THE IMPACT OF GREEN SUPPLY CHAIN ON PERFORMANCE OF OIL MARKETING FIRMS IN KENYA

BY:

ABRAHAMS AMBUCHE ABUKO

A Management Research Proposal Submitted in Partial Fulfillment of the Requirements for the Award of Degree in Master of Business Administration of the University of Nairobi

OCTOBER, 2011

DECLARATION

This research project is my original work and has not been presented for a degree in any other university

Signed..... Date 09.11.2011.....

ABUKO ABRAHAMS AMBUCHE

D61/72709/2009

The research project has been submitted for examination with my approval as university supervisor

Signed..... Date 9/11/2011.....

Supervisor; OMBATI THOMAS

DEDICATION

Whoever claims they don't care how society perceives them are implying they never look in the mirror. To my Mum, Dad, entire family, Aly, Edu, Weso, Chepteek and Support Team; Thank you guys for being my mirror.

ACKNOWLEDGEMENTS

I would like to express my appreciation to my Supervisor Mr Ombati and Moderator Mr. Akello who gave immense guidance in the project.

I also would like to thank Magellan M., Murage N., Eric M. and Naomi M. for going out of their way to facilitate collection of data.

I would like to thank my colleagues at work, Georgette and the Support team, who had to content with my ever changing schedule during my study period. No good deed shall go unrewarded.

Special thanks goes to the folks through whom God chose to blow breath in my lungs – my Mum and Dad. I cannot say thank you enough but try and live up to the standards you envisioned for a son while I was still an infant. Thank you dad for your encouragement.

I would also like to thank all my classmates and study buddies and all that have affected this study.

I most importantly thank God and pray you all get his unending blessings.

ABSTRACT

This study sought to establish the impact of green supply chain on performance of major oil marketing firms in Kenya. Environmental consciousness by consumers and government environmental regulations have compelled organizations to seek ways of pursuing environmental friendly practices in their business activities while ensuring they comply with environmental regulations set by the government.

In this study, oil marketing firms were identified as significant contributors in waste emissions and natural resource use and therefore the study sought to determine the extent to which green supply chain is practiced and the impact of adoption of green supply chain on performance of oil marketing firms in Kenya.

Primary data for the study was collected from the major oil marketing firms in Kenya through self administered questionnaires and analyzed by use of descriptive statistics.

The study showed that the oil firms have adopted green supply chain to a moderate extent but needed awareness and support to fully implement the concept. The study also found out that its practice had a positive impact on overall firm's performance by improving quality, productivity, efficiency and cost savings. Lack of government support 26%, was identified as a major stumbling block with improved environmental performance 27% rated as the most beneficial aspects of the practice.

The study recommends formulation of an environmental policy and more government support for GSC practices. Similarly more awareness needs to be created on the GSC concept among stakeholders with oil marketing firms encouraged to adopt total quality management and redesign factory layout to enhance productivity and efficiency.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

GSCM – Green Supply Chain Management

GSC – Green supply chain

JIT – Just in Time

STD DEV- Standard Deviation

CHAPTER ONE: INTRODUCTION

1.0 Introduction

1.1 Background of the study

The conventional supply chain does not take to account the environmental and social costs in their supply chain management. Cost of supply chain was limited to activities related with manufacturing and converting raw materials to final goods delivered to the end user at the lowest possible cost with maximum customer satisfaction. Recently, there has been a need for an environmental friendly supply chain due to risk of climate change (Beamon, et al, 1999). Improved environmental performance apart from climate risks also means lower waste disposal and training costs, fewer environmental permitting fees and often reduced material and social costs (Feng, 2009).

Many components in a supply chain can be made green and at the same time help companies achieve efficiency in financial and social costs. Any hazardous disposal will damage the company's reputation and cost the company more in terms of damage control while companies that have already embraced green supply chain continue to gain momentum due to reduced costs and preference by end users, finding themselves on the leading edge of competitiveness (Shi, J. Stephen, and Jane M. Kane, 1996). In the exploration and production sectors of the oil industry, the product – oil, is exactly the same for all competing firms with a very narrow product differentiation. Consequently, many of these firms cannot differentiate themselves by introduction of a new and exciting product and can only do so based on the ability to economically find and produce oil and oil products more efficiently than their competitors. Even though exploration and production companies are unique in many aspects, a differentiation factor can lie in the ability to adopt a sound supply chain program (Chima, et al, 2007). Pursuit of green supply chain is such a program which would ensure that an oil marketing firm differentiates itself and in the process acquire a sustainable competitive advantage.

1.1.1 Green Supply Chain

Srivastava (2007) highlights the quality revolutions and the supply chain revolutions of 1980's and 1990's respectively as the reason for organizations to be environmentally conscious. A green supply chain is therefore a series of activities and processes in the supply chain that strive to continually achieve environmentally friendly practices that are sustainable in the long run. Sustainability implies meeting the current needs without jeopardizing the ability of future generations to meet theirs and involves responsible use of resources so that they can be replenished in a natural equilibrium (Costanza, 1992; Daly &Cobb, 1989). Global consumer markets and environmental regulations are pushing organizations to be more sustainable (Gungor and Gupta, 1999). Many tradeoff decisions are made in green supply chain optimization with the goal being maximizing carbon emission reduction (Feng, 2009).

The green supply chain comprises various activities constituting the entire chain. First, there is green purchasing involving sourcing for materials that are environmentally friendly with less impact on environment and can be recycled or be disposed of easily (Feng, 2009). By incorporating green principles into purchasing, companies can provide design specifications to suppliers that include environmental requirements for green purchased items. This assists in deciding which suppliers to collaborate with for materials, equipment, parts, and services that support environmental goals (Hu H. et al, 2010). Secondly, there's green production that focuses upon three fundamental goals; minimizing emissions, effluents and accidents, minimizing the use of virgin materials and non-renewable forms of energy, and minimizing the life-cycle cost (cradle to grave) of products or services (Hart and Shrivastava, et al, 1992). Thirdly, Green supply chain also involves green transportation and storage by ensuring minimum storage costs are used, that are also environmental friendly in terms of using a transport system that is not contributing to global warming through emission of pollutants (Feng, 2009) and lastly green packaging which involves use of packaging material that is environmentally friendly and cost efficient. The end user should also ensure minimal greenhouse gas emissions and use of the final product in an environmental friendly manner. Green packaging requirements involves use of less material that is non-polluting, recyclable and reusable (Feng, 2009).

The supply chain in the oil industry comprises of activities including exploration, production, oil refining, marketing and consumption (Chima, 2007). These major links in the oil industry represent the interface between companies and the materials flowing through. Within each stage are operations. For example, exploration includes seismic, geophysical and geological operations, while production operations include drilling reservoir, production and facilities engineering while refining is a complex operation whose output is the input for marketing that includes sale of oil and other refined products. Each stage of the link can be a separate company or a unit of an integrated firm. The major and common issue along the links in oil industry is economics; weighing benefits versus costs along the chain (Chima, et al, 2007). For a green supply chain to be effective and positively impact on performance, these linkages must be managed as an integrated unit.

1.1.2 Green supply chain and performance indicators

Organizations that pursue green supply chain practices experience better performance and with it competitiveness (Rao and Holt 2005) which consists of improved efficiency, quality & productivity improvement and cost savings (Rha, 2010). Efficiency can be measured in terms of procurement distance and the raw materials held, in-house traffic movements which affect time as a resource, use of resource such as fuel, utilization of empty trailer space and effective fleet utilization. Secondly, quality improvement is determined by environmental friendly products, reduction in size and weight of products, waste management & reduction and reduction of carbon emission in course of production, transportation and utilization of a product. Thirdly, productivity would entail the speed with which orders are processed and goods dispatched without delays, increased product output as a result of reduced factory/ in-house movements and lastly cost savings measured by cost reduction benefits from suppliers improved efficiency, achieving least total costs while minimizing carbon footprint and reduction in the overall operational costs (Feng, 2009).

1.1.3 Oil Marketing Firms in Kenya

The oil industry in Kenya witnessed significant government participation before the industry was liberalized in 1994.Consequently the role of the private sector was minimal. The National Oil Corporation, incorporated in 1981 under the companies act (Cap 486), was mandated to supply

as much as 30% of the crude oil required in Kenya and coordinate activities towards oil exploration on behalf of the government (Njau, 2010). The sector boasts of over 30 oil importing and marketing companies comprising of five major companies namely Shell, Total, Kenol/Kobil, Oil Libya, Chevron, and the government owned National Oil Corporation of Kenya (NOCK). Challenges faced the sector which included proliferation of substandard petroleum, dispensing and storage sites which pose environment health and safety risks. In 2006, the Energy Act No. 12 of 2006 was enacted which created the Energy Regulatory Commission (ERC) mandated to regulate petroleum and renewable energy sectors in addition to electricity. The functions of ERC included regulating the importation, exportation, transportation, refining, storage and sale of petroleum and petroleum products. This is according to the ERC website www.erc.go.ke. All petroleum operators and products are required to comply with provisions for environment health and safety.

The major oil marketing firms have brands that differentiates them for instance Total Kenya, Kenol/Kobil, shell Kenya have lubricants and Liquefied petroleum Gas (LPG) products with their respective names thereby building brand loyalty. They also own major oil installations such as lubricant blending plants, LPG filling and petroleum storage plants with nationwide retail networks. Kenya Shell has such installations while Kenol/Kobil has over 180 service stations in the country (Macheo and Omiti 2003).

Major oil marketers have maintained their dominant market share status even after new entrants have joined the industry through mergers and acquisitions. Kenya Shell for instance acquired BP Kenya in 2006 increasing its market share from 15% -25% in 2008 whereas in 2007 Oil Libya acquired Exxon Mobil shares while all the assets previously owned by Chevron were acquired by Total Kenya (Report on Petroleum sub-sector in Kenya, 1994). Oil marketers are involved in the entire business activities along the supply chain, from procurement of crude oil, refining, marketing and ownership of fuel stations thereby the oil institutions operate as cartels with uniform changes in fuel prices. This is also because costs along the supply chain are almost similar as a result of similar handling and storage costs (Petroleum Insight- Magazine of the petroleum institute of East Africa 1st Quarter, 2007).

Current challenges in the oil industry in Kenya include uncontrollable high prices partly as a result of the weak Kenyan shilling against the US dollar, lack of steady supply and storage facilities which cause fuel shortages and inefficient transportation of fuel via road.

1.2 Statement of the Problem

Conventional supply chain management in the oil industry is focused on improving the efficiency of the individual entities along the supply chain (Christopher, M, et al, 2007). It concentrates on financial unit costs reduction and maximizing customer satisfaction (Forester, 1958, 1961). Cost accounting in green supply chain takes to account social, health and environmental costs and the sustainable use of resources (Costanza, 1992) in addition to the traditional unit costs. It impacts the value chain on various significant points and becomes a strategic resource which becomes inimitable, unique and rare thereby acts as a source of competitive advantage boosting the performance of an organization relative to competitors (Shrivastava, 1995).

The environmentally conscious consumer has necessitated oil marketing firms to not only conform to environmental regulations, but also integrate green practices in their supply chain activities. However, most organizations are of the idea that implementing green supply chain practices would involve higher costs and investments to the business (Feng, et al, 2009). The study will seek to establish the impact of green supply chain management practice on performance of oil marketing firms and show the social and financial benefits of its adoption for the organizations.

Previous studies by Ayugi (2007) on effectiveness and efficiency of the supply chain model in the Wrigley Company (East Africa) Ltd identified increased productivity, customer service, customer responsiveness and high quality standards as the most common supply chain objectives for the organization and reported findings that company supply chain had led to an increase in sales with greater stock visibility to a greater extend. Mwirigi (2007) went further and did a survey on Green supply chain management practices by manufacturing firms in Kenya with findings that green supply chain practices were found valuable in overcoming environmental impacts arising from manufacturing operations as environmental impacts occurs at every stage of the product life cycle. Odhiambo (2008) did a survey of the extent to which floricultural firms in

Kenya practice green marketing with findings that a majority of firms were yet to fully adopt it though plans were in formulation to adopt the practice. The studies highlighted did not address the impact of green supply chain on performance of oil industries.

The research questions will be to find out; does green supply chain practice have an impact on performance of oil marketing firms? Does green supply chain contribute to or influence the choice of suppliers? What is the relation between green supply chain and competitiveness in major oil marketing firms in Kenya?

1.3 Objective of the study

1. To establish extent to which oil marketing firms have adopted green supply chain
2. To establish the impact of green supply chain on performance of oil marketing firms

1.4 Significance of the study

The study would benefit oil marketing firms by highlighting financial and social benefits to be accrued through green supply chain practice and highlight areas of improvement in the supply chain to make it leaner and efficient while at the same time be environmentally friendly.

The study will highlight the real cost of supply chain to society which would enable government in policymaking in terms of environmental regulations to be enacted and help in setting the amount of environmental pollution penalty fees and permit fees.

The Study will engage scholars who want to further pursue and write on the concept of green supply chain and show green can also be lean.

CHAPTER TWO: LITERATURE REVIEW

2.0 Introduction

This chapter highlights the concept of green supply chain, the financial and social benefits accrued from practicing green supply chain and the relationship between green supply chain and competitive advantage.

2.1 The Concept of Green Supply Chain

Green supply refers to the way in which innovations in supply chain management and industrial purchasing may be considered in the context of the environment (Rha, 2010). It is the purchase function that encompasses recycle, reuse, reduce and substitution of materials (Narasinhan and cater, 1998). Going green is not limited to individuals only but also business organizations who are now taking steps to minimize harm to the environment by cutting on the carbon footprint. A green supply chain is therefore a series of activities and processes in the supply chain that strife to continually achieve environmentally friendly practices that are sustainable in the long run. Sustainability implies meeting the current generation's needs without jeopardizing the ability of future generations to meet theirs. It involves responsible use of resources so that they can be replenished in a natural equilibrium (Costanza, 1992; Daly &Cobb, 1989). There are two types of green supply chain management process that include product based green supply and greening the supply process (Brown et al, 2001).

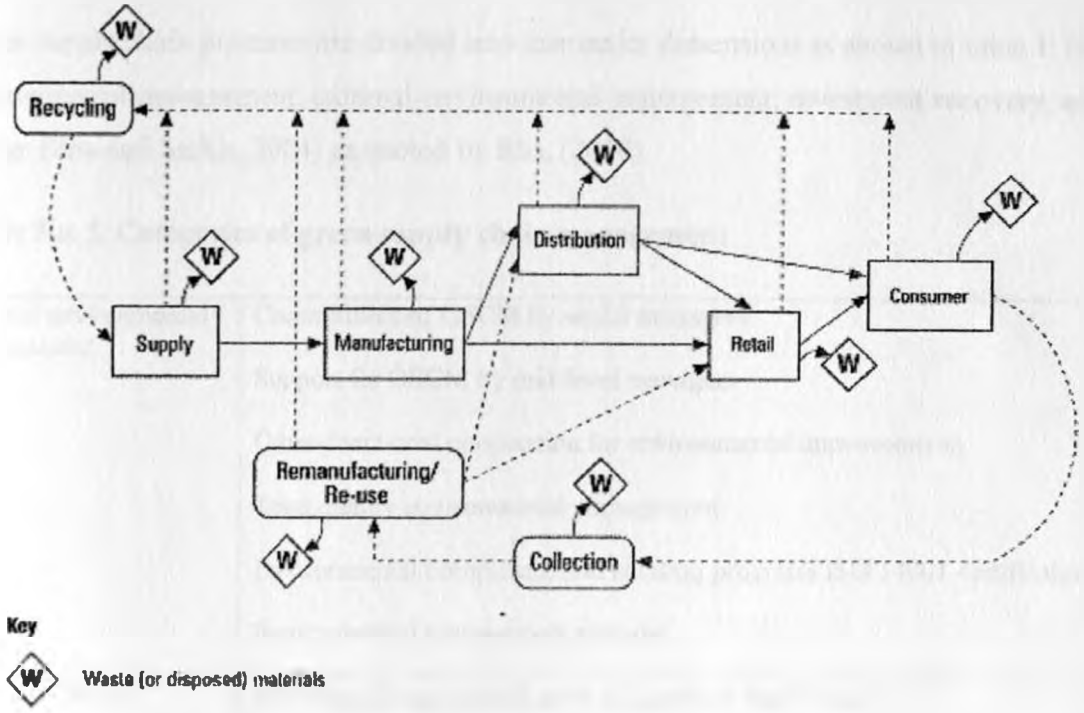
Betty Feng, (2009) in the article Reduce Supply Chain Carbon Footprint, highlights the many trade off decisions to be made in green supply chain optimization with the goal of maximizing carbon emission reduction. She suggested environmental initiatives from supply chain functions point of view and divided the functions into five groups; product development, procurement, production, distribution and transportation.

Under the product development function, initiatives would include package redesigning, designing for environment, waste management solutions at end of life cycle and identifying & use of less hazardous or recyclable material. These initiative efforts would offer environmentally friendly products, improve competitiveness, reduce product size & weight and improve waste

management together with solid waste reduction. Secondly, initiatives in the procurement function would include green sourcing for direct and indirect materials, collaborating with suppliers for green initiatives and localized sourcing for just in time (JIT). These initiatives would lead to utilization of environmentally friendly materials, cost reduction benefits from suppliers' improve efficiency, short procurement distance and reduced raw material inventory. Initiatives under the production function would include improving the factory layout, utilizing fuel efficient tools & machines, recycling materials and improving the production process from straight push to pull, push-pull, or postponement strategy. This would reduce in-house traffic movement, reduce finished goods inventory & warehouse space and improve fuel efficiency. Fourthly, distribution function initiatives include strategic placement of warehouse & distribution centers, warehouse layout improvement and utilization of fuel efficient tools and equipment which would lead to improved efficiency and productivity, improved fuel efficiency and help achieve least total costs while minimizing carbon footprint. Lastly, initiatives in the transportation function would include milk-run for both inbound & outbound, use of more environmental friendly logistics providers, rerouting of fleet vehicles, optimization of truck loads, use of rail or intermodal transportation and use of back-haul. This would result in reduced waste of empty trailer space, incentivize logistics providers to be greener, reduce miles and improve fleet utilization and reduce carbon emissions caused by transportation (Feng 2009).

The key themes that came out in the green supply chain literature are the concepts of green design, green operations, reverse logistics, waste management and green manufacturing (Guide & Srivastava, 1998; Srivastava, 2007) as quoted by Otago Management Graduate Review (2009). Figure 1 illustrates the green supply chain structure.

Figure No. 1 Green Supply chain management



Source: Beamon (1999) as quoted by Otago Management Graduate Review, (2009)

Green design incorporates green into new product development and is a systematic method for companies to reduce the environmental impact of their products and processes while simultaneously cutting costs and increasing product marketability (Hu, 2010). Organizations with complex supply chains can become environmental friendly in remanufacturing through reverse logistics (Fiksel, 1996). An important sub concept to green design is the life cycle analysis introduced to measure environmental and resource related products to the production process (Srivastava, 2007). This measurement takes place in stages from extraction of raw materials, production, distribution, and remanufacturing, recycling and final disposal (Otago Management Graduate Review, 2009).

Green Operations would include reverse logistics which Beamon, (1999) highlights as the opposite of forward logistics. Reverse logistics is a process where a manufacturer accepts previously shipped products from the point for consumption for possible recycling and re-

manufacturing (Carter and Ellram 1998). Collection is done at the initial stage where products are selected, brought together and transported to a common facility for remanufacturing (Srivastava, 2007).

Green supply chain practices are divided into four major dimensions as shown in table 1: internal environmental management, external environmental management, investment recovery, and eco design (Zhu and Sarkis, 2004) as quoted by Rha, (2010).

Table No. 1 Categories of green supply chain management

Internal environmental management	Commitment of GSCM by senior managers
	Support for GSCM by mid-level managers
	Cross-functional cooperation for environmental improvements
	Total quality environmental management
	Environmental compliance and auditing programs ISO 14001 certification
	Environmental management systems
External GSCM practices	Providing design specification to suppliers that include environmental requirements for purchased item
	Cooperation with suppliers for environmental objectives
	Environmental audit for suppliers' internal management
	Suppliers' ISO14000 certification
	Second-tier supplier environmentally friendly practice evaluation
	Cooperation with customer for eco-design
	Cooperation with customers for cleaner production
	Cooperation with customers for green packaging
Investment recovery	Investment recovery (sale) of excess inventories/materials
	Sale of scrap and used materials
	Sale of excess capital equipment

Eco-design	Design of products for reduced consumption of material/energy Design of products for reuse, recycle, recovery of material, component parts Design of products to avoid or reduce use of hazardous products and/or their manufacturing process

Source; Categories of green supply chain management from literature (Zhu and Sarkis, 2004) as originally quoted by Rha, (2010).

For an organization to improve its environmental performance, its internal environment performance is critical (Zhu et al, 2008) and this can only be achieved through quality management which ensure adherence to rigorous quality control by learning from experiences of their quality management programs (Zhu and Surkis, 2004). By receiving the certificate for the ISO 14001 environmental management system (EMS) standard, organizations are able to create structured mechanisms for continuous improvement in environmental performance (Kitazawa and Srakis, 2000). GSCM and logistics efforts have encouraged firms to adapt the closed-loop supply chain (Beamon 1999). Closed-loop supply chain management stands for "the design, control and operation of a system to maximize value creation over the entire life-cycle of a product with the dynamic recovery of value from different types and volumes of returns over time" (Guide and Van Wassenhove 2006) as quoted by Rha (2010).

Resource Reuse and reduction enables firms to minimize waste which results in more efficient forward and reverse distribution processes (Carter and Ellram, 1998). Eco-design, design for environmental management, enables organizations to improve their environmental performance and close the supply chain loop by handling product functionality while minimizing life-cycle environmental impacts (Zhu et al., 2008).

2.2 Cost Accounting in Green Supply Chain

Unlike the green supply chain, the traditional supply chain did not consider environmental and social costs in their supply chain management. Cost of supply chain was defined as those activities related with manufacturing and converting raw materials to final goods which are delivered to the end user at the lowest possible cost with maximum customer satisfaction though recently there has been a vital need for an environmental friendly supply chain due to risk of climate change (Beamon, et al, 1999). Conventional supply chain in the oil industry is focused on improving the efficiency of the individual entities along the supply chain, they forecast customers demand depending on these individual entities in the supply chain /units in the supply chain and not focus on the supply chain as an integrated system (Christopher, M, et al, 2007). Since the goal of supply chain is to provide maximum customer service at the lowest possible costs, it has also been advocated that the supply chain be managed as an integral and coordinated system. This would further reduce costs by eliminating unnecessary uses or requirements which are loads on the chains. Loads are costs and integrating the system reduces loads, hence, costs (Forester, 1958, 1961).

Total supply chain management cost is a discrete measurement defined as the fixed and operational costs associated with the plan, source, make, and deliver supply chain processes. This activity based view of supply chain costs takes into account order management, material acquisition, inventory carrying, planning/finance, and information technology costs (Bolstorff, 2007). Players and other stake holders in the supply chain normally often classify or segment supply chain costs based on process activities such as order management costs that include customer service costs, finished goods warehouse costs, outbound transportation costs, contact and program management cost, installation planning and execution costs, accounts receivable costs; material acquisition costs that include purchasing cost, raw material warehouse cost, supplier quality cost, component engineering and tooling cost, inbound transportation cost, accounts payable cost; Planning costs that include demand planning cost, supply planning costs, supply chain finance control cost; Inventory carrying cost that include opportunity cost, obsolescence cost, shrinkage costs, taxes and insurance costs and lastly IT costs for supply chain that include application cost, IT operational cost for supply chain (Bolstorff and Rosenbaum,

2007) .The traditional supply chain therefore failed to account for environmental costs that could not directly be associated with process activities.

Green supply chain, in addition to unit production costs, considers environmental cost and its impact on other supply chain process, to the environment and the society Traditional structure of cost accounting does not count these costs, for instance the costs that oil marketing firms incur to clean up hazardous wastes and oil spills could be classified as contingent costs however any future spills trigger image/relationship costs and external costs due to damage to the nearby aquatic ecosystem (United states environmental protection agency report, 1995). Green supply chain aims at saving these environmental costs.

2.2.1 Environmental Cost

Environmental costs are costs related to potential or actual deterioration of the environment and natural resources as a result of economic activities. These costs can be associated with the economic unit directly causing environmental deterioration through its activities or, the costs can be associated with economic units independent of whether they have caused the impact on environment (Glossary Of Environmental Statistics, Studies in Methods, 1997). They are costs incurred when preventing, containing, or removing environmental contamination (Dictionary of Accounting Terms). Environmental costs comprise both internal and external costs and relate to all costs incurred in relation to environmental damage and protection (Environmental Management Accounting Procedures and Principles, United Nations. New York 2001). Environmental costs include conventional costs, hidden costs, contingent costs, image or relationship costs, social costs and health costs.

Conventional costs are costs that can be directly attributed towards activities involved in production of goods and services (Kaplan and Cooper, 1998).These includes raw material cost, direct labour, capital and activities/processes involved in production. Conventional costs majorly concern themselves with the expense incurred internally associated with an undertaking (Drucker, 1999). These costs of using raw materials, utilities, capital goods, and supplies are usually addressed in cost accounting and capital budgeting, but are not usually considered environmental (United States Environmental Protection Agency report, et al, 1995).

Hidden costs are not easily identified with a specific product or activity e.g. the opportunity costs associated with forgoing the best alternative when using a limited resource that involves choice and necessity (Buchanan, 2008). Contingent costs are meant to cover uncertainties and potential liability that may face the organization in the future in terms of litigation, law suits and environmental cleanup costs (Beamon 1999). Image/relationship costs are costs deemed intangible as they are incurred to affect subjective, measurable perceptions of management, customers, employees, communities, and regulators. These costs are corporate image and relationship costs and would include costs of annual environmental reports, community relations activities and costs incurred voluntarily for environmental activities e.g., tree planting (United states environmental protection agency report, 1995). Social and External costs are costs that impact upon the environment and do not directly accrue to the business or the business doesn't account for, e.g., the damage caused by oil spills to the nearby aquatic system, climate risk leading to global warming while health costs are costs associated with sickness as a result of pollution and global warming (United states environmental protection agency report, 1995).

The oil industry is a major source of pollution to the environment. It has been noted, oil exploration, drilling, pumping, refining, transporting and use impacts the environment (Feng, 2009).Wastes produced after oil extraction and processing are toxic leading to hydrological disruption and acid rain generated and cause extensive amount of carbon emission and pollution to the environment (Helfferich, 1991). This has been reported to have damaged crops and has also practically wiped out fish populations in many streams, rivers and lagoons (World Rainforest Movement Report, 2004). Usurpation of rights of indigenous folks; Natives have always found themselves on the receiving end of being displaced to create room oil related activities. (Kane, 1996) writes in his book 'Savages' of how a people called the Huaorani living in the deepest part of Amazon rain forest of Ecuador and not exposed to civilization, have their rights infringed because they are living a top some of Ecuador's richest oil fields.

Military Intervention to secure oil supplies; There has been tension between the governments of Sudan and Southern Sudan over the disputed region of Abyei which holds strategic oil importance (The Christian Science Monitor, July 27, 2011). Economic issues such as contingent costs incurred and loss of lives due to oil spills that have ended up causing fires, in Kenya, for example the oil spill in SALGAA Kenya, which claimed numerous, lives in 2008 (The

Independent, February 1, 2009). Lives lost means loss in labour while contingent costs means companies incur extra costs which they pass on to the consumer.

Conventional methods of supply chain did not consider these environmental and social costs as costs to be put into considerations in there supply chain management .Supply chain was defined as those activities related with manufacturing and converting raw materials to final goods which are delivered to the end user at the lowest possible cost with maximum customer satisfaction though recently there has been a vital need for an environmental friendly supply chain due to risk of climate change (Beamon, et al, 1999). Most oil marketing firms were focused on reducing unit costs in the supply chain, many companies later evolved into looking at total landed costs with the onset of global trade, companies also started looking at the usage costs with a piece of equipment (Mollenkopf, et al, 1997). Conventional supply chain does not consider environmental impacts of oil production as costs. Green initiative in a supply chain considers the use of environmental friendly inputs and transforming the inputs into by products that can improve the environmental condition in a supply chain.

2.3 Impact of Green Supply Chain

Green initiative in a supply chain considers the use of environmental friendly inputs and transforming the inputs into by products that can improve the environmental condition in a supply chain .In the UAE 40% of companies knew the cost benefits of GSC in relation to the environment, 60% were ignorant or planned to adopt the practice in the future. Big companies often do not know the effects of their operations on the environment and are unaware of the fact that the modes of transport they use to transport their products which may be trucks, ships, planes or trains might be harming the environment. One of the methods to avoid this may be to use low emissions modes (Rettab, B, et al, 2008). Oil marketing firms have an impact on the environment during their supply chain processes. This impact has a price that every corporation pays inform of environmental costs (United Nations Division for Sustainable Development Report, 2001) though the traditional structure of cost accounting does not account for these costs. If companies can develop a GSC that is cost effective in terms of saving money by not having to dispose of harmful by products, it would promote a reduction in obsolescence, decrease in the amount of money spent on scrap and the resources spent on adhering to regulatory issues

(Kosibu, 2001). A cost efficient green supply chain can be achieved by identification of environmental costs within their companies, determine alternative opportunities that would yield significant cost savings and at the same time reduce on the environmental and social costs and then evaluate these benefits of the proposed alternatives before implementing and monitoring these improvement solutions (Chima, et al, 2007).

GSC improves on the efficiency of the supply chain process. When oil marketing firms go green in their supply chain it means that they are cutting down on costs such as the use of machinery and resources hence improving on the way they produce and what they use in oil production which eventually cuts down on costs of production and increasing on their profits. By reevaluating the supply chain process of a company in terms of planning, buying, shipping, distribution and use of resources in the oil corporations, many cost reductions could be made when managing supply chain in an environmental friendly manner. Some other benefits are the decrease in in waste disposal training costs reduction of resource costs and less environmental permitting fees (Murray, et al 2008).

Green supply chain affords competitive advantage by impacting on the input, output and throughput systems. Firstly, in the input system, there is rearranging of priorities and creation of new goals and objectives in line with preservation of ecological value. Competitive advantage is therefore derived from resource & labour commitment together with energy conservation (Fang S., Lin S, 2006). Secondly, in the throughput system, green manufacturing with environment in mind fosters production efficiencies with the benefit of reduced waste and environmental pollution which is vital for both a good company image and minimal environmental liabilities which would mean better credit risk for the organization and less vulnerability to litigation which are two significant sources of competitive advantage (Fang S., Lin S, 2006). Lastly, in the output system, a green supply chain system creates competitive advantage by ensuring environmentally friendly product design, business undertakings, reverse logistics and better management of waste and pollution (Shrivastava, 1995).

Green supply chain management would also promote reduced environmental costs in terms of conventional costs i.e. reduced environmental permitting fees ,lower material costs, potentially hidden costs, contingent costs due to reduced chances of oil spills ,better image of the company

leading to reduced image /relationship costs due to good subjective perspective of the company, reduced external costs due to reduced rate of environmental impact in terms of aquatic damage, reduced global warming due to reduced production of greenhouse gasses CO2, better health as factors such as green manufacturing aims to control the hazardous spills to the environment. On overall there is improved efficiency in the supply chain in terms of costs internally and externally and also better living conditions (Murray, et al 2008).

Poorly managed GSC leads to cost related issues in that it may have increased costs on the production process. This may also be due to managers who still today do not know how to incorporate social and environmental responsibility into their daily decisions, training of employees to understand the concept of green and also how to use the new green technology in implementing the activities. Sometimes a company would be interested in GSC but the supplier they deal with is not using environmentally friendly processes. Unfortunately most companies are falling in this pitfall where they are working on improving and reducing their environmental effects only to be let down by their suppliers (Murray, M, et al, 2008).

GSC would also need energy efficient technology that can lessen the power consumption, increase the products life span, improve on machines uptime and also result in efficiency and effectiveness. The technology is quite different from normal supply chain which may pose a challenge to the company in terms of training, to the society in terms of loss of jobs by workers whose earlier performed duties have been taken over by the new technology (walker, et al 2008).

Challenges have also been identified in implementing green supply chain as there is not enough awareness about the green supply chain, often consumers and producers are not aware of what to do to heal the environment or they are ignorant to the fact that they are harming the environment also in some case there may be high initial costs to switch from traditional supply chain being used to the green supply chain. This may go against the companies' aim of minimum costs and profit maximization (Murray, M, et al, 2008).

2.4 GSC as a tool for Competitiveness and Competitive Advantage in the oil industry

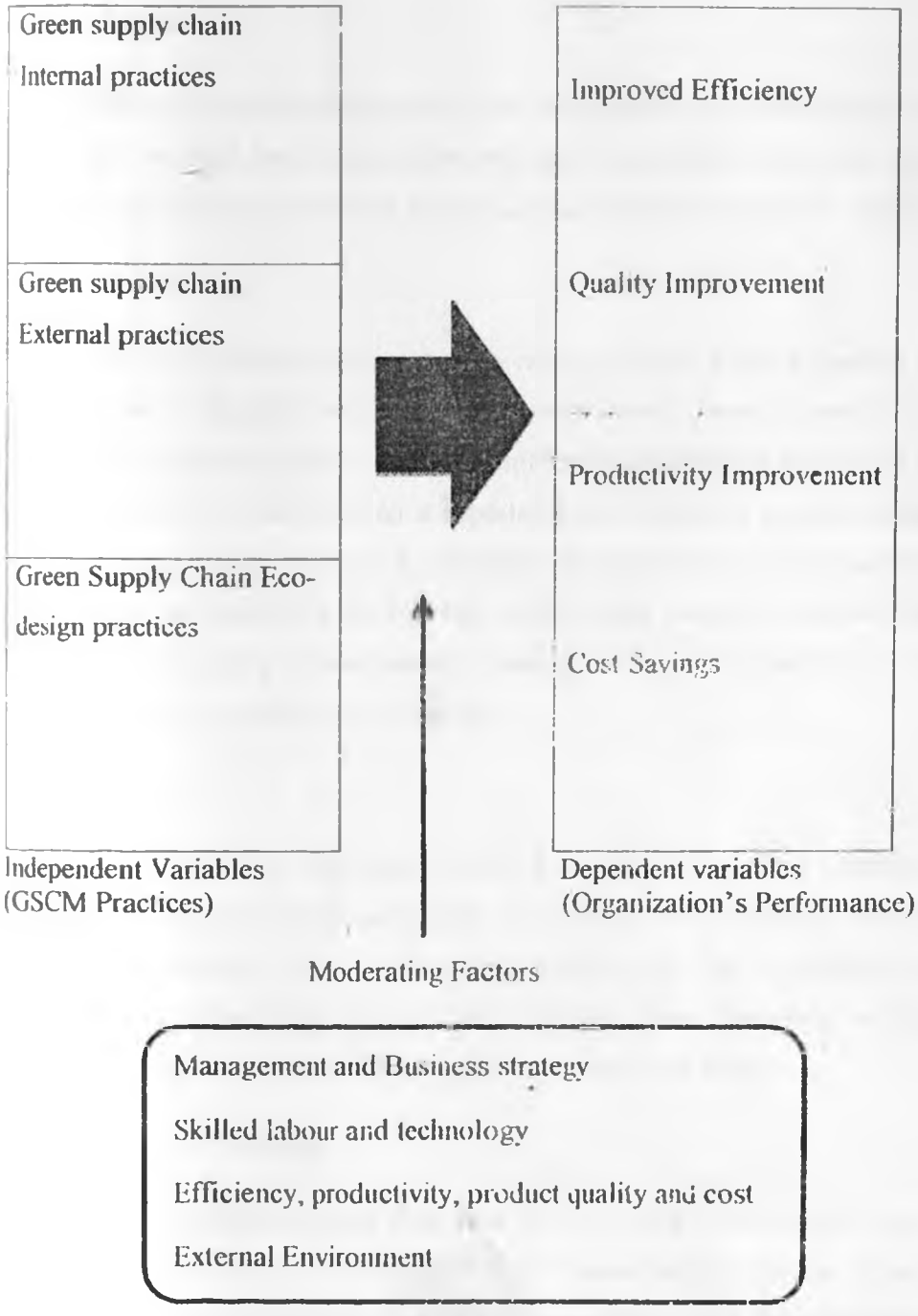
Organizations that pursue green supply chain practices experience better competitiveness (Rao and Holt 2005). A firm's performance is measured in terms of its competitiveness which consists of improved efficiency, quality & productivity improvement and cost savings (Rha, 2010).

The oil industry can be segmented into three main sections or stages in terms of the supply chain. The input or the upstream stage which involves all activities towards exploration, drilling and crude oil production, the throughput stage or midstream where crude oil is transferred, transported and traded among oil refiners and lastly the output or downstream where the refined oil and oil products are distributed to middlemen and final users (Chima, 2007; Njau 2010). From past experiences, the production of oil has been largely determined by global demand of the product. This however does not mean oil marketing firms operating in different countries have the power to set oil prices as this is done by the Organization of Petroleum Exporting Countries (OPEC) (Njau, 2010). This means therefore that if oil firms want to establish a competitive advantage, they can only do so through efforts to cut costs as there is no much differentiation in the product. It has been observed that the last frontier where organizations can reduce costs and compete is in the supply chain starting from extraction to end user i.e. "end to end" (Gattorna and Christopher, 2009). It is only by viewing the supply chain in its entirety and totality that the costs can be reduced. The concept of green supply chain seeks to streamline the supply chain in the oil industry by making it lean and green through channeled efforts in prioritizing issues, prudent or sustainable management and use of resources and managing waste and environmental pollution. Many oil marketing firms in Kenya would need to change their corporate culture, processes, equipment etc. in order to implement green supply chain and this perhaps would be the biggest huddle to overcome as this requires lots of resources.

Many companies that take a proactive stance toward environmental improvements in production have a decided advantage over businesses that are indifferent to or actively oppose new standards. First, they gain a greener image in the public eye. Second, because adopting new standards takes time and money, they have more time to develop methods for reducing waste and can do so, on their own schedule (Stephen, S. & Jane Kane, J., et al, 1996). In addition, the company that adopts this strategy the earliest, would stand to benefit from "first mover

advantages" where they could establish customer loyalty, good will, establishment of supplier relations (Lieberman and Montgomery, 1988) which could in future be barriers to entry for competitors later implementing the green supply chain (Caves and Porter, 1977). It has to be noted that the oil market is moving from environmental compliance towards using the concept of green supply chain management as a tool for value addition and therefore competitive advantage. The oil firms that are non-complaint stand to incur huge costs in form of permits, by product costs, regulatory costs, training costs, waste disposal and other environmental costs. Regulatory factors are not the only factor driving the green revolution. In fact, the customer turned green consumer is at the center of it all. Nowadays consumers are concerned not only about purchase and consumption processes but also production process in terms of scarce resources consumed (Zinkhan and Carlson, 199).

2.5 Conceptual Framework



Source; Rha (2010)

Figure No. 2 Conceptual framework

CHAPTER THREE: RESEARCH METHODOLOGY

3.0 Introduction

This chapter presents the research design, the population that was researched, the sample design and sample size used, instruments of research used and analysis of the data collected.
Information gathering was done in a systematic and objective manner to realize objectives set.

3.1 Research Design

The research was conducted using a survey research design which according to Kathuri and pals (1993) aimed to describe and explore a phenomenon. Surveys provide quick inexpensive, efficient and accurate means of assessing information about the population (Zickmund, 2003). The objectives of the survey aimed at explaining and describing characteristics of a pre specified group. In this case the concept to be explored was green supply chain and the target group was the five major oil marketing firms in Kenya. The study sought to find out the relational impact between green supply chain practice and performance in terms of efficiency, quality improvement, productivity and cost savings.

3.2 Population

The research focused on the supply chain function and therefore attention was focused on employees in the procurement and supply chain department. Managers from the top level, mid-level and supervisory levels in the supply chains were the respondents used. The sample population was drawn from 5 major oil marketing firms operating in Kenya that included National oil, Shell Kenya, Kenol/Kobil, Oil Libya and Total Kenya.

3.3 Sample Size and Design

There were 6 respondents drawn from each of the 5 major oil marketing firms i.e. National oil, Shell Kenya, Kenol/Kobil, Oil Libya and Total Kenya therefore the sample population consisted of 30 respondents who were questioned and administered with the questionnaires to determine the impact of green supply chain on performance. In each organization, 2 respondents were drawn from each of supervisory, mid-level and top level management which enabled collection of accurate and relevant information for the research.

3.4 Data Collection

The Data was collected through questionnaires from the 5 major oil marketing firms with the aim of establishing the impact of green supply chain on performance of oil firms. The questionnaires were self-administered and were distributed to the target sample where the drop and pick later method was adopted. The researcher visited the respondents at their place of work to ensure quick and timely response.

The questionnaire was divided into three. The first part sought company information to help researcher understand nature of the company, second part sought to establish the extent to which oil marketing firms practiced green supply chain management while the third part wanted to establish the impact of green supply chain on performance of organization. Secondary data for example data from company websites, financial reports, journals etc., was used to supplement data from questionnaires.

3.5 Data Analysis

Data collected in the research was edited for accuracy, consistency, uniformity and completeness in preparation for analysis. Multivariate data analysis techniques were used as it allowed for simultaneous investigation of more than two variables (Zickmund, 2003). Frequency proportions were used to determine the extent of adoption of green supply chain in oil marketing firms and the influence of GSC practices on their performance.

CHAPTER FOUR: DATA ANALYSIS, FINDINGS AND DISCUSSIONS

4.1 Introduction

This chapter presents the analysis and interpretation of data obtained through questionnaires received from 15 respondents where the objective of the study was to establish the extent to which major oil marketing firms in Kenya had adopted green supply chain and how green supply chain affected their performance.

4.2 Characteristics of the Respondents

The researcher sought to establish the nature and ownership of oil marketing firms in Kenya. Information gathered on the firms' profile showed 75% of the firms were multinationals. 65% of the respondents indicated they had served their respective firms for 6-15yrs whereas 20% had worked for more than 15 years. Respondents from the supervisory level were the most responsive perhaps because of their relatively larger numbers as compared to mid-level and top level managers in the organizations. The respondents' feedback was varied as shown in table 4.2 a below.

Table 4.2 a. Respondents' feedback

	Respondents	Sample	percentage
Top level managers	3	8	38%
Mid-level managers	5	8	63%
Supervisors	7	8	88%
Total	**15**	**24**	**63%**

Source: Research Data (2011)

4.3 Determinants of Green Supply chain practices

Assessment on adoption of GSC by the oil marketing firms was done by presenting questions on internal practices that include among others commitment to GSC by management, environmental management systems and certification; external practices that involved collaboration with suppliers and audit of their internal management; and eco design practices that involve design for environment and reduction of energy use and hazardous wastes.

4.3.1 Internal management

The research wanted to establish the extent to which oil marketing firms practiced GSCM in their internal environment. The study shows that the most adopted practice was environmental compliance and auditing programs ISO 14001 certification with a mean of 4.47 this could majorly be as a result of firms being required by law to comply with environmental regulations. The next indicator of adoption was commitment for GSCM by senior managers with a mean of 3.67 suggesting top management could be incorporating green supply chain to overall business strategy. However total quality environmental management was the least adopted with a mean of 2.27. suggesting these organizations lacked the necessary expertise to fully implement it. Table 4.3 a. shows the findings.

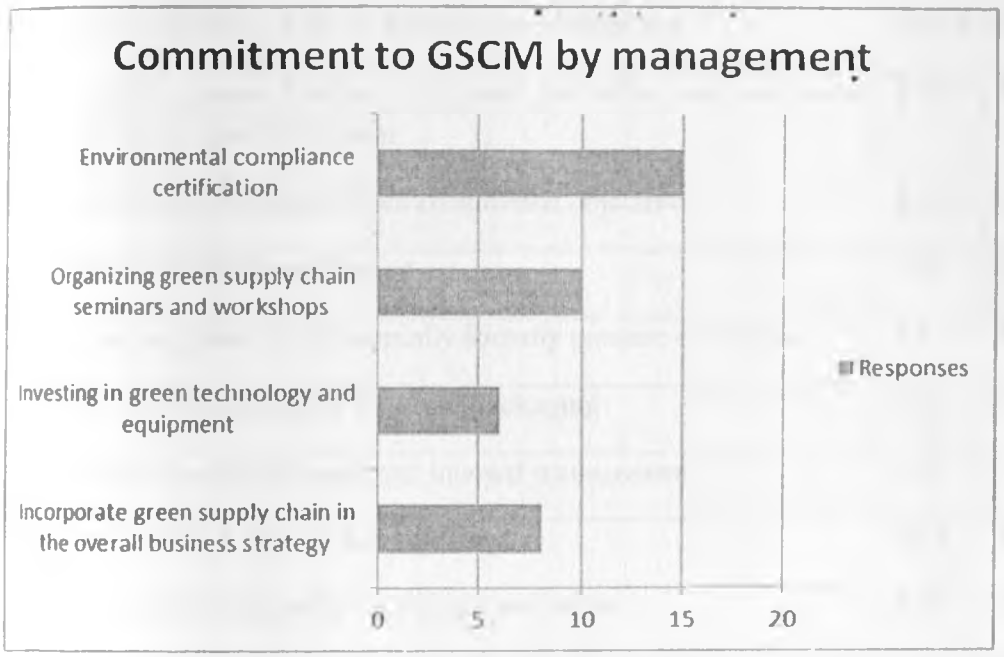
The study also showed support from management on green practices was majorly through environmental compliance followed by organizing GSCM seminars and training, suggesting legislation and cost respectively played a significant role in choice of practice. However the least practice indicated by respondent was investing in green technology and equipment suggesting there was a perception that the costs are prohibitive. Figure 4 a. below shows level of commitment by managers.

Table 4.3 a. Extent of GSCM practice in internal environment

Extent of adoption of GSC on internal environment	**Mean**	**Std Dev**	**Rank**
Environmental compliance and auditing programs ISO 14001 certification	4.47	0.516	1st
Commitment for GSCM by senior managers	3.67	1.234	2nd
Support for GSCM by mid-level managers	3.33	1.014	3rd
Cross-functional cooperation for environmental improvements	3.13	1.060	4th
Environmental management systems	2.67	1.347	5th
Total quality environmental management	2.27	1.387	6th
Average	**3.26**	**1.093**	

Source: Research data (2011)

Figure 4a. Commitment to GSC by management



Source: Research data (2011)

4.3.2 External supply chain practices

The research sought to establish the extent to which oil marketing firms practiced GSCM in their external supply chain practices. Providing design specification to suppliers that include environmental requirements for purchased item was the most adopted practice to a great extent with a mean of 4.6, this was popular because when ordering for goods, the firm had a greater control over the requirements needed without necessary having to spend significantly higher costs. This was closely followed by cooperation with suppliers for environmental objectives at a mean of 4.40 However, cooperation with customers for cleaner production was the least adopted practice with a mean of 2.33 suggesting oil marketing firms were unwilling to participate more with the customer in fear of divulging sensitive company information that could be used to a competitors' advantage. Table 4.3 b illustrates the findings

Table 4.3 b Extent of adoption of GSC in external environment

Extent of adoption of GSC in External environment	Mean	Std Dev	Rank
Providing design specification to suppliers that include environmental requirements for purchased item	4.60	0.507	1
Cooperation with suppliers for environmental objectives	4.40	0.507	2
Suppliers' ISO14000 certification	4.07	0.458	3
Second-tier supplier environmentally friendly practice evaluation	3.87	0.516	4
Cooperation with customers for green packaging	3.40	1.352	5
Environmental audit for suppliers' internal management	3.27	1.280	6
Cooperation with customer for eco-design	3.07	1.163	7
Cooperation with customers for cleaner production	2.33	1.047	8
Average	**3.63**	**0.853**	

Source: Research data (2011)

4.3.3 Eco design practices

The questions presented in this section sought to establish the extent of GSCM practices in oil marketing firms' eco design practices and focused on material/energy use, manufacturing processes, components and waste management. Design of products for reduced consumption of material/energy was the practice adopted to a very great extent with a mean of 4.53 suggesting firms pay more attention to reduction of material and energy consumption because it had a direct impact on cost incurred therefore affected their books of account. Design of products for reuse, recycle, recovery of material, component parts followed with a mean of 4.40 however, design of products to avoid or reduce use of hazardous products and in their manufacturing process was least adopted, suggesting cost minimization was a priority. Table 4.3 c below shows the findings.

In resource and waste management, 93% of the respondents indicated use of intermodal transportation which included sea, air and pipeline to cut emissions. That may have been done for their convenience rather than cutting emissions as most firms were not aware that this was a GSC practice. It was followed by design of products for reuse, recycle, recovery of material,

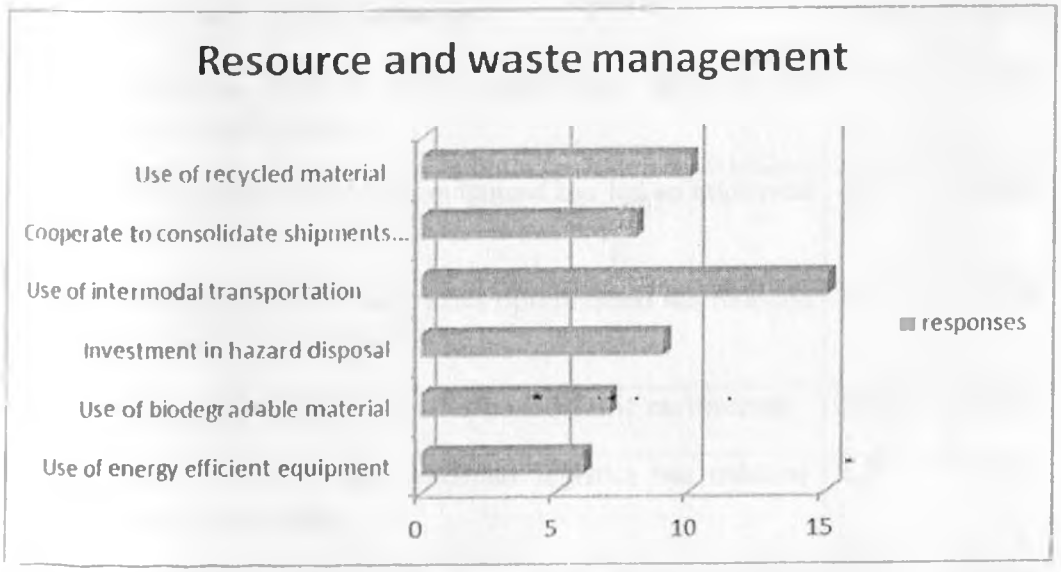
component parts which had 60% of the responses. The least adopted practice in this category was use of energy efficient machines, suggesting firms were unwilling to phase out their current outdated machines for more efficient ones due to cost constraints. Figure 4.b below illustrates resource and waste management.

Table 4.3 c Extent of GSC in Eco design

Gscm in eco design	Mean	Std dev	Rank
Design of products for reduced consumption of material/energy	4.53	0.516	1
Design of products for reuse, recycle, recovery of material, component parts	4.40	0.507	2
Design of products to avoid or reduce use of hazardous products and/or their manufacturing process	3.80	0.676	3
Average	**4.24**	**0.566**	

Source: Research data (2011)

Figure 4 b Resource and waste management



Source: Research data (2011)

4.4 Impact of green supply chain on performance

In this section questions were presented to respondents on the influence of GSCM on efficiency, quality improvement, productivity and cost savings as performance indicators of the firms. The research therefore wanted to establish the impact of GSC on performance of oil marketing firms.

4.4.1 Impact of GSC on firms' efficiency

The research wanted to establish the impact of GSC on a firms' efficiency and from the findings it was established that localized sourcing resulting in short procurement distance and reduced raw material inventory was most adopted with a mean of 4.33 and thus having the greatest influence on efficiency. Localized sourcing ensures order processing and delivery period was relatively short thereby reducing on time between order processing and delivery. Utilization of fuel efficient tools and equipment was also found to impact efficiency to a great extent, however improved production process had the least influence on efficiency with a mean of 2.4 as probably most firms adopted straight push method thereby increasing their respective inventories thus diminishing warehouse space. The table 4.4 a below illustrates the impact on GSC on efficiency.

Table 4.4 a. Impact of GSC on efficiency

GSC practices that enable efficiency	Mean	Std Dev	Rank
Localized sourcing leads to short procurement distance and reduced raw material inventory	4.33	0.488	1
Utilizing fuel efficient tools and equipment has led to improved fuel efficiency	4.07	0.884	2
Rerouting fleet vehicles and truck loads optimization has reduced miles and improved fleet utilization	4.0	0.378	3
Improved factory layout has reduced in house traffic movements	3.73	0.433	4
Consolidation of inbound and outbound logistics has reduced waste of empty trailer space.	3.47	1.356	5
Improved production process from straight push to pull has reduced finished goods inventory and warehouse space	2.40	1.298	6
Average	**3.66**	**0.806**	

Source: Research data (2011)

4.4.2 Impact of GSC on quality improvement

The study sought to establish the influence of GSC on quality improvement and established Optimization of truck loads, utilizing back-haul and use of rail or intermodal were the most adopted practice with a mean of 4.7 this was because firms didn't have to invest in new transportation machinery but rather adjust the way they transported goods. It was relatively easier to adopt this practice compared to others that require additional investments. Waste management at the end of the product life cycle was also indicated to influence quality improvement to a greater extent with a mean of 4.53 mainly because there were penalties and fines associated with violation of waste disposal regulations therefore firms were quick to comply with them. However the least influential and least adopted in this category was design for environment with a mean of 3.73 this could suggest the oil marketing firms were still yet to fully embrace the practice due to additional resources and skill required in redesigning the product. Table 4.4 b below illustrates the influence of GSC on quality improvement.

Table 4.4 b Impact of GSC on quality improvement

Green practices that enable quality improvement	Mean	Std Dev	Rank
Optimization of truck loads, utilizing back-haul and use of rail or intermodal reduces carbon emissions caused by transportation.	4.73	0.458	1
Waste management solutions at end of product life cycle improve waste management and reduce solid waste.	4.53	0.743	2
Green sourcing for indirect and direct materials leads to utilization of environmentally friendly materials	4.33	0.617	3
Design for environment and redesign packaging offer environmentally friendly products and reduce size & weight of product	3.73	0.704	4
Average	**4.33**	**0.631**	

Source: Research data (2011)

4.4.3 Impact of GSC on productivity

Questions in this section wanted to establish the impact of GSC on productivity. The research established that improved warehouse layout was most adopted and had the greatest impact on productivity with a mean of 3.53, this suggests that by the firms improving layout they could mechanize their operations therefore increased work done per specific time as compared to human labour. However, improved factory layout was least adopted and had least impact on productivity. This suggested the oil firms have not continually changed their factory layout in time. Table below shows the impact of GSC on productivity.

Table 4.4 c. Impact of GSC on productivity

Green practices that improve productivity	**Mean**	**Std Dev**	**Rank**
Improved warehouse layout enable mechanization which improves efficiency and productivity	3.53	0 743	1
Improved factory layout and production process reduce in-house traffic movements	2.27	1.63	2
Average	**2.9**	**1.865**	

Source: Research data (2011)

4.4.3 Impact of GSC on cost savings

The research sought to establish the influence of GSC on cost savings and it was found out that the use of more environmental friendly logistics providers had the greatest influence on environmental costs and other savings with a mean of 4.27, this suggests that logistics providers adopted GSCM practices to a great extent because they were afraid on missing out on clients. This therefore was an incentive to them while it enabled them in turn to pass the cost saving realized to their clients. Strategic placement of warehouse and distribution centers was the second most influential in terms of cost savings with a mean of 4.13, here the cost savings were derived from shorter distances covered during transportation which meant less fuel costs and less carbon emissions to the environment. However, collaboration with suppliers for their green initiatives to realize cost reduction benefits from suppliers improved efficiency was least influential on cost saving with a mean of 2.27 suggesting other intervening variables such as commitment by suppliers' managers and other business environmental factors affected the

efficiency of the suppliers and with it the costs associated with it. Table 4.4 d shows the impact of GSC on cost savings

Table 4.4 d Impact of GSC on cost savings

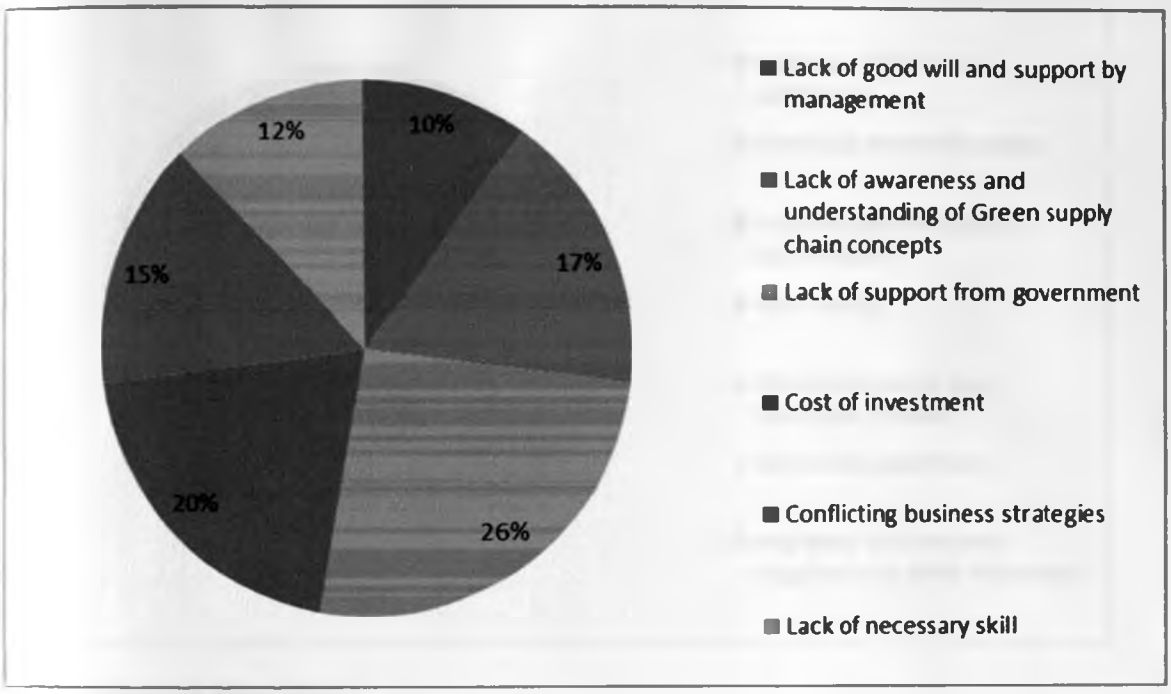
Green practices that improve cost savings	**Mean**	**Std Dev**	**Rank**
Use of more environmental friendly logistics providers incentivize logistics providers to be greener	4.27	0.704	1
Strategic placement of warehouse and distribution centers achieves least total costs, while minimizing carbon footprint	4.13	0.990	2
Collaboration with suppliers for their green initiatives leads to cost reduction benefits from suppliers improved efficiency	2.27	1.387	3
Average	**3.56**	**1.027**	

Source: Research data (2011)

4.5 Factors Hindering Implementation of GSC

The study sought to establish factors that hinder GSC implementation. The research findings indicated that the greatest hindrance was lack of government support at 26%. This was as a result of lack of clear policy guidelines on green supply chain issues while in second place 20% of the respondents indicated costs involved were a hindrance. This might be purely on perception due to lack of proper understanding of the green supply chain concept or due to the change in technology and training required to implement green supply chain practices respectively. However lack of support from management was the least ranked at 10% as a hindrance this could suggest respondent are not fully aware of what management could do to be more supportive. Figure 4 c. below shows the findings

Figure 4 c. Factors hindering implementation of GSC

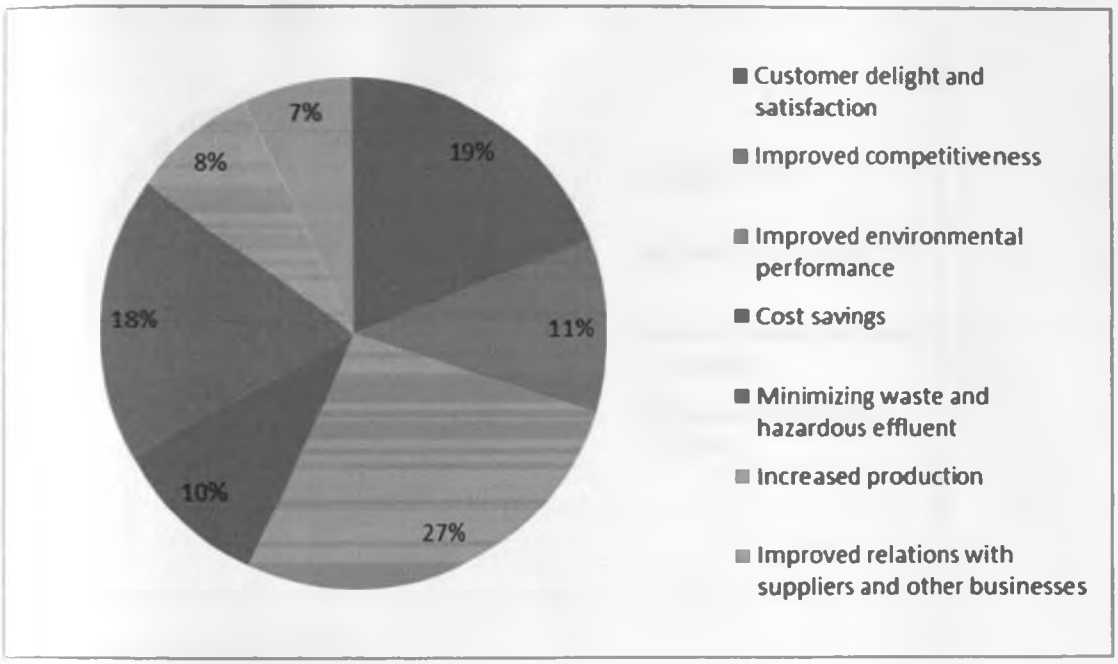


Source: Research data (2011)

4.6 Benefits of GSCM

The research sought to establish the benefits associated with GSC. 27% of the respondents strongly indicated there was enhanced environmental performance on adoption of GSCM. This could be attributed towards reduced emissions, hazardous waste management and reduced resource/energy use. 19% of the respondents indicated GSC improved customer delight. This affirmed the idea that the consumer was environmental conscious and demanded sustainability in production and consumption. However improved relations with suppliers was rated the least beneficial suggesting that suppliers were unwilling to pass on benefits gained from GSC. Figure 4 d. below illustrates the benefits.

Figure 4 d. Benefits of GSC

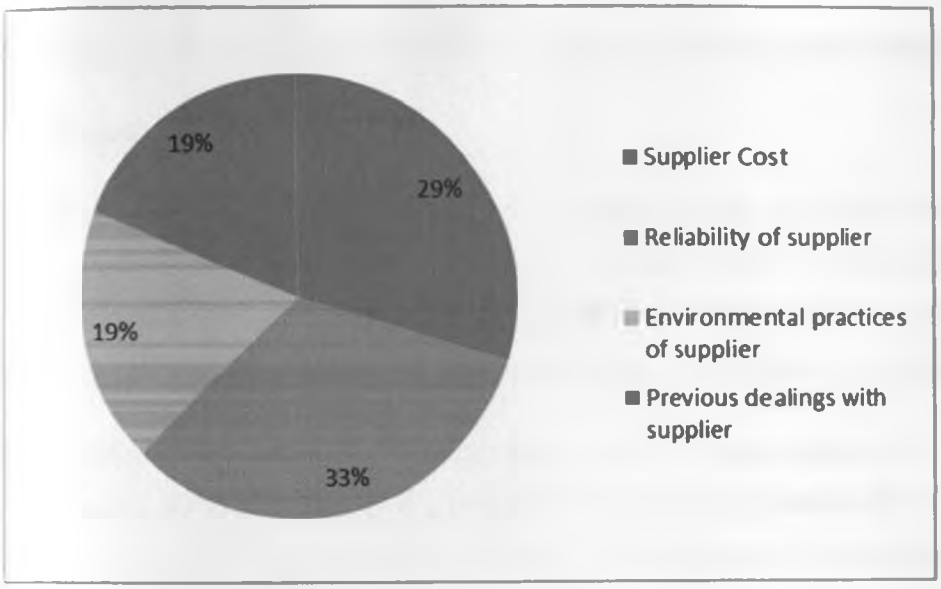


Source: Research data (2011)

4.7 Factors influencing choice of suppliers

The research wanted to establish factors that influence choice of suppliers. 30% of the respondents indicated supplier reliability mattered most closely followed by cost of supplier at 27%. The findings confirm reliability was key because without a steady reliable supplier business would stop. Cost was significant but firms would always transfer cost of business to the final consumer. However the least determinants were environmental factors and previous dealings, suggesting the firms were not as keen to source exclusively from a supplier practicing GSC and were yet to fully comprehend relation between environmental performance and business sustainability. Figure 4 e. below illustrates.

Figure 4 e. Factors influencing choice of suppliers



Source: Research data (2011)

CHAPTER FIVE: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary

Respondents who participated were drawn from major oil marketing firms, with only one being a parastatal and the other multinationals. Point to note was that the extent of adoption of green supply chain practices varied from one firm to the other depending on the nature of ownership and the size of the firm which had a significant influence on resources, both human and capital.

The study showed that eco design GSC practices with an average mean of 4.24 were adopted to a great extent by the firms followed by external GSC practices at a mean of 3.63 and lastly internal GSC practices at 3.26, this suggested companies readily adopt GSC Eco design practices as they have greater control over design of the product as they issue specifications to suppliers. On the other hand firms lacked sufficient will and resources to phase out obsolete technology for more environmental friendly technology. This could also be as a result of the perception that GSC perception was costly, something they see to be conflicting with their short term financial goals of minimizing costs and expenditure.

The study also showed that adoption of GSC practice influences to a great extent, quality improvement with a mean average of 4.33, improved efficiency with a mean of 3.66, and cost savings at 3.56, however GSC practice affects productivity to a moderate extent with a mean of 2.9 where the four parameters were used in the study as indicators of performance.

The study showed that firms had adopted GSC to a moderate extent though they had yet to fully adopt green supply chain practices mostly because they didn't fully understand the concept and its benefits, and didn't receive adequate support from the government. It was noted that firms were also reluctant to invest and make changes in their firms as it would mean incurring cost, Most therefore were confortable with environmental certifications and audits as opposed to total environmental management systems adoption.

The study showed green supply chain practice had a significance influence on a firm's performance by impacting on efficiency, quality improvement, productivity and cost savings. These indicators had an average mean of 3.61 indicating GSC influences performance to a great

extent. The study confirmed that the marketing oil companies would enjoy an even higher level of performance if only they could fully embrace and invest in green supply chain practices.

5.2 conclusions

The study confirms oil marketing firms like all the other modern firms, are faced with the ever environmental conscious consumer and government regulation and are now moving away from mere compliance towards use of the concept of green supply chain as part of the organizational business strategy.

The management of a majority of the firms studied was found to be generally supportive of green supply chain practice though they would probably be more supportive if they were actually trained on the same. Most of the respondents probably didn't fully appreciate the concept because it was only until recently that procurement and supply chain was given the due attention it deserves as a department in an organization let alone green supply chain. Therefore there were aspects indicating adoption of green supply chain practices but adoption levels were still low, some of the organization didn't even know some of the supply chain practices fell under green supply chain.

A considerable number of organizations under the study showed a positive impact between green supply chain practice and the overall performance of the firm and show willingness to pursue the concept even further despite challenges faced.

5.3 Recommendations

The study suggests that if an oil firm wants to adopt green supply chain, they have to make it a priority sourcing from suppliers who observe environmental friendly practices and collaborate with them as it was seen that most organizations choose suppliers based on reliability and cost. The study also suggested that more government involvement and creation of awareness among all stakeholders is necessary to ensure not only adoption but also sustained green supply chain practice. It was also found that that an environmental policy and framework needs to be constituted to safeguard gains of green supply chain while oil marketing firms need to fully adopt total quality management system in the internal practices. In addition, the firms need to redesign their factory layout to enhance productivity and efficiency

5.4 Limitations of the study

Some of the respondents took too much time to give their response while some were unwilling to answer the questionnaires. Some of the respondents didn't understand the topic and the concept discussed consequently they did not fill some of the questions posed.

5.5 Suggestions for further research

There was a perception that pursuit of green supply chain ultimately conflicts with cost minimizing strategies because of the necessary spending required on skills and green technology. A study could be undertaken to establish how an organization can pursue green practices while still maintaining minimal costs i.e. find out how Lean can also be made green. Similarly a study can be undertaken on the perceptions of GSC managers in the oil industry to better understand challenges and find the way forward.

REFERENCES

Ayugi, P., (2007) A study on the effectiveness & efficiency of the supply chain in Wrigley CO. E.A., Unpublished MBA, University of Nairobi

Beamon, B. (1999). Designing the green supply chain. Logistics Information Management, 12(4), 332-342.

Brown, G.G., Arntzen, B.C., Harrison, T.P. and Trafton, L.L. (1995). Global supply chain management at Digital Equipment Corporation. Interfaces, 25(1), 69-93.

Buchan an M. James (2008). "Opportunity cost". Second Edition. The New Palgrave Dictionary Of Economics Online

Bolstorff p, and Resenbaum R, (2007) supply chain excellence; Total Supply Chain Management Cost (www.scelimited.com/totalsupplychainmanagementcost.html)

Carter, C., and Ellram, L. (1998). Reverse logistics: a review of the literature and framework for future investigation. Journal of Business Logistics, 19(1), 85-102.

Caves, R. E., & Porter, M., (1977). From entry barriers to mobility barriers: Conjectural Decisions and contrived deterrence to new competition. Quarterly journal of Economics, 91:241-262

Chima M. Christopher, (2007). Journal of business and economics Research , June 2007.

Christopher, M., (2007). The agile supply chain – competing in volatile markets. Industrial Marketing Management, 29(1), 37-44.

Christopher, M.G., (1992) Logistics and Supply Chain Management, (1st Edition), Pearson, 1992 Available at (http://martin-christopher.info/wp-content/uploads/2009/12/SUPPLY-CHAIN- COST-MANAGEMENT-AND-VALUE.pdf) Accessed August 15th 2011

Costanza, R., (1992). Ecological economics. Columbia University Press, NY.

Daly, E., & Cobb, J., (1989). For the common Good: Redirecting the economy toward Community. Beacon Press, Boston, MA

Dictionary of accounting Terms. Available at: (http://www.allbusiness.com/glossaries/environmental-costs/4953587-1.html) Accessed 8th july 2011

Drucker Peter F. (1999) Management Challenges of the 21st Century. New York: Harper Business, 1999

Environmental Management Accounting Procedures and Principles, (2001) United Nations, New York Available at (www.p2pays.org/ref/02/01306.pdf) Accessed 29th July 2011

Fang, S., Lin, S , (2006), Green Supply Chain Management as Competitive Advantage; A Perspective of Intellectual Capital available at (http://ir.lib.cyut.edu.tw:8080/bitstream/310901800/7941/1/4.pdf) July 26, 2011

Feng, B (2009). Reduce supply chain carbon foot print. Available (http://gscmotion.wordpress.com/2009/09/23/reduce-supply-chain-carbon-footprint/) Accessed on July 14, 2011

Forester J.W. (1958) Industrial dynamics: A major breakthrough for decision makers. Harvard Business school review, 26(4), 1958. 37-66

Forester, J. W., (1961) Industrial dynamics. MIT press Cambridge, 1961

Fiksel, J., (1996). Design for environment: Creating eco-efficient products and processes. New York: McGraw-Hill.

Gattorna, J., & Christopher, M. (2009) supply chain cost management and value-based pricing. (http://martin-christopher.info/wp-content/uploads/2009/12/supply-chain-cost-management-and-value.pdf) Accessed 20th July 2011

Glossary of Environment Statistics, Studies in Methods, (1997) Series F, No. 67, United Nations, New York, (http://stats.oecd.org/glossary/detail.asp?ID=819)

Guide Jr., Van Wassenhove (2006). Production planning and control for remanufacturing: Industry practice and research needs. Journal of Operations Management, 18(4), 467-483.

Guide, V. D. R., & Srivastava, R. (1998). Inventory buffers in recoverable manufacturing. Journal of Operations Management, 16, 551-568.

Gungor, A., & Gupta, S. M. (1999). Issues in environmentally conscious manufacturing and product recovery: A survey. Computers & Industrial Engineering, 36, 811-853.

Hart, Stuart L., (1994) "How Green Production Might Sustain the World." Northwest Environmental Journal

Hart Stuart and Shrivastava, P., (1992) "Greening Organizations." Academy of Management Best Paper Proceedings. Vol. 52. Available at; (www.enotes.com/small-business-encyclopedia/green-production) Accessed on 16th of July 2011 at 4.45pm

Helfferich, C., (1991), Consequences of Kuwait's fires, Article 1051, Available at (www2.gi.alaska.edu/ScienceForum/ASF10/1051.html) accessed 27th July 2011

Hirshlifer, J, (1980) Price theory and applications (2nd Ed.) Englewood cliffs, NJPrentice –hall.

Hu H. Allen, (2010) Critical factors for implementing green supply chain management practice. Management Research Review, Volume 33, Number 6, 2010.

Kaplan, R. S.; Cooper, R.(1998) Cost and Effect: Using Integrated Cost Systems to Drive Profitability and Performance, Boston, MA: Harvard Business School Press, 1998.

Kitazawa, S., and Sarkis, J., (2000). The relationship between ISO 14001 and continuous source Reduction programs, International Journal of Operations and Production Management, 20(2), 225-248.

Lieberman, M. B., & Montgomery, D. B. (1988) First mover advantages. Strategic management Journal, 9:41-54.

Macheo, J. and Omiti, J (2003) Petroleum Market Structure and Pricing Following Deregulation Ocassional Paper Number 09/2003

Murray, M. (2008). Green supply chain best practices. Available (http://logistics .about.com /od/greensupply chain /a/GSC- Best_pra.htm) (Accessed on 27th Dec 2010)

Mollenkopf, D.et al., (1997). The hidden value in reverse logistics. Supply Chain Management Review, 9, 34-43

Mwirigi, P., (2007) Green supply chain mgt practices by manufacturing firms in Kenya Unpublished MBA, University of Nairobi

Narasimhan, R., and Carter, J. (1998). Environmental Supply Chain Management. Center for Advanced Purchasing Studies, Tempe, AZ.

Njau, N (2010) The Impact of Value Chain Management Strategy on performance of a company; A case of Major Oil marketing firms in Kenya, Unpublished MBA, University of Nairobi

Odhiambo, A., (2008) A survey of the extent to which floricultural firms in Kenya practice green Marketing, Unpublished MBA, University of Nairobi

Otago Management Graduate Review, (2009) Volume 7, 62 Green Supply Chain Management.

Petroleum Institute of East Africa, (2005). Insight Magazine Quarterly Publication. Bulletin of the institute of Economic affairs (May 2005) Issue No. 58

PIEA, (2006). Petroleum insight, Journal of the petroleum institute of East Africa. Nairobi. Oakland Media Service. Nairobi Kenya

Rao, P. and Holt, D. (2005). Do green supply chains lead to competitiveness and economic performance?. International Journal of Operations and Production Management, 25(9), 898-916.

Rha Jin Sung, (2010),The Impact of Green Supply Chain Practices on Supply Chain Performance. Unpublished MA, University of Nebraska at Lincoln Available at http://digitalcommons.unl.edu/businessdiss/11 Accessed 7th September 2011

Rettab B., et al, 2008. (2008). Green supply chain in Dubai. Available: http://web2.dubaichamber.ae/pdf/reports/GREEN%20SUPPLY%20CHAIN%20IN%20DUBAI.pdf. [Accessed 7 April 2011.]

Shi, J. Stephen, and Jane M. Kane. (1996) "Green Issues." Business Horizons. January-February Available (www.enotes.com/small-business-encyclopedia/green-production)

Shrivastava, P. (1995). Environmental technologies and competitive advantage. Strategic Management Journal, 16:183–200.

Srivastava, S. (2007). Green supply-chain management: A state-of-the-art literature review. International Journal of Management Reviews, 9(1), 53-80.

Stephen, S. & Jane Kane, J., et al, (1996), Green Issues." Business Horizons. Jan-February 1996.

The Independent Newspaper, February 1, 2009

The Christian Science Monitor, et al (July 27, 2011) (www.csmonitor.com/World/Africa/Africa-Monitor/2011/0726/Abyei-remains-tense-as-UN-Sudanese-Army-disagree-on-troop-presence)

United Nations Division for Sustainable Development Report, 2001
(www.un.org/esa/sustdev/publications/proceduresandprinciples.pdf)
Accessed 17th August 2011

United States environmental protection agency, (1995) An Introduction to Environmental Accounting as a Business Management Tool: Key Concepts And Terms, (www.p2pays.org/ref/02/01306.pdf)

Walker H, (2007) "Drivers and barriers to environmental supply chain management practices: Lessons from the public and private sectors"
Available on: http://www.sciencedirect.com.ezproxy.
[Accessed on 19th April 2010]

World Rainforest Movement REPORT, 2004
Available (www.wrm.org.uy/deforestation/mining/text.pdf) accessed 17 august 2011

Zhu, Q., and Sarkis, J. (2004). Relationships between operational practices and performance Among early adopters of green supply chain management practices in Chinese Manufacturing enterprises. Journal of Operations Management, 22(3), 265-289.

Zhu, Q., Sarkis, J., Lai, K.H. (2008). Green supply chain management implications for "closing The loop". Transportation Research Part E, 44(1), 1-18.

Zikmund G. William, (2003). Business Research Methods. Oklahoma State University

Zinkhan, George, and Les Carlson, (1995) "Green Advertising and the Reluctant Consumer." Journal of Advertising. Summer 1995.

APPENDICES

Appendix I: Introduction Letter to the Respondents

September 2011

The Human Resource Manager,

Dear Sir/Madam,

RE: MBA RESEARCH PROJECT REQUEST TO COLLECT DATA

I am a student at the University of Nairobi taking a master's degree in MBA (Procurement and Supply chain management)

Pursuant to the pre-requisite course work, I am carrying out a research on the impact of green supply chain on the performance of major oil marketing firms in Kenya which will involve use of questionnaires administered to members of management.

I kindly seek authority in conducting the research in your company through questionnaires. The findings of the report will solely be used for academic purposes, a copy of which will be made available to you on request.

Enclosed is an introductory letter from the University. Your assistance is highly valued and appreciated.

Thank you.

Yours faithfully

Abrahams A. Abuko

REG. NO: D61/72709/2009

Appendix II: Questionnaire

SECTION A: GENERAL INFORMATION

1. Name of organization_____ (Optional)

2. Year of Establishment_____

3. Indicate nature of the organization; please tick as appropriate

Multinational ☐

Local company ☐

4 Indicate Ownership of the institution

Privately Owned [ ]

Public Owned [ ]

Private/Public [ ]

Parastatal [ ]

5. Indicate below how many years you served at your company

Less than one year	1-5	6-15	Above 15

6. How long in years, has your organization been in operation? Tick as appropriate.

1-5	
6-15	
16-30	
31-60	
61 and Above	

7. What is your management level?

Top Level	Mid-level	Supervisory

SECTION B: EXTENT OF ADOPTION OF GREEN SUPPLY CHAIN PRACTICES

8. Indicate the extent to which your organization practices green supply chain in its internal environmental management.

5 – To a very great extent, 4 – To a great extent, 3 – To a moderate extent,

2 – To a lesser extent, 1 – To no extent

	5	4	3	2	1
Commitment of GSCM by senior managers					
Support for GSCM by mid-level managers					
Cross-functional cooperation for environmental improvements					
Total quality environmental management					
Environmental compliance and auditing programs ISO 14001 certification					
Environmental management systems					

9. Kindly indicate whether management undertakes the following in your firm. Tick where appropriate

Incorporate green supply chain in the overall business strategy [ ]

Investing in green technology and equipment [ ]

Organizing green supply chain seminars and workshops [ ]

Environmental compliance certification [ ]

12. Indicate the extent to which you organization practices green supply chain in Eco- design practices.

5 – To a very great extent, 4 – To a great extent, 3 – To a moderate extent,

2 – To a lesser extent, 1 – To no extent

	5	4	3	2	1
Design of products for reduced consumption of material/energy					
Design of products for reuse, recycle, recovery of material, component parts					
Design of products to avoid or reduce use of hazardous products and/or their manufacturing process					

13. Kindly indicate whether your firm undertakes the following to cut of resource/energy consumption and hazardous waste. Tick where appropriate

Use of energy efficient equipment [ ]

Use of biodegradable material [ ]

Investment in hazard disposal [ ]

Use of intermodal transportation [ ]

Cooperate to consolidate shipments with other firms [ ]

Use of recycled material [ ]

SECTION C: IMPACT OF GRE PRACTICES ON PERFORMANCE

14. Indicate the extent to which green supply chain management in your organization improves efficiency by influencing the following variables.

5 – To a very great extent, 4 – To a great extent, 3 – To a moderate extent,

2 – To a lesser extent, 1 – To no extent

	5	4	3	2	1
Localized sourcing leads to short procurement distance and reduced raw material inventory					
Improved factory layout has reduced in house traffic movements					
Improved production process from straight push to pull has reduced finished goods inventory and warehouse space					
Utilizing fuel efficient tools and equipment has led to improved fuel efficiency					
Consolidation of inbound and outbound logistics has reduced waste of empty trailer space.					
Rerouting fleet vehicles and truck loads optimization has reduced miles and improved fleet utilization					

12. Indicate the extent to which green supply chain management in your organization enables quality improvement by influencing the following variables.

5 – To a very great extent, 4 – To a great extent, 3 – To a moderate extent,

2 – To a lesser extent, 1 – To no extent

	5	4	3	2	1
Design for environment and redesign packaging offer environmentally friendly products and reduce size & weight of product					
Waste management solutions at end of product life cycle improve waste management and reduce solid waste.					
Green sourcing for indirect and direct materials leads to utilization of environmentally friendly materials					
Optimization of truck loads, utilizing back-haul and use of rail or intermodal reduces carbon emissions caused by transportation.					

13. Indicate the extent to which green supply chain management in your organization improves productivity by affecting the following variables.

5 – To a very great extent, 4 – To a great extent, 3 – To a moderate extent,

2 – To a lesser extent, 1 – To no extent

	5	4	3	2	1
Improved factory layout and production process reduce in-house traffic movements					
Improved warehouse layout enable mechanization which improves efficiency and productivity					

14. Indicate the extent to which green supply chain management in your organization improves cost savings by affecting the following variables.

5 – To a very great extent, 4 – To a great extent, 3 – To a moderate extent,

2 – To a lesser extent, 1 – To no extent

	5	4	3	2	1
Collaboration with suppliers for their green initiatives leads to cost reduction benefits from suppliers improved efficiency					
Strategic placement of warehouse and distribution centers achieves least total costs, while minimizing carbon footprint.					
Use of more environmental friendly logistics providers incentivize logistics providers to be greener					

15. What are the factors that hinder the implementation of green supply chain management practice in your firm?

Lack of good will and support by management [ ]

Lack of awareness and understanding of Green supply chain concepts [ ]

Lack of support from government [ ]

Cost of investment [ ]

Conflicting business strategies [ ]

16. Kindly indicate what benefits, if any, have accrued to your organization as a result of green supply chain adoption.

Customer delight and satisfaction [ ]

Improved competitiveness [ ]

Improved environmental performance [ ]

Cost savings [ ]

Minimizing waste and hazardous effluent [ ]

Increased production [ ]

Improved relations with suppliers and other businesses [ ]

End of Questionnaire