to five. Similarly, the results showed that kurtosis overall score value of -0.7374 was below 3 indicating that the dataset was light tailed and possessed a platykurtic shape. This also meant that there were fewer extreme values or no outliers in the data (Garson, 2020). Consequently, the data was approximately symmetrical. Results further showed a standard deviation with an overall mean score value of 1.174 that revealed that all the waste management items were not dispersed. Implying that there was high internal consistency that could measure the same concept (waste management).

4.4.6 Government Regulation

The study assessed government regulation incorporated by private oil and gas firms whose outcome is disclosed in table 4.8 below.

Table 4.8 Descriptive Statistics Results on Government Regulations

Statements	N	Min	Max	Mean	Std. Dev.	Skewness	Kurtosis
A comprehensive environmental policy that guides operations exist in your company	358	1	5	4.17	1.032	.057	-.758
During the adoption of GSCM practices government regulation bears great influence in the level of adoption that affect company performance	358	1	5	4.14	1.045	-.285	-.848
Compliance with environmental regulatory framework increases company performance	358	1	5	4.26	1.052	-.366	-.712
State regulation is a major aspect that make organizations to embrace GSCM practices that results into greater company performance	358	1	5	4.32	1.072	-.271	-.789
Internal and external ecological motivators have played a major role in GSCM implementation that enhance company performance	358	1	5	4.17	1.085	-.280	-.772
Overall Score				**4.212**	**1.057**	**-0.2290**	**-0.7758**

Source: Field Data, 2022

The outcome revealed that respondents agreed (M=4.17, SD=1.032) that there is a comprehensive environmental policy that guides operations in their firms to have ecofriendly operations. Respondents admitted (M=4.14, SD=1.045) that the government influences adoption and implementation of GSCM practices in their firms to reduce the carbon footprints caused by their activities. It was agreed (M=4.26, SD=1.052) that the firm's performance increased because the firms comply with the environmental regulatory framework to avoid government penalties on non-compliance. In addition, respondents agreed (M=4.32, SD=1.072) that state regulation has a great bearing in the way their firms embrace GSCM practices that result into greater company performance. Further, respondents agreed (M=4.17. SD=1.085) that for their firms, internal and external ecological motivators played a major role in GSCM implementation that enhanced company performance.

From the results, the overall mean 4.212, disclosed that government regulation has influence in firm performance and thus significant. The results were confirmed by Hu and Hsu (2010) who note that private oil and gas companies get pressuredby stakeholders, such as the final consumers, investors and government who would like to buy green products as well as the increasing legislations that create environmental standards for the products. Implying that both internal and external ecological motivators have played a major role in GSCM implementation that enhance company performance

Skewness of the government regulation items fell within the range -2 and +2 implying that the data was approximately symmetrical (Hair *et al*., 2022). The distribution lacked outliers and extreme skewness. Skewness aggregate score of -0.2290, indicated that there was a slightly longer tail to the left than to the right. Implying that the responses tending towards one were few than the ones tending towards five. The government regulation items showed a kurtosis < 3, implying that the distribution was light tailed containing a platykurtic shape. This disclosed that the data was approximately symmetrical, meaning that there were no outliers and lacked extreme kurtosis values (Garson, 2020)

The overall standard deviation value of 1.057 showed that all the government regulation sub-variables were not spread. Implying that there was a high internal consistency that could measure the same concept (government regulation).

4.4.7 Firm Performance

The study examined performance of private oil and gas firms. The results were shown in table 4.9

Table 4.9 Descriptive Statistics Results on Firms Performance

Statements	N	Min	Max	Mean	Std. Dev.	Skewness	Kurtosis
The company's annual operations costs had significantly reduced by per 3annum in the last three years.	358	1	5	4.20	1.05	-.009	-.592
The company's annual profits had improved by in the last three years.	358	1	5	4.06	1.01	.020	-.523
The carbon footprint of the company activities has improved over time.	358	1	5	4.15	1.04	.019	-.484
The company is increasingly using other possible types of energy than electricity for example, solar, wind for powering warehouses.	358	1	5	4.17	1.03	-.099	-.492
Company had progressively implemented the environmental management system (EMS) to create a greener workplace	358	1	5	4.27	1.06	-.064	-.696
The organization treats customers respectfully and is committed to sustainable deliveries of their products	358	1	5	4.13	1.04	-.183	-.524
Overall mean score				**4.16**	**1.03**	**-0.0527**	**-0.5528**

Source: Field Data, 2022

Findings in table 4.9 show that respondents admitted (M=4.20, SD=1.05) that their firms' annual operation costs have significantly reduced in the last three years due to the adoption as well as a commitment of greening their supply chains. Respondents admitted (M=4.06, SD=1.01) that the firms' annual profits had significantly improved in the last three years. Additionally, the respondents agreed (M=4.15, SD=1.04) that the carbon footprint of the companies' activities has improved over time due to greening of the distribution function. Further, it was agreed (M=4.17, SD=1.03) that the firms are increasingly using other possible types of energy than electricity for example, biogas,

geothermal, solar, or wind for lighting warehouses to cut down on energy use as well as reduction of GHG emissions. Further, respondents agreed (M=4.27, SD=1.06) that their firms have progressively implemented the environmental management system (EMS) to create a greener workplace reduce health and safety risks. Additionally, respondents admitted (M=4.13, SD=1.04) that their firms treat customers respectfully and are committed to sustainable product deliveries to reduce customer complaints.

From the overall mean score of 4.16, organizational performance was achieved by the firms through adoption of GSCM practices. The results agreed with Small (2017) who observed that if the firms in the private oil and gas sector institute appropriate organizational practices that include green practices, then, they have the capacity to gain improved economic value through minimization of operating costs. Gunarathne (2021) agrees with the results by establishing that there was a significant positive connection amongst GSCM strategies on performance of the production industry. The outcome of the analysis is also in agreement with Kirat (2015) who noted that adoption of GSCM practices and a commitment towards decarbonization in all the private oil and gas activities enhance environmental efficiency.

Skewness of the firm performance items fell within the range -2 and +2 implying that the data was approximately symmetrical (Hair *et al*., 2022). The distribution lacked outliers and extreme skewness. Skewness aggregate score of -0.5528, indicated that there was a slightly longer tail to the left than to the right. Implying that the responses tending towards one were few than the ones tending towards five. The firm performance items showed a kurtosis < 3, implying that the distribution was light tailed containing a platykurtic shape. This disclosed that the data was approximately symmetrical, meaning that there were no outliers and lacked extreme kurtosis values (Garson, 2020)

The overall standard deviation value of 1.03 showed that all the firm performance sub-variables

were not spread. Implying that there was a high internal consistency that could measure the same concept (firm performance).

4.5 Factor Analysis

Factor analysis is a statistical technique used to reduce a large number of variables into a few factors. This method extracts maximum common variance from all variables and puts them into a common score (Williams, Osman & Brown, 2010). Factor analyzes were performed to identify heavily loaded objects to enable retain significant ones for further analyzes. This was important because a large number of objects in a variable have the possibility of making the study to be somewhat difficult to conduct. The sub-variables retained were utilized for further inquiry.

The appropriateness of factor examination about the magnitude of the sample for the study, was confirmed. The sample size for this study was 470, which was ascertained to be adequate. The study utilized Kaiser-Meyer-Olkin (KMO) as well as the Bartlett's Test to determine the variables not to be dropped resulting from the principal components analysis (PCA). The KMO value was used to measure sampling adequacy. KMO is a test to examine the strength of the partial correlations between the variables. According to Kaiser (1974) KMO value of 0.5 or more is satisfactory for factor analysis to proceed. The Kaiser principle for not dropping factors with eigenvalues exceeding one (1) was also used (Yong and Pearce, 2013).

The Instruments' validity was measured through Bartlett's Test of Sphericity (Muhammad, 2009). This test is utilized to test the null hypothesis that the correlation matrix is an identity matrix. The identity correlation matrix shows that the variables are uncorrelated and thus not suitable for factor analysis. A significant statistical test ($p<0.05$), indicates that the correlation matrix is indeed not the identity matrix (rejection of the null hypothesis). In this research, after the Kaiser-Meyer-Olkin (KMO) and Bartlett's Tests were conducted and analyzed, factor analyzes were carried out for all the research variables.

4.5.1 Principal Component Analysis for Green Procurement

The study validated data for green procurement using factor analysis utilizing SPSS version 22. The outcome of the factor analysis through extraction by principal component technique as well as rotating through varimax were defined as indicated in table 4.10 below.

Table 4.10 Factor Analysis for Green Procurement

Rotated Component Matrix[a]

	Component 1	
Use of recyclable packaging materials is encouraged by your company	.748	
Company buys from suppliers who comply with environmental rules and laws.	.748	
Company provides design guidelines on green requirements to suppliers for bought items	.755	
Company cooperates with suppliers to enable achieve green goals through supplier collaboration and green trainings	.755	
Company develops green training materials and trains staff handling procurement in the company.	.711	
Company purchases fuel efficient devices and equipment	.777	
Company selects suppliers with ISO certification and conduct green audits amongst them.	.704	
Total Variance Explained		
Initial Eigenvalue	3.864	
% of Variance	55.193	
Cumulative %	55.193	
KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.908
Bartlett's Test of Sphericity	Approx. Chi-Square	921.816
	Df	21
	Sig.	.000

Extraction Method: Principal Component Analysis.
Rotation Method: Equamax with Kaiser Normalization.
a. 1 component extracted

Source: Field Data, 2022

Results in table 4.10 showed that the 7 items for green procurement had factor loadings that were above 0.5 and were all put through principal component analysis by use of SPSS version 22. Before carrying out the process of principal component analysis, measurements of data suitability for factor analysis were conducted. Any item which had factor loadings exceeding 0.5 was retained. Results in table 4.10 further showed that the 7 items had their factor loadings exceeding 0.5 and were all retained. The retained items were subjected to further analyses.

The results further revealed that Kaiser- Meyer-Olkin (KMO) measure value for sampling adequacy was 0.908. The KMO statistic value was more than the proposed value of 0.6 (Kaiser 1970, 1974). According to Bartlett (1954) the results in table 4.11 following Bartlett's Test of Sphericity, was significant, having a corresponding p-value =.000, that was smaller than the significance level of 0.05 (Bartlett's test= (921.816, P<0.05), indicating that the data for the green procurement variable was suitable for factor analysis.

Similarly, the findings showed that Principal component analysis had one component with Eigen value of 3.864 that was above 1 and accounted for 55.19% of the variance. Sub-variables fit into a component when the loading matches to that specific component as well as being relatively bigger as compared to the loadings generated by the other components. The total variance explained by the one component was 55.19 %.

4.5.2 Principal Component Analysis for Green Distribution

The study did data validation for green distribution using factor analysis through SPSS version 22. The outcome of the factor analysis through extraction by principal component technique as well as rotating through varimax, were defined as shown in the table 4.11 below

Table 4.11 Factor Analysis for Green Distribution

Rotated Component Matrix[a]

	Component 1
Company uses ecofriendly packaging materials and distribution containers/ Company uses biodegradable packaging materials.	.715
Company storage facilities are certified as ecofriendly through ecological management certification, for example ISO 14000	.743
Company ensures that all products are eco-labelled for customers to know whether they are ecofriendly or not	.674
Company encourages fuel efficient types of delivery to customers to save energy	.721

Total Variance Explained

Initial Eigen value	2.037
% of Variance	50.935
Cumulative %	50.935

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.737
	Approx. Chi-Square	201.464
Bartlett's Test of Sphericity	Df	6
	Sig.	.000

Extraction Method: Principal Component Analysis.
Rotation Method: Equamax with Kaiser Normalization.
a. 1 component extracted

Source: Field Data, 2022

Results from table 4.11 showed the 4 items representing green distribution, had factor loadings that were above 0.5 and were all put through principal component analysis by utilizing SPSS version 22. Preceding the process of principal component analysis, the measurements of data fitness for factor analysis were undertaken. Items which had factor loadings exceeding 0.5 were retained. Results in table 4.11 clearly showed that the 4 items had their factor loadings exceeding 0.5 and were all retained. The retained items were subjected to further analyses.

The results further revealed that Kaiser- Meyer-Olkin (KMO) measure value for sampling adequacy was 0.737. The KMO statistic was more than the recommended value of 0.6 (Kaiser 1970, 1974). According to Bartlett (1954) the results in table 4.12 following Bartlett's Test of Sphericity, was significant, having a corresponding p-value = .000, that was smaller than the significance level of 0.05 (Bartlett's test= (201.464, P<0.05), showing that data for green distribution variable was suitable for factor analysis.

Equally, the findings showed that Principal component analysis had one component with Eigen value of 2.037 that was greater than 1 and accounted for 50.94 % of the change. Sub-variables fit into a component when the loading matches to that specific component as well as being relatively bigger as compared to the loadings generated by the other components. The total variance explained by the one component was 50.94 %.

4.5.3 Principal Component Analysis for Green Manufacturing

The study validated data for green manufacturing using factor analysis utilizing SPSS version 22. The outcome of the factor analysis through extraction by principal component technique as well as rotating through varimax were defined as indicated in table 4.12 below.

Table 4.12 Factor Analysis for Green Manufacturing

Rotated Component Matrix[a]

	Component 1
Company gives priority to returned materials for production than using virgin raw materials.	.696
Company is totally dedicated to green manufacturing.	.723
Company encourages use of renewable energy during production.	.737
Company designs products that cannot lead to high damage rates, high delivery costs and with low carbon footprints	.679
Company monitors and controls unsafe and dangerous emissions by using filters and other methods.	.761
Workers are involved and undertake trainings on green production to improve their understanding on the consequences of their activities on the natural surroundings.	.717

Total Variance Explained

Initial Eigenvalue	3.104
% of Variance	51.741
Cumulative %	51.741

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.861
	Approx. Chi-Square	586.867
Bartlett's Test of Sphericity	Df	15
	Sig.	.000

Extraction Method: Principal Component Analysis.
Rotation Method: Equamax with Kaiser Normalization.
a. 1 component extracted

Source: Field Data, 2022

Output from table 4.12 showed that the 6 items for green manufacturing exhibited factor loadings

that were above 0.5 and were put through principal component analysis by using SPSS version 22.

Before the process of principal component analysis commenced, measurements of data fitness for factor analysis were conducted. An item that had factor loadings exceeding 0.5 was retained. Results in table 4.12 further indicated that the 6 items had their factor loadings exceeding 0.5 and were all retained. The retained sub-variables were subjected to further analyses.

The outcome further revealed that Kaiser- Meyer-Olkin (KMO) measure value for sampling adequacy was 0.861. The KMO statistic was more than the proposed value of 0.6 (Kaiser 1970, 1974). According to Bartlett (1954) the results in table 4.13 following Bartlett's Test of Sphericity, was significant, having a corresponding p-value = .000, that was smaller than the significance level of 0.05 (Bartlett's test= (586.867, P<0.05), showing that data for green manufacturing variable was fit for factor analyzes.

Equally, the results showed that Principal component analysis had one component with Eigen value of 3.104 that was above 1 and accounted for 51.74 % of the change. The items fit into a component when the loading matches to that specific component as well as being relatively bigger as compared to the loadings generated by the other components. The total variance explained by the one component was 51.74 %.

4.5.4 Principal Component Analysis for Reverse Logistics

This study tested data verification for reverse logistics using factor analysis utilizing SPSS version 22. The outcome of the factor analysis through extraction by a principal component technique as well as rotating through varimax, are defined in table 4.13 below

Table 4.13 Factor Analysis for Reverse Logistics

Rotated Component Matrix[a]

	Component
	1
There is a proper system in place for disposal of all forms of materials e.g. hazardous materials	.734
Company encourages recycling and reusing of returned materials that have residual value.	.708
Company has a policy on products and packages return or take back	.723
Company has installed drop of points for collection of returned packages	.754
The company encourages waste management and exchanges	.665

Total Variance Explained

Initial Eigen value	2.573
% of Variance	51.469
Cumulative %	51.469

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.815
Bartlett's Test of Sphericity	Approx. Chi-Square	383.241
	Df	10
	Sig.	.000

Extraction Method: Principal Component Analysis.
Rotation Method: Equamax with Kaiser Normalization.
a. 1 component extracted

Source: Field Data, 2022

Results indicated above, in table 4.13, revealed that the 5 items for reverse logistics showed factor loadings that were above 0.5 and were put through principal component analysis by using SPSS version 22. Prior to the process of principal component analysis started, measurements of data fitness for factor analysis were carried out. Any item which had factor loadings exceeding 0.5 was retained. Results in table 4.13 further indicated that the 5 items had their factor loadings exceeding 0.5 and were all retained. The retained items were subjected to further analyses.

The outcome further revealed that Kaiser- Meyer-Olkin (KMO) measure value for sampling adequacy was 0.815. The KMO statistic value was more than the proposed value of 0.6 (Kaiser 1970, 1974). According to Bartlett (1954) the results in table 4.14 following Bartlett's Test of Sphericity, was significant, having a corresponding p-value = .000, that was smaller than the significance level of 0.05 (Bartlett's test= (383.241, P<0.05), showing that data for reverse logistics variable was fit for factor analyses.

Further, the results showed that principal component analysis had one component with Eigen value of 2.573 that was above 1 and accounted for 51.47% of the change. Sub-variables fit into a component when the loading matches to that specific component as well as being relatively bigger as compared to the loadings generated by the other components. The total variance explained by the one component was 51.47 %.

4.5.5 Principal Component Analysis for Waste Management

This study measured data authentication for waste management factor analysis utilizing SPSS version 22. The outcome of the factor analysis through extraction by a principal component technique as well as rotating through varimax, were shown in the table 4.14 below

Table 4.14 Factor Analysis for Watse Management

Rotated Component Matrix^a

	Component
	1
Company minimizes the garbage generated through environmental management system (EMS) procedure.	.699
The company recycles or reuses the waste which have residual value	.720
Company gives special inducement promotions on reusing of waste	.725
Company observes regulatory compliance through laws and regulations to manage waste	.731
Company practices proper disposal of waste materials	.654

Total Variance Explained

Initial Eigen value	2.495
% of Variance	49.905
Cumulative %	49.905

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.795
Bartlett's Test of Sphericity	Approx. Chi-Square	354.775
	Df	10
	Sig.	.000

Extraction Method: Principal Component Analysis.
Rotation Method: Equamax with Kaiser Normalization.
a. 1 component extracted

Source: Field Data, 2022

Table 4.14 findings showed that the 5 items for waste management indicated factor loadings that were greater than 0.5 and were subjected to principal component analysis using SPSS version 22. Before the process of principal component analysis begun, measurements of data suitability for factor analysis were conducted. Any item which had factor loadings exceeding 0.5 was retained. Results in table 4.14 further indicated that the 5 items had their factor loadings exceeding 0.5 and were all retained. The retained sub-variables were subjected to further analyses.

The results further revealed that Kaiser- Meyer-Olkin (KMO) measure value for sampling adequacy

was 0.795. The KMO value was more than the proposed value of 0.6 (Kaiser 1970, 1974). According to Bartlett (1954) the results in table 4.15 resulting from Bartlett's Test of Sphericity, was significant, having a corresponding p-value = .000, that was smaller than the significance level of 0.05 (Bartlett's test= (354.775, P<0.05), showing that data for waste management variable was suitable for factor analyses.

Further, the results showed that principal component analysis had one component with Eigen value of 2.495 that was above 1 and accounted for 49.91% of the change. Sub-variables fit into a component when the loading matches to that specific component as well as being relatively bigger as compared to the loadings generated by the other components. The total variance explained by the one component was 49.91%.

4.5.6 Principal Component Analysis for Government Regulations.

This study tested the confirmation of data for government regulations using factor analysis utilizing SPSS version 22. The outcome of the factor analysis through extraction by a principal component technique as well as rotating through varimax were defined in the table 4.15 below

Table 4.15 Factor Analysis for Government Regulation

Rotated Component Matrix^a

Source: Field Data, (2022)	Component 1
A comprehensive environmental policy that guides operations exist in your company	.681
During the adoption of GSCM practices government regulation bears great influence in the level of adoption that affect company performance	.701
Compliance with environmental regulatory framework increases company performance	.729
State regulation is a major aspect that make organizations to embrace GSCM practices that results into greater company performance	.740
Internal and external ecological motivators have played a major role in GSCM implementation that enhance company performance	.744

Total Variance Explained

Initial Eigen Value	2.588
% of Variance	51.765
Cumulative %	51.765

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.815
	Approx. Chi-Square	390.121
Bartlett's Test of Sphericity	Df	10
	Sig.	.000

Extraction Method: Principal Component Analysis.
Rotation Method: Equamax with Kaiser Normalization.
a. 1 component extracted

Source: Field Data, 2022

The research findings in table 4.15 indicated that the 5 items for government regulation had factor loadings that exceeded 0.5 and were all subjected to principal component analysis through SPSS version 22. Prior to carrying out any principal component analysis, measurements of data appropriateness for factor analysis were conducted. Items which had factor loadings exceeding 0.5 were retained. Results in table 4.15 further showed that the 5 items had their factor loadings

exceeding 0.5 and were all retained. The retained items were subjected to more analyses.

The results further revealed that Kaiser- Meyer-Olkin (KMO) measure value for sampling adequacy was 0.815. The KMO value was more than the proposed value of 0.6 (Kaiser 1970, 1974). According to Bartlett (1954) the results in table 4.16 resulting from Bartlett's Test of Sphericity, was significant, having a corresponding p-value = .000, that was smaller than the significance level of 0.05 (Bartlett's test= (390.121, P<0.05), indicating that the data for government regulation variable was suitable for factor analyses.

Similarly, the findings showed that Principal component analysis had one component with Eigen value of 2.588 that exceeded 1 and explained for 51.77% of the change. Sub-variables fit into a component when the loading matches to that specific component as well as being relatively bigger as compared to the loadings generated by the other components. The total variance explained by the one component was 51.77%.

4.5.7 Principal Component Analysis (PCA) for Firm Performance

This research verified the authentication of the information for firm performance using factor analysis through the SPSS software, version 22. Output of the factor examination through extraction by principal component technique and rotating through varimax, were defined in table 4.16 below.

Table 4.16 Factor Analysis for Firm Performance

Rotated Component Matrix^a

	Component
	1
The company's annual operations costs have significantly reduced in the last three years.	.671
The company's return on equity have significantly improved in the last 3 years.	.659
The carbon footprint of the company activities has been improving over time.	.706
The company is increasingly using other possible types of energy than electricity for example, biogas, geothermal, solar, or wind for lighting facilities.	.708
Company has progressively recorded less employee fatalities injuries at the workplace for the last three years.	.667
The organization treats customers politely, communicates with them effectively and timely on their product deliveries	.722

Total Variance Explained

Initial Eigenvalue	2.850
% of Variance	47.500
Cumulative %	47.500

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.854
Bartlett's Test of Sphericity	Approx. Chi-Square	454.065
	Df	15
	Sig.	.000

Extraction Method: Principal Component Analysis.
Rotation Method: Equamax with Kaiser Normalization.
a. 1 component extracted

Source: Field Data, 2022

The research findings in table 4.16 indicated that the 6 items for firm performance had factor loadings that exceeded 0.5 and were all subjected to principal component analysis through SPSS version 22. Prior to carrying out any principal component analysis, measurements of data appropriateness for factor analysis were conducted. Items which had factor loadings exceeding 0.5 were retained. Results in table 4.16 showed that the 6 items had their factor loadings exceeding 0.5 and were all retained. The retained items were subjected to further analyses.

The results further revealed that Kaiser- Meyer-Olkin (KMO) measure value for sampling adequacy was .854. According to Kaiser (1970, 1974) this KMO statistic value was more than the proposed statistic of 0.6. According to Bartlett (1954) the results in table 4.10 following Bartlett's Test of Sphericity, was significant having a corresponding p-value = .000, that was smaller than the significance level of 0.05 (Bartlett's test= (454.065, P<0.05), indicating that the data for firm performance variable was suitable for factor analysis.

Further, the findings showed that Principal component analysis had one component with Eigenvalue of 2.850 that exceeded 1 and accounted for 47.50 % of the change. Sub-variables fit into a component when the loading matches to that specific component as well as being relatively bigger as compared to the loadings generated by the other components. The total variance explained by the one component was 47.50 %.

4.6 Diagnostic Tests

The study examined direct links among GSCM practices and private oil and gas firms' performance in Kenya. Prior to this, assumptions of regression had been tested. Data used for any analysis had first to satisfy the assumptions of the scientific procedures (Garson, 2012). This was so because the investigator had to validate the nature of the information as well as pinpoint the pertinent study model which satisfied the principles of impartiality, steadfastness and appraisals that are competent. For this reason, assumptions of normality, linearity, multicollinearity and heteroscedasticity were conducted to ensure that the data met them. If the assumptions were not tested, it could lead to poor estimations from the regression as well as the regression coefficients, doubtful p-values including standard errors and the statistical significance tests that are biased (Keith, 2006). The interpretations and conclusions of the models might not be reliable as well as valid. The outcome from these assumption tests informed further tests of prediction as well as relationships.

4.6.1.1 Normality Test

In regression analysis, normality is assumed to have variables that are normally distributed. Normality is also assumed to be achieved when the scores in a continuous concept is dispersed around a mean (Silverman, 2016). This research used the P-P plot to test for normality by visually checking the goodness of fit of a specific distribution. It is a quick way to check whether the data is normally distributed. The interpretation of the P-P plot was that when data points are near the diagonal line, the data is said to be normally distributed. When the supposition of normality does not hold, interpretations and conclusions might not be reliable as well as valid. The outcome of the normality tests is shown in figure 4.1 below

Figure 4.1: PP Scatter Plot
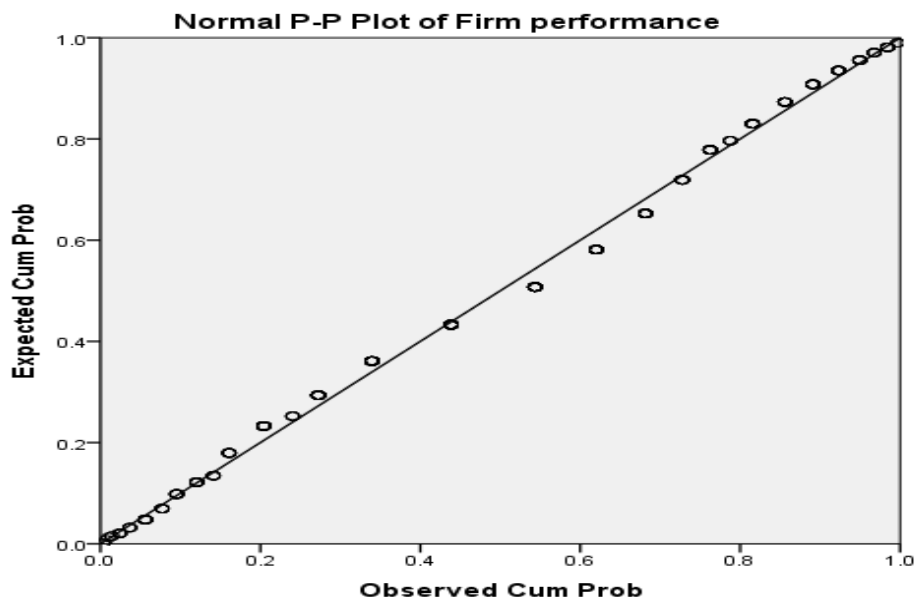
Figure 4.1: PP Scatter diagram
Source: Field Data, 2022

Results from figure 4.1 showed a normally distributed data since the data points were along the line of best fit. Consequently, the data was suitable for parametric test like correlation examination as well as regression analyses. This result was also supported by a visual check of figure 4.2 histogram below.

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Figure 4.2: Histogram
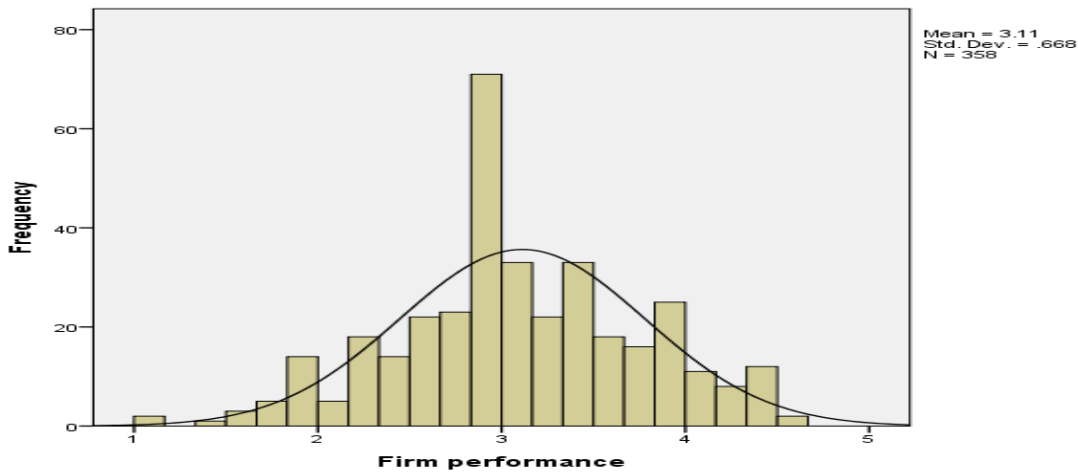
Figure 4.2 Histogram
Source: Field Data, 2022

Figure 4.2 above indicate a bell shaped as well as symmetrical histogram. It means the data was normally distributed and suitable for correlation as well as regression analyses

4.6.1.2 Linearity test P-P Scatter Plot

Linearity occurs when the explanatory variables in a regression shows a straight-line association with the criterion variable. Multiple regression does precisely evaluate the association between the outcome and the predictor variables when found that the link between them is in a straight-line (Osborne & Waters, 2002). If the assumption of linearity is not achieved, then the estimations from the regression as well as the regression coefficients including standard errors plus the numerical significance tests might be biased (Keith, 2006). This study used the P-P scatter plot to ascertain the linearity of data. The P-P plot uses a graph to visually check the goodness of fit of a specific distribution. The interpretation of the P-P plot is that when data points were near the diagonal line, the data is said to be linear. If the data were dispersed away from the diagonal line, then the data were taken not to be linear.

Figure 4.3: Linearity Test P-P Scatter plot.
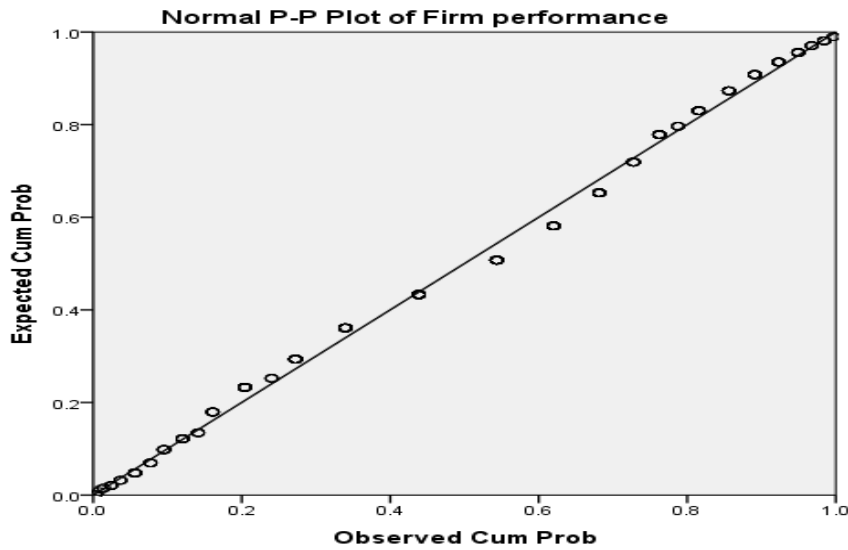
Figure 4.3: P-P scatter plot.
Source: Field Data, 2022

The result from the P-P plot showed that the variables were linearly distributed since the data points fell along the line of best fit. This implied that the data was linear and could be subjected to regression and correlation analyses. This result was also supported by the deviations from linearity test table 4.17 below.

Table 4.17 Deviations from Linearity Test Results

		Sum of Squares	df	Mean Square	F	Sig.
Firm performance * Green procurement	Deviation from Linearity	1.785	10	.178	.802	.626
Firm performance * Green manufacturing	Deviation from Linearity	9.028	19	.475	2.545	.449
Firm performance * Green distribution	Deviation from Linearity	24.935	30	.831	3.841	.373
Firm performance * Reverse logistics	Deviation from Linearity	27.607	33	.837	1.463	.202
Firm performance * Waste management	Deviation from Linearity	5.056	22	.230	.856	.654
Firm performance * Government regulation	Deviation from Linearity	.968	10	.097	.386	.952

Source: Field Data, 2022

Results from Table 4.17 indicated that all the independent variables did not have significant deviations from the response variable (p>0.05). This implied that that the assumption of linearity was met and hence suitable for further analyses.

4.6.1.3 Test for Multi-collinearity

Multicollinearity occurs when explanatory variables in a regression model get highly interrelated or associated (Ali *et al*., 2013). It is a statistical phenomenon where two or more independent variables in a multiple regression model are highly correlated (Shrestha, 2020). This study used the variance inflation factor (VIF) to measure the effect of collinearity between variables in a regression model. When the explanatory variables often overlap, the capability of the investigator to identify the individual influence of the variables is weakened. Hence it was important to conduct a multicollinearity test on the explanatory variables (green procurement, green manufacturing, green distribution, reverse logistics, waste management and government regulation), prior to conducting a regression analysis. There will be no multicollinearity when the VIF figures are less than 10 as well as the tolerance is greater than 0.1 (Williams, 2015). With multicollinearity, it is difficult to fit the model as well as deduce the findings, if the degree of inter-correlations or associations amongst explanatory variables is big enough.

Table 4.18 Multi-collinearity Test

Variable	Tolerance	VIF
Green procurement	.250	4.007
Green manufacturing	.318	3.148
Green distribution	.393	2.543
Reverse logistics	.249	4.010
Waste management	.406	2.464
Government regulation	.317	3.158

Source: Field Data, 2022

The findings show that the VIF values ranged from 2.464 to 4.010 that were not more than 10 and the tolerance scores were from .249 to .406 and were more than 0.1. This implied that there was no

multicollinearity among the predictor variables of this research and thus, the data was suitable for further analyses.

4.6.1.4 Homoscedasticity Test

Prior to conducting regression analyses, the data was subjected to a test for homoscedasticity, that is, checking whether the dataset had constant error variance. If the variance of all the observations was established to be identical to one another, then, it was homoscedastic. If the dataset did not exhibit constant error variance, then it was heteroscedastic. For homoscedasticity, ordinary least square (OLS) regression assumes that all residuals were drawn from a population that had constant variance. In this study, homoscedasticity was tested by Q-Q scatter plot (Schutzenmeister, Jensen & Piepho, 2012). Through a visual inspection of the dispersed area, if the error terms are similar across the ranges of the independent variables, the data was ascertained to be homoscedastic.

Figure 4.4 Homoscedasticity Plot Chart
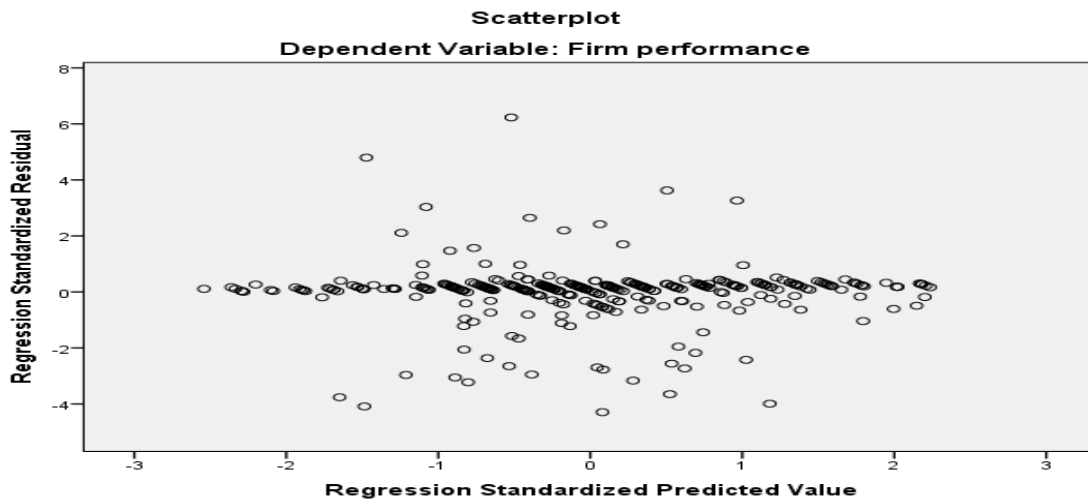
Figure 4.4 Homoscedasticity Plot Chart
Source: Field Data, 2022

Results from the scatterplot indicated in figure 4.4, disclosed that the data points are distributed equally above as well as below zero on x-axis as well as to the right and left of y-axis. The findings show that through a visual inspection of the scatter plot, the spread of the data was found to be

constant across the range of the explanatory variables. Hence the homoscedasticity assumption of

variance was met and, therefore, the data was subjected for further regression analysis.

Homoscedasticity is also tested using the Q-Q Scatter Plot figure 4.5 shown below

Figure 4.5: Q-Q Scatter Plot
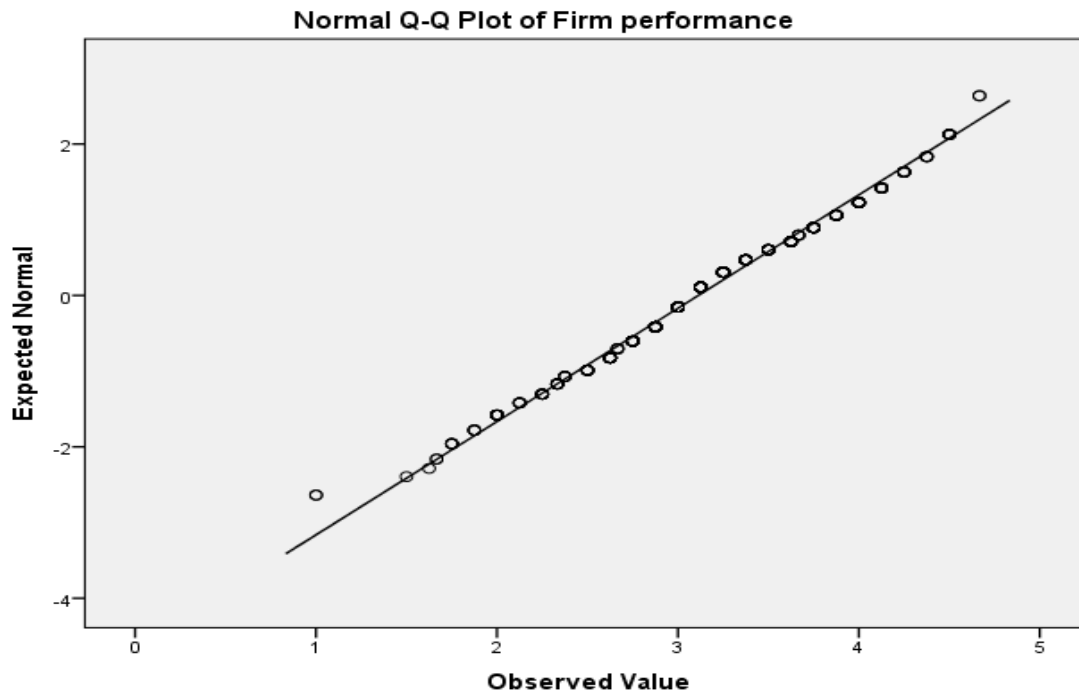
Figure 4.5 Q-Q Scatter Plot
Source: Field Data, 2022

Result of figure 4.5 showed that through a visual inspection of the dispersed area, the error terms

were similar across the ranges of the independent variables, the data was ascertained to be

homoscedastic and fit for regression analyses.

4.7 Inferential Statistics

4.7.1 Correlation Analysis

The correlation procedure was utilized to examine the extent of association existing between two

concepts (Chadha and Gagandeep, 2013). Correlation analysis was conducted to establish the

direction as well as the strength of associations amongst the variables to be measured. The research used the Pearson product moment correlation coefficient (r) to determine the strength of the linear relationship between green supply chain management practices and performance of private oil and gas firms.

Correlation coefficient (r) measures the extent as well as the direction of the association between two individual variables. The Pearson correlation coefficient assumes values between +1 (perfect positive correlation) and -1 (perfect negative correlation). When the correlation coefficient tends towards -1 or +1, the correlation becomes stronger while when it tends towards zero, the correlation between the variables becomes weaker. A figure of zero shows no association between two variables. If the coefficient is 0.1 to 0.29 the relationship is weak. When the coefficient is 0.3 to 0.59 the relationship is moderate. When the coefficient is 0.6 to 0.7, the relationship is strong. The results of the correlation analysis are shown in Table 4.19 below

Table 4.19: Results for Correlation Analysis

		Green procurement	Green distribution	Green manufacturing	Reverse logistics	Waste management	Firm performance
Green procurement	Pearson Correlation	1					
	Sig. (2-tailed)						
	N						
Green distribution	Pearson Correlation	.469**					
	Sig. (2-tailed)	.000	1				
	N	358					
Green manufacturing	Pearson Correlation	.509**	.495**				
	Sig. (2-tailed)	.000	.000	1			
	N	358	358				
Reverse logistics	Pearson Correlation	.765**	.406**	.364**			
	Sig. (2-tailed)	.000	.000	.000	1		
	N	358	358	358			
Waste management	Pearson Correlation	.484**	.741**	.400**	.414**		
	Sig. (2-tailed)	.000	.000	.000	.000	1	
	N	358	358	358	358		
Firm performance	Pearson Correlation	.711**	.633**	.740**	.668**	.637**	
	Sig. (2-tailed)	.000	.000	.000	.000	.000	1
	N	358	358	358	358	358	358

**. Correlation is significant at the 0.01 level (2-tailed).

Source: Field Data, 2022

Findings presented in table 4.19 indicates that GSCM practices; green procurement, green distribution, green manufacturing, reverse logistics and waste management exhibited a statistically significant correlation with firm performance. In particular, the correlation analysis showed that there was a strong and positive correlation between green procurement and firm performance. The p-value = .000, indicating that the association was significant, (r=.711, n= 358, p<0.05). This implied that green procurement strongly determined firm performance of private oil and gas firms in Kenya. The correlation analysis results further showed that there was a strong and positive

correlation between green distribution and firm performance. The p-value = .000, meaning that the connection was significant, (r=.633, n=358, p<0.05). This implied that green distribution strongly determined firm performance of private oil and gas firms in Kenya.

Similarly, the correlation examination revealed that there was a strong and positive correlation between green manufacturing and firm performance. The p-value =.000, indicating that the association was significant (r= .740, n=358, p<0.05). This meant that green manufacturing strongly determined firm performance of private oil and gas firms in Kenya. The results of the correlation analysis further showed that there existed a strong and positive correlation between reverse logistics and firm performance. The p-value = .000, implying that the association was significant, (r=.668, n=358, p<0.05). This was evidence enough that reverse logistics strongly determined firm performance of private oil and gas firms in Kenya. The correlation analysis, at the same time, revealed that there was a strong and positive correlation between waste management and firm performance. The p-value=.000, implying the relationship was significant (r=.637, n=358, p<0.05). This meant that waste management strongly determined firm performance of private oil and gas firms in Kenya

These results are similar with previous studies conducted by Ndua and Were (2018), Gunarathne (2021), Abba *et al* (2021), Sarhaye and Marendi (2017) who established that GSCM practices had a significant association with firm performance. However, Akali and Imam (2016) established no positive link amongst GSCM practices and the environmental performance dimension.

4.7.2 Regression Analysis

The outcome of the hypotheses testing, numerical examination as well as the interpretation of the connections amongst numerous constructs being investigated are presented including; to establish influence of green procurement on performance, to establish the influence of green distribution on

performance, to establish the influence of green manufacturing on performance, to establish the influence of reverse logistics on performance, to establish the influence of waste management on performance, to establish the moderating influence of government regulation on the relationship between green procurement on performance of private oil and gas firms in Kenya, to establish the moderating influence of government regulation on the relationship between green manufacturing on performance of private oil and gas firms in Kenya, to establish the moderating influence of government regulation on the relationship between green distribution on performance of private oil and gas firms in Kenya, to establish the moderating influence of government regulation on the relationship between reverse logistics on performance of private oil and gas firms in Kenya and to establish the moderating influence of government regulation on the relationship between waste management on performance of private oil and gas firms in Kenya.

The outcome from the multiple linear regression examination were utilized to interpret the results. The p-values, $p<0.05$ meant a statistically significant association while $p>0.05$ showed a non-significant relationship. F-value showed the statistical significance level of the overall model while the T-values showed the significance level of individual variables. The R-value showed the power of the correlation between the research variables. The R^2-value disclosed the extent to which parameters are explained by explanatory variables. The Beta (β)-values indicated a positive or a negative influence of the explanatory variable on the response variable. The results could be significant if the calculated F value is greater that the F critical value. The regression equation models were formulated from the Beta values in the coefficient tables.

4.7.2.1 Green Procurement on Firm Performance

The first specific objective was to stablish the influence of green procurement on performance of private oil and gas firms in Kenya. It was predicted that green procurement did not have a statistically significant influence on performance of private oil and gas firms in Kenya. Hence, a

simple linear regression model was utilized to establish the association between green procurement

and firm performance. The hypothesis was tested by the model below;

$$Y = \beta_0 + \beta_1 X_1 + \varepsilon. \quad \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \; \textbf{i}$$

Where;

Y= firm performance

β_0 = regression intercept

β_1 is the coefficient of green procurement

X_1 is green procurement

ε = error term

Table 4.20a presents a model summary that gives R, R^2, adjusted R^2 as well as the Standard error

estimates that could be utilized to fix how good the study model fits the research information.

Further, table 4.20a presents the model summary of the influence of green procurement on firm

performance.

Table 4.20a the Model Summary for Green Procurement

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.711[a]	.506	.504	.47031

a. Predictors: (Constant), Green procurement
b. Dependent Variable: Firm performance
Source: Field Data, 2022

Results in table 4.20a, shows that the influence of green procurement had a correlation coefficient

(R) of 0.711 that is positive. In addition, the research had the coefficient of determination R^2=.506,

implying that the green procurement model accounted for 50.6% of the variation in performance

of private oil and gas firms in Kenya while 49.4% of the change in performance was explained by

other factors.

The ANOVA outcome is shown in table 4.20b. ANOVA is an instrument used to establish the

fitness of a model in predicting the connection between the criterion variable and the explanatory

variable.

Table 4.20b ANOVA[a] for Green Procurement

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	71.087	1	71.087	286.894	.000[b]
	Residual	88.210	356	.248		
	Total	159.296	357			

a. Dependent Variable: Firm performance
b. Predictors: (Constant), Green procurement
Source: Field Data, 2022

In table 4.20b, the ANOVA model disclosed the model fitness for the effect of green procurement on firm performance, which is statistically significant (F=286.894, p=.000<0.05) for a normally distributed data. Conventionally, when the calculated F-value is more than the critical value, it demonstrates that the model is fit for the dependent variable to be predicted by the independent variable. The results of the model show computed F=286.894, is greater than the critical F= 3.85 (1, 357), at α = 0.05. Demonstrating that the model is fit to predict the effect of green procurement on performance of private oil and gas firms in Kenya. Implying that the model significantly explains the variation in firm performance. Consequently, the null hypothesis (**H$_{01}$**) was rejected

The outcome on green procurement agrees with those established by Omusebe *et al* (2017) that implementing green purchasing improves performance in areas of costs, lead time as well as quality that are critical in purchasing management in organizations. Karim *et al* (2017) did a study in Saudi Arabia entitled, does green procurement improve organizational performance? The result showed that combined sustainable procurement (SP) practices revealed a significant relationship with the firm's performance.

Regression coefficients table 4.20c below determined a mean variation in firm performance for individual unit variation in green procurement. Beta coefficients account for the extent that firm performance varies because of a unit variation in the use of green procurement.

Table 4.20c Coefficients [a] for green procurement

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.331	.108		12.272	.000
	Green procurement	.573	.034	.711	16.938	.000

a. Dependent Variable: Firm performance
Source: Field Data, 2022

Tables 4.20c shows that $\beta_0 = 1.331$, denoting that if all other factors were kept constant, performance of private oil and gas firms would be 1.331. Additionally, coefficient of green procurement was 0.573, meaning that a unit increase in green procurement having other factors constant at zero, would lead to 0.573 increase in performance of private oil and gas firms in Kenya.

The model:

$Y = \beta_0 + \beta_1 X_1 + \varepsilon$, keeping all the other factors at zero, leads to the derivation of the equation below.

$$Y = 1.331 + .573X_1$$

This clearly shows that a unit variation in the use of green procurement practices resulted to 0.573 units increase in firm performance.

The hypothesis for this objective outlined in chapter one ''green procurement does not have a statistically significant influence on performance of private oil and gas firms in Kenya'', was tested. The outcome of the test was as follows;

The model summary outcome showed that the coefficient of determination $R^2 = .506$ and $p < 0.05$. Implying that keeping other factors at zero, green procurement, accounted for 50.6% of the variation in performance of private oil and gas firms in Kenya. The coefficients outcome disclosed a beta of 0.573. The beta coefficient is positive, implying that a unit change in the use of green procurement leads to an improvement of firm performance by 0.573 units.

4.7.2.2 Green Distribution on Firm Performance

The next specific objective was to establish the influence of green distribution on performance of private oil and gas firms. The study predicted that green distribution did not have a statistically significant influence on performance of private oil and gas firms in Kenya. Consequently, a simple linear regression model was utilized to establish the association between green distribution and firm performance. The hypothesis was tested by the model below;

$Y = \beta_0 + \beta_2 X_2 + \varepsilon$..........................**ii**

Where;

Y = firm performance
β_0 is regression intercept
β_2 is the coefficient of green distribution
X_2 is green distribution
ε is error term

Table 4.21a shows a model summary that gives R, R^2, adjusted R^2 as well as Standard error of the estimate that are used to determine how well the study regression model, fits the research information. Further, table 4.21a displays the model summary of the influence of green distribution on firm performance.

Table 4.21a Model Summary for Green Distribution

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.633ᵃ	.401	.399	.51786

a. Predictors: (Constant), Green distribution

b. Dependent Variable: Firm performance

Source: Field Data, 2022

The outcome in table 4.21a, shows that the influence of green distribution had a correlation coefficient (R) of 0.633 that is positive. In addition, the research had the coefficient of determination R^2=.401, implying that the green distribution model accounted for 40.1% of the variation in performance of private oil and gas firms in Kenya while 59.9% of the change in performance was explained by other factors.

The ANOVA outcome was illustrated in table 4.21b. The Analysis of variance is a tool used to discover the fitness of a model in predicting the connection between the response variable and the independent variable

Table 4.21b ANOVAa for Green Distribution

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	63.824	1	63.824	237.992	.000[b]
	Residual	95.472	356	.268		
	Total	159.296	357			

a. Dependent Variable: Firm performance
b. Predictors: (Constant), Green distribution
Source: Field Data, 2022

In table 4.21b, the ANOVA model revealed the model fitness for the effect of green distribution on firm performance, which was statistically significant (F=237.992, p=.000<0.05) for a normally distributed data. Conventionally, when the calculated F-value is more than the critical value, it demonstrates that the model is fit for the dependent variable to be predicted by the independent variable. The results of the model show calculated F=237.992, is greater than the critical F= 3.85 (1, 357), at α = 0.05. Signifying that the model is fit to predict the effect of green distribution on performance of private oil and gas firms in Kenya. Implying that the model significantly explains the variation in firm performance. Accordingly, the null hypothesis (**H₀₂)** was rejected

The results on use of green distribution concur with those established by Rutere (2020) who observed that green distribution exhibited a significant influence on performance of the industrial companies. Chrisostom and Monari (2018) conducted research on the influence of green logistics management on performance of motorized organization of Kenya. The research established that some ecofriendly purchasing practices, for example green logistics management exhibited a significant influence on performance of motorized

Regression coefficients table 4.21c below determined a mean variation in firm performance for each unit variation in green procurement. Beta coefficients account for the extent to which firm performance varies because of a unit variation in the use of green distribution

.**Table 4.21c Coefficients^a for Green Distribution**

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.439	.112		12.866	.000
	Green distribution	.503	.033	.633	15.427	.000

a. Dependent Variable: Firm performance
Source: Field Data, 2022

Tables 4.21c shows that $\beta_0 =1.439$, denoting that if all other factors were kept constant, performance of private oil and gas firms would be 1.439. Additionally, coefficient of green procurement was 0.503, meaning that a unit increase in green procurement having other factors constant at zero, would lead to 0.503 increase in performance of private oil and gas firms in Kenya. The model:

$Y = \beta_0 + \beta_2 X_2 + \varepsilon$, keeping all the other factors at zero, leads to the derivation of the equation

$$Y=1.439 + .503X_2$$

This clearly shows that a unit variation in the use of green distribution practices resulted to 0.503 units increase in firm performance.

The hypothesis for this objective outlined in chapter one ''green distribution does not have a statistically significant influence on performance of private oil and gas firms in Kenya'', was tested. The outcome of the test was as follows;

The model summary outcome showed that the coefficient of determination $R^2 =.401$ and $p < 0.05$. Implying that keeping other factors at zero, green distribution, accounted for 40.1% of the variation in performance of private oil and gas firms in Kenya. The coefficient outcome disclosed a beta of 0.503. The beta coefficient is positive, implying that a unit change in the use of green distribution led to an increase of firm performance by 0.503 units.

4.7.2.3 Green Manufacturing on Firm Performance

The third specific objective was to establish the influence of green manufacturing on performance of private oil and gas firms in Kenya. A prediction was made that green manufacturing did not have a statistically significant influence on the performance of private oil and gas firms in Kenya. Hence, a simple linear regression model was utilized to assess the association between green manufacturing and firm performance. The hypothesis was tested by the model below;

$$Y = \beta_0 + \beta_3 X_3 + \varepsilon \dots\dots\dots\dots\dots\dots\dots\text{iii}$$

Where;
Y is firm performance
β_0 is regression intercept
β_3 is the coefficient of green manufacturing
X_3 is green supply chain manufacturing
ε is error term

Table 4.22a shows a model summary that gives R including R^2 and adjusted R^2 as well as the Standard error of the estimate that are utilized to establish how good the study model represents the research information. Further, table 4.22a displays the model summary of the influence of green manufacturing on firm performance.

Table 4.22a Model Summary for Green Manufacturing

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.740ᵃ	.548	.547	.44957

a. Predictors: (Constant), Green manufacturing
b. Dependent Variable: Firm performance
Source: Field Data, 2022

The outcome in table 4.22a, shows that the influence of green manufacturing had a correlation coefficient (R) of 0.740 that is positive. In addition, the research had the coefficient of determination R^2=.548, implying that the green manufacturing model accounted for 54.8% of the variation in performance of private oil and gas firms in Kenya while 45.2% of the change in performance was explained by other factors.

The ANOVA outcome was illustrated in table 4.22b. The Analysis of variance is a tool used to

discover the fitness of a model in predicting the connection between the response variable and the

independent variable

Table 4.22b ANOVAa for Green Manufacturing

Model		Sum of Squares	Df	Mean Square	F	Sig.
	Regression	87.344	1	87.344	432.150	.000[b]
1	Residual	71.953	356	.202		
	Total	159.296	357			

a. Dependent Variable: Firm performance
b. Predictors: (Constant), Green manufacturing
Source: Field Data, 2022

In table 4.22b, the ANOVA model revealed the model fitness for the effect of green manufacturing

on firm performance, which was statistically significant (F=432.150, p=.000<0.05) for a normally

distributed data. Conventionally, when the calculated F-value is more than the critical value, it

proves that the model is fit for the response variable to be predicted by the explanatory variable. The

results of the model show calculated F=432.150, is greater than the critical F= 3.85 (1, 357), at α =

0.05. Suggesting that the model is fit to predict the effect of green manufacturing on performance of

private oil and gas firms in Kenya. This implies that the model significantly explains the variation

in firm performance. Accordingly, the null hypothesis (**H₀₃**) was rejected

The results on the use of green manufacturing agreed with the ones established by Mukonzo and

Odock (2017) that there was a significant association among green manufacturing practices adopted

by a firm and its performance in operations and that most ecological issues faced by the cement firm

were as a result of ecological laws as well as regulations not adequately enforced. Otundo (2018)

studied the influence of green manufacturing on the economic performance of Kenya's'

manufacturing firms. The results showed that embracing ecofriendly manufacturing improves the

company's financial performance; in manufacturing costs and output, supply expenses as well as

efficiency in environmental management programs and new business alliances.

Regression coefficients table 4.22c below determined a mean variation in firm performance for each unit variation in green manufacturing. Beta coefficients account for the extent to which firm performance changes because of a unit variation in the use of green manufacturing.

Table 4.22c Coefficients^a for Green Manufacturing

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.197	.095		12.578	.000
	Green manufacturing	.629	.030	.740	20.788	.000

a. Dependent Variable: Firm performance
Source: Field Data, 2022

Tables 4.22c shows that $\beta_0 = 1.197$, denoting that if all other factors were kept constant, performance of private oil and gas firms would be 1.197. Additionally, coefficient of green manufacturing was 0.629, meaning that a unit increase in green manufacturing having other factors constant at zero, would lead to 0.629 increase in performance of private oil and gas firms in Kenya.

The equation:

$Y = \beta_0 + \beta_3 X_3 + \varepsilon$, keeping all the other factors at zero, leads to t the equation below.

$$Y = 1.197 + .629X_3$$

This clearly shows that a unit variation in the use of green distribution practices resulted to 0.629 units increase in firm performance.

The hypothesis for this objective outlined in chapter one ''green manufacturing does not have a statistically significant influence on performance of private oil and gas firms in Kenya'', was tested. The outcome of the test was as follows;

The model summary outcome showed that the coefficient of determination $R^2 = .629$ and $p < 0.05$. Implying that keeping other factors at zero, green manufacturing, accounted for 62.9% of the variation in performance of private oil and gas firms in Kenya. The coefficient outcome disclosed a

beta of 0.629. The beta coefficient is positive, implying that a unit change in the use of green distribution led to an increase of firm performance by 0.629 units.

4.7.2.4 Reverse Logistics on Firm Performance

The fourth specific objective was to examine the influence of reverse logistics on performance of private oil and gas firms in Kenya. It was predicted that reverse logistics had no statistically significant influence on the performance of private oil and gas firms in Kenya. Hence, a simple linear regression model was utilized to establish the association between reverse logistics and firm performance. The hypothesis was tested by the model below;

$$Y = \beta_0 + \beta_4 X_4 + \varepsilon \;\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots..iv$$

Where

Y is firm performance

β_0 is regression intercept

β_1 is the coefficient of reverse logistics

X_4 is green supply chain reverse logistics ε is error term

ε is error term

Table 4.23a shows a model summary that gives R including R^2 and adjusted R^2 as well as the Standard error of the estimate that were utilized to find how good the study model represented the research information. Further, table 4.23a displays the model summary of the influence of reverse logistics on firm performance.

Table 4.23a Model Summary for Reverse Logistics

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.668ᵃ	.447	.445	.49761

a. Predictors: (Constant), Reverse logistics
b. Dependent Variable: Firm performance
Source: Field Data, 2022

The outcome in table 4.23a, shows that the influence of reverse logistics had a correlation coefficient (R) of 0.668 that is positive. In addition, the research had the coefficient of determination $R^2=.447$, implying that the reverse logistics model accounted for 44.7% of the variation in performance of private oil and gas firms in Kenya while 53.3% of the change in performance was explained by other factors.

The ANOVA outcome was illustrated in table 4.23b. The ANOVA is an instrument used to ascertain the fitness of a model in predicting the relationship between the response variable and the explanatory variable.

Table 4.23b ANOVA[a] for Reverse Logistics

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	71.145	1	71.145	287.324	.000[b]
	Residual	88.151	356	.248		
	Total	159.296	357			

a. Dependent Variable: Firm performance
b. Predictors: (Constant), Reverse logistics
Source: Field Data, 2022

In table 4.23b, the ANOVA model revealed the model fitness for the effect of reverse logistics on firm performance, which was statistically significant (F=287.324, p=.000<0.05) for a normally distributed data. Conventionally, when the calculated F-value is more than the critical value, it proves that the model is fit for the response variable to be predicted by the explanatory variable. The results of the model show calculated F=287.324, is greater than the critical F= 3.85 (1, 357), at α = 0.05. Signifying that the model is fit to predict the effect of reverse logistics on performance of private oil and gas firms in Kenya. This implies that the model significantly explains the variation in firm performance. Therefore, the null hypothesis (**H04**) was rejected

These results in the use of reverse logistics concur with what was established by Mwaura *et al* (2016)

who found out that reverse logistics had a significant effect on the competitiveness of the foodstuff processors within Kenya. Afum, Sun and Kusi (2019) agree with the results by revealing that embracing reverse logistics impacts significantly on competitive edge as well as company performance. Further, the results showed that competitive edge positively and significantly impacted company performance.

Regression coefficients table 4.23c below determined a mean variation in firm performance for each unit variation in reverse logistics. Beta coefficients account for the extent to which firm performance changes because of a unit variation in the use of reverse logistics.

Table 4.23c Coefficients^a for Reverse Logistics

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.290	.111		11.659	.000
	Reverse logistics	.582	.034	.668	16.951	.000

a. Dependent Variable: Firm performance
Source: Field Data, 2022

Tables 4.23c shows that $\beta_0 =1.290$, denoting that if all other factors were kept constant, performance of private oil and gas firms would be 1.290. Additionally, coefficient of reverse logistics was 0.582, implying that a unit increase in reverse logistics having other factors constant at zero, would lead to 0.582 increase in performance of private oil and gas firms in Kenya.

The equation:

$Y = \beta_0 + \beta_4 X_4 + \varepsilon$, keeping all the other factors constant, becomes the equation below.

$$Y= 1.290 + .582X_4$$

This clearly shows that a unit change in the use of reverse logistics practices resulted to 0.582 units increase in firm performance.

The hypothesis for this objective outlined in chapter one ''reverse logistics does not have a

statistically significant influence on performance of private oil and gas firms in Kenya'', was tested. The outcome of the test was as follows;

The model summary outcome showed that the coefficient of determination was $R^2 = .447$ and $p < 0.05$. Implying that keeping other factors constant, reverse logistics, accounted for 44.7 % of the variation in performance of private oil and gas firms in Kenya. The coefficient outcome disclosed a beta of 0.582. The beta coefficient is positive, implying that a unit change in the use of reverse logistics led to an increase of firm performance by 0.582 units.

4.7.2.5 Waste Management on Firm Performance

The fifth specific objective was to establish the influence of waste management on performance of private oil and gas firms in Kenya. It was predicted that waste management had no statistically significant influence on performance of private oil and gas firms in Kenya. Hence, a simple linear regression model was utilized to establish the association between waste management and firm performance. The hypothesis was tested by the model below;

$$Y = \beta_0 + \beta_5 X_5 + \varepsilon \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\textbf{v}$$

Where
Y is firm performance

β_0 is regression intercept

β_5 is the coefficient of waste management
X_5 is waste management

ε = error term

Table 4.24a shows a model summary that gives R including R^2 and adjusted R^2 as well as Standard error of the estimate that were utilized to establish how good the study model represents the research information. Further, table 4.24a displays the model summary of the influence of waste management on firm performance.

Table 4.24a Model Summary[b] for Waste Management

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.637[a]	.405	.404	.51584

a. Predictors: (Constant), Waste management
b. Dependent Variable: Firm performance
Source: Field Data, 2022

The outcome in table 4.24a, shows that the influence of waste management had a correlation coefficient (R) of 0.637 that is positive. In addition, the research had the coefficient of determination R^2=.405, implying that the waste management model accounted for 40.5% of the change in performance of private oil and gas firms in Kenya while 59.5% of the change in performance was explained by other factors.

The ANOVA outcome was illustrated in table 4.24b. The ANOVA is an instrument used to ascertain the fitness of a model in predicting the relationship between the response variable and the explanatory variable.

Table 4.24b ANOVA[a] for Waste Management

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	64.569	1	64.569	242.662	.000[b]
	Residual	94.727	356	.266		
	Total	159.296	357			

a. Dependent Variable: Firm performance
b. Predictors: (Constant), Waste management
Source: Field Data, 2022

In table 4.24b, the ANOVA model revealed the model fitness for the effect of waste management on firm performance, which was statistically significant (F=242.662, p=.000<0.05) for a normally distributed data. Normally, when the calculated F-value is more than the critical value, it demonstrates that the model is fit for the response variable to be predicted by the explanatory variable. The results of the model disclose calculated F=242.662, is greater than the critical F= 3.85

(1, 357), at α = 0.05. Signifying that the model is fit to predict the effect of waste management on performance of private oil and gas firms in Kenya. This implies that the model significantly explains the variation in firm performance. Therefore, the null hypothesis (**H₀₅**) was rejected

These results in the use of waste management agrees with that established by Chummun (2019) who established that EMS like ISO 14001 adoption by organizations significantly enhances ecological performance in the waste management sector in Africa. EMS also minimizes the creation of wastes as well as risks linked with business operations that affects the company's profits. The result is also in line with that of Kimeu (2015) who established that the model utilized, showed a moderate ability to explain the impact of waste management in enhancing operational performance in the accommodation industry in Mombasa Kenya.

Regression coefficients table 4.24c below determined a mean change in firm performance for each unit variation in waste management. Beta coefficients account for the extent to which firm performance changes because of a unit variation in the use of waste management.

Table 4.24c Coefficients^a for Waste Management

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
1 (Constant)	1.360	.116		11.742	.000
Waste management	.507	.033	.637	15.578	.000

a. Dependent Variable: Firm performance
Source: Field Data, 2022

Tables 4.24c shows that β_0 =1.360, denoting that if all other factors were kept constant, performance of private oil and gas firms would be 1.360. Additionally, coefficient of waste management was 0.507, implying that a unit increase in reverse logistics having other factors constant at zero, would lead to 0.507 increase in performance of private oil and gas firms in Kenya.

The equation:

$Y = \beta_0 + \beta_5\ X_5 + \varepsilon$, keeping all the other factors constant, becomes the equation below.

$$Y = 1.360 + .507X_5$$

This clearly shows that a unit change in the use of waste management practices resulted to 0.507 units increase in firm performance.

The hypothesis for this objective outlined in chapter one ''waste management does not have a statistically significant influence on performance of private oil and gas firms in Kenya'', was tested. The outcome of the test was as follows;

The model summary outcome showed that the coefficient of determination was $R^2 = .405$ and $p < 0.05$. Implying that keeping other factors constant, reverse logistics, accounted for 40.5 % of the variation in performance of private oil and gas firms in Kenya. The coefficient outcome disclosed a beta of 0.507. The beta coefficient is positive, implying that a unit change in the use of waste management led to an increase in firm performance by 0.507 units.

4.7.2.6 Green Supply Chain Management Practices on Firm Performance

The study sought to test the combined influence of GSCM practices on performance of private oil and gas firms in Kenya. Multiple linear regression examination was conducted to establish the association among GSCM Practices (explanatory variable) and firm performance (response variable). Below is the multiple regression model to be used for testing the influence of GSCM practices on performance of private oil and gas firms in Kenya.

$Y = \beta_0 + \beta_1\ X_1 + \beta_2\ X_2 + \beta_3\ X_3 + \beta_4\ X_4 + \beta_5\ X_5 + \varepsilon$

Where;

Y is firm performance
β_0 is regression intercept
$\beta_1 - \beta_5$ are the coefficients of GSCM practices
X_1 = green procurement
X_2 = green distribution
X_3 = green manufacturing

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X₄ = reverse logistics
X₅ = waste management
ε = error term

Table 4.25a presents a model summary that gives R, R^2, adjusted R^2 and the estimate of the Std. error that could be utilized to find how good the study model represents the research information.

Table 4.25a displays the model summary of the influence of GSCM practices on firm performance.

Table 4.25a Model Summary for GSCM Practices on Firm Performance

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.894ᵃ	.799	.797	.30081

a. Predictors: (Constant), Waste management, Green manufacturing, Reverse logistics, Green distribution, Green procurement

Source: Field Data, 2022

Results in table 4.25a revealed influence of GSCM practices had a correlation coefficient (R) of 0.894 that is positive. Further, the model had the coefficient of determination R^2=0.799, implying that the combined model accounted for 79.9% of the change in performance of private oil and gas firms in Kenya while 20.1% of the change in performance was explained by other factors. This means that the combined GSCM practices influence performance of private oil and gas firms in Kenya.

The ANOVA table 4.25b below shows the influence of GSCM practices on performance of private oil and gas firms in Kenya. ANOVA is a tool utilized to establish the fitness of a model in predicting the connection between the criterion variable and the explanatory variable.

Table 4.25b ANOVAa for GSCM Practices on Firm Performance

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	127.444	5	25.489	281.677	.000ᵇ
	Residual	31.852	352	.090		
	Total	159.296	357			

a. Dependent Variable: Firm performance

b. Predictors: (Constant), Waste management, Green manufacturing, Reverse logistics, Green distribution, Green procurement

Source: Field Data, 2022

In table 4.25b, the ANOVA model disclosed a model fitness for the effect of the GSCM practices on firm performance, which was statistically significant (F=281.677, p=.000<0.05) for a normally distributed data. The outcome revealed that the combined model had calculated F=281.677 greater than the critical F= 2.26 (5, 353), at α = 0.05. The combined model was fit to predict performance of private oil and gas firms in Kenya, using green procurement, green distribution, green manufacturing, reverse logistics and waste management. This implies that the combined model significantly explains the change in firm performance. Thus, the null hypothesis (H06) was rejected.

This outcome is confirmed by Vijayvargy and Saumyaranjan (2021) who established that GSCM practices posted a positive influence on firm performance that improved ecological as well as enhance profitability and productivity as well. Further, the result is in agreement with Gunarathne (2021) who established there was significant positive connection amongst GSCM strategies on performance of the production industry.

Regression coefficients table 4.25c below determined a mean change in firm performance for a combined unit variation in GSCM practices. Beta coefficients explain the extent to which firm performance changes due to a unit variation in the use of GSCM practices jointly.

Table 4.25c Coefficients[a] for GSCM Practices on Firm Performance

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	T	Sig.
1	(Constant)	.033	.085		.386	.700
	Green procurement	.093	.034	.113	2.765	.006
	Green manufacturing	.382	.025	.450	15.254	.000
	Green distribution	.053	.030	.066	1.765	.048
	Reverse logistics	.257	.032	.295	7.925	.000
	Waste management	.183	.029	.231	6.313	.000

a. Dependent Variable: Firm performance
Source: Field Data, 2022

The combined equation before the moderation was as indicated below;

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \varepsilon$$

After the analysis, the results were used to formulate the multiple linear regression model below.

$$Y = 0.033 + 0.093X_1 + 0.053X_2 + 0.382X_3 + 0.257X_4 + 0.183X_5$$

4.8 Government Regulation, GSCM practices on Firm performance

The research used the hierarchical multiple regression to quantify the influence of the moderating variable (government regulation) on the association between predictor variables (green procurement, green distribution, green manufacturing, reverse logistics and waste management) and firm performance (response variable).

4.8.1 Government Regulation, Green Procurement on Firm Performance

The research sixty objective was to establish the moderating influence of government regulation on the relationship among GSCM practices and performance of private oil & gas firms in Kenya. To do this as well as establish a moderating influence of government regulation the following steps were followed. Step 1; the research constructed a regression model. This was model 1 which predicted the response variable using GSCM practices (green procurement, green distribution, green manufacturing, reverse logistics and waste management). The influence and the model in general (R^2) are supposed to be significant. Step 2; the study added an interaction influence (government regulation) to preceding models (model 2,3,4 as well as 5) then inspected for a significant (R^2) variation and a significant influence through an introduction of an interaction term. When established that the two are significant, then moderation is taking place. When the two, the explanatory variable and the moderator variable are not significant with the introduced interaction term, then, complete moderation had not taken place. Marsh *et al* (2013) observed that when the explanatory variable and the moderator variable are significant with the introduced interaction term, then, the moderation has taken place, nonetheless, the key effects will also be significant.

Table 4.26a Model Summary, Government Regulation, Green Procurement on Firm Performance

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
					Change Statistics				
1	.711[a]	.506	.504	.47031	.506	364.182	1	356	.000
2	.793[b]	.629	.627	.40802	.123	117.979	1	355	.000

a. Predictors: (Constant), Green procurement
b. Predictors: (Constant), Green procurement, Government regulation
Source: Field Data, 2022

The hierarchical multiple regression outcome in table 4.26a, showed two different simple linear regression models produced (models 1 and 2). The most significant of the two models, is the simple linear regression model 2, because of an interaction term introduced between green procurement and government regulation. The simple linear regression model 1, did not have an interaction term added. The simple linear regression model 2 indicated a strong significant association between green procurement, government regulation and firm performance. This meant that green procurement and government regulation accounted for 62.9% (R^2=.629) of the variation in oil and gas performance.

Further, the results indicated that green procurement by itself, accounted for 50.6% (R^2=.506) of the change in private oil and gas firm performance. When government regulation was introduced to green procurement in model 2, they jointly accounted for 62.9% (R^2=.629) of the change in performance of private oil and gas firms in Kenya. The impact of the influence exerted by the moderating variable (government regulation) on firm performance was 12.3% (62.9%-50.6%). The outcome of the analysis shows that government regulation has a significant moderation influence on the relationship between the firm's use of green procurement and firm performance.

Table 4.26b ANOVAa Government Regulation, Green Procurement on Firm Performance

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	80.553	1	80.553	364.182	.000[b]
	Residual	78.743	356	.221		
	Total	159.296	357			
2	Regression	100.195	2	50.097	300.914	.000[c]
	Residual	59.102	355	.166		
	Total	159.296	357			

a. Dependent Variable: Firm performance

b. Predictors: (Constant), Green procurement

c. Predictors: (Constant), Green procurement, Government regulation

Source: Field Data, 2022

Result in table 4.26b, that is, the ANOVA model above, shows that green procurement and government regulation are statistically significant (F=300.914, p-value=.000<0.05). Normally, when the calculated F-value is more than the critical value, it demonstrates that the model is fit to predict the moderation influence between the independent variable and the response variable. The model results reveal that the computed F =300.914, was greater than critical F = 3.00 (2, 356), at α = 0.05, showing that the model is suitable to predict the moderation influence of government regulation on the association between green procurement and performance of private oil and gas firms in Kenya. Implying that government regulation is a significant moderator on the association between green procurement and performance of private oil and gas firms in Kenya. Consequently, H$_{0(6a)}$ was rejected

The outcome is supported by Sandra *et al* (2018) who studied government regulation and stakeholders' enterprise orientation for obtaining firm performance and established that government rules as well as laws, showed a significant moderation effect on business environment that helps the development of the hospital sector.

Below are coefficients of the projected model meant to solve the issues of objective (6a).

Table 4.26c Coefficients for Government Regulation, Green Procurement on Firm Performance

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.231	.102		12.106	.000
	Green procurement	.583	.031	.711	19.084	.000
2	(Constant)	.612	.105		5.832	.000
	Green procurement	.407	.031	.497	13.118	.000
	Government regulation	.378	.035	.411	10.862	.000

a. Dependent Variable: Firm performance
Source: Field Data, 2022

The regression model output in table 4.26c showed that government regulation positively moderated the connection between green procurement and firm performance. The results also indicated a unit improvement in green procurement moderated by government regulation led to an improvement in private oil and gas firms' success by .378, p-value<0.05. Using this outcome, the equation,

$Y = \beta_0 + \beta_1 X_1 M + \varepsilon$ is transformed to the equation below;

$$Y = 0.612 + 0.378 X_1 M$$

This outcome implies that each unit variation in moderated green procurement increases performance of private oil and gas firms in Kenya. Thus, the bigger the value of the explanatory variable- moderated use of green procurement- the higher the value of firm performance.

4.8.2 Government Regulation, Green Distribution on Firm Performance

This section utilized a simple linear regression to assess the effect of government regulation on the association between green distribution and firm performance. The outcome of the analysis is shown in tables 4.27a, 4.27b and 4.27c below.

Table 4.27a Model Summary for Government Regulation, Green Distribution on Firm Performance

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
					Change Statistics				
1	.633[a]	.401	.399	.51786	.401	237.992	1	356	.000
2	.766[b]	.586	.584	.43087	.186	159.266	1	355	.000

a. Predictors: (Constant), Green distribution
b. Predictors: (Constant), Green distribution, Government regulation

Source: Field Data, 2022

Results in table 4.27a, showed two different simple linear regression models generated (models 1 and 2). The most significant of the two models is the simple linear regression model 2 due to an interaction term introduced between green distribution and government regulation. The simple linear regression model 1, did not have an interaction term included. The simple linear regression model 2 indicated a moderate significant association among green distribution, government regulation and firm performance. This implied that green distribution and government regulation accounted for 58.6% (R^2=.586) of the variation in performance of private oil and gas firms in Kenya. The results further indicated that green distribution exclusively accounted for 40.1% (R^2=.401) of the change in private oil and gas firms' performance. When green distribution was combined with government regulation, they accounted for 58.6% (R^2=.586) of the change in firm performance of private oil and gas firms in Kenya. The impact of the effect exerted by the moderating variable on firm performance was 18.5% (58.6%-40.1%). The results of the examination shows that government regulation has a high moderation influence on the relationship between the firm's use of green distribution and firm performance.

Table 4.27b ANOVAª for Government Regulation, Green Distribution and Firm Performance

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	63.824	1	63.824	237.992	.000[b]
	Residual	95.472	356	.268		
	Total	159.296	357			
2	Regression	93.392	2	46.696	251.530	.000[c]
	Residual	65.905	355	.186		
	Total	159.296	357			

a. Dependent Variable: Firm performance

b. Predictors: (Constant), Green distribution

c. Predictors: (Constant), Green distribution, Government regulation

Source: Field Data, 2022

Result in table 4.27b, that is, the ANOVA model above, showed that green distribution and government regulation were statistically significant with (F=251.530, p-value=.000<0.05). Normally, when the calculated F-value is more than the critical value, it demonstrates that the model is fit to predict the moderation influence between the independent variable and the response variable. The model results reveal that the computed F =251.530, was greater than critical F = 3.00 (2, 356), at α = 0.05, showing that the model is suitable to predict the moderation influence of government regulation on the association between green distribution and performance of private oil and gas firms in Kenya. Implying that government regulation is a significant moderator on the association between green distribution and performance of private oil and gas firms in Kenya. Consequently, **H$_{0(6b)}$** was rejected

Below are the coefficients of the projected model purposed to solve the issues of objective (6$_b$) as shown in table 4.27c

Table 4.27c Coefficients[a] for Government Regulation, Green Distribution on Firm Performance

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.439	.112		12.866	.000
	Green distribution	.503	.033	.633	15.427	.000
2	(Constant)	.624	.113		5.507	.000
	Green distribution	.330	.030	.415	10.847	.000
	Government regulation	.444	.035	.483	12.620	.000

a. Dependent Variable: Firm performance

Source: Field Data, 2022

The regression model output in table 4.27c showed that government regulation positively moderated the relationship between green distribution and firm performance. The outcome further indicated that a unit increase of green distribution moderated by government regulation led to an increase in private oil and gas firms' performance by 0.444, $p<0.05$. Using the above outcome, the research formulated the model shown below. Using this outcome, the equation,

$Y = \beta_0 + \beta_2 X_2M + \varepsilon$ becomes the equation below;

$$Y = 0.624 + 0.444X_2M$$

This outcome implies that each unit variation in moderated green distribution increases performance of private oil and gas firms in Kenya. Thus, the higher the value of the explanatory variable- moderated use of green distribution- the higher the value of firm performance.

4.8.3 Government Regulation, Green Manufacturing on Firm Performance

To establish the influence of government regulation on the link between green manufacturing and private oil and gas performance, a simple linear regression was employed. The outcome of the analysis is shown in tables 4.28a, 4.28b and 4.28c below.

Table 4.28a Model Summary Government Regulation, Green Manufacturing on Firm Performance

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
					Change Statistics				
1	.740[a]	.548	.547	.44957	.548	432.150	1	356	.000
2	.751[b]	.564	.561	.44234	.016	12.737	1	355	.000

a. Predictors: (Constant), Green manufacturing
b. Predictors: (Constant), Green manufacturing, Government regulation
Source: Field Data, 2022

Results in table 4.28a, showed two different simple linear regression models created (models 1 and 2). The most significant of the two models is the simple linear regression model 2 due to an interaction term introduced between green manufacturing and government regulation. The simple linear regression model 1, did not have an interaction term added. The simple linear regression model 2 indicated a moderate significant association between green manufacturing, government regulation and firm performance. This implied that green manufacturing and government regulation accounted for 56.4% (R^2=.564) of the variation in performance of private oil and gas firms in Kenya.

The results further indicated that green manufacturing alone accounted for 54.8% (R^2=.548) of the change in private oil and gas firms' performance. When green manufacturing was combined with government regulation, they accounted for 56.4% (R^2=.564) of the change in firm performance of private oil and gas firms in Kenya. The impact of the influence exerted by the moderating variable on firm performance was 1.6% (56.4%-54.8%).

The results of the analysis shows that government regulation has a high moderation influence on the relationship between the firm's use of green manufacturing and firm performance.

Table 4.28b ANOVA[a] for Government Regulation, Green Manufacturing on Firm Performance

Model		Sum of Squares	Df	Mean Square	F	Sig.
	Regression	87.344	1	87.344	432.150	.000[b]
1	Residual	71.953	356	.202		
	Total	159.296	357			
	Regression	89.836	2	44.918	229.567	.000[c]
2	Residual	69.460	355	.196		
	Total	159.296	357			

a. Dependent Variable: Firm performance

b. Predictors: (Constant), Green manufacturing

c. Predictors: (Constant), Green manufacturing, Government regulation

Source: Field Data, 2022

Result in table 4.28b, of the ANOVA model above, showed that green manufacturing and government regulation are statistically significant with (F=229.567, p-value=.000<0.05). Normally, when the calculated F-value is more than the critical value, it proves that the model is fit to predict the moderation influence between the independent variable and the response variable. The model results reveal that the computed F =229.567, was greater than critical F = 3.00 (2, 356), at α = 0.05, showing that the model is suitable to predict the moderation influence of government regulation on the association between green manufacturing and performance of private oil and gas firms in Kenya. Implying that government regulation is a significant moderator on the association between green manufacturing and performance of private oil and gas firms in Kenya. Consequently, **H$_{0(6c)}$** was rejected

The results agree with Antin *et al* (2020) findings which showed that application of state guidelines lead to a significant effect on GSCM and thus, a significant effect on financial as well as ecological performance. The results showed that embracing ecofriendly manufacturing improves the company's financial performance; in manufacturing costs and output, supply expenses as well as efficiency in environmental administration programs and new business alliances.

The coefficients of the model purposed to solve the issues of objective (6c) are in table 4.31c

Table 4.28c Coefficients[a] for Government Regulation, Green Manufacturing on Firm Performance

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.197	.095		12.578	.000
	Green manufacturing	.629	.030	.740	20.788	.000
2	(Constant)	1.028	.105		9.806	.000
	Green manufacturing	.485	.050	.571	9.668	.000
	Government regulation	.194	.054	.211	3.569	.000

a. Dependent Variable: Firm performance
Source: Field Data, 2022

The regression model output in table 4.28c showed that government regulation positively moderated the relationship between green manufacturing and firm performance. The outcome further indicated that a unit increase of green manufacturing moderated by government regulation led to an increase in private oil and gas firms' performance by 0.194, $p < 0.05$. Using the above outcome, the research formulated the model shown below. Using this outcome, the equation,

$Y = \beta_0 + \beta_3 X_3 M + \varepsilon$ becomes;

$$Y = 1.028 + 0.194 X_3 M$$

This outcome implies that each unit variation in moderated green manufacturing increases performance of private oil and gas firms in Kenya. Thus, the higher the value of the explanatory variable- moderated use of green manufacturing- the higher the value of firm performance.

4.8.4 Government Regulation, Reverse Logistics on Firm Performance

A regression examination was utilized in examining an effect of government regulation on the connection among reverse logistics and the performance of a firm.

The outcome of the analysis is shown in tables 4.29a, 4.29b and 4.29c below.

Table 4.29a Model Summary for Government Regulation, Reverse Logistics on Firm Performance

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
					Change Statistics				
1	.668[a]	.447	.445	.49761	.447	287.324	1	356	.000
2	.796[b]	.633	.631	.40566	.186	180.672	1	355	.000

a. Predictors: (Constant), Reverse logistics

b. Predictors: (Constant), Reverse logistics, Government regulation

Source: Field Data, 2022

The findings in table 4.29a above, showed two different linear regression models (models 1 and 2). The most significant of the two models is the simple linear regression model 2 because of an interaction term introduced between reverse logistics and government regulation. The simple linear regression model 1, had no interaction term introduced. Model 2 indicated a strong significant association between reverse logistics, government regulation and firm performance. This meant that reverse logistics and government regulation accounted for 63.3% (R^2= .633) of the variation in private oil and gas firms' performance.

The results further indicated that reverse logistics alone accounted for 44.7% (R^2 = .447) of the variation in private oil and gas firms' performance. When reverse logistics was combined with government regulation, they explained 63.3% (R^2 =.633) of the change in performance of private oil and gas firms in Kenya. The effect of the influence exerted by the moderating variable on firm performance is 18.6% (63.3%-44.7%).

Table 4.29b ANOVA[a], Government Regulation, Reverse Logistics on Firm Performance

Model		Sum of Squares	Df	Mean Square	F	Sig.
	Regression	71.145	1	71.145	287.324	.000[b]
1	Residual	88.151	356	.248		
	Total	159.296	357			
	Regression	100.877	2	50.439	306.503	.000[c]
2	Residual	58.419	355	.165		
	Total	159.296	357			

a. Dependent Variable: Firm performance

b. Predictors: (Constant), Reverse logistics

c. Predictors: (Constant), Reverse logistics, Government regulation

Source: Field Data, 2022

The result output from table 4.29b, that is, ANOVA model, showed that reverse logistics and government regulation were statistically significant with (F=306.503, p-value=.000<0.05). Normally, when the calculated F-value is more than the critical value, it proves that the model is fit to predict the moderation influence between the independent variable and the response variable. The model results reveal that the computed F =306.503, was greater than critical F = 3.00 (2, 356), at α = 0.05, showing that the model is suitable to predict the moderation influence of government regulation on the association between reverse logistics and performance of private oil and gas firms in Kenya. Implying that government regulation is a significant moderator on the association between reverse logistics and performance of private oil and gas firms in Kenya. Consequently, **H0(6d)** was rejected

The results of the analysis shows that government regulation has a high moderation influence on the relationship between the firm's use of reverse logistics and firm performance. The results also agree with Xuefei, Wang and Chen (2018) who established that the application of environmental regulation over a short period of time, negatively affected GSCM growth while in a long time, the application showed a positive effect on GSCM growth.

Below are the coefficients of the projected model purposed to solve the issues of objective (6d) as shown in table 4.29c.

Table 4.29c Coefficients^a Government Regulation, Reverse Logistics on Firm Performance

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.290	.111		11.659	.000
	Reverse logistics	.582	.034	.668	16.951	.000
2	(Constant)	.459	.109		4.193	.000
	Reverse logistics	.411	.031	.472	13.350	.000
	Government regulation	.436	.032	.475	13.441	.000

a. Dependent Variable: Firm performance

Source: Field Data, 2022

The regression model output in table 4.29c showed that government regulation positively moderated the relationship between reverse logistics and firm performance. The outcome further indicated that a unit increase of reverse logistics moderated by government regulation led to an increase in private oil and gas firms' performance by 0.436, $p<0.05$. Using the above outcome, the research formulated the model shown below. Using this outcome, the equation,

$Y = \beta_0 + \beta_4 X_4M + \varepsilon$ becomes;

$$Y = 0.459 + 0.436X_4M$$

This outcome implies that each unit variation in moderated reverse logistics increases performance of private oil and gas firms in Kenya. Thus, the higher the value of the explanatory variable- moderated use of reverse logistics- the higher the value of firm performance.

4.8.5 Government Regulation, Waste Management on Firm Performance

The regression examination was utilized to establish an effect of government regulation on the relationship among waste management and the performance of a firm. The outcome of the regression analysis is shown in tables 4.30a, 4.30b and 4.30c below.

Table 4.30a Model Summary Government Regulation, Waste Management on Firm Performance

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
					Change Statistics				
1	.637[a]	.405	.404	.51584	.405	242.662	1	356	.000
2	.765[b]	.586	.584	.43102	.181	154.884	1	355	.000

a. Predictors: (Constant), Waste management
b. Predictors: (Constant), Waste management, Government regulation
 Source: Field Data, 2022

The outcome in table 4.33a above, created two models. The most significant model of the two was the simple linear regression model number 2 due to an interaction term between waste management and government regulation. The simple linear regression model 2 indicated a moderate significant association between waste management, government regulation and firm performance. This meant that waste management and government regulation explained 58.6% (R^2 = .586) of the variation in private oil and gas firms' performance.

The results further indicated that waste management alone accounted for 40.5 % (R^2= .405) of the variation in private oil and gas firm performance. When waste management was combined with government regulation, they account for 58.6% (R^2 = .586) of the change in firm performance. The effect of the influence exerted by the moderating variable on firm performance was 18.1% (58.6%-40.5%).

The results of the analysis shows that government regulation has a high moderation influence on the relationship between the firm's use of green manufacturing and firm performance.

Table 4.30b ANOVA[a] for Government Regulation, Waste Management on Firm Performance

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	64.569	1	64.569	242.662	.000[b]
	Residual	94.727	356	.266		
	Total	159.296	357			
2	Regression	93.344	2	46.672	251.219	.000[c]
	Residual	65.952	355	.186		
	Total	159.296	357			

a. Dependent Variable: Firm performance

b. Predictors: (Constant), Waste management

c. Predictors: (Constant), Waste management, Government regulation

Source: Field Data, 2022

Results in table 4.30b, of the ANOVA model above, showed that waste management and government regulation are statistically significant with (F=251.219, p-value=.000<0.05). Usually, when the calculated F-value is more than the critical value, it proves that the model is fit to predict the moderation influence between the independent variable and the response variable. The model results reveal that the computed F =251.219, was greater than critical F = 3.00 (2, 356), at α = 0.05, showing that the model is suitable to predict the moderation influence of government regulation on the association between waste management and performance of private oil and gas firms in Kenya. Implying that government regulation is a significant moderator on the association between waste management and performance of private oil and gas firms in Kenya. Consequently, **H$_{0(6e)}$** was rejected

The results agree with Yang and Chwen (2011) who established that EU enforcement of guidelines boost ecofriendly partnerships amongst production companies in different stages of development based at various positions in the global value chains.

Below are the coefficients of the predicted model purposed to look at the issues of objective (6e) as shown in table 4.30c

Table 4.30c Coefficientsᵃ for Government Regulation, Waste Management on Firm Performance

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.360	.116		11.742	.000
	Waste management	.507	.033	.637	15.578	.000
2	(Constant)	.586	.115		5.098	.000
	Waste management	.332	.031	.417	10.832	.000
	Government regulation	.440	.035	.479	12.445	.000

a. Dependent Variable: Firm performance

Source: Field Data, 2022

The regression model output in table 4.30c showed that government regulation positively moderated the relationship between waste management and firm performance. The outcome further indicated that a unit increase of waste management moderated by government regulation led to an increase in private oil and gas firms' performance by 0.440, $p<0.05$. Using the above outcome, the research formulated the model shown below. The equation, $Y= \beta_0 + \beta_5 X_5M + \varepsilon$ becomes;

$$Y = 0.586 + 0.440X_5M$$

This outcome implies that each unit variation in moderated waste management increases performance of private oil and gas firms in Kenya. Thus, the higher the value of the explanatory variable- moderated use of waste management- the higher the value of firm performance.

4.8.6 Government Regulation, GSCM Practices and Performance of Private Oil and Gas Firms.

This study attempted to describe the extent to which government regulation moderated the association between GSCM practices and firm performance. To examine the moderating effect of government regulation on the link between GSCM practices and firm performance, a multiple regression examination technique was employed. The first step was to carry out a regression model examination to test the influence of GSCM practices and firm performance. The second step was to

carry out a regression model among GSCM practices (green procurement, green distribution, green manufacturing, reverse logistics, and waste management) and firm performance to establish the influence among GSCM practices and private oil and gas firms' performance.

Table 4.31a Model Summary for Government Regulation, GSCM Practices on 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	.894ᵃ	.799	.797	.300	.800	281.677	5	352	.000
2	.895ᵇ	.801	.796	.301	.002	.505	1	351	.000

a. Predictors: (Constant), Waste management, Green manufacturing, Reverse logistics, Green distribution, Green procurement
b. Predictors: (Constant), Waste management, Green manufacturing, Reverse logistics, Green distribution, Green procurement, Government regulation
Source: Field Data, 2022

Findings in table 4.31a created models one and two. The most significant of the two models was the multiple linear regression model 2 because it combined all the GSCM practices and government regulation. The multiple linear regression model 2 indicates a strong significant association between GSCM practices, government regulation and firm performance, meaning that GSCM practices and government regulation accounted for 80.1% of the variation in private oil and gas firms' performance.

The results further indicated that GSCM practices alone accounted for 79.9 % of the variation in private oil and gas firms' performance. When GSCM practices are combined with government regulation, they accounted for 80.1% of the change in private oil and gas firms' performance. The extent of the moderating effect of government regulation on the relationship among GSCM practices and performance of private oil and gas firms was 0.2% (80.1%-79.9%).

The results of the analysis shows that government regulation has a high moderation influence on the

relationship between the firm's use of GSCM practices and firm performance.

Below are the coefficients of the predictive model purposed to look at the issues are shown in table 4.31c below.

Table 4.31b ANOVA for Government Regulation, GSCM Practices on Performance

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	127.444	5	25.489	281.677	.000[b]
	Residual	31.852	352	.090		
	Total	159.296	357			
2	Regression	127.490	6	21.248	234.485	.000[c]
	Residual	31.806	351	.091		
	Total	159.296	357			

a. Dependent Variable: Firm performance
b. Predictors: (Constant), Waste management, Green manufacturing, Reverse logistics, Green distribution, Green procurement
c. Predictors: (Constant), Waste management, Green manufacturing, Reverse logistics, Green distribution, Green procurement, Government regulation
Source: Field Data, 2022

The output from table 4.31b indicated that the combined model was statistically significant with (F = 234.485, p<0.05). Usually, when the calculated F-value is more than the critical value, it proves that the model is fit to predict the moderation influence between the independent variables and the response variable. The model results reveal that the calculated F =234.485, was greater than critical F = 3.00 (5, 353), at α = 0.05, showing that the model is suitable to predict the moderation influence of government regulation on the association between GSCM practices and performance of private oil and gas firms in Kenya. Implying that government regulation had a positive as well as a significant influence on the connection between GSCM practices and performance of private oil and gas firms in Kenya. Hence, the null hypothesis (H_{06}) was rejected.

The results support Maryam and Hossein (2018) who established that the government should enforce rules and guidelines with a lot of care to avoid firms going for practices that are more profitable than

embracing practices that offer little total ecological performance. It further found that under certain

situations stringent rules can make companies hesitate innovating and go ahead to produce one

standardized product apart from many different products meant for various segments of the market

Table 4.31c Coefficients for Government Regulation, GSCM Practices on Performance

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	.033	.085		.386	.700
	Green procurement	.093	.034	.113	2.765	.006
	Green manufacturing	.382	.025	.450	15.254	.000
	Green distribution	.053	.030	.066	1.765	.048
	Reverse logistics	.257	.032	.295	7.925	.000
	Waste management	.183	.029	.231	6.313	.000
2	(Constant)	.045	.087		.521	.603
	Green procurement	.094	.034	.115	2.796	.005
	Green manufacturing	.401	.036	.472	11.060	.000
	Green distribution	.050	.030	.063	1.669	.036
	Reverse logistics	.259	.033	.298	7.951	.000
	Waste management	.188	.030	.236	6.313	.000
	Moderated Green procurement	.407	.031	.497	13.118	.000
	Moderated Green manufacturing	.485	.050	.571	9.668	.000
	Moderated Green distribution	.330	.030	.415	10.847	.000
	Moderated Reverse logistics	.411	.031	.472	13.350	.000
	Moderated Waste management	.332	.031	.417	10.832	.000
	Government regulation	0.028	0.039	0.03	0.711	0.048

Source: Field Data, 2022

Table 4.31c findings showed the coefficient estimates on the introduction of an interaction term between the moderator, predictor variables and the response variable. Model 2 showed regression coefficients resulting from the interaction of the moderator, GSCM practices, firm performance and the interaction term. Moderated green procurement was significant with (0.407, p=.000<0.05). Moderated green distribution was significant with (0.330, p=.000<0.05). Moderated green manufacturing was significant with (0.485, p=000<0.05). Moderated reverse logistics was significant with (0.411, p=000<0.05). Moderated waste management was significant with (0.332, p<0.05).

Below is the combined model;

$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 XZ + \varepsilon$, after the analysis becomes;

$Y=0.033+0.093X_1+0.053X_2+0.382X_3+0.257X_4+0.183X_5+0.407X_1*M+0.330X_2*M+0.485X_3*M+0.411X_4*M+0.332X_5*M$

The coefficients model Table 4.31 gives a summary of the outcome with an interaction between the moderator, predictor variables and the response variable. The result discloses that the contribution of all the variables; green procurement, green distribution, green manufacturing, reverse logistics and waste management had a positive and significant influence on performance of private oil and gas firms before and after the moderation. Implying that each unit change in moderated GSCM practices increase performance of private oil and gas firms in Kenya.

4.8.7 Summary of Hypotheses Testing Results

Table 4.35 outcome, showed a summary of the tested hypotheses for multiple as well as hierarchical models of the research. It shows the p-values, computed F values as well as critical F values for the main five objectives and five sub objectives, the interaction impact and the decisions arrived at on the framed hypotheses.

Table 4.32 Summary of Hypotheses Testing Results

Hypothesis formulated main effects	p-Values	Calculated F value> F Critical value	Critical F value α = 0.05	Decision taken.
H$_{O1}$.Green procurement does not have a statistically significant influence on performance of private oil and gas firms in Kenya. $Y = \beta_0 + \beta_1 X_1 + \varepsilon$	0.000	F$_c$=286.894 > F$_{cr}$=3.85	df (1,356) =3.85	Null Hypothesis rejected
H$_{O2}$. Green distribution does not have a statistically significant influence on performance of private oil and gas firms in Kenya. $Y = \beta_0 + \beta_2 X_2 + \varepsilon$	0.000	F$_c$=237.992 > F$_{cr}$=3.85	df (1,356) =3.85	Null Hypothesis rejected
H$_{O3}$.Green manufacturing does not have a statistically significant influence on performance of private oil and gas firms in Kenya. $Y = \beta_0 + \beta_3 X_3 + \varepsilon$	0.000	F$_c$=432.150 > F$_{cr}$ 3.85	df (1,356) =3.85	Null Hypothesis rejected
H$_{O4.}$ Reverse logistics does not have a statistically significant influence on performance of private oil and gas firms in Kenya. $Y = \beta_0 + \beta_4 X_4 + \varepsilon$	0.000	F$_c$=287.324 > F$_{cr}$=3.85	df (1,356) =3.85	Null Hypothesis rejected
H$_{O5.}$ Waste management does not have a statistically significant influence on performance of private oil and gas firms in Kenya. $Y = \beta_0 + \beta_5 X_5 + \varepsilon$	0.000	F$_c$=242.662 > F$_{cr}$=3.85	df (1,356) =3.85	Null Hypothesis rejected
H$_{O6a}$.Government regulation does not have a statistically significant moderating influence on the relationship between green procurement and performance of private oil and gas firms in Kenya. $Y = \beta_0 + \beta_1 X_1M_1 + \varepsilon$	0.000	F$_c$=300.914 > F$_{cr}$=3.00	df (2,355) =3.00	Null Hypothesis Rejected
H$_{O6b}$. Government regulation does not have a statistically significant moderating influence on the relationship between green distribution and performance of private oil and gas firms in Kenya. $Y = \beta_0 + \beta_2 X_2M_1+ \varepsilon$	0.000	F$_c$=251.530 > F$_{cr}$=3.00	df (2,355) =3.00	Null Hypothesis Rejected

H_{O6c}. Government regulation does not have a statistically significant moderating influence on the relationship between green manufacturing practices and performance of private oil and gas firms in Kenya. $Y = \beta_0 + \beta_3\, X_3 M_1 + \varepsilon$	0.000	$F_c{=}229.567$ $> F_{cr}{=}3.00$	df (2,355) =3.00	Null Hypothesis Rejected
H_{O6d}. Government regulation does not have a statistically significant moderating influence on the relationship between Reverse logistics and performance of private oil and gas firms in Kenya. $Y = \beta_0 + \beta_4\, X_4 M_1 + \varepsilon$	0.000	$F_c{=}306.503$ $> F_{cr}{=}3.00$	df (2,355) =3.00	Null Hypothesis Rejected
H_{O6e}. Government regulation does not have a statistically significant moderating influence on the relationship between Waste management and performance of private oil and gas firms in Kenya. $Y = \beta_0 + \beta_5\, X_5 M_1 + \varepsilon$	0.000	$F_c{=}251.219$ $> F_{cr}{=}3.00$	df (2,355) =3.00	Null Hypothesis Rejected

Source: Field Data, 2022

Table 4.32 showed a summary of hypotheses of the five key objectives as well as five sub objectives.

The research results in table 4.35 rejected all the null hypotheses.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary of Findings

The research sought to establish influence of government regulation on the link amongst GSCM practices and the performance of private oil and gas firms. The study specific objectives were, to establish the influence of green procurement, green distribution, green manufacturing reverse logistics and waste management on performance of private oil and gas firms as well as establishing the moderating influence of government regulation on the relationship between GSCM practices and performance of private oil and gas firms. Both financial and non-financial measures were utilized to measure firm performance.

Rationale of the study was to mitigate the adverse effects of private oil and gas activities on the economic, environment and social dimensions through adoption of GSCM practices. To deal with the research problem, this research focused on the five GSCM practices and RBV of the firm. Other theories included, natural resource-based view, the stakeholder theory and the institutional theory. Quantitative data was analyzed using both descriptive and inferential statistics. Simple and Multiple regression analysis measured direct effects of variables. Hierarchical regression analysis tested the moderation effect of variables. Analyzed data was presented through tables and figures. A summary of the research findings is presented. From the outcome, conclusions are drawn. From the conclusions, recommendations are offered to close the gaps identified in the area investigated. Further, recommendations are offered for future studies.

5.1.1 Influence of Green Procurement on Performance of Private Oil and Gas Firms in Kenya

The first objective sought to establish the influence of green procurement on performance of private oil and gas firms in Kenya. The study findings indicated that respondents agreed that during

procurement of materials and services, their firms prefer suppliers to use recyclable packaging materials to lessen wastes. Respondents also agreed that their firms purchased goods and services from suppliers who are environmentally compliant It was further admitted that the companies provide design guidelines on green requirements to suppliers for purchased materials and services. Respondents further admitted that their companies collaborated with suppliers to enable them achieve green goals through supplier relationship and ecofriendly activities. Additionally, respondents admitted that their companies have a policy to develop green training materials to specifically train their staff to acquire more green knowledge to enable them handle ecofriendly procurement processes and activities. Furthermore, respondents admitted that their firms purchased fuel efficient devices and equipment to save energy, reduce GHG emissions and pollution. Similarly, respondents agreed that the companies prequalified and selected suppliers with ISO certification and conducted green audits amongst them to enable purchase green products.

The correlation analysis disclosed that there was a strong, positive and significant relationship between green procurement and performance of private oil and gas firms in Kenya. The results of the regression analysis confirmed that green procurement positively and significantly affected performance of private oil and gas firms, and, was a significant predictor on firm performance. Cosequently, the null hypothesis that green procurement did not have a statistically significant influence on performance of private oil and gas firms in Kenya was rejected

5.1.2 Influence of Green Distribution on Performance of Private Oil and Gas Firms in Kenya
The second study objective sought to establish the influence of green distribution on performance of private oil and gas firms in Kenya. The findings showed that respondents agreed that during product distribution their firms utilize ecofriendly packages as well as distribution containers to customers to avoid sending more waste to the waste system. Additionally, respondents admitted that

that their companies' warehouses are certified as ecofriendly by ecological management certification bodies, for instance ISO 14000. Respondents admitted that during materials distribution, their firms ensure that all products are eco-labelled for customers to know whether they are ecofriendly or hazardous. Further, it was agreed that their firms use fuel efficient types of delivery to customers to save on energy consumption as well as reduce pollution.

The correlation examination disclosed that there was a strong, positive and significant relationship between green distribution and performance of private oil and gas firms. The regression analysis confirmed that green distribution positively as well as significantly affected performance of private oil and gas firms and was an important predictor on firm performance. Therefore, the null hypothesis that green distribution did not have a statistically significant effect on performance of private oil and gas firms in Kenya was rejected.

5.1.3 Influence of Green manufacturing on Performance of Private Oil and Gas Firms in Kenya

The third research objective sought to establish the influence of green manufacturing on performance of private oil and gas firms in Kenya. The study findings indicated that the respondents agreed that their firms prioritized use of returned materials as inputs or production than virgin raw materials to save energy and cut down on costs. It was further agreed that the firms were totally dedicated to green manufacturing to lessen wastes and conserve energy consumption. In addition, respondents agreed that the firms use renewable energy (solar, hydro, wind) during production. Further, majority respondents admitted that their firms design products that do not lead to high damage rates, high delivery costs and have low carbon footprints. Respondents agreed that the firms use filters and other techniques to monitor and control unsafe and dangerous emissions that might affect employees' health and that of the community. It was further agreed that the employees are involved and

undertake trainings on green production to improve their understanding on the consequences of their activities in the natural surroundings to avoid injuries at the work place and firms to sustain green jobs.

The correlation analysis unveiled that there was a strong, positive and significant association between green manufacturing and performance of private oil and gas firms. The research regression analysis confirmed that green manufacturing positively and significantly influenced performance of private oil and gas firms and was an important predictor on firm performance. Consequently, the null hypothesis that green manufacturing did not have a statistically significant effect on performance of private oil and gas firms in Kenya was rejected.

5.1.4 Influence of Reverse Logistics on Performance of Private Oil and Gas Firms in Kenya

The fourth research objective sought to establish the influence of reverse logistics on performance of private oil and gas firms in Kenya. The results showed that respondents agreed that their firms have instituted proper system for the disposal of all forms of materials, for example, hazardous materials to lessen toxins, GHG emissions and pollution. Respondents admitted that the firms recycled and reused returned materials that have residual value. Additionally, respondents agreed that the firms have a policy on products and packages return or take back from customers for product and reputation. Similarly, respondents agreed that the firms have installed drop of points for ease collection of returned packages for either recycling or reusing purposes. Further, the respondents admitted that the firms practice waste exchanges with other firms.

The correlation analysis showed that there was a strong, positive and significant association between reverse logistics and performance of private oil and gas firms in Kenya. The regression analysis confirmed that reverse logistics positively and significantly influenced performance of private oil and gas firms and was an important predictor on firm performance. Therefore, the null hypothesis

that reverse logistics did not have a statistically significant effect on performance of private oil and gas firms in Kenya was rejected

5.1.5 Influence of Waste Management on Performance of Private Oil and Gas Firms in Kenya

The fifth research objective sought to assess the influence of waste management on performance of private oil and gas firms in Kenya. The results showed respondents agreed that the firms have environmental management system (EMS) procedures in place to minimize the garbage generated to reduce wastes and pollution. In addition, respondents admitted that the firms recycle and reuse the waste which has residual value to save energy and costs. Similarly, the respondents admitted that the firms give special inducement promotions on reusing of waste. Additionally, it was agreed that the firms observe regulatory compliance through laws and regulations to manage waste in order to avoid penalties for non-compliance. Many other respondents agreed that the firms are practicing proper disposal of waste materials to minimize costs, waste and pollution.

The correlation analysis revealed that there was a strong, positive and significant association between waste management and performance of private oil and gas firms. The research regression analysis confirmed that waste management positively and significantly influenced performance of private oil and gas firms and was a significant predictor on firm performance. Consequently, the null hypothesis that waste management did not have a statistically significant effect on performance of private oil and gas firms in Kenya was rejected.

5.1.6 Moderating influence of government regulation on the relationship among GSCM practices and performance of private oil and gas firms in Kenya.

This section describes the influence of each of the explanatory variables as moderated by government regulation on their relationship with performance of private oil and gas firms in Kenya. The study hypothesized five elements of relationships (H_{06a} to H_{06e}).

Firstly, it was hypothesized that government regulation did not have statistically significant moderating influence on the relationship between green procurement and performance of private oil and gas firms in Kenya. The findings indicated that government regulation had a significant moderation influence on the relationship between green procurement and firm performance. Consequently, the null hypothesis was rejected.

Secondly, it was hypothesized that Government regulation did not have a statistically significant moderating influence on the relationship between green distribution and performance of private oil and gas firms in Kenya. The result showed that government regulation had a statistically significant moderation influence on the relationship between the firm's use of green distribution and firm performance. Therefore, the null hypothesis was not supported.

Thirdly, it was hypothesized that government regulation did not have a statistically significant moderating influence on the relationship between green manufacturing and performance of private oil and gas firms in Kenya. The result showed that government regulation had a statistically significant moderation influence on the relationship between the firm's use of green manufacturing and firm performance. Therefore, the null hypothesis was not supported.

Fourthly, it was hypothesized that government regulation did not have a statistically significant moderating influence on the relationship between reverse logistics and performance of private oil and gas firms in Kenya. The result showed that government regulation had a statistically significant moderation influence on the relationship between the firm's use of reverse logistics and firm performance. Therefore, the null hypothesis was not supported.

Fifthly, it was hypothesized that government regulation did not have a statistically significant moderating influence on the relationship between waste management and performance of private oil

and gas firms in Kenya. The result showed that government regulation had a statistically significant moderation influence on the relationship between the firm's use of waste management and firm performance. Therefore, the null hypothesis was rejected.

The sixth joint objective sought to examine the moderating influence of government regulation on the relationship between GSCM practices and performance of private oil and gas firms in Kenya. The study findings on the inferential statistics showed that government regulation positively and significantly moderated the relationship between GSCM practices and performance of private oil and gas firms. Therefore, the null hypothesis that government regulation did not have a statistically significant effect on the relationship among GSCM practices and performance of private oil and gas firms in Kenya was rejected. Further, Government regulation as the moderator of the study, when introduced as an interaction term between the study variables, increased the influence of all the variables in explaining the variance in private oil and gas firms' performance.

5.2 Conclusions

The study general objective was to establish the influence of GSCM practices on performance of private oil and gas firms in Kenya. Besides, the research sought to establish the moderating influence of government regulation on the association between GSCM practices and performance of private oil and gas firms. The research outcome showed that the five GSCM practices positively and significantly influenced firm performance. Conclusions for each of the specific objective are discussed as follows;

In regards to green procurement, the research results showed evidence that green procurement positively and significantly influenced performance of private oil and gas firms. The reasons were that firms purchase goods and services from suppliers who are environmentally compliant, provide design guidelines on green requirements to suppliers for purchased materials and services and

collaborate with suppliers to enable them achieve green goals through supplier relationship and ecofriendly activities. To improve performance private oil and gas firms should embrace these greening practices in their entire supply chain. For this reason, the research concluded that green procurement practices positively affected firm performance.

With reference to green distribution, the research output confirmed that green distribution affected performance of private oil and gas firms positively and significantly. This was attributed to distribution of products with ecofriendly packages, certification of warehouse by EMS certification bodies, eco-labelling products and using fuel efficient types of delivery to customers to save on energy consumption as well as reduce pollution. When these practices are properly adopted by private oil and gas firms, they increase performance. The study, therefore, concluded that green distribution exhibited a positive effect on performance of private oil and gas firms in Kenya.

In relation to green manufacturing, **t**he results showed evidence that green manufacturing had a positive and significant association with performance of private oil and gas firms. The reasons for this is attributed to using raw virgin materials for production, renewable energy for lighting and production, use filters to monitor and control emissions, green training on workers and designing products that cannot lead to high damage rates, high delivery costs and with low carbon footprints. Embracing these green practices enhances private oil and gas performance. Thus, the study concluded that green manufacturing practices positively influenced firm performance in a significant way.

Regarding reverse logistics, evidence from the research results confirm that reverse logistics had a positive as well as a significant effect on performance of private oil and gas firms. This was attributed to reusing and recycling of returned materials, have a policy on product returns, have installed drop of points for collection of returned packages and have a proper system in place for

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disposal of all forms of materials e.g., hazardous materials. Adopting these ecofriendly practices in private oil and gas firms improve performance. The study, thus, concluded that reverse logistics had a positive relationship with firm performance.

In view of waste management, the research findings confirmed that waste management positively as well as significantly affected performance of private oil and gas firms. The reasons for this were; the firms have environmental management system (EMS) procedures in place to minimize the garbage generated to reduce waste and pollution, firms recycle and reuse the waste which has residual value to save energy and costs, and they observe regulatory compliance through laws and regulations to manage waste in order to avoid penalties for non-compliance. Adopting these ecofriendly practices in private oil and gas firms improve performance. The study, thus, concluded that waste management positively influenced firm performance,

In relation to government regulation as a moderating variable, the research results indicated that government regulation moderated the association between GSCM practices and performance of private oil and gas firms. Therefore, the study concluded that; government regulation was a moderating factor in the relationship between GSCM practices and performance of private oil and gas firms in Kenya, government regulations had a statistically significant moderating influence on the relationship between green procurement and firm performance, government regulations had a statistically significant moderating influence on the relationship between green distribution and firm performance, government regulations had a statistically significant moderating influence on the relationship between green manufacturing and firm performance, government regulations had a statistically significant moderating influence on the relationship between reverse logistics and firm performance and government regulation had a statistically significant moderating influence on the relationship between waste management and firm performance.

5.3 Theoretical Implication.

This study embodies a significant contribution to theory supporting green supply chain management. Findings of this study showed that the private oil and gas firms are proactively adopting appropriate practices that encourage green innovations (recycling and reuse, use of renewable energy and using methods of transport that do not cause pollution) to accomplish sustainable development in their activities. The implication of theory for this research is based on GSCM practices on firm performance that should be adopted to address green innovative capability and performance of private oil and gas firms. This is in line with the resource-based view (RBV), supported by the natural resource-based view (NRBV), by postulating that a firm's green development is supported by internal strategic endowment of resources as well as capabilities and assets such as green innovation resource and clean technology resource. NRBV postulates that competitive advantage is created through the relationship between internal capabilities and the external environment. From this viewpoint, the enterprise's tangible as well as intangible resources are to provide the input which will be combined as well as transformed by the capabilities to produce innovative systems of a competitive edge. Green innovations as an organization resource, confers competitive edge through cost reduction in production, customer brand loyalty and improved compliance of regulatory needs.

This research also contributes to the stakeholder theory. The research findings showed clearly that private oil and gas firms had adopted and applied some green supply chain management practices in their operations. This was made possible because the stakeholder theory encourages a practical as well as an efficient governance of organizations through investors, managers and staff of these firms, who are also stakeholders. The stakeholder theory postulates that stakeholders are people with the ability to affect the organization's performance and at the same time are affected by the company's accomplishments on the enterprise's objectives. The stakeholder theory forces, in this case, acted as a precursor for private oil and gas firms to implement some GSCM practices which enhanced their

environmental performance. This research dealt with the administration of stakeholders in the governance of private oil and gas firms in Kenya and thus, adds new knowledge to the stakeholder theory.

The institutional theory emphasizes the cultural influences on the oil and gas firms and points out the ways the firms tend to comply and legitimize their social order in line with their wider cultural environments. The theory explains the adoption and spread of formal firm structures such as written policies, new standard practices and new forms of organizations. The institutional theory forces in this study acted as a precursor for private oil and gas firms to implement some new greening practices which enhanced their environmental performance. The theory argues that in addition to industry and firm level conditions, oil and gas firms also needed to take into account the influences of formal and informal rules that led to the adoption of GSCM practices that enhanced performance as found in this research. Hence, contributing to the body of knowledge.

5.4 Recommendations of the Study

5.4.1 Implication for Policy and Practice

The research found out that green procurement positively and significantly predicted performance of private oil and gas firms. The study recommends that the private oil and gas firms should embrace green procurement in their firms to enable supplier green audits, ecofriendly labelling of products, environmental collaboration with vendors and supplier ecological management accreditation systems which, in turn, decrease origin of waste, regeneration of material and achieve sustainable characteristics such as non-injurious elements, recyclability and reusability.

The research found out that green distribution positively and significantly predicted performance of private oil and gas firms. The study recommends that the private oil and gas firms should adopt and implement green distribution practices such as minimizing use of fossil fuels, arrange for

environmental packaging with clients, trace and scan levels of emissions, have sustainable deliveries and use renewable energy in production, that, in turn, lead to reduction of GHG emissions and pollution, reduce wastes, minimize energy use, conserve resources and gain better profits.

The research found out that green manufacturing positively and significantly predicted performance of private oil and gas firms. The study recommends that the private oil and gas firms should adopt green distribution practices like; recycle and reuse of materials, green production, use renewable energy during production to decrease waste, conserve energy and resources and reduce pollution.

The research found out that reverse logistics positively and significantly predicted performance of private oil and gas firms. The study recommends that the private oil and gas firms should adopt reverse logistics practices such as reusing and recycling, recall policy and procedure leading to environmental efficiency, profitability and sales growth.

The research found out that waste management positively and significantly predicted performance of private oil and gas firms. The study recommends that the private oil and gas firms should adopt waste management practices such as environmental management system, proper waste handling and disposal, and reuse and recycle the waste which leads to environmental conservation, cost reduction and better returns.

The study employed government regulation as the moderating variable. The research outcome recommend that management should adopt and implement government regulations as a moderating variable among GSCM practices, since they jointly showed a positive and significant contribution to performance of private oil and gas firms in Kenya. Variable individualized recommendations include; management should embrace government regulation as a moderating variable between green procurement and performance since it showed a positive and significant contribution to

performance, the firms' leadership should adopt government regulation as a moderating variable between green distribution and performance since it revealed a positive and significant contribution to performance, top management should comply to government regulation as a moderating variable between green manufacturing and performance since it disclosed a positive and significant contribution to performance, the oil and gas firms should embrace government regulation as a moderating variable between reverse logistics and performance since it exhibited a positive and significant contribution to performance, the petroleum sector should embrace government regulation as a moderating variable between waste management and performance since it displayed a positive and significant contribution to performance.

5.4.3 Implication for methodology

The current study used the positivist study philosophy to guide the methodology in terms of data collection, analysis as well as interpretation to enable determine various relationships among GSCM practices and performance of oil and gas firms in Kenya. Building on this, similar research can be carried out using the interpretivist philosophy to compare the results.

5.4.4 Contribution of the Thesis to Body of Knowledge

The research results contribute to theory by coming up with a conceptual framework which outlines the way GSCM practices influence performance of private oil and gas firms in Kenya. Similarly, by introducing a moderator (government regulation) between GSCM practices and performance of private oil and gas firms in the Kenyan context.

The study further, offers contribution to the literature through conceptualization of GSCM practices as green procurement, green distribution, green manufacturing, reverse logistics and waste management since no preceding research has used GSCM practices under the same constructs, particularly, in the private oil and gas firm's context, in Kenya.

Previous literature indicates that apart from the financial pursuit, the oil industry is slowly embracing environmental preservation due to the impact of its activities, but not the social issues in the Kenyan context. Findings from this study disclosed that the private oil and gas firms offered new information on social sustainability in the oil value chain through less employee fatal work injuries (green jobs), product and firm reputation, and better customer treatment.

The study offers new knowledge by ranking the study variables in terms of their contribution either singly or when combined by decision makers to enhance performance of private oil and gas firms.

5.4.5 Suggestions for Further Studies

The scope and extent of this research was restricted by the construct as well as the context adopted. The study was limited to only five GSCM practices and there is need to identify other GSCM practices not utilized for future studies to increase the research constructs. The study recommends that future research can use the identified variables to establish their influence on firm performance since there is no one standard method of selecting specific GSCM practices that improve firm performance.

This research was limited to the private oil and gas firms in Nairobi City County, Kenya. The findings from this study are applicable to the oil industry. Further research can be conducted on the other sectors of the economy such as, SMEs, manufacturing, mining and the agricultural sector.

This research was moderated by government regulations, future research can use organizational resources, sector type, organizational size, national norms as well as global exposure to moderate the hypothesized relationships. Other studies can be done to establish the attitude of the management towards GSCM practices adoption.

REFERENCES

Abba, A., Norhayati, Z., Usman S., Saif., Ali, M., Rajeh, B. A. (2021) green distribution on performance of listed oil and gas firms in Nigeria: a moderating role of internet of thing: *Gusau Journal of Accounting and Finance* ISSN 2756-665X (Print) 2756-6897 (Online)

Abdulrahman, D. M; Gunasekaran, A. and Subramanian. N. (2014) Critical barriers in implementing reverse logistics in the Chinese manufacturing sectors. *International Journal of Production Economics;* Volume 147, Part B, January 2014, Pages 460-471

Afum, E., Zhuo, S. B. C., and Kusi, L.Y. (2019). Reverse Logistics, Stakeholder Influence and Supply Chain Performance in Ghanaian Manufacturing Sector. *Journal of Supply Chain Management Systems*, 8 (3) 2019, 13-24

Afum, E. (2019). Reverse Logistics and Performance of Bottled and Sachet Water Manufacturing Firms in Ghana: The Intervening Role of Competitive Advantage. *IOSR Journal of Business and Management* (IOSR-JBM)

Agyapong D. & Attram A. B, (2019). "Effect of owner-manager's financial literacy on the performance of SMEs in the Cape Coast Metropolis in Ghana," *Journal of Global Entrepreneurship Research,* Springer;UNESCO Chair in Entrepreneurship, vol. 9(1), pages 1-13, December.

Ahi, P. and Searcy, C. (2015). Measuring social issues in sustainable supply chains, *Measuring Business Excellence*, 11-0041

Akali, M. Y. and Imam, M. I. (2016). Accountability and Environmental Sustainability: Nigerian Maritime Experience. *Asian Journal of Economics and Empirical Research*, 3(1), 1-5.

Ali S, Z. H.; Khan, H. and Ahmed, A. (2013) "Factors Contributing to the Students' Academic Performance: A Case Study of Islamia University Sub-Campus." American Journal of Educational

Research 1, no. 8 (2013): 283-289. doi: 10.12691/education-1-8-3.

Al-Odeh, M. and Smallwood J. (2012). Sustainable Supply Chain Management: Literature Review, Trends, and Framework. *International Journal of Computational Engineering & Management.* 15. 2230-7893.

Al-Shboul, M. and Kumar, R. H. (2017) Two Criteria for Good Measurements in Research: *Validity and Reliability.* Annals of Spiru Haret University Economic Series 17(4):59-82.DOI:10.26458/1746

Allen H. Hu, A. H. and Hsu, C. (2010) Critical factors for implementing green supply chain management practice: An empirical study of electrical and electronics industries in Taiwan *Management Research Review*, ISSN: 2040-8269

Antin, R., Kusumawati, A., Rahardjo, K., and Muhammad, N. (2020). The role of government regulation on sustainable business and its influences on performance of medium-sized enterprises*. Journal of Sustainability Science and Management*

Anis, M. D., and Siddiqui, T. Z. (2015). Issues Impacting Sustainability in the Oil and Gas Industry. *Journal of Management and Sustainability* 5(4), 115.

Amemba, C. S., Nyaboke, P. G., Osoro, A. and Mburu, N. (2013). Elements of Green Supply Chain Management. *European Journal of Business and Management*. 5(12) 51-61

Ahmed, S., Akter, T., & Ma, Y. (2018). *Green Supply Chain Management (GSCM) Performance* Implemented by the Textile Industry of Gazipur District, Dhaka. Logistics, 2(4), 2-18.

Augustine, A. (2020). The Influence of Green Procurement Practice on Organizational Performance. *Journal of Economics, Management and Trade* 10.9734

Ashby, A., Leat, M. and Hudson-Smith, M. (2012). Making connections: a review of supply chain management and sustainability literature. Supply Chain Management: *An International*

Journal, 17 (5), 497–516.

Ascensão, F., Fahriq, S., Clevenger, A. P., Corlett, R. T., Jaege, J. A., Laurance, W. F., &

Azlina, N. and Bardai, B. (2019) on the Mediating Role of Efficiency Factors in Determining Bank Financial Performance. *International Journal of Innovative Science and Research Technology,* 2456-2165

Bachev, H. (2018). Management and Agrarian Sustainability-Impact of Institutions in Bulgaria. *International Journal of Management and Sustainability,* 7(2), 113-142.

Barney, J. (1991). Firm Resources & Sustained Competitive Advantage. *Journal of Management*, 17, 99-120.

Barnat, R. (2015). Strategic management: *formulation and implementation*. Accessed on May 11, 2015.

Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology,* 51(6), 1173–1182.

Bartlett M. S. (1954). A further note on the multiplying factors for various chi-square approximations in factor analysis. *Journal of the Royal Statistical Society, Series B*, 16, 296-298.

Bergquist, A. (2017). Business and Sustainability: *New Business History Perspectives*. Harvard Business School.

Boss, K., & Gupta, J. (2016). Inclusive development, oil extraction, and climate change: a multilevel analysis of Kenya. *International Journal of Sustainable Development &World Ecolog*y, 23 (6), 482-492.

Bowan, P.A. Sam Kayaga, S., Julie Fisher, J. (2020) Municipal Solid Waste Management Performance. *Journal of Studies in Social Sciences*, 2201-4624

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

Bigliani, R. (2013) Reducing Risk in Oil and Gas Operations, IDC Energy Insights. Framingham.

Bisoyi, B., Das, D., Subbarao, P., Das, B. (2019). An Evaluation on Green Manufacturing: It's Technique, Significance and Rationality. *IOP Conference Series: Materials Science and Engineering*

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*

Blumberg, B., Cooper, D. R., & S. Schindler, P. (2008). *Business Research Methods* (2nd Europeans Edition ed.). London: McGraw-Hill Higher Education.

Brindley, C. & Oxborrow, L. (2014). Aligning the sustainable supply chain to green marketing needs: A case study. *Industrial Marketing Management*. 43. 45–55.

Bryman, A. and Bell, E. (2003) *Business Research Methods.* Oxford University Press, Oxford.

Castagra.org. (2015). Top 7 Oil and Gas Disaster Videos.

Ceptureanu, E.G.; Ceptureanu, S.I.; Olaru, M.; Bogdan, V.L. (2018). An exploratory study on competitive behavior in oil and gas distribution. *Energies* 11, 1234.

Ceptureanu, E.G.; Ceptureanu, S.I.; Radulescu, V.; Ionescu, S. (2018). What makes competition successful? An inter-organizational side analysis on Critical Success Factors in oil and gas distribution networks. *Energies,*11, 3447

Circular Economy Promotion Law (2008): Shanghai Cooperation Organization Environmental Information

Sharing Platform Order of the President of the People's Republic of China No.

Cooper, D. R., & Schindler, P. (2012). *Business Research Methods.*

Consolata, K. M., Madegwa, L., Otiso, K. N., & Yatundu, F. A. (2015). Employees Participation On Performance Appraisal Process And Its Effect On Work Attitude; The Case of Kenya Seed Company Ltd. *International Journal of Current Advanced Research,* 4(11), 491–494.

Chauhan, B. F.; Maya M.J.; Singh, M.A. and Ryan, Z. (2017) Behavior change interventions and policies influencing primary healthcare professionals' practice-an overview of reviews. Affiliations expand PMID: 28057024 PMCID: PMC5216570 DOI: 10.1186/s13012-016-0538-8

Chavez, R.; Yu, W.; Feng, M. and Wiengarten, F. (2014). The effect of customer centric green supply chain management on operational performance and customer satisfaction. *Business Practice and the Environment, in press.*

Cheng, F. K. (2014). Utilizing Computer-Assisted Qualitative Data Analysis Software.

Choi, S. B., & Williams, C. (2017). Entrepreneurial orientation and performance: mediating effects of technology and marketing action across industry types. Industry and Innovation, 23(8), 673-693.

Choi & Springer (2015). Sustainable fashion supply chain management: *From sourcing to retailing*. International Publishing Switzerland.

Choi, Y. T. and Hong Y. (2002) Unveiling the Structure of Supply Networks: Case Studies in Honda, Acura, and Daimler Chrysler. *Journal of Operations Management* 20(5):469-493;DOI:10.1016/S0272-6963(02)00025-6

Chummun, Z. B. (2019). Environmental Performance in the Waste Management Industry of Africa: A Measure of Responsible Management. *Journal of International Business, Innovation and Strategic Management*. 2617-1805

Cousins P.D., Lawson B., Petersen K.J., Price M. F., Fugate B.S. and Walton S. M. (2019) Investigating Green Supply Chain Management Practices and Performance: The Moderating Roles of Supply Chain Ecocentricity and Traceability. *International Journal of Operations & Production Management*. 10.1108/-0676

Cox, S.A. (2010), "*Online social network attitude toward online advertising formats", Master dissertation,* The Rochester Institute of Technology, Rochester, NY.

Chin, A T.; Sulaiman Z. and Huam T. H (2015) Green Supply Chain Management Practices and Sustainability Performance: *Journal of Computational and Theoretical Nanoscience* 21(5). DOI:10.1166/asl.2015.6029

Chrisostom, A. O. & Monari, F. (2018). *Influence of Green Logistics Management on Performance of registered Automotive Firms in Kenya.*

Clarke, Philip (2015). "*Long Tradition of Green Production in Germany*." Farmers Weekly. 4 October 2016.

Crook, T. R. – Combs, J. G. (2007). Sources and consequences of bargaining power in supply chains. *Journal of Operations Management*, 546–555.

David, R. A., & Muthini, J. N. (2019). Influence of green supply chain management practices on procurement performance of private health institutions in Kenya: A case of Aga Khan Hospital Kisumu. *The Strategic Journal of Business &Change Management*, 6(2), 1378-1396.

Das, D. (2018). The impact of sustainable supply chain management practices on firm performance: Lessons from Indian organizations. *Journal of cleaner production,* 203, 179-196.

De Giovanni, P., & Vinzi, V. E. (2012). Covariance versus component-based estimations of

performance in green supply chain management. *International Journal of Production Economics,* 135(2), 907-916.

Dewi, S., Kasali, R., Balqiah, T & Widjaja, A. (2018). Government regulations and stakeholders' entrepreneurial orientation in achieving organizational performance: An empirical study on private hospitals in Indonesia. *Management. Science Letters* , 8(12), 1273-1282.

DiMaggio, P.J. and Powell, W.W. (1983). "The Iron Cage Revisited: Institutional Isomorphism and Collective Rationality in Organizational Fields." *American sociological review* 48 (2).

Douglas, J. (2016). Building Adaptations, 2nd edition. Oxford: Butterworth-Heinemann.

Dubey, R., Bag, S., Ali, S. S. & Venkatesh, V. G. (2013). Green purchasing is key to superior performance: An empirical study. *International Journal of Procurement Management*, 6(2), 187–210.

Dyer, J. H. – Singh, H. (1998) The relational view: cooperative practice and sources of interorganizational competitive advantage. *The Academy of Management Review*, 660–679.

Easley, C., & Lenox, M. (2006). Firm responses to secondary stakeholder action. *Strategic Management Journal,* 27(8), 765-781.

Easterby-Smith, M., Thorpe, R. and Jackson, P. (2008b) *Management Research*. London: SAGE.

Elgouacemi, A et al, (2020). The fiscal implication of the low-carbon transition. Energy and Petroleum Regulatory Authority (2019). *Kenya Energy & petroleum Statistics report*. Nairobi.

EIA (Energy Information Administration), (2019). *Annual Energy Outlook.* US, EIA.

Esfahbodi, A., Zhang, Y., & Watson, G. (2016). Sustainable supply chain management in emerging economies: Trade-offs between environmental and cost performance. *International Journal of Production Economics,* 181, 350-366.

Faryadi, Q. (2018). PhD Thesis Writing Process: A Systematic Approach—How to Write Your

Literature Review. *Creative Education*, 9, pp 2912-2919.

Feng, Z. and Chen, W. (2018), *Environmental Regulation, Green Innovatio*n, and Industrial Green Development: An Empirical Analysis Based on the Spatial Durbin Model. MDPI.

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

Freeman, R. E., & Dmytriyev, S. (2017). Corporate Social Responsibility and Stakeholder Theory: Learning from Each Other. *Emerging Issues in Management*, 2, 7-15.

Frezatti, F., D.B. Carter, D.B., Barroso M.F.G. (2014), Accounting without accounting: Informational proxies and construction of organizational discourses. *Accounting, Auditing & Accountability Journal,* 27

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

Flatworld Solutions Research. (2015). *Different Types of Questions in Questionnaire Design* .

Fowler F.J. (2014) *The Problem with Survey Research*, by Beam George. New Brunswick, NJ: Transaction Publishers, 2012. 421pp. $59.95 cloth. ISBN: 9781412846035. Volume 43, Issue 5; https://doi.org/10.1177/0094306114545742

Foo, Y. M., Kanagi, K., and Mohd, S.R. (2019). Green purchasing Capabilities, practices and Institutional pressure. *Emerald Insight journal at:* www.emeraldinsight.com/1477-7835.htm

Gabrielli, F., Amato, A., Balducci, S., Magi Galluzzi, L., & Beolchini, F. (2018). Disaster waste management in Italy: *Analysis of recent case studies*. Waste Management,71, 542–555.

Gagandeep and Chadha, S.K., (2013). Empowering Quality Management Systems Through Supply Chain Management Integration: A Survey of Select Hospitals in Chandigarh, Mohali and Panchkula (October 25, 2013). *The IUP Journal of Supply Chain Management*

Gandhi, Meeta & Vasudevan, Hari. (2019). Green Supply Chain Management Practices and Its Impact on Business Performance: *ICIMA*

Garson, G. D. (2012). *Testing Statistical Assumptions*. Statistical Associates Publishing.

Geisler, E. & Wickramasinghe, N. (2015). Principles of Knowledge Management: Theory, Practice, and Cases. *Routledge*

Geng, R., Mansouri, S. A. & Aktas, E. (2017). "The relationship between green supply chain 40 management and performance: A meta-analysis of empirical evidences in Asian emerging economies", *International Journal of Production Economics.*

Gitong'a, M.W. (2018). *Organizational constraints and performance of solid waste management projects in Nairobi city county, Kenya*. Unpublished MBA thesis, Kenyatta University.

GoK (2020). Energy and Petroleum Regulatory Authority Report, 2019-2020- EPRA.

GoK (2019). National Environment Management Authority Report, 2018-2019- NEMA

GoK (2015). Kenya Institute for Public Policy Research and Analysis Report 2014-2015- KIPPRA.

Golicic, S. L., & Smith, C. D. (2013). A meta-analysis of environmentally sustainable supply chain management practices and firm performance. *Journal of supply chain management,* 49(2), 78-95.

Gore, Al. (1992) Earth in the Balance: Ecology and the Human Spirit, 1992, Houghton Mifflin, Boston, MA, hardcover, 416 pages, ISBN 0-395-57821-3.

Gubbi, J.(2013) Internet of Things (IoT): A Vision, Architectural Elements, and Future Directions. Future Generation Computer Systems, 29, 1645-1660. https://doi.org/10.1016/j.future.2013.01.010

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.

Ghanbari, M. (2014). *Business Goals vs. Objectives vs. Practices vs. Tactics.*

Ghobakhloo, M., Tang, S. H., Zulkifli, N., & Ariffin, M. K. A. (2013). An integrated framework of green supply chain management implementation. *International Journal of Innovation, Management and Technology,* 4(1), 86.

Gray, B.; Jones, E.C.; Amstrong H. (2013) Utilizing pipeline quality and facility sustainability to optimize crude oil supply chains

Halfpenny, P. (2015). Laws, Causality and Statistics: Positivism, Interpretivism and Realism. *Sociological Theory*, *5*(1), 33-36.

Hamdy, O. M. M., Elsayed, K. K., & Elahmady, B. (2018). Impact of sustainable supply chain management practices on Egyptian companies' performance. *European Journal of Sustainable Development*, 7(4), 119-130.

Hajikhani, M., Wahat, N. W. B. A., & Idris, K. B. (2012). Considering on green supply chain management drivers, as a strategic organizational development approach, Malaysian perspective. *Australian Journal of Basic and Applied Sciences*, 6(8), 146-165.

Hajmohammad, S., Vachon, S., Klassen, R. and Gavronski, I. (2013). Lean management and supply management: their role in green practices and performance. *Journal of Cleaner*

Production, 39

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., Ringle, C. M., & Sarstedt, M. (2012). Partial least squares: the better approach to structural equation modeling? *Long Range Planning*, 45(5-6), 312- 319.

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

Hair, J. F., Ringle, C. M., & Sarstedt, M. Hult, G.T.M. (2022). A *Primer on Partial least squares: the better approach tostructural equation modeling* (PLS-SEM). (3rd) Thousand Oaks, CA: Sage.

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

Hasan, M. (2013). Sustainable Supply Chain Management Practices and Operational Performance. *American Journal of Industrial and Business Management*, 42-48.

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

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.

Hayes, A. F., & Montoya, A. K. (2017). A tutorial on testing, visualizing, and probing an interaction involving a multi-categorical variable in linear regression analysis. *Communication Methods and Measures*, 11(1), 1-30.

Hijuzaman, A., Rahayu and Kusnendi (2019). The effect of green supply chain management implementation to marketing performance through company competitiveness (study on paper industry in West Java). *4th International Seminar of Mathematics, Science and Computer Science Education IOP Publishing*

Hill, T. (2017). Manufacturing practice. *The practice management of the manufacturing function*. Macmillan International Higher Education

Honcharenko, I. (2015). *The Implementation Features of the Strategic Management*

Process in Organizations of Small and Medium Business. National University, Technology and Design

Hossein, N., Meghdad, A. F. and Rahman, A. A. (2016). An Evaluation of Government Role in Green Supply Chain Management through Theories. *International Journal ofEconomics and Financial Issues*

Hou, C., Wu, L., & Liu, Z. (2014). Effect of proactive personality and decision-making self-efficacy on career adaptability among Chinese graduates. *Social Behavior and Personality: An international journal*, *42*(6), 903-912.

Hubbard, R., Haig, B., & Parsa, R. (2019). The Limited Role of Formal Statistical Inference in Scientific Inference. *The American Statistician*, 73(1), 91-98.

Hugos, M. (2018). *Essentials of supply chain management*. Hoboken, NJ: John Wiley & Sons.

Hunter, J. E., & Schmidt, F. L. (2004). *Methods of meta-analysis: Correcting error and bias in research findings*. Thousand Oaks, CA: Sage.

Hussain, R.; Assavapokee, T.; Khumawala, B. (2006), Supply chain management in the petroleum industry: Challenges and opportunities. *Int. J. Glob. Logist. Supply Chain Mana*g. 2006, 1, 90–97.

Ibrahim, Y. M., Hami, N., & Othman, S. N. (2019). Assessing of Imbalance among Economic, Environmental and Social Sustainability: Evidence from Oil and Gas Industry in Iraq. *Journal of Physics: Conference Series*, 1294- 072006.

IEA (International Energy Agency), (2018). *World Energy Outlook 2018*. Paris: IEA. 28(6-8), 671-683.

IEA (International Energy Agency), (2021). *Climate Change*. Retrieved 05 /07, 2021, from International Energy Agency.

International Energy Agency. (2017*). Climate Change*. Retrieved 02 19, 2018, from International Energy Agency.

International Energy Agency (IEA, 2022). Retrieved 06/09, 2022, from International Energy Agency.

Jaccard, J.; Anthony G.; Brian A. and Sriram, N. (2006) Consequential Validity of the Implicit Association Test. *American Psychologist* 61(1):56-61; discussion 62-71.

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DOI:10.1037/0003-066X.61.1.56

Jayarathna, C. & Lasantha, S.A.R. (2018). Impact of GSCM Practices on Financial Performance: Special Reference to Manufacturing Companies in Sri Lanka. *Kelaniya Journal of Management.* 7. 40. 10.4038

Johnson, R. B., & Onwuegbuzie, A. J. (2004). Mixed methods research: A research paradigm whose time has come. *Educational Researcher*, *33*(7), 14-26.

Junior, F. H., Galleli, B., Gallardo-Vázquez, D., & Sánchez-Hernández, M. I. (2017). *Strategic aspects in sustainability reporting in oil & gas industry*: The comparative case-study of Brazilian Petrobras and Spanish Repsol. Ecological Indicators, 72(2017), 203–214.

Kaiser H. F. (1974). An index of factorial simplicity. Psychometrika, 39, 31-36.

Kamol CO, Akunga DN, Warutere P (2019) *Occurrence of Occupational Physical Injuries among Workers in Onshore Oil Drilling Operations in Turkana County, Kenya.*

Kara, H. (2012). *Research and Evaluation for Busy Practitioners: A Time-Saving Guide, Bristol: The Policy Press.*

Karim, A. Halim P. Fikriya, F. Kardiyati E. N. (2020). A Charismatic Relationship: How a Kyai's Charismatic Leadership and Society's Compliance Are Constructed? *Journal ofIndonesian Economy and Business.* 129 – 143

Karani, W. J., Aosa, E., Awino, B. Z., & Njihia, J. (2018). Intervening Role of Operational Efficiency on the Relationship between Business Process Outsourcing and Performance of Oil and Gas Distribution Firms in Kenya. *Journal of Finance and Accounting*

Keith T. (2006) *Multiple Regression and Beyond*. Google books

Keith I. Marton, M.D., Harold C. Sox, JR, M.D., […], and Charles E. Duisenberg, M.D. (2006) Attitudes of Patients Toward Diagnostic Tests: The Case of the Upper Gastrointestinal Series. Roentgenogram. Volume 2, Issue 4

https://doi.org/10.1177/0272989X8200200406

Kerlinger, Fred N. (1973) *Foundations of Behavioral Research*. 2nd edition. Holt, Rinehart and Winston. Theory: "A set of interrelated constructs (concepts), .

Kiambati K. and Itunga J. (2014). *Business Research Methods. 1st ed. Nairobi:* Cedar Pine Lithographics.

Kimeu D. M. (2015). *Effect of waste management practices on the Operational performance of hotels in Mombasa County, Kenya*. Unpublished MBA thesis, University of Nairobi.

Kimira, C., Wangui, G.P., & Karie, D., (2016), Effect of Green Procurement Practices on Competitiveness of Manufacturing Firms in Kenya: A Case of Unilever Kenya Limited. *Journal of Agricultural Research* ISSN: 2455-7668.

Kinanga, R. and Partoip, S. (2015) Linkage between Target Setting in Performance Contracting and Employee Performance. A Kenyan Perspective. Journal of Human Resources Management Research · July 2015. DOI: 10.5171/2013.16261

Kirat, M. (2015) 'Corporate social responsibility in the oil and gas industry in Qatar perceptions and practices', *Public Relations Review*. Elsevier Inc., 41(4), pp. 438–446.

Kirunga, F. & Kihara, A. (2018). Influence of green distribution practices on environmental performance of chemical manufacturing firms in Kenya. J*ournal of International Business, Innovation and Strategic Management*, 1(7), 197 - 214

Kivunja, C., & Kuyini, A. B. (2017). Understanding and Applying Research Paradigms in Educational Contexts. *International Journal of Higher Education*, 6, 26-41. https://doi.org/10.5430/ijhe.v6n5p26

Ketchen D. J. Jr., and Hult G. T. M. (2007) Bridging organization theory and supply chain management: The case of best value supply chains. *Journal of Operations Management* 25(2),573–580

Knaub, J.R., Jr.(2017), "Quasi-Cutoff Sampling and the Classical Ratio Estimator: Application to Establishment Surveys for Official Statistics at the US Energy Information

Administration," *JSM 2017- Survey Research Methods*

Koh, S. L., Gunasekaran, A., Morris, J., Obayi, R., & Ebrahimi, S. M. (2017). Conceptualizing a circular framework of supply chain resource sustainability. *International Journal of Operations & Production Management, 37*(10), 1520-1540.

Kothari, C. (2014). *Research Methodology, Methods and Technique*s, (Second Edition).

New Delhi: *New Age International Publisher International Publishers*

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

Khor, K. & Udin, Z. & Ramayah, T. & Hazen, B. (2016). Reverse Logistics

in Malaysia: The Contingent Role of Institutional Pressure. *International Journal of Production Economics.* 175. 10.1016.

Kvalheim, S. A. and Dahl, O. (2016) 'Safety compliance and safety climate: A repeated cross-sectional study in the oil and gas industry', *Journal of Safety Research*. Elsevier Ltd and National Safety Council, 59, pp. 33–41.

Kwak, S.K. and Kim, J.G. (2017) Statistical data preparation: management of missing values and outliers

Laari, S. (2016). *Green supply chain management practices and firm performance*: Evidence from Finland. University of Turku. ISBN: 978-951-29-6536-6.

Lai, K. Cheng and Ailie K.Y. Tang A.K.Y (2010) *Green Retailing*: Factors for Succes. Volume 52, Issue 2 https://doi.org/10.1525/cmr.2010.52.2.6

Lahn, G and S. Bradley (2020). *How Covid-19 is changing the opportunities for oil and gas led-*Growth.

Laosirihongthong, T., Adebanjo, D., & Choon Tan, K. (2013), "Green supply chain management practices and performance", *Industrial Management & Data Systems.*

Lalit K. Toke & Shyamkumar D. Kalpande (2020) Total quality management in small and medium enterprises: An overview in Indian context, Quality Management Journal, 27:3, 159-175, DOI: 10.1080/10686967.2020.1767008

Lee, Y.; Lu, S. and Hsieh, Y. (2016) *Empirical research on customer satisfaction study: a consideration of different levels of performance.* Springer Plus 5(1). DOI:10.1186/s40064-016-3208-z

Le Quéré, C., Korsbakken, J.I., Wilson, C., Tosun, J., Andrew, R., Andres, R.J et al. (2019).

Drivers of declining CO2 emissions in 18 developed economies, *Nature Climate Change* 9(3), 213–217.

Luthra, S., Garg, D., & Haleem, A. (2013). Identifying and ranking of practices to implement green supply chain management in Indian manufacturing industry using Analytical Hierarchy Process. *Journal of Industrial Engineering and Management,* 6(4), 930.

Mafini, C. & Muposhi, A., (2017). 'The impact of green supply chain management in small to medium enterprises: Cross-sectional evidence', *Journal of Transport & Supply Chain Management* 11, a270.

Manimaran, A. Muthuraman V. and Jayakumar, V. (2018), A Novel Tolerance Evaluation Framework for Green Supply Chain Management Implementation, *International Journal of Mechanical Engineering and Technology 9*(1)

Mansouria A. and Emel A. (2017). The relationship between green supply chain management and performance: *A meta-analysis of empirical evidences in Asian emerging economies*

Maryam H.; Hossein, Z. (20118) Green product development and environmental performance: Investigating the role of government regulations. *International Journal of Production Economics.* Volume 204, October 2018, Pages 395-410

Marangu, M.N.; Rita, K.L. and Rukangu, S. M. (2015) Influence of Human Resource Management Practices on Growth of Sacco Societies in Meru County, Kenya. *International Journal of Science and Research* (IJSR) ISSN (Online): 2319-7064 Index Copernicus Value (2013): 6.14

Masters, G.M. (2014). *Renewable and Efficient Electric Power Systems*. New Jersey;

Matta, C. (2015). Interpretivism and Causal Explanations. *Philosophy of the Social Sciences*, 45(6), 543-567.

Mengying F. & Yu, W. & Wang, X. & Wong, C.Y. & Maozeng, X. & Zhi (2017). Green supply chain management and financial performance: The mediating roles of operational and environmental performance. *Business Practice and the Environment*. 27. 10.1002.

Mearns, K. and Flin, R. (1995) 'Risk perception and attitudes to safety by personnel in the offshore oil and gas industry: a review', *Journal of Loss Prevention in the Process Industries*, 8(5)

Mearns, K. and Yule, S. (2009) 'The role of national culture in determining safety performance: Challenges for the global oil and gas industry', *Safety Science.* Elsevier Ltd, 47(6)

Min, H., & Galle, W. P. (2001). Green purchasing practices of US firms. 21(9): 1222.

Ministry of Energy and Petroleum. (2016). *Strategic environmental and social Assessment of the petroleum sector in Kenya.*

Mittal, V. K., and Sangwan, K. S. (2014) 'Modelling Drivers for Successful Adoption of Environmentally Conscious Manufacturing', *Journal of Modelling in Management*, 9(2), 127-140.

Mojarad, A. S. Atashbari, V., & Tantau, A. (2018). Challenges for sustainable development practices in oil and gas industries. *Proceedings of the 12th International Conference on Business Excellence*, 626-638.

Mugenda, O., & Mugenda, A. (2008). *Research methods*: Quantitative & Qualitative approaches Nairobi: African Centre for Technology Studies press.

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

Mukonzo E.S. and Odock, S. O. (2017). Green Manufacturing and Operational Performance of a Firm: Case of Cement Manufacturing in Kenya. *International Journal of Business and Social Science.*

Muma, B., Nyaoga, R., Matwere, R., & 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.

Murphy, E. (2012*). Key Success Factors for Achieving Green Supply Chain Performance*; A study of UK ISO 14001 Certified Manufacturers (PhD thesis, The University of Hull).

Muthuka, U.M. (2015) *Green supply chain management practices and operational performance of commercial banks in Kisumu.*

Mwabu, G. (2018). Kenya's Oil Governance Regime: *Challenges and Policies.* CRPD Working Paper.

Mwaura A., Nicholas L., Gicuru, I. and Orwa B. (2015). Reverse Logistics Practices and Their Effect on Competitiveness of Food Manufacturing Firms in Kenya. *International Journal of Economics, Finance and Management Sciences.*

Nanok, J. K., & Onyango, C. O. (2017). A socio-economic and environmental analysis of the effects of oil exploration on the local community in Lokichar, Turkana County, Kenya. *International Journal of Economics and Financial Issues.*

Namjoo, M.R., & Keramati, A. (2017) Analyzing Causal dependencies of composite service resilience in cloud manufacturing using resource-based theory and DEMATEL method *International Journal of Computer Integrated Manufacturing*, 31 (10) (2018), pp. 942-960, 10.1080/0951192X.2018.1493231

Nezakati, H., Meghdad A. F. and Rahman, A. A. (2016), An Evaluation of Government Role in Green Supply Chain Management through Theories. *International Journal of Economics and Financial Issues.* 2146-4138

Nderitu, K. M & Ngugi, K. (2014). Effects of Green Procurement Practices on an Organization Performance in Manufacturing Industry: Case Study of East African Breweries Limited. *European Journal of Business Management*, 2 (1), 341-352.

Ndua, S. T., & Were, S. (2018) *Effect of green supply chain management practices on performance of Kenyan universities.* A Case of university of Nairobi. Journal of Management.

Ndolo, J. M., Namusonge G.S., Wario G., Noor I. S., (2016). *Role of government health and safety regulations on petroleum supply chain management by surveying oil marketing companies in Kenya*

Ngugi, C. A., & Kihara, A. (2019). Influence of supply chain sustainability on Performance of companies in the oil industry in Kenya. *International Journal of Supply Chain and Logistics*, 3 (2),84

Odock, SO, Awino, Z.B., Njihia, J.M., IRAKI, W.N. (2016). "*Green supply chain management practices and performance of ISO 14001 certified manufacturing firms in East Africa DBA Africa Management Review.6(3):103-128.*

Omusebe, J. A., Wanjohi, P., Ismael, N. & Iravo, M. (2018). Role of supplier's use of green manufacturing technology on organizational performance of energy and petroleum state corporations in Kenya. International Academic *Journal of Procurement and Supply Chain Management*, 3(1), 1-17

Omwenga, A.M. Ngacho, C., and Muya, J. (2019). Effects of Reverse Logistics Practices on Competitiveness of Plastic Packaging Manufacturing Firms in Nairobi County, Kenya. *International Journals of Academics & Research* issn: 2617-4138

Ongeti, J. W.(2014) Organizational Resources and Performance of Kenyan State Corporations Performance, Kenya. *European Scientific Journal* ESJhttps://doi.org/10.19044/esj.2018.v14n34p91

Osborne, J. W. and Elaine Water, E. (2002) Four Assumptions Of Multiple Regression That Researchers

Should Always Test

Otundo, R.M. (2018). *Effects of green production practices on financial performance of manufacturing firms in Kenya*

Pereira, H. M. (2018). Environmental challenges for the Belt and Road Initiative. *Nature Sustainability*, 1 (2018), pp 206–20.

Petrescu, M. (2017). Marketing research using single-item indicators in structural equation models. *Journal of Marketing Analytics*, 1(2), 99-117.

Paraskova T., (2021). *Climate change.* Petersberg climate dialogue, 05/07.2021

Pembere, D. (2016). *Green Procurement Practices and Supply Chain Performance of Companies Listed at The Nairobi Securities Exchange*. Unpublished Thesis University of Nairobi

Piscicell, L. Ludden, G. D., & Cooper, T. (2017). What makes a sustainable business model successful? An empirical comparison of two peer-to-peer goods-sharing platforms. *Journal of Cleaner Production,* 172.

Porter M. E. (2015) *Competitive Advantage: Creating and Sustaining Superior Performance*. Simon and Schuster, 1416595848, 9781416595847

Preacher KJ, Rucker DD and Hayes AF (2007) Addressing moderated mediation hypotheses: theory, methods, and prescriptions. *Multivariate Behavioral Research* 42(1): 185–227.

Pryobudi, P., Moeljadi, Atim, D. and Risna, W. (2017). *Role of efficiency as mediator for the influence of firm size on financial performance of banking that do merger and acquisition in Indonesia.*

Public Participation in Environment Law (2015) Shanghai Cooperation Organization Environmental Information Sharing Platform Order of the President of the People's Republic of China No.

Qorri, A. & Zlatan, M.& Gashi, S. & Kraslawski, A. (2018). Green Supply Chain Management Practices and Company Performance: A Meta-analysis approach. *Procedia Manufacturing*. 17. 317-325.

Rahman,A.B.; Ismail, K. H. and Rubini K. (2017) Gender development: a pilot study on gender role among pdrm officers in Negeri Sembilan *Special Issue* 3 (2017): 009 ISSN: 1823-884x

Raravi, P. and Shrinivas, N.T. (2016), Study on Government Policies and Regulation: Factors which are Affecting the Performance of SME's (Manufacturing). *Journal of Business and Management (IOSR-JBM)*

Rao, P. and Holt, D. (2005), "Do green supply chains lead to competitiveness and economic performance?", *International Journal of Operations & Production Management.*

Rasit, Z. & Zakaria, M. & Hashim, M. & Aliza, M.& Mohamed, M. (2019). Green Supply Chain Management (GSCM) Practices for Sustainability Performance: An Empirical Evidence of Malaysian SMEs. *International Journal of Recent Technology and Engineering (IJRTE)* ISSN: 2277-3878.

Raufflet, E., Cruz, L. B. and Bres, L. (2014) 'An assessment of corporate social responsibility practices in the mining and oil and gas industries', *Journal of Cleaner Production,* 84(1), pp. 256–270.

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.

Rentizelas, A., Jabbour, A. B. L., & Balushi, A. D. (2018). Social Sustainability in the Oil and Gas Industry: Institutional Pressure and the Management of Sustainable Supply Chains. *Ann Oper Res*. 10479-018-2821-3.

Roehrich, J. K., Hoejmose, S. U., & Overland, V. (2017). Driving green supply chain management performance through supplier selection and value internalization: a self-determination theory perspective. *International Journal of Operations & Production Management, 37*(4), 489-509

Rogers, D. S., & Tibben-Lembke, R. (2001). An examination of reverse logistics practices. *Journal of Business Logistics, 22*(2), 129-48.

Roslan M. H., Habidin, N. F., Mohd Z. Z., Nur I.N.A., Abdul, S. H., (2014) Waste Management Practices and Organization Performance in Malaysian Healthcare Industries. *Journal of Applied Science and Research,* 2014, 2 (2):14-22

Rudnicka, A. (2016). Understanding Sustainable Business Models. *Journal of Positive Management*, 7 (4),52–60.

Rugman, A. and Verbeke, A. (2017). Global corporate practice and trade policy. Routledge Ruoqi

Rutere Yusuf. (2020). "Effect of Green distribution on the Performance of Manufacturing Firms in Kenya." *IOSR Journal of Business and Managemen*t (IOSR-JBM), 22(4), pp. 01- 07.

Ryan Gemma (2018), *Introduction to Positivism, Interpretivism and Critical Theory*, Nurse Researcher, 25(4),41-49

Erhard Rahm, E. and Do, H.H. (2000) Data Cleaning: Problems and Current Approaches University of Leipzig, Germany. http://dbs.uni-leipzig.de

Saad S., Udin, Z.M. & Hasnan, N. (2013). *Dynamic supply chain management in oil and gas industry.* in 3rd Asia-Pacific. Business Research Conference, Kuala Lumpur, Malaysia, 2013.

Saad S., Udin, Z.M. & Hasnan, N. (2021). Influence of green distribution practices on environmental performance in the hydrocarbon industry of Bahrain moderated by green innovation. Business Research, Kuala Lumpur, Malaysia,

Saeed, A. & Yun, J. & Nubuor A., Saviour & Priyankara, H. & Prasad Fernando P. J. and Mahabaduge. (2018). Institutional Pressures, Green Supply Chain Management Practices on Environmental and Economic Performance: A Two Theory View. *Sustainability*. 10. 517.

Sarhaye , S., A. & Marendi, P., N. (2017). Role Of Green Procurement On Organizational Performance of Manufacturing Firms in Kenya: A Case of Coca Cola Company, the *Strategic Journal of Business and Change Management,* 3 (7), 85-102

Sarkis, J., Zhu, Q. & Lai, K.-H. (2011). An organizational theoretic review of green supply chain management literature. *International Journal of Production Economics.*

Sarkis, J., & Dou, Y. (2017). Green Supply Chain Management: *A Concise Introduction*. Milton: Taylor and Francis.

Sarkis, J., Zhu, Q. & Lai, K.-H. (2007). An organizational theoretic review of green supply chain management literature. *International Journal of Production Economics.*

Sandra, D. Kasali R; Ezni B. and Anton, W. W. (2018) Government regulations and stakeholders entrepreneurial orientation in achieving organizational performance: An empirical study on private hospitals in Indonesia; *Management Science Letters,* 8(12):1273-1282 DOI: 10.5267/j.msl.2018.9.012

Saunders, M., Lewis, P. and Thornhill, A. (2012) *Research Methods for Business Students.* Pearson, New York.

Saunders, M., Lewis, P., & Thornhill, A. (2008). *Research Methods for Business Students.* Rotolito Lombarda, Italy.

Sekaran, U., & Bougie, R. (2003). *Research Methods for Business: A Skill-Building Approach*

(2nd ed ed.). canada: JOHN WILEY & SONS, INC 5th ed.

Sibel, Y. Ç, Sezen, B. (2019) "Effects of green supply chain management practices on sustainability performance", *Journal of Manufacturing Technology Management.*

Singh, M. D. & Girish, T. (2018). Green manufacturing practices in SMEs of India -a literature review. *Industrial Engineering Journal.* 11.10.26488.

Silverman, D. (2016) Introducing Qualitative Research.

Subramanian A.N. (2014) Critical barriers in implementing reverse logistics in the Chinese manufacturing sectors. *Int. J. Prod. Econ.,* 147 (Part B)

Shafique M. N., Muhammad, S.A. and RAHMAN, H. (2017*), The impact of green supply chain management practices on performance: moderating role of institutional pressure with mediating effect of green innovation.*

Shao, J., & Ünal, E. (2019). What do consumers value more in green purchasing? Assessing the sustainability practices from demand side of business. *Journal of Cleaner Production*, 209, 1473-1483.

Shapiro, S.S. and Wilk, M.B. (1965). *An analysis variance tests for normality (complete samples).* Biometrika 52 (3): 591-611.

Shi, V. G., Koh, S. L., Baldwin, J., & Cucchiella, F. (2012). Natural resource based green supply chain management. Supply Chain Management: *An International Journal*, 17(1), 54-67.

Shinn, D. H. (2016). The Environmental Impact of China's Investment in Africa. Cornell *International Law Journal,* 49 (1) 2. Retrieved from https://scholarship.law.cornell.edu/cgi/viewcontent.cgi?article=1875&context=cilj

Schwab, P. D. (2005) Research methods for organizational studies: Second edition. DOI:10.4324/9781410611284

Schleifer, P., & Sun, Y. (2018). Emerging markets and private governance: the political economy of sustainable palm oil in China and India. *Review of International Political Economy*, 25 (2)

Schleifer P. & Sun Y. (2018) Emerging markets and private governance: the political economy of sustainable palm oil in China and India, *Review of International Political Economy*, 25:2, 190-214, DOI: 10.1080/09692290.2017.1418759

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.

Small, L. B. (2017). *Sustainability Practices That Influence Profitability in the Petroleum Industry.* Walden Dissertations and Doctoral Studies.

Shrestha, N. (2020) Detecting Multicollinearity in Regression Analysis. *American Journal of Applied Mathematics and Statistics*, 8, 39-42. https://doi.org/10.12691/ajams-8-2-1

Srivastava, S.K. (2007). *Green supply-chain management*: a state-of-the-art literature re-view. *Int. J. Manag. Rev. 9 (*1), 53–80

Srivastava, S.K. (2017). *Green supply-chain management*: a state-of-the-art literature re-view. *Int. J. Manag. Rev. 9 (1), 53–80*

Statista. (2015). *Royal Dutch Shell, ExxonMobil and BP Revenues from 2001 to 2014 (in billion U.S. Dollars.*

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

Suzy, N., Kus, N. A. Y. Haryanto, J. O. (2015). Proposed Model fo r Industrial Waste Management Practices and Its Impact on Organizational Performance. *Journal Iceland for Issues in Social and Environmental Accounting*. ISSN 1978-0591

Syed, K. & Zhang, Y. (2017). Impact of green supply chain management practices on firms' performance: an empirical study from the perspective of Pakistan. *Environmental science and pollution research international.* 24. 10.1007.

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

Tabachnik, B. G., & Fidell, S. L. (2013). *Multicollinearity and singularity. Using multivariate statistics*. Boston: Pearson Education Inc, 2(013), 88-91.

Testa, F., &Iraldo, F. (2010). Shadows and lights of gscm (green supply chain management): determinants and effects of these practices based on a multi-national study. *Journal of cleaner production,* 18(10-11), 953-962.

Tijiani, A., (2014), *A Study of Sustainability in the Oil and Gas Supply Chain in the UK oil and gas industry.* Thesis.

Toke, L.K., Gupta, R.C. & Dandekar, M. (2012). An empirical study of green supply chain management in Indian perspective. *International Journal of Applied Sciences and*

Engineering Research, 1(2), 372-383.

Toke, K. L.; Kalpande S. (2019) Critical success factors of green manufacturing for achieving sustainability in Indian context. *International Journal of Sustainable Engineering* 12(8):1- DOI:10.1080/19397038.2019.1660731

Topal, H. (2014) Whose Terms? A Glossary for Social Practice: Research Analysis. Thompson, B. (2004). *Exploratory and Confirmatory Factor Analysis: Understanding Concepts and Application*. Washington, DC: American Psychological Association.

Tritos, L., Dotun, A.& Keah, C.T. (2013). Green supply chain management practices and performance. *Industrial Management & Data Systems*,113(8),1088 – 1109

Trivellas P., Malindretos, G. and Reklitis, P. (2020). Implications of Green Logistics Management on Sustainable Business and Supply Chain Performance: Evidence from a Survey in the Greek Agri-Food Sector. *Journal of Sustainability* 2020, 12, 10515.

Response Scale, Rating Scale, Attitude Scale, Liker Scale, Scaling Method, Response Rate,

Taherdoost, H. (2016) Questionnaire, Survey Design. *International Journal of Academic Research in Management*Volume 8, Issue 1, 2019, ISSN: 2296-1747

Tsai, K. H. & Yang S. Y, (2014). The continent value of firm innovativeness for business performance under environmental turbulence. *International entrepreneurship and management Journal* 10 (2), 343-366.

Tseng, M.-L., Tan, R.R. and Siriban-Manalang, A.B. (2013), "Sustainable consumption and production for Asia: sustainability through green design and practice", *Journal of Cleaner Production,* 1-5.

UNDP (2020). Sustainable Development Goals.

UNEP (2017) The Emissions Gap Report 2017. Available at: unenvironement.org/emissions gap. UNEP (1997) *Environmental management in oil and gas exploration and production*, Industry and Environment. London.

United Nations Environment Programme (2018) The Emissions Gap Report 2018. Nairobi. United Union Environment Program (2019). *Waste and Climate Change*. Retrieved 02 19, 2018, from United Union Environment Program.

United Nations Environment Programme (2019) The Emissions Gap Report 2018. Nairobi. United Union Environment Program. (2019). *Waste and Climate Change*. Retrieved 02 19, 2018, from United Union Environment Program.

UK Environmental Agency, (2018) Environment Agency annual report and accounts 2018 to 2019.

Vachon, S. & Klassen, R. D. (2008). Environmental management and manufacturing performance: The role of collaboration in the supply chain. *International Journal of Production Economics*, 299-315.

Vanalle, R., Gilberto, G. Filho, M and Wagner, L. (2017), Green supply chain management: An investigation of pressures, practices, and performance within the Brazilian automotive supply chain. *Journal of Cleaner Production*

Varnäs, A., Balfors, B., & Faith-Ell, C. (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

Vijayvargy, L., Thakkar, J. and Agarwal, G. (2017), "Green supply chain management practices and performance the role of firm-size for emerging economies", *Journal of Manufacturing Technology Management,* 299-323.

Wagner, M., & Schaltegger, S. (2004). The effect of corporate environmental practice choice and environmental performance on competitiveness and economic performance: An empirical study of EU manufacturing. *European Management Journal*, 22(5), 557-572.

Wadhah, A., Konstantinos, S., Ahmed, A., Maher, A. (2019). *Lean-Green Manufacturing Practices and Their Link to Sustainability*

Wahyuni D.; Irwan B.; Tryana M. and Nimah P. (2019) Analysis of workload and number of workers in brick SMEs. *1st International Conference on Industrial and Manufacturing Engineering:IOP Conf. Series: Materials Science and Engineering* 505 (2019) 012027

IOP Publishing doi:10.1088/1757-899X/505/1/012027

Wan, A., Wan N. & de Brito, M. & Tavasszy, L.A. (2016). Sustainable supply chain management in the oil and gas industry: A review of corporate sustainability reportingpractices. Benchmarking: *An International Journal*. 23. 1423-1444.

Wang, J., & Dai, J. (2018). Sustainable supply chain management practices and performance. *Industrial Management & Data Systems,* 118(1), 2-21.

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%

Wernerfelt, B. (1995). The resource-based view of the firm: Ten years after. *Strategic Management Journal*, 16(3), 171-174.

Wernerfelt, B. (1984a). A resource-based view of the firm. *Strategic Management Journal,* 5(2), 171-180.

Wibowo, A.M., Handayani, U.N. and Mustikasari, A. (2018). "Factors for Implementing Green Supply Chain Management in the Construction Industry","*Journal of Industrial Engineering and Management*",11(4)651-679.

Wilden, R. and Gudergan, S.P. (2015), "The impact of dynamic capabilities on operational marketing and technological capabilities: investigating the role of environmental turbulence", *Journal of the Academy of Marketing Science,* 2, 181- 199

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.

Williams, B. A., Onsman, A., & Brown, G. T. (2010). Exploratory factor analysis: A five-step guide for novices. *Journal of Emergency Primary Health Care*, 8 (3), 1 - 13.

245

Williams, R. (2015). *Multicollinearity,* University of Notre Dame. https://www3.nd.edu/~rwilliam/stats2/l11.pdf

Wolf, J. (2011). Sustainable supply chain management integration: a qualitative analysis of the German manufacturing industry. *Journal of Business Ethics*, 102(2):221-235.

World Health Organization. (2015). *WHO guidelines for indoor air quality: household fuel combustion*. World Health Organization.

Xu, X., Wang, L. and Chen, S. (2018), *The effects of environmental regulation and technological innovation on green growth*: A theoretical analysis.

Yamane, T. (1967). *Elementary sampling theory*. London: John Wiley & Sons

Yang, C.S., Lu, C.S., Haider, J.J., & Marlow, P.B. (2013). The effect of green supply chain management on green performance and firm competitiveness in the context of container shipping in Taiwan.: *Logistics and Transportation Review*, *55*, 55-73.

Yong, A.G. and Pearce, S. (2013) A Beginner's Guide to Factor Analysis: Focusing on Exploratory Factor Analysis. *Tutorials in Quantitative Methods for Psychology*, 9, 79-94. https://doi.org/10.20982/tqmp.09.2.p079

Yang, C. J. and Chen, J. L. (2011) Accelerating preliminary eco-innovation design for products that integrates case-based reasoning and TRIZ method. *Journal of Cleaner Production,* Volume 19, Issues 9–10, June–July 2011, Pages 998-1006

Zachary, M. (2018). Public and Private Sector Perceptions of Sustainability in Kenya: Practice, Barriers, Stakeholder Participation. *Kenya Climate Innovation Centre*.

Zailani S.H.M., Eltayeb, T.K. Hsu, C.-C. and Tan K.C. (2012b), The impact of external institutional drivers and internal practice on environmental performance. *Int. J. Oper. Prod. Manag*., 32 (6),721-745

Zikmund W.G. Babin, B.J.; Carr, J.C. and Grifin M. (2013). *Business Research Methods*. Cengage Learning, 2013. ISBN 1111826927, 9781111826925

Zhao, W., & Nie, J. (2018). The Establishment and Decision-Making about Recycling Model of Waste Electronic Products under Government's Incentive. *International Journal of Supply Chain Management,* 6(3), 102-111.

Zulkefli N. S Mahmud F. and Mohd N. Z. (2019) A Survey on Green Supply Chain Management (GSCM) Challenges in the Malaysian Construction Industry: DOI:10.18502/kss.v3i22.5120

APPENDICES

APPENDIX I: LETTER OF INTRODUCTION

Evans Obiso,

P.O Box 30061, Nairobi.

Kisii University.

Cell Phone 0722742516.

The Managing Director

Company Name

Address

Dear Sir/Madam,

Ref: Questionnaires.

I am a student at Kisii University studying Doctorate of Philosophy Degree in Procurement and Logistics, Department of Management Science School of Business and Economics. I am conducting research on the INFLUENCE OF SUPPLY CHAIN MANAGEMENT PRACTICES ON ORGANIZATIONAL PERFORMANCE OF OIL AND GAS MARKETING FIRMS IN KENYA. I recognize your responsibility as the Managing Director of the firm and request for your permission as well as your assistance in carrying out this research. Please provide the required information by filling the questionnaire attached herein. Facilitate your selected staff to fill the information too, since your input and theirs are considered significant for this study. Information filled in the questionnaire will be considered confidential and only meant for this research.

Thank you for your feedback.

Yours faithfully

Evans Obiso

APPENDIX II: QUESTIONNAIRRE

SECTION A: General Information

Insert (X) where applicable

1. Gender

Male ☐   Female ☐

2. Age in years   18-25 ☐   26-33 ☐   34-41 ☐

42-49 ☐   50-57 ☐   58-65 ☐

66 and over ☐

3. Highest educational Level

Primary ☐   Secondary ☐

College ☐   Undergraduate ☐

Masters ☐   Doctorate ☐

4. Number of years in current employment

1-6 years ☐   7-11 years ☐

12-16 years ☐   17 years and above ☐

5. Terms of employment in your current position

Regular ☐   Contract ☐

SECTION B: Organizational Performance Measurement Variables

Kindly indicate to what extent GSCM practices have influenced organizational performance in your organization by correctly inserting 'X' where applicable, where your response ranges from; Strongly disagree (1), Disagree (2), Neither agree or Disagree (3), Agree (4) and strongly agree(5)

	1	2	3	4	5
The company's annual operations costs have significantly reduced by in the last three years.					
The company's annual profits have significantly improved in the last 3 years.					
The carbon footprint of the company activities has been improving over time.					
The company is increasingly using other possible types of energy than electricity for example, biogas, geothermal, solar, or wind for lighting facilities.					
Company is progressively implementing the environmental management system (EMS) to create a greener workplace					
The organization treats customers respectfully and is committed to sustainable deliveries of their products					

SECTION C: Green Procurement Measurement Variable

Kindly indicate to what extent green procurement practice has influenced organizational achievement in your organization by correctly inserting 'X' where applicable, where your feedback covers; Strongly disagree (1), Disagree (2), Neither agree or Disagree (3), Agree (4) and strongly agree (5)

	1	2	3	4	5
Use of recyclable packaging materials is encouraged by your company					
Company buys from suppliers who comply with environmental rules and laws.					
Company provides design guidelines on green requirements to suppliers for bought items					
Company cooperates with suppliers to enable achieve green goals through supplier collaboration and green trainings					
Company develops green training materials and trains staff handling procurement in the company.					
Company purchases fuel efficient devices and equipment					
Company selects suppliers with ISO certification and conduct green audits amongst them.					

SECTION D : Green Manufacturing Measurement Variables

Kindly indicate to what extent green manufacturing practice has influenced organizational achievement in your organization by correctly inserting 'X' where applicable, where your response ranges from; Strongly disagree (1), Disagree (2), Neither agree or Disagree (3), Agree (4) and strongly agree (5)

	1	2	3	4	5
Company gives priority to returned materials for production than using virgin raw materials.					
Company is totally dedicated to green manufacturing.					
Company encourages use of renewable energy during production.					
Company designs products that cannot lead to high damage rates, high delivery costs and with low carbon Footprints					
Company monitors and controls unsafe and dangerous emissions by using filters and other methods.					
Workers are involved and undertake trainings on green production to improve their understanding on the consequences of their activities on the natural surroundings.					

SECTION E: Green Distribution Measurement Variables

Kindly indicate to what extent green distribution practice has influenced organizational achievement in your organization by correctly inserting 'X' where applicable, where your response ranges from; Strongly disagree (1), Disagree (2), Neither agree or Disagree (3), Agree (4) and strongly agree (5)

	1	2	3	4	5
Company uses ecofriendly packaging materials and distribution containers/ Company uses biodegradable packaging materials.					
Company storage facilities are certified as ecofriendly through ecological management certification, for example ISO 14000					
Company ensures that all products are eco-labelled for customers to know whether they are ecofriendly or not					
Company encourages fuel efficient types of delivery to customers to save energy					

SECTION F: Reverse Logistics Measurement Variables

Kindly indicate to what extent reverse logistics practice has influenced organizational achievement in your organization by correctly inserting 'X' where applicable, where your response ranges from; Strongly disagree (1), Disagree (2), Neither agree or Disagree (3), Agree (4) and strongly agree(5)

	1	2	3	4	5
There is a proper system in place for disposal of all forms of materials e.g. hazardous materials					
Company encourages recycling and reusing of returned materials that have residual value.					
Company has a policy on products and packages return or take back					
Company has installed drop of points for collection of returned packages					
The company encourages waste management and Exchanges					

SECTION G: Waste Management Measurement Variables

Kindly indicate to what extent waste management practice has influenced organizational achievement in your organization by correctly inserting 'X' where applicable, where your response ranges from; Strongly disagree (1), Disagree (2), Neither agree or Disagree (3), Agree (4) and strongly agree (5)

	1	2	3	4	5
Company minimizes the garbage generated through environmental management system (EMS) procedure.					
The company recycles or reuses the waste which have residual Value					
Company gives special inducement promotions on reusing of Waste					
Company observes regulatory compliance through laws and regulations to manage waste					
Company practices proper disposal of waste materials					

SECTION H: Government Regulation Measurement Variables

Kindly indicate to what extent government regulation has a moderating influence on the association amongst GSCM practices and organizational achievement in your organization by correctly inserting 'X' where applicable, where your response ranges from; Strongly disagree (1), Disagree (2), Neither agree or Disagree (3), Agree (4) and strongly agree (5)

	1	2	3	4	5
A comprehensive environmental policy that guides operations exist in your company					
During the adoption of GSCM practices government regulation bears great influence in the level of adoption that affect company performance					
Compliance with environmental regulatory framework increases company performance					
State regulation is a major aspect that make organizations to embrace GSCM practices that results into greater company performance					
Internal and external ecological motivators have played a major role in GSCM implementation that enhance company performance					

APPENDIX lll: TARGET POPULATION

S/NO	Name of Oil and gas firm	Top Mgt	Managers	Supervisors & Procurement Staff	Totals
1.	Alba petroleum limited	1	4	09	**14**
2.	Dalbit petroleum limited	6	9	15	**30**
3.	Fossil fuels limited	1	4	09	**14**
4.	Hass petroleum Kenya limited	6	8	12	**26**
5.	Olympic petroleum limited	1	4	13	**18**
6.	Petro oil (K) ltd	10	8	21	**39**
7.	Total Kenya ltd	10	9	62	**81**
8.	Banoda oil ltd	1	4	12	**17**
9.	City oil (k) ltd	1	4	10	**15**
10.	Hasmack company ltd	0	4	10	**14**
11.	Texas energy ltd	1	4	13	**18**
12.	Eliora energy limited	0	3	12	**15**
13.	Royal energy (k) limited	1	4	22	**27**
14.	Societe petroliere Kenya limited	1	5	11	**17**
15.	Awali group limited	1	2	09	**12**
16.	Ilade oil co. Limited	1	5	06	**12**
17.	Ms oil limited	0	2	08	**10**
18.	Ola oil Kenya Limited	6	2	17	**25**
19.	Savanna energy Kenya limited	1	5	10	**16**
20.	Netgas and energy limited	1	2	12	**15**
21.	Oryx energies Kenya limited	10	8	32	**50**
22.	Jak line company ltd	0	3	13	**16**
23.	One petroleum limited	1	4	12	**17**
24.	Tec flex limited	0	4	11	**15**
25.	Emkay international limited	1	4	08	**13**
26.	Moil Kenya limited	1	5	21	**27**
27.	Zacosia trading limited	0	5	22	**27**
28.	Meridian energy limited	1	3	12	**16**
29.	Teslor corporation limited	1	4	10	**15**
30.	Tosha petroleum (Kenya) limited	6	6	21	**33**
31.	Bachulal popatlal (Kenya) limited	0	3	12	**15**
32.	Red star petroleum limited	1	3	12	**16**
33.	Engen Kenya limited	10	8	33	**51**
34.	Afro petroleum ltd	1	4	22	**27**
35.	Buzeki enterprises limited	1	4	11	**16**
36.	Mena energy limited	0	5	22	**27**
37.	Asharami synergy limited	1	5	21	**27**
38.	Astrol petroleum company limited	3	6	21	**30**

39.	Hared energy limited	0	5	21	**26**
40.	Taam petroleum limited	0	4	12	**16**
41.	Bulk petroleum limited	1	3	09	**13**
42.	Eppic oil (k) limited	0	4	11	**15**
43.	Desert star oil co. Limited	1	3	21	**25**
44.	Brain field oil and gas limited	0	4	11	**15**
45.	Global petroleum Kenya limited	1	5	11	**17**
46.	Mogas Kenya limited	3	6	22	**31**
47.	Riva petroleum dealers limited	3	5	25	**33**
48.	Bushra energy limited	1	4	21	**26**
49.	Luqman petroleum limited	1	4	21	**26**
50.	Oilcom (k) limited	6	6	17	**29**
51.	Towba petroleum company limited	0	3	12	**15**
52.	Evon international energy limited	0	3	22	**25**
53.	Link oil ltd	1	3	21	**25**
54.	Oilpro limited	1	3	13	**17**
55.	Kenol Kobil (k) limited	10	17	58	**85**
56.	Ranway traders limited	1	4	22	**27**
57.	Vivo energy Kenya limited	10	8	62	**80**
58.	Kosmoil petroleum (ea) limited	0	4	21	**25**
59.	Ramji haribhai devani limited	1	5	31	**37**
60.	Aftah petroleum(k)ltd	0	4	22	**26**
61.	Gapco Kenya limited	10	8	46	**64**
62.	Oil energy Kenya limited	1	3	23	**27**
63.	Petrocam Kenya ltd	1	4	22	**27**
64.	Axon energy limited	1	5	21	**27**
65.	Jojes oil dealers limited	0	4	23	**27**
66.	Gasline petroleum limited	0	5	12	**17**
67.	Ocean energy limited	1	5	22	**28**
68.	Regnol oil (k) limited	4	4	21	**29**
69.	East African gasoil limited	1	3	14	**18**
70.	Kayman energy limited	0	5	12	**17**
71.	Torch energy ltd	0	4	22	**26**
72.	Kencor petroleum limited	1	5	30	**36**
Totals		**149**	**338**	**1363**	**1850**

Source: EPRA, 2019

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APPENDIX lV: SAMPLE SIZE

S/NO	Name of Oil and gas firm	Top Mgt	Managers	Supervisors & Procurement Staff	Totals
1.	Alba petroleum limited	0	1	2	**3**
2.	Dalbit petroleum limited	2	2	4	**8**
3.	Fossil fuels limited	0	1	2	**3**
4.	Hass petroleum Kenya limited	2	2	3	**7**
5.	Olympic petroleum limited	0	1	3	**4**
6.	Petro oil (K) ltd	3	2	6	**11**
7.	Total Kenya ltd	3	2	16	**21**
8.	Banoda oil ltd	0	1	3	**4**
9.	City oil (k) ltd	0	1	3	**4**
10.	Hasmack company ltd	0	1	3	**4**
11.	Texas energy ltd	0	1	3	**4**
12.	Eliora energy limited	0	1	3	**4**
13.	Royal energy (k) limited	0	1	6	**6**
14.	Societe petroliere Kenya limited	0	1	4	**4**
15.	Awali group limited	0	1	2	**3**
16.	Ilade oil co. Limited	0	1	2	**3**
17.	Ms oil limited	0	1	2	**3**
18.	Ola oil Kenya Limited	2	1	4	**6**
19.	Savanna energy Kenya limited	0	1	3	**4**
20.	Netgas and energy limited	0	1	2	**3**
21.	Oryx energies Kenya limited	3	1	8	**11**
22.	Jak line company ltd	0	1	3	**4**
23.	One petroleum limited	0	1	3	**4**
24.	Tec flex limited	0	1	3	**4**
25.	Emkay international limited	0	1	2	**3**
26.	Moil Kenya limited	0	1	6	**6**
27.	Zacosia trading limited	0	1	6	**7**
28.	Meridian energy limited	0	1	3	**4**
29.	Teslor corporation limited	0	1	3	**4**
30.	Tosha petroleum (Kenya) limited	2	2	6	**9**
31.	Bachulal popatlal (Kenya) limited	0	1	3	**4**
32.	Red star petroleum limited	0	1	3	**4**
33.	Engen Kenya limited	3	2	8	**12**
34.	Afro petroleum ltd	0	1	6	**7**
35.	Buzeki enterprises limited	0	1	3	**4**
36.	Mena energy limited	0	1	6	**7**
37.	Asharami synergy limited	0	1	5	**6**
38.	Astrol petroleum company limited	1	2	6	**8**
39.	Hared energy limited	0	1	5	**6**
40.	Taam petroleum limited	0	1	4	**4**

41.	Bulk petroleum limited	1	1	2	**4**
42.	Eppic oil (k) limited	0	1	3	**4**
43.	Desert star oil co. Limited	0	1	5	**6**
44.	Brain field oil and gas limited	0	1	3	**4**
45.	Global petroleum Kenya limited	0	1	3	**4**
46.	Mogas Kenya limited	1	2	6	8
47.	Riva petroleum dealers limited	1	1	6	**8**
48.	Bushra energy limited	0	1	5	**6**
49.	Luqman petroleum limited	1	1	6	**8**
50.	Oilcom (k) limited	2	2	5	**8**
51.	Towba petroleum company limited	0	1	4	4
52.	Evon international energy limited	0	1	6	**7**
53.	Link oil ltd	0	1	5	6
54.	Oilpro limited 17/07/2019	0	1	4	**4**
55.	Kenol Kobil (k) limited	3	4	16	**22**
56.	Ranway traders limited	0	1	6	**7**
57.	Vivo energy Kenya limited	3	2	I6	**21**
58.	Kosmoil petroleum (ea) limited	0	1	5	**6**
59.	Ramji haribhai devani limited	1	1	8	10
60.	Aftah petroleum(k)ltd	0	1	6	**7**
61.	Gapco Kenya limited	3	2	13	**17**
62.	Oil energy Kenya limited	0	1	6	**7**
63.	Petrocam Kenya ltd	0	1	6	7
64.	Axon energy limited	0	1	6	**6**
65.	Jojes oil dealers limited	0	1	6	**7**
66.	Gasline petroleum limited	0	1	3	**4**
67.	Ocean energy limited	0	1	6	**7**
68.	Regnol oil (k) limited	1	1	5	**7**
69.	East African gasoil limited	0	1	4	**5**
70.	Kayman energy limited	0	1	3	4
71.	Torch energy ltd	0	1	6	**7**
72.	Kencor petroleum limited	0	1	8	**9**
Totals		**38**	**86**	**346**	**470**

Source: Researcher, 2021

APPENDIX VI: MAP OF NAIROBI CITY COUNTY
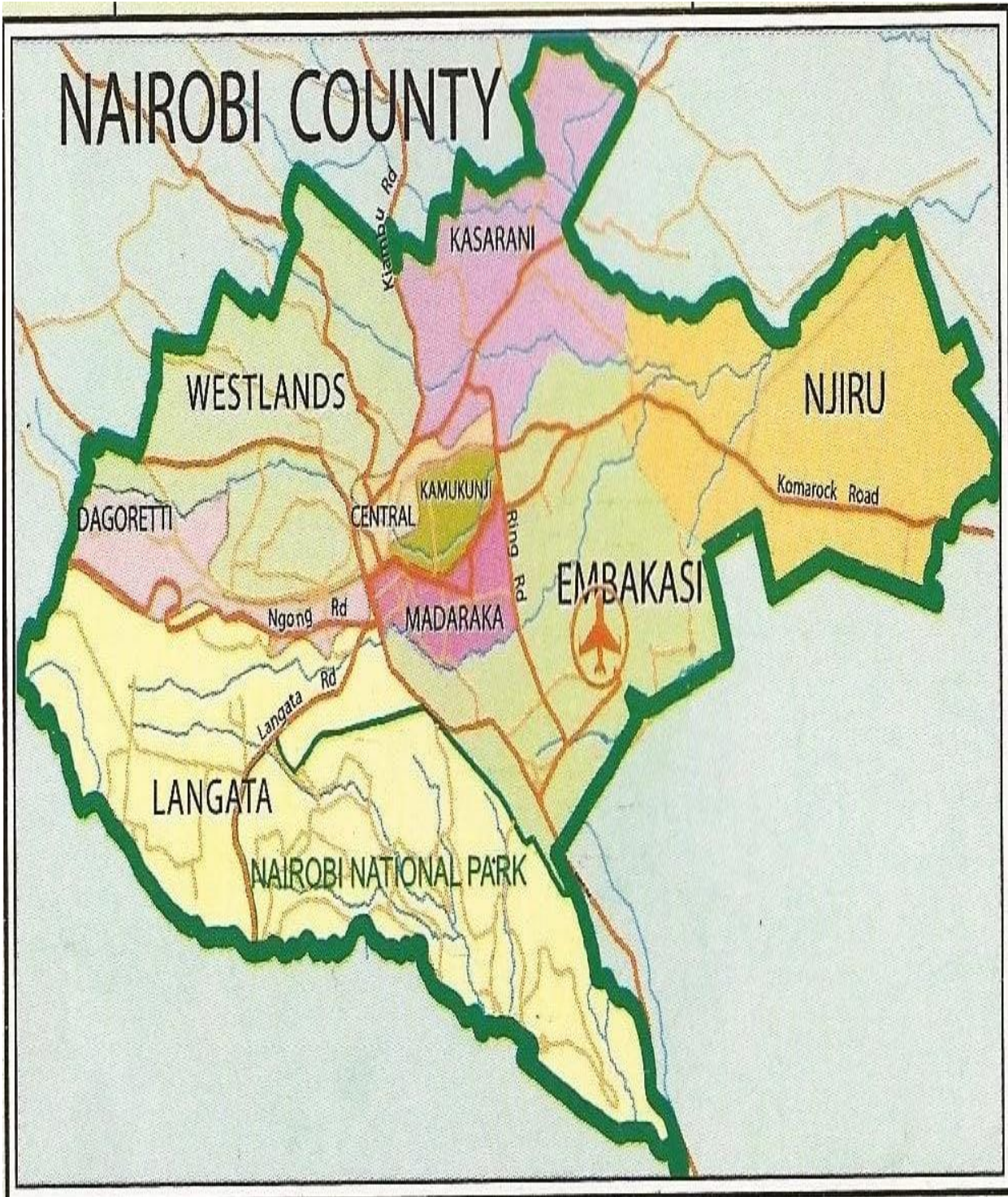
APPENDIX VII: NACOSTI RESEARCH LICENSE

REPUBLIC OF KENYA

NACOSTI

NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION

Ref No: **696876**

Date of Issue: **14/June/2022**

RESEARCH LICENSE

This is to Certify that Mr.. Evans Isaac Obiso of Kisii University, has been licensed to conduct research in Nairobi on the topic: **INFLUENCE OF GREEN SUPPLY CHAIN MANAGEMENT PRACTICES ON PERFORMANCE OF PRIVATE OIL AND GAS MARKETING FIRMS IN KENYA: MODERATING EFFECT OF GOVERNMENT REGULATION for the period ending : 14/June/2023.**

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NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

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APPENDIX VIII: AUTHORIZATION LETTER

KISII UNIVERSITY

Telephone : 020 2610479
Facsimile : 020 2491131
Email : fcommerce@kisiiuniversity.ac.ke

P. O. Box 408-40200
KISII, KENYA.
www.kisiiuniversity.ac.ke

SCHOOL OF BUSINESS AND ECONOMICS

OFFICE OF THE COORDINATOR, POST-GRADUATE PROGRAMMES

Ref: KSU/SBE/DCB/10425/15

Tuesday, 7th June, 2022

The Director,
National Commission for Science, Technology &
Innovation (NACOSTI)
NAIROBI.

Dear Sir,

**REF: APPLICATION FOR A RESEARCH PERMIT FOR
EVANS ISAAC OBISO REG. NO. DCB/10425/15**

The above named is a PhD student in our institution who intends to carry out a Research. The intended study is titled; "Influence of green Supply Chain management Practices on Performance of private Oil and Gas marketing Firms in Kenya: A Moderating effect of Government Regulation".

The purpose of this letter is to request you to give him a research permit to enable him conduct the research.

Thank you.

Dr. Joshua Wafula, PhD
COORDINATOR, POST-GRADUATE PROGRAMMES

WJC/pa

KISII UNIVERSITY IS ISO 9001:2008 CERTIFIED

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APPENDIX IX: SOME DATA COLLECTION FIRMS

Yours faithfully

Evans Obiso

VIVO ENERGY KENYA LTD.
RECEIVED
0 3 NOV 2022
P. O. Box 43561 - 00100
NAIROBI

MICHAEL KING'OO

filled in the questionnaire will be considered confidential and only meant for this research.

Thank you for your feedback.

Yours faithfully

Evans Obiso

OILCOM (K) LIMITED
P. O. Box
10370 - 00100
NAIROBI

10/11/2022

Evans Obiso

RUBIS HEAD OFFICE
5TH FLOOR
0 3 NOV 2022
RECEIVED
Sign:

3/11/2022.

Yours faithfully

Evans Obiso

HASHI ENERGY LIMITED
P. O. Box 10795 - 00100, NAIROBI
1 0 NOV 2022
Tel: +254 20 2215088

10/11/2022