GREEN SUPPLY CHAIN IMPLEMENTATION PRACTICES AND SUPPLY CHAIN PERFORMANCE OF BATTERY MANUFACTURING FIRMS IN KENYA

BY

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DECLARATION

This research project is my original work and has not been submitted for examination to any other university.

Signature ……..Date……..

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This research project has been submitted for examination with my approval as the university Supervisor.

Signature…… Date……
DR. MAGUTU

DEDICATION

I dedicate this project to my family and the school of business, university of Nairobi for being supportive throughout my study. I have acquired a wealth of knowledge during my time at the university.

ACKNOWLEDGEMENT

I wish to thank The Almighty God for giving me the gift of life to write this work. I wish to express my gratitude to my supervisors **DR. MAGUTU** for his professional guidance and motivation that enabled me compile this proposal. I wish to extend my gratitude to my classmates whose presence offered me psychological motivation and the need to learn more.

Finally, I thank my family for supporting me throughout my studies at the various levels and their unconditional love to me is my greatest strength.

ABSTRACT

This study examines the practices in implementing green supply chain management (GSCM) and analyses their impact on environmental, economic, and supply chain performance by considering the business strategy as an organizational focus. A sample of 190 dataset was collected from ISO 14001 certified manufacturing companies in Kenya and used to test the proposed research hypotheses. Factor analysis was used examine the construct validity while multivariate liner regression was employed to test criterion validity. Legislation and regulation (re-active practice) was considered as a priority leading to enhance the environmental, economic, and intangible performance. Reverse logistics (pro-active practice) indicated a low level of adoption and does not show a significantly impact to any of the three GSCM performance. The results of this study suggested that organizations need to be aware that pursuing a low cost strategy may impact on their ability to invest in GSCM. Finally, this study is the first attempt to explore GSCM implementation reflecting by business strategy and intuitional drivers.

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CHAPTER ONE
INTRODUCTION

1.1 Background

Firms can no longer effectively compete in isolation of their suppliers and other entities in the supply chain. Interest in the concept of supply chain management has steadily increased since the 1980s when companies saw the benefits of collaborative relationships within and beyond their own organization. Industry groups are now working together to improve the integrative processes of supply chain management and accelerate the benefits available through successful implementation. The competitive importance of linking a firm's supply chain strategy to its overall business strategy and some practical guidelines are offered for successful supply chain management as stated by Testa and Irlado (2010).

Effective supply chain management is important to build and sustain competitive advantage in product and services of the firms. Gunasekaran and Ngai,(2004); Sufian (2010) stated that the performance of supply chain was influenced by managing and integrating key element of information into their supply chain. Supply chain management has been becoming increasingly important in competitive business. To compete at the supply chain level, firms must adopt an appropriate supply chain management strategy. The strategy needs to integrate and coordinate throughout the supply chain to generate the performance of supply chain members (Green Jr. et al., 2008; Cohen and Roussel, 2005; Wisner, 2003). Mason-Jones et al. (2000) and Lewicka (2011) argued that supply chains need to adopt a strategy that suits both their particular product and marketplace.

Customers consistently demand that products are delivered faster, on time, and with no damage. This can only be achieved with proper coordination of efforts by linking systems and processes to create synergyAndic et al. (2012**)**. Each of these necessitates better coordination with suppliers and distributors, and constitutes the linkage between SCM core competencies, strategy and SCM core capabilities, which are not easy to match. This combination creates a competitive edge within the system that cannot be copied by the competitor in the market place; hence becomes core capability of the firm Testa & Iraldo (2010)

1.1.1Green Supply Chain Practices

The concept of green supply chain is a new concept appearing in recent literatures. It is based on the two concepts. The supply chain management and the environmental management. Lamming and Hampson(1996) linked the two concepts together.it refers to the way in which innovation in supply chain management and industrial purchasing may be considered in context of the environment. Enviromental supply chain management consists of purchasing functions involvement in activities that include reduction, reuse and substitution of materials.it involves the practice of monitoring and improving the environment in the supply chain.

Godfrey (1998)"green supply chain management as company practices that continuously monitor the environmental impact of a supply chain and improve its results. Narasimhan & Carter (1998) defined green supply chain management as involving the purchase of methods that reduced the use of materials in addition to recycling and reuse. Green

supply chain management will aim at confining the wastes within the supply chain system in order to conserve energy and prevent release of dangerous materials to the environment.

In a developing countries, the attention is mainly focused on cost reduction,Zhu et al., 2004 founded that there are some main drivers behind applying GSCM in a manufacturing industry, such as straightforward cost reduction to facilitate the development of co-operative relationships with suppliers and encouraging life-cycle. On the other side, despite that there is an increasing environmental awareness; there is a slow implementation of GSCM across enterprises, and it is approved through the study that turning the awareness and pressures into practices and performance will take some time in a manufacturing industry Zhu et al., 2004.

Testa and Irlado (2010) have proved that there is a positive relationship between adopting GSCM practices and enhanced reputation and brand image of an organization. Green supply chain enhances the economic advantages such as economy of production, increasing competitive advantage and increasing profit. Andic et al. (2012) added that in general, environmental activities support organization with negotiation power with potential customers.

Green supply chain like any other business investment is without challenges especially since it is new to many businesses. Ryder Centre(2003) identified the three main challenges facing companies while trying to green their supply chains.1)lack of

appropriate technology to support companies and their efforts to go green 2)business processes needed to capture the appropriate data in supply chain and therefore make use of existing technology. A number of approaches for implementing GSCM practice have been proposed in previous literature (Hsu and Hu, 2008).Wikerson (2005) identified four green supply chain implementation practices; align green supply chain goals with business goals, evaluate the supply chain as a single life cycle system, use green supply chain as a catalyst of innovation and focus on source reduction to reduce waste

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Implementation of GSCM practices in different settings can result in different performance outcomes (Koh et al, 2012). In common some of these findings, Murphy and Poist (2003) mentioned that this is a lack of uniformity is clear in the literature. While some studies such as Diabat and Govindan (2011) argued that GSCM practices comprise green design, reducing energy consumption, revising/recycling material and packaging, reverse logistics and environmental collaboration in the supply chain, others such as Wu et al (2011) claimed that green practices include cleaner production, number of patents, internal service quality, green design, green purchasing and green innovation. Testa & Iraldo (2010) proposed green practices include the sale of excess inventory, sale of scrap and used material, environmental auditing programs, commitment from senior managers and total quality environment management.

Not surprisingly there have been several studies that attempted to link GSCM practices with the supply chain performance of an organization. While some studies such as Green et al (2012), Rao and Holt (2005) and Zhu and Sarkis (2004) found positive relationships

such as improvement of brand image, reduction of wastes and also economic use of raw materials. other studies such as Giovanni and Vinzi (2012), and Huang et al (2012) showed that there is no significant relationship between GSCM practices and supply chain performance.

Yet other studies including Azevedo et al (2011) and Wu and Pagell (2011) found a combination of positive and other relationships. The evidence from literature, therefore, is that there is a lack of consensus on the impact of GCSM on SCM performance outcomes. Zhu et al (2012) argued that the conflicting findings have the potential to become a barrier for organizations that intend to implement GSCM.

1.1.2 Supply chain performance

Supply chain performance is when suppliers are in sync with customers, supporting their production requirements on a JIT basis, providing notification of shipment and visibility to order status and item location, responding quickly to requests, and supporting. Many firms look to continuous improvement as a tool to enhance their core competitiveness using SCM. Many companies have not succeeded in maximizing their supply chain's potential because they have often failed to develop the performance measures and metrics needed to fully integrate their supply chain to maximize effectiveness and efficiency. Lee and Belington(1992).

Totenberg and Witt struck (2012) identified three dimensions of performance – environmental, economic and social. The study, therefore, differed from others on GSCM

performance as most of these studies focused primarily on environmental, operational and economic performance. The importance of a social dimension to GSCM has been discussed in literature, primarily in developed economies. Eltayeb et al(2011) argued that intangible outcomes such as company image, product image, employee satisfaction and customer loyalty or satisfaction had not received much attention as outcomes of GSCM despite studies such as Xie and Breen (2012) and Zhu et al (2012) asserting that GSCM can result in improved brand image, better relations with stakeholders and improved personnel motivation.

Zailain et al (2012) measured social performance in-terms of product image and company image with customers and community stakeholders. In his study the focus is on the implementation of GSCM practices and how they impact or influence the organizational productivity or economic performance. The production/ economic performance will be measured in terms of reduced cost and increased profitability as did Testa and Iraldo (2010) in a study involving a multinational organization.

It has been proved that there is a positive relationship between adopting GSCM practices and supply chain performance. This is because enhanced reputation and brand image of an organization and also its efficient supply chain will help in general performance other organization at large (Azevedo et al (2011).

1.1.3 Battery Manufacturing Firms in Kenya

Battery manufacturing firms are firms that use more capital and large quantities of other factors. Economies of scale occurs here because of cost advantage that enterprises obtain due to the size, ;2cost per unit of output generally decreasing with increasing scale as fixed costs are spread out over more unit of output. David Kass 1998''economies of scale exists if a firm can produce a product line at a given output level more cheaply than a combination of separate firms each producing a single product at the same output level''

The battery manufacturing companies surveyed in this study are Eveready East Africa Ltd and Chloride Exide Kenya Ltd and will involve the managers in these two firms. Eveready E.A Ltd plant is based in Nakuru and is one of the largest battery manufacturing companies with a capacity of over 2000 million pakapower batteries annually and a workforce of 400 people. Eveready Company is a multinational that is affiliated to the Eveready Battery Company in the U.S.A.Chloride Exide Kenya Ltd is a manufacturer of batteries with pressure in the whole of East Africa. Chloride Exide Company has a strong network of over 17 branches and 400 dealers in the East African Region.

Supply chains are networks of organizations, information, technologies, and conversion of physical goods or services from supplies to the end consumers. To achieve economies of scale, battery manufacturing firms needs to produce their products on large scale. Generally the higher the production output of the firm, the lower the unit cost of their product will be Testa and Iraldo (2010)

Zhu and Sakris (2004) argued that besides the output volume, the speed of production will determine the lead time from manufacturing to delivery, High productivity will enable the firms to achieve shorter production cycles, which equates to better competitiveness in their respective markets.

Capacity management will determine how efficient the manufacturer will be in producing its goods. Overcapacity will increase wastage and costs, while under capacity will see the firm lose certain profits that it should gain. The firms must therefore must invest in supply chain that could lead to improve service delivery and enhance performance.

1.2 Research problem

Over the past decade, Green Supply Chain Management (GSCM) has emerged as an important component of the environmental and supply chain strategies for a number of companies and they have been aiming at integrating environmental concerns in their business operations and in interactions with their stakeholders in embracing environmental sustainability into business strategies (Chege, 2012).

Battery manufacturing in large scale operations as practiced by Eveready E.A Company and Chloride Oxide Kenya Company produce waste products which contain ingredients with dangerous substances that are released into the environment, and they will seep into the soil and into the air. Thus, injures both human health and the environment. Qinghuyan and Sarks (2004) studied automobile industry in which they observed that increasing pressures from a variety of directions have caused the Chinese automobile

supply chain managers to consider and imitate implementation of green supply chain management (GSCM) practices to improve both their economic and environmental performance.

Obiso (2011) study found that majority of the independent petroleum marketing firms were not aware of GSC implementation practices and could not understand what is green supply chain implementation practices and hence there is need to know if battery manufacturing companies in Nairobi are aware of GSCM practices and if they are aware, which of the GSCM practices are they carrying out.Khisa (2011) study shows that many organizations were either considering or just initiating implementation of green supply chain implementation practices. From his findings there was need for the public sector organizations in Kenya to adopt green supply chain implementation practices in order to help in the effort to conserve the environment.

There was lack of knowledge on green practices in general hence there is a need to know if battery manufacturing companies in Nairobi are aware of green supply chain implementation practices as it is one of the GSCM elements.

Abuko (2011) study shows that adoption of Green Supply Chain implementation practices influenced to a great extent quality improvement, efficiency, cost saving and productivity. He found out that most respondents were not aware of GSCM practices. 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. There is need to know if battery manufacturing companies in Nairobi, Kenya have the same notion and if they are aware of the GSC implementation practices.

Zhu and Sarkis (2004) evaluated the effectiveness of Green supply chain implementation practices on the supply chain performance, he stated that Knowing the relationship between green supply chain implementation practices and its influence on supply chain performance can assist the business managers and policy makers in cost reduction and product improvement hence general performance of the firm. Battery manufacturing firms which is among the manufacturing firms in Kenya needs to adopt the greening as customers increasingly needs to understand the conditions under which products have been produced and desire products that have been produced in an environmentally desired way Collins et al.(2007)

Chege (2012) carried out research on GSCM practices and supply chain performance of manufacturing firms in Nairobi Kenya, she found that GSC implementation practices have a significant relationship with supply chain performance. However, the study did not cover the battery manufacturing firms in Nairobi Kenya hence creating a need for further studies in these areas. There is need to fill this knowledge gap of identifying the GSC implementation practices and Supply chain performance in battery manufacturing firms in Nairobi.

This research will try to address the gap by carrying out a study on the Green supply chain management practices and the influence on supply chain performance in battery

manufacturing firms in Kenya. The research will attempt to answer the following questions: what are the green supply chain practices implemented in battery manufacturing firms in Kenya? What is the relationship between green supply chain Implementation practices and supply chain performance of battery manufacturing firms in Kenya?

1.3 Objectives of the study

i. To determine the green supply chain practices implemented by battery manufacturing firms in Kenya; and
ii. To establish the relationship between green supply chain implementationpractices and supply chain performance of battery manufacturing firms in Kenya.

1.4 Value of the study

Empirical analysis of GSC implementation practices and how these practices have affected supply chain performance in battery manufacturing firms in Nairobi would provide valuable information to the management of the battery manufacturing firms and policy makers apart from providing materials of intellectual pursuits. It also improves operations and provides environmental solutions.

The findings of this paper will assist the corporate managers to make sound and informed strategic management decisions and enable them to focus on their customers more efficiently. With such exposition, managers will understand how firms can perform better and add value to the shareholders under SCM orientation.

Green Supply Chain Management is one of the recent innovations for the enhancement of capabilities of supply chain management. Environmental issues are critical for business performance normally referred to in economics as externalities and very little research has been done in this study to analyze the effects of GSCM practices on the organizational production/economic performance in battery manufacturing firms in Nairobi.

CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

This chapter presents a review of the relevant literature on green supply chain implementation practices and supply chain performance of battery manufacturing firms in Kenya. The chapter covers an overview of green supply chain implementation; green supply chain implementation practices and supply chain performance of battery manufacturing firms.

2.2 Green supply chain

The interest in an organization's environmental performance in the face of tighter EU regulations, restricted natural resources, changing customer demands, competitive pressures and ethical responsibility has been steadily growing over the last decade. The globalization of business operations results in increasing value chain complexity the requirements for environmental-friendly operations and strategies extend also to businesses from the transient and emerging economies. The development of green supply chain management (GSCM) in countries that are on the way to play a stronger economic role in the global market without having yet adopted a clear strategic approach toward the natural environment will gain increasing importance in the near future Zhu and sarkis (2004).

According to Laosirihngthong et al (2012) environmental concerns and inclusion of green practices within the supply chain is a subject that has become topical in the academic literature. This interest is mirrored by the increasing interest in the environment and

climate change and the efforts by governments and organizations around the world to minimize their impact on the environment. According to Sarkis et al (2011), the integration of environmental issues and supply chain management has become a thriving field over the past decades. Despite its increasing popularity in industrialized countries, there are still several areas of green supply chain management that require further research particularly as greening the supply chain has been identified as a key issue of sustainable production. GSCM has also begun to gain popularity in emerging economies such as China, Malasyia and African countries. For example, Eltayeb et all (2011) explored the outcomes of green supply chain initiatives among ISO14001 certified firms in Malaysia, whereas Sailani et al (2012) carried out a study on GSM research in Malaysia to analyze the impact of internal and external forces on environmental performance. However, studies in the context of emerging economy countries, such as Kenya are still not comprehensive and convincing.

Hence, this research study examines the application of green supply chain practices and evaluates he associated outcomes. The compelling reasons for this reach are three-fold. Firstly although there have been several studies examining the relationships between GSCM practices and organizational performance (Giovanim and Vinzi, 2012), there is dearth of studies that have considered these relationships within the context of organizational or business strategy in the development of GSCM initiatives.

Secondly, most studies according to Green et al, (2012) have examined the outcomes of GSCM within the context of tangible measures including environmental, operational, and

economic performance. Consequently, research on intangible outcomes of GSCM practices is limited. Thirdly, as manufacturing moves to Asia and other emerging markets in the world, awareness of green operations, and sustainability have become important but studies in such countries are not many (Arbjorn and Lu, 2012). In particular, within the context of South East Asia, if GSCM is to be widely implemented, links between the practices and performance need to be identified and so there is need for more GSCM research in the sub-region and also in the emerging markets in other parts of the world k (Rao and Holt, 2005)

Zhu and sarkis (2004) and zhu et al (2007) evaluated the effectiveness of GSCM in a chinese manufacturing enterprises and the automobile industry respectively.De borito et al(2008)conducted a survey of stakeholder to explore how green initiatives impact the fashion retail supply chain organization and its performance. They found that green issues on fashion industry was more sensitive due to intense competition, high resource use and concerns about labor practices. Lock et al(2007) also studied green supply chain management downstream side, their results shows that customers increasingly want to understand the conditions under which the products have been produced and desire products that have been produced in an environmentally sustainable way.

Hsu and Hu(2000) ivestigated the consistency approaches by factor analysis that determines the adoption and implementation of GSCM in Taiwanese electronic industry. The fuzzy analytic hierarchy process method was applied to prioritize the relative importance of four dimensions and 20 approaches among nine firms in electronic industry. Meanwhile, Shang et al. (2003) explored key green supply chain management (GSCM) capability dimensions and firm performance based on electronics-related manufacturing firms in Taiwan. On the basis of a factor analysis, six green supply chain management dimensions were identified: green manufacturing and packaging, environmental participation, green marketing, green suppliers, green stock, and green eco-design.

2.3 Green supply chain implementation practices

For years businesses have been concentrating on improving supply chain visibility, refining efficiency and minimizing cost. Despite the focus being moving towards a green supply chain the goals of visibility, efficiency and cost reduction do not have to be discarded. By examining the companies who have already made strives towards to a green supply chain, we can begin to see some practices that will help others to begin their own transition. The study by Liu et al. [28] in China has analyzed the relationship between green supply chain management level (LGSCM) and the classified determinant factors. The study confirmed that a company's environmental management capacities will be strongly enhanced by frequent internal training of employees to increase its involvement in GSCM practices. Another research from China, studied by Yan Li [29], examined the adoption levels of GSCM practices in China and explored the performance

measurement for GSCM. The findings demonstrated that GSCM was strongly balancing to other advanced management practices, and contributed to improving environmental performance. (Hsu and Hu, 2008).Wikerson (2005) identified four green supply chain implementation practices; align green supply chain goals with business goals, evaluate the supply chain as a single life cycle system, use green supply chain to focus on source reduction to reduce waste, and use of green supply as a catalyst for innovation.

2.3.1 Align green supply chain goals with business goal

Creating a green supply chain that has little to do with your business goals will not help your company to achieve its business objectives .A supply chain goal should always support the attainment of the business goals. A company should therefore look at its overall business goals and identify how a transition to a green supply chain can help achieve those goals. For example if a company wants to reduce its energy costs it should start by evaluating its energy consumption to establish whether a reduction can be made by using energy efficient and environmentally friendly equipment. (Mazumder, 2010)

2.3.2 Evaluate the supply chain as a single life cycle system

A life cycle system allows a holistic view of the supply chain from raw material Extraction to final disposal of materials. This ensures full visibility across the entire supply chain and an understanding of the end-to-end impact of green supply chain management programs. In this way, it becomes easier to identify opportunities for the program to deliver business value such as lower costs or improved competitive advantage (GSC, 2011).

The trend towards developing a green supply chain is now gaining popularity but most companies are still coming to terms with how this can be achieved and where do they start. For years businesses have been concentrating on improving supply chain visibility, refining efficiency and minimizing cost. Despite the focus being moving towards a green supply chain the goals of visibility, efficiency and cost reduction do not have to be discarded. By examining the companies who have already made strides towards to a green supply chain, best practices were adopted hence proper implementation.

2.3.3 Focus on source reduction to reduce waste

The recycle and reuse waste management programs focuses on management of waste after it has been created. On the other hand source reduction focuses on the prevention or reduction of wastage during production rather than managing it after it has been generated with the aim of efficiently utilizing resources by examining how business is conducted, how materials are used and what products are purchased.

Source reduction can be achieve through measures such as: using reusable instead of disposable materials, eliminating certain items, repair and maintenance of equipment, using durable products, and using recycled products (Cohen,2005)

2.3.4 Use Green Supply Chain as a catalyst of innovation

Companies do not often change their businesses processes and it is this attitude allows inefficient processes to continue unabated causing unnecessary waste and pollution. For example ineffective processes in the US automotive industry allowed the innovative Japanese automakers to become market leaders. Businesses that want to transition to a

green supply chain should take the opportunity to review all their business processes to identify areas where adopting a greener outlook can actually improve their business. Companies should review each process along the supply chain to identify if a more environmentally sound approach will help cure the inefficiencies that occur. Many companies that have been through this exercise have identified processes where raw materials were wasted; resources underutilized and unnecessary energy used due to inefficient equipment.

2.4. Supply chain performance

Supply chain performance refers to the evaluation of supply chain management, and includes both tangible for example cost and intangible for example capacity utilization factors (Chang, Tsai and Che- Hsu, 2013). Supply Chain Performance Measurement can be done through Balance score card (BSC). According to (Halme, 2010) the balance score card has four main areas of measurement. The four areas are; the Customer perspective which evaluates on how the company adds value for the customers. The customer estimates the value through time, quality, performance, service and cost. In BSC the company has to set goals for these value adding elements and translate these into specific measures. Customer based measures have to be translated into a measures of what the company have to do internally to meet its customers' expectations. Customer value derives from processes, decisions and actions in the organization. The second area is the internal business perspective focuses on these elements. The third are is financial perspective which measures financial success. Goals in this area are deals typically with

profitability, growth, and shareholder value. Finally, innovation and learning perspective evaluates on how the company can continue to improve and create the value in the future. Another well-known approach for the SC measurement is Supply chain operations reference (SCOR), which is used in various industries around the world. The Supply-Chain Council, which is a global organization of firms interested in SCM, introduced the SCOR model in 1996. The SCOR model is a business process reference model. It provides a framework that includes supply chain business processes, performance metrics, best practices, and people features. In the SCOR model the metrics are linked with five management processes: plan, source, make, deliver, and return. The SCOR model contains hundreds of performance metrics that are divided under five core supply chain performance attributes namely; Reliability which involves achievement of customer demand fulfillment on-time, complete, without damage etc. Responsiveness entails the time it takes to react to and fulfill customer demand. Agility involves the 15 ability of supply chain to increase or decrease demand within a given planned period. Cost is objective assessment of all components of supply chain cost and Assets involves the assessment of all resources used to fulfill customer demand (Supply-Chain Council, 2010).

Many firms look to continuous improvement as a tool to enhance their core competitiveness using SCM. Many companies have not succeeded in maximizing their supply chain's potential because they have often failed to develop the performance measures and metrics needed to fully integrate their supply chain to maximize effectiveness and efficiency. Lee and Belington (1992) observed that the discrete sites in

a supply chain do not maximize efficiency if each pursues goals independently. They point to incomplete performance measures existing among industries for assessment of the entire supply chain. Many firms look to continuous improvement as a tool to enhance their core competitiveness using SCM. Many companies have not succeeded in maximizing their supply chain's potential because they have often failed to develop the performance measures and metrics needed to fully integrate their supply chain to maximize effectiveness and efficiency. Lee and Belington (1992) observed that the discrete sites in a supply chain do not maximize efficiency if each pursues goals independently. They point to incomplete performance measures existing among industries for assessment of the entire supply chain.

Totenberg and Witt struck (2012) identified three dimensions of performance – environmental, economic and social. The study, therefore, differed from others on GSCM performance as most of these studies focused primarily on environmental, operational and economic performance.

The importance of a social dimension to GSCM has been discussed in literature, primarily in developed economies. Eltayeb et al(2011) argued that intangible outcomes such as company image, product image, employee satisfaction and customer loyalty or satisfaction had not received much attention as outcomes of GSCM despite studies such as Xie and Breen (2012) and Zhu et al (2012) asserting that GSCM can result in improved brand image, better relations with stakeholders and improved personnel motivation. Zailain et al (2012) measured social performance in-terms of product image

and company image with customers and community stakeholders. In this study the focus is on the implementation of GSCM practices and how they impact or influence the organizational productivity or economic performance. The production/ economic performance will be measured in terms of reduced cost and increased profitability as did Testa and Iraldo (2010) in a study involving a multinational organization.

Not surprisingly, there have been several studies that have attempted to link GSCM practices with organizational performance. While some studies such as Green et al (2010, Rao and Holt (2005), and Zhu and Sarkis (2007) found positive relationships environmental practices and organizational performance, other studies such as Giovanim and Vinzi (2012) and (Huang et al 2012) showed that there is no significant relationship between such practices and supply chain performance.

2.5 Summary of the literature review

The literature review confirms that there is a link between GSC implementation practices and supply chain performance. Whereas there is awareness on GSC implementation practices in various countries and organization around the world, it does not apply in Kenya where no studies have been carried out on GSC implementation practices and Supply chain performance in battery manufacturing firms in Kenya. It is therefore clear that there is need to find out the GSC implementation practices and supply chain performance in Battery manufacturing firms in Kenya.

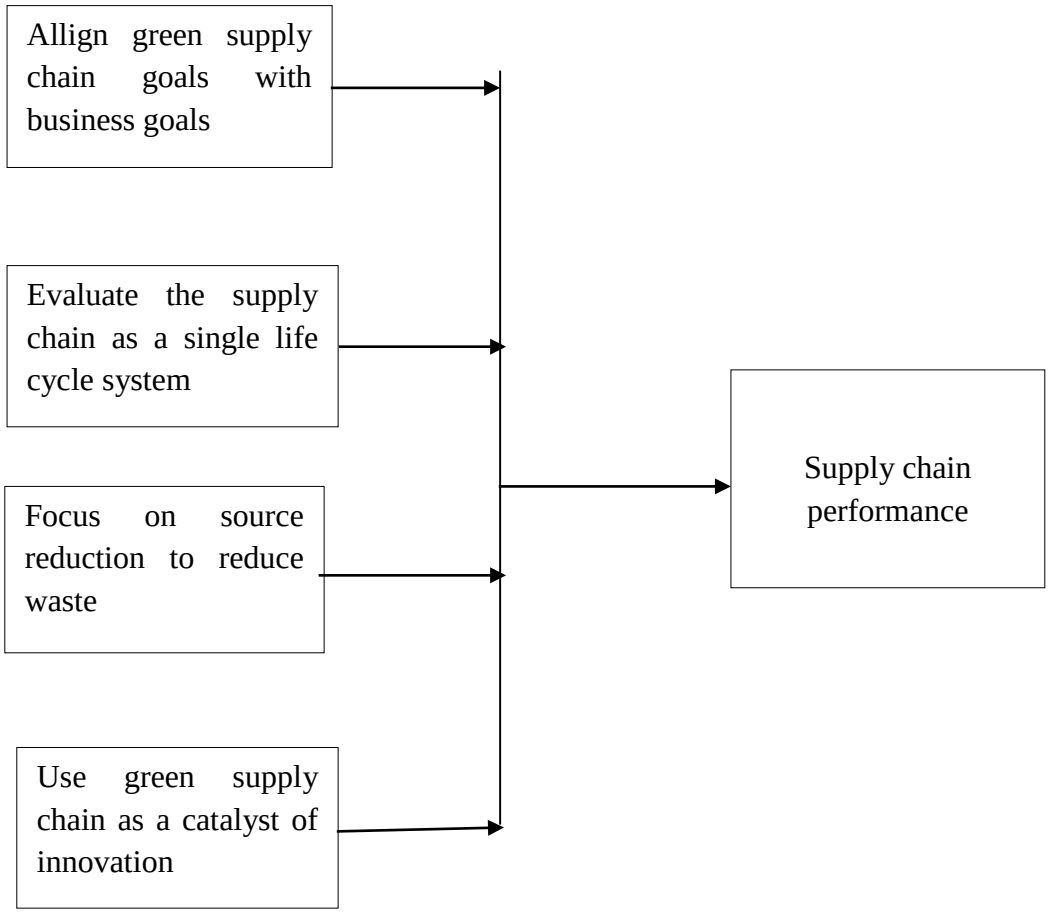
2.6 Conceptual model

Conceptual model links Green supply chain implementation practices and supply chain performance

Figure 1: Conceptual Framework

Independent Variables **Dependant Variable**

Green supply chain implementation practices



CHAPTER THREE
RESEARCH METHODOLOGY

3.1 Introduction

The chapter describes the research methods used. This includes the research design, target population, sampling design, data collection and techniques for data analysis.

3.2 Research Design

The Research design for the study was a descriptive study. According to (Salaria, 2012) descriptive research is devoted to the gathering of information about prevailing conditions or situations for the purpose of description and interpretation. This type of research method is not simply amassing and tabulating facts but includes proper analysis, interpretation, comparisons, identification of trends and relationships. Chege, (2012) used the design in her study on Green supply chain implementation practices and supply chain performance of manufacturing firms in Nairobi, Kenya. This design was deemed appropriate as it allowed the researcher to draw conclusion on the link between GSC implementation practices and supply chain performance.

3.3 Population and Sample

The study population will be carried in the two registered battery manufacturing firms in Kenya. According to Export processing zone project on Kenya's battery manufacturing industry there are 2 registered companies (see appendix ii). All the 2 companies will be used; and therefore there will be no need of sampling.

3.4 Data Collection

The study will use primary data which will be collected with the help a structured questionnaire. The use of the primary data is to establish the Green supply chain implementation practices and supply chain performance of battery manufacturing firms in Kenya. The 50 study respondents will be the battery manufacturing firm managers of all the 2 battery manufacturing firms in Kenya or other persons carrying the same responsibility.

There will be an introduction to the questionnaire explaining the study topic and the purpose of the study. Drop and pick method will be used as a method of administering the questionnaire so that the respondent could fill the questions at their convenient time.
The questionnaire will be in the form of Likert scale where respondents were required to indicate their views on a scale of 1 to 5.

The questionnaire contained 4 sections: Section A will be on the battery company profile; section B covered information on the extent of Green supply chain implementation practices of battery manufacturing firms in Kenya; and section C; highlighted the supply chain performance of the battery manufacturing firm in Kenya.

3.5 Instrumentation

The study collected primary data with the help of a questionnaire. The questionnaire had close ended questions and employed the likert scale methodology. In the likert scale, the respondents was expected to either indicate their level of agreement using a five point

scale namely; Strongly Agree, Agree, Neither Agree or disagree, Disagree and Strongly Disagree.

3.6 Data Analysis

Before processing the responses, the completed questionnaires will be edited for completeness and consistency. Quantitative data collected will be analyzed by use of descriptive statistics to generate percentages, means, standard deviations and frequencies. This will be done by tallying up responses, computing percentages of variations in response as well as describing and interpreting the data in line with the study objectives and assumptions. Tables and other graphical presentations as appropriate were be used to present the data collected for ease of understanding and analysis. Information generated was then be interpreted and explained.

Table 1: Summary of Research Design and Methodology

Objective	Data	Purpose	Analysis	Display
To determine the green supply chain practices implemented by battery manufacturing firms in Kenya	Primary/Secondary (Actual experiences)	To determine the green supply chain practices implemented by battery manufacturing firms in Kenya	SPSS	Summary table of the responses,.

.

Descriptive and inferential statistics was used to analyse information generated from respondents. Descriptive statistics refers to, "simple statistical methods, which do not support or falsify a relationship but help in the description of the data." Thus, descriptive statistics enabled the researcher to organize data in an effective and meaningful way. By use of percentages, frequency distributions, tables, charts, the researcher categorized the variables.

Inferential statistics involve making generations, predictions or conclusions about characteristics of a sample from a population. Inferential statistics is used to establish whether a relationship exists in the larger population from which the sample was drawn from. This helped in making relevant generalizations whereby a Pearson correlation co-efficient was calculated to determine and test the correlation between the dependent variable and each independent variable.

$$\mathbf{Y = \beta 0 + \beta 1 X1 + \beta 2 X2 + \beta 3 X3 + \beta 4 X4 + \varepsilon}$$

Whereby: **Y** = organizational Performance (OP);

X1 = business goals (BG);

X2= evaluation of supply chain (ESC);

X3= source reduction (SR);

X4= green supply chain (GSC); and

B0, β1, β2, β3, β4 =Regression model coefficients.

ε = Error Term.

CHAPTER FOUR
DATA ANALYSIS, PRESENTATION AND INTERPRETATION OF FINDINGS

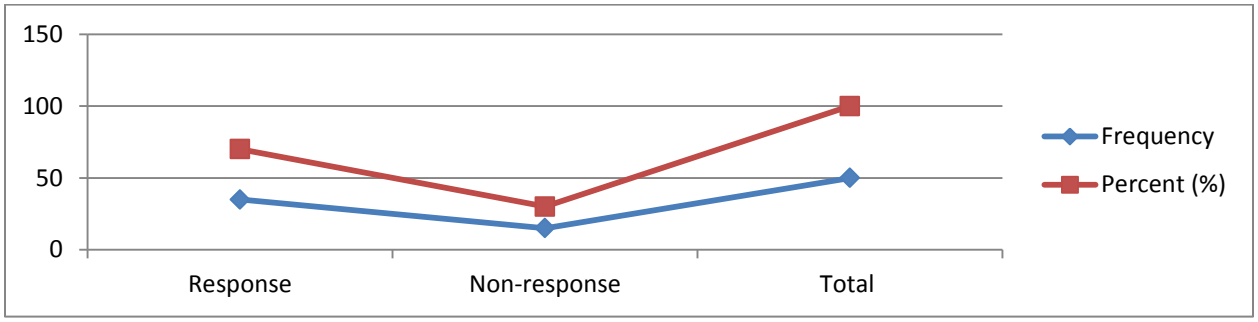
4.1 Introduction

This chapter covers data presentation and analysis. The main objective of the study was to determine the green supply chain practices implemented by battery manufacturing firms in Kenya and establish the relationship between green supply chain implementation practices and supply chain performance of battery manufacturing firms in Kenya. In order to simplify the discussions, the researcher provided tables and figures that summarize the collective reactions and views of the respondents.

4.2 Response Rate

The targeted sample size was 50 participants. Those filled and returned questionnaires were 35 respondents making a response rate of 70 %. According to Mugenda and Mugenda (1999), a response rate of 50% is adequate for analysis and reporting; a rate of 60% is good and a response rate of 70% and over is excellent. This means that the response rate for this study was excellent and therefore enough for data analysis and interpretation.

Figure 2: Response rate



Source: Author 2014

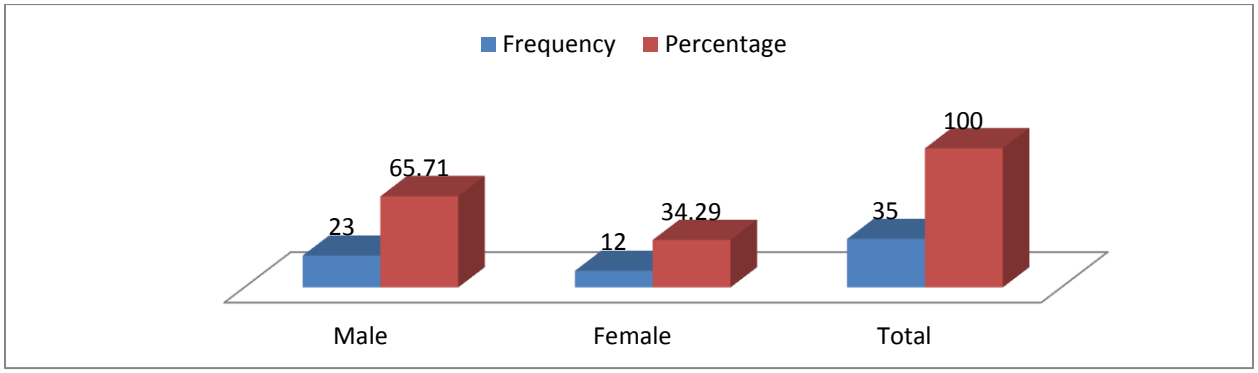
4.3 Demographic Information

The study sought to establish the demographic information in order to determine whether it had influence on green supply chain practices implemented. The demographic information of the respondents included age, gender and education levels of the respondents.

4.4 Gender of respondents

The table displays demographic information according to gender.

Figure 3: Gender of the respondents



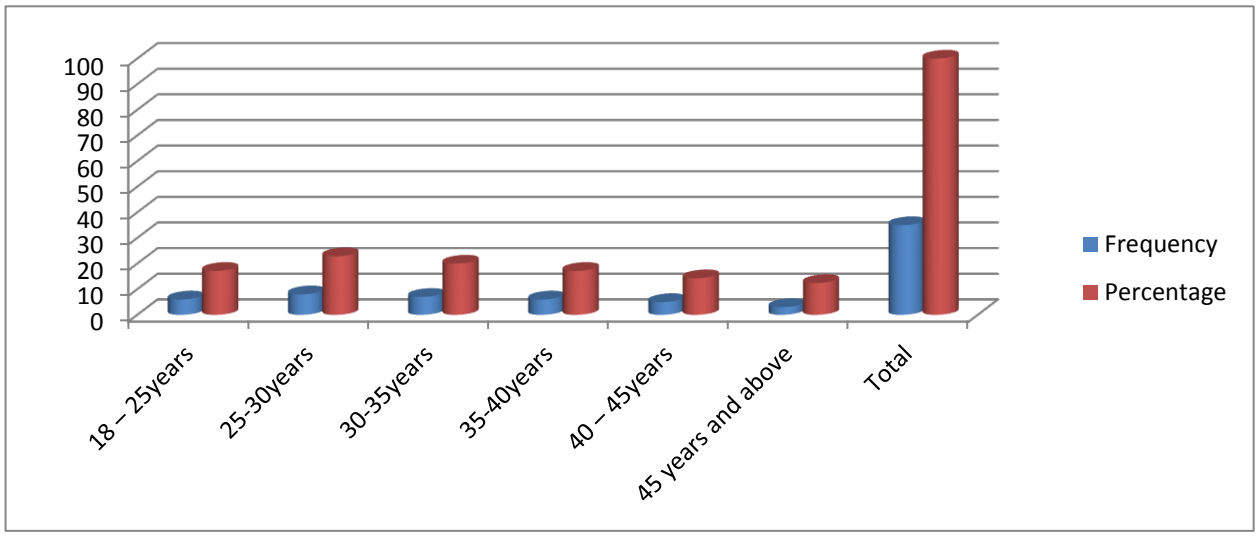
Source: Author (2014)

The study found it paramount to determine the respondents' gender in order to ascertain whether there was gender parity in the positions indicated by the respondents. The findings of the study are as shown in table 4. According to the analysis it was evident that majority of the respondents were male which represented 65.71% while 34.29% were female. It can therefore be deduced that males were the most dominant gender in the company.

4.5 Age Bracket of the respondents

The researcher sought to determine if the respondents were old enough to provide valuable responses that pertain to green supply chain implementation practices and supply chain performance.

Figure 4: Age Bracket of the respondents



Source: Author (2014)

The respondents were required to indicate their age where the study findings indicated that majority (22.86%) indicated that their age bracket was between 25-30years. Analysis of findings also indicated that 20% of the respondents were between 30-35years of age.

The findings further indicated that there were to age groups with 17.14% which were 18 – 25years and 35-40years.

14.29% of the respondents were between the age of 40 – 45years While the remaining 12.4% indicated that they were 45 years and above. The finding therefore implies that the respondents were old enough to provide valuable responses.

4.6 Level of education of the respondents

The table shows the respondents level of education.+

Table 2: Level of education of the respondents

	Frequency	**Percentage**
certificate	6	17.14
Diploma	7	20.0
Bachelor's degree	14	40.0
Master's degree	8	22.86
Total	**35**	**100.0**

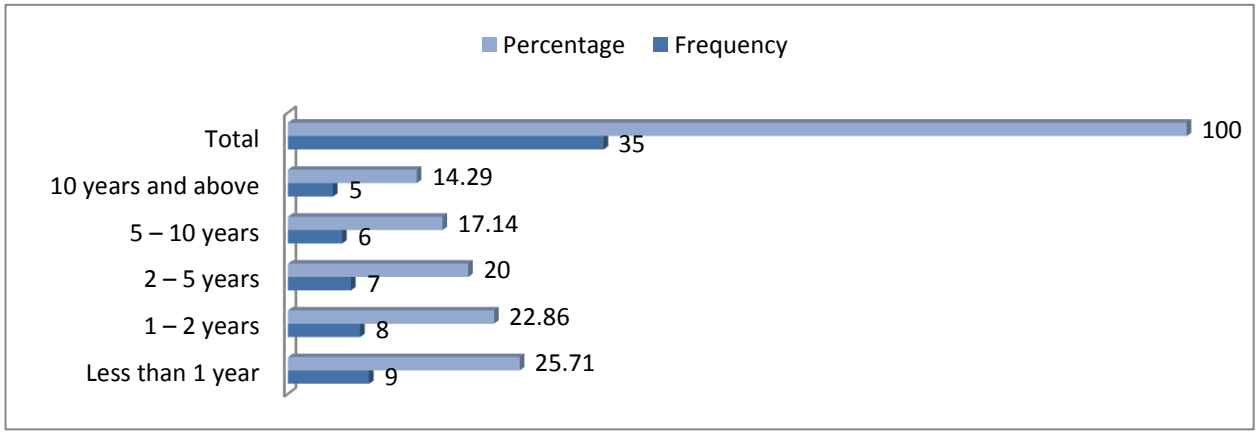
Source: Author (2014)

The study sought to find out the respondents level of education. The findings of the study are tabulated as in table 4.4. From the findings, majority (40.0%) had university degrees followed by 22.86% who indicated that they had master degree, 20.0% of the respondents had diplo9ma certificates while and the remaining 17.14% indicated that they have attained college diplomas. Therefore the findings conclude that most respondents had adequate education to answer the questionnaires pertaining to supply chain implementation.

4.7 working experience

The table shows the respondents working.

Figure 5: working experience



Source: Author (2014)

The respondents were required to indicate their working experience in the company where the study findings indicated that majority (25.71%) indicated that they had working experience of less than one year. Analysis of findings also indicated that 20% of the respondents had working experience of between 2 – 5 years. 22.86% of the respondents indicated that they have working experience of 1 – 2 years. The findings further indicated that 17.14% of the respondents had working experience of 5 – 10 years while the remaining 12.4% indicated that they had working experience of 10 years and above. The finding therefore implies that most of the respondents had enough working experience to give the required information.

4.8 Extent to which the firm has implemented practices in the management of its supply chain

The researcher sought to find out the extent to which the firm has implemented practices in the management of its supply chain. The findings were tabulated in the table below.

Table 3: Extent to which the firm has implemented practices in the management of its supply chain

Indicators	Mean	Std. deviation
The firm has included in its supply chain the green practices	3.871	0.971
The firm has incorporated environmental issues in the design of its products	3.972	0.829
The firm recognizes greening the supply chain as a source of sustainable product	3.915	0.762
The firm has increased its supply chain visibility by including green practices in its supply chain	4.137	0.857
The firm has refined its efficiency in its supply chain by including green practices in its supply chain	3.983	0.993
The firm has minimized costs by including green practices in its supply chain	3.916	1.003
The firm has offered frequent internal trainings to its employees to increase in its involvement in GSCM	4.119	0.775
The firm has improved its environmental performance by going green in its supply chain	3.761	0.891
The firm has improved its operational performance by going green in its supply chain	3.613	0.854
The firm has improved its economic performance by greening its supply chain	3.953	0.951

Source: Author (2014)

The researcher found out that the respondents indicated that they greatly agreed with the statements concerning extent to which the firm has implemented practices in the management of its supply chain. However the respondents agreed though to a low extent with the statement that the firm has improved its operational performance by going green in its supply chain with a mean of 3.613.

4.9 Extent to which the firm has evaluated its supply chain as a single life cycle system in the management of its green supply chain implementation

The researcher sought to find out the Extent to which the firm has evaluated its supply chain as a single life cycle system in the management of its green supply chain implementation. The findings were tabulated in the table below.

Table 4: Extent to which the firm has evaluated its supply chain as a single life cycle system in the management of its green supply chain implementation

Indicators	Mean	Std. deviation
The firm always takes a holistic view from the raw materials procurement to disposal	3.541	0.916
The firm recognized the holistic view of the supply chain and has led to improved competitive advantage	4.518	0.734
The firm has recognized the procurement of raw materials to disposal as a way of lowering costs	3.799	0.597
Has the firm experienced full visibility in the entire	3.423	0.802

supply chain in its supply chain processes		
The firm has improved its distribution channels it its supply chain	3.963	1.027
The firm has identified opportunities to deliver business value in its supply chain	3.729	1.128
The firm has gained a competitive edge through proper flow of materials in the supply chain	4.005	0.911

Source: Author (2014)

4.10 Extent to which the firm has implemented the recycle and reuse programs in management of its supply chain.

The researcher sought to find out the Extent to which the firm has implemented the recycle and reuse programs in management of its supply chain. The findings were tabulated in the table below.

Table 5: Extent to which the firm has implemented the recycle and reuse programs in management of its supply chain

INDICATORS	Mean	Std. deviation
The firm has made use of the recycle and reuse	3.91	1.047
The firm has embraced source reduction as a way of reducing wastes.	3.87	0.734
Waste reduction, reuse	4.17	1.301
Treatment and control of post combustion emissions	3.99	0.802
Use of alternative fuels	3.73	1.024
Use of biodegradable materials	4.28	0.623

Implementation of waste-to-energy process	4.15	0.997
Reduction of hydro fluorocarbons	3.54	0.813
Waste recycling approaches	3.51	0.987

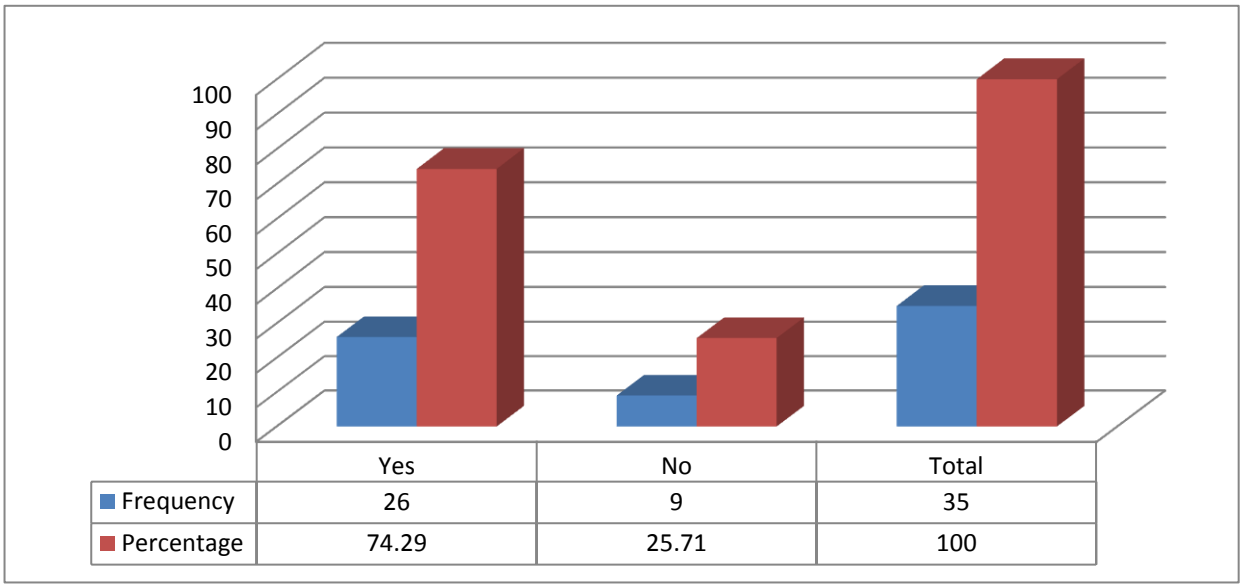
Source: Author (2014)

The study findings indicated that the respondents agreed to a great extent with the indicators showing the extent to which the firm has implemented the recycle and reuse programs in management of its supply chain. There are only two indicators that the respondents moderately agreed with i.e. Reduction of hydro fluorocarbons with a mean of 3.54 and Waste recycling approaches with a mean of 3.51.

4.11 Supply chain effectiveness and efficiency

The researcher sought to find out if the organization ensures that the supply chain is effective and efficient.

Figure 6: supply chain effectiveness and efficiency



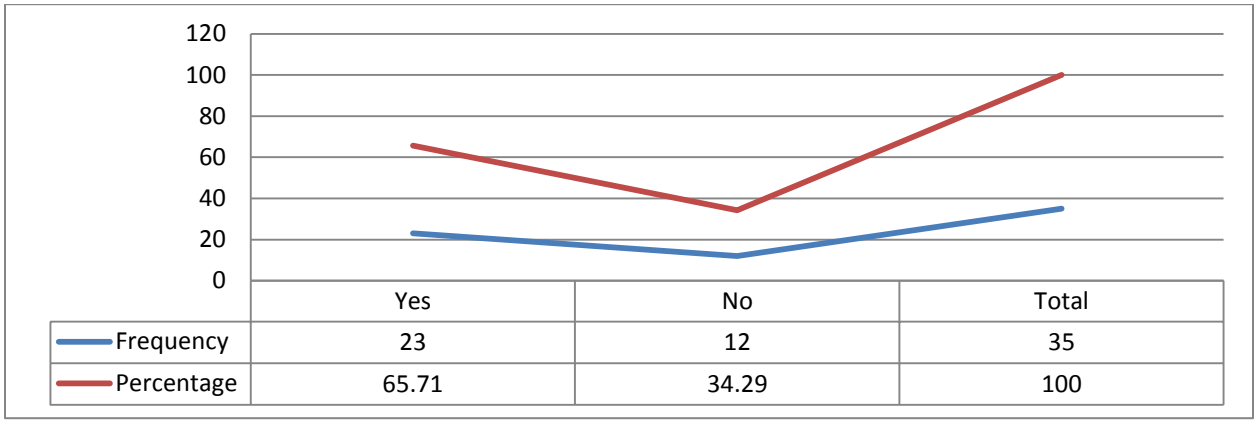
Source: Author 2014

The study findings indicate that 74.29% of the respondents agree that the organization ensures that the supply chain is effective and efficient. 25.71% of the respondents on the other hand disagreed that the organization ensures that the supply chain is effective and efficient. The researcher therefore concluded that the organization ensured that supply chain is effective and efficient.

4.12 Performance measures and metrics needed to fully integrate the supply chain to maximize effectiveness and efficiency

The researcher sought to find out if the organization ensures that the performance measures and metrics needed to fully integrate their supply chain to maximize effectiveness and efficiency are in place.

Figure 7: performance measures and metrics needed to fully integrate the supply chain to maximize effectiveness and efficiency



	Yes	No	Total
Frequency	23	12	35
Percentage	65.71	34.29	100

Source: Author 2014

The study findings indicate that 65.71% of the respondents agree that the organization ensures that the performance measures and metrics needed to fully integrate their supply chain to maximize effectiveness and efficiency are in place. 34.29% of the respondents disagreed that the organization has ensured that the supply chain is effective and efficient. The researcher therefore concluded that the organization ensured that the performance measures and metrics needed to fully integrate their supply chain to maximize effectiveness and efficiency are in place.

4.13 Effects of green supply chain implementation practices on the supply chain performance in your organization

The study sought to find out the effect of green supply chain implementation practices on the supply chain performance in the organization. The study findings indicated that green supply chain implementation practices improved supply chain performance to a high extent with a mean of 4.13 and a standard deviation of 0.917. According to most of the

respondents, green supply chain implementation practices encouraged the implementation of the green supply chain hence the improved performance of supply chain in the organization.

4.14 Performance of supply chain

The researcher sought to find out the extent to which the respondents agreed with some of the statements concerning the performance of supply chain in the organization.

Table 6: extent of agreement with statements concerning the performance of supply chain in the organization

No	Statement	Mean	Std. deviation
1	Sharing of information improves supply chain performance	4.13	0.999
2	Information moves faster and this reduces lead time in the organization	3.81	0.871
3	Orders and deliveries are easily processed to avoid delays	3.65	0.617
4	Supply chain decisions are made in time	3.93	0.743
5	Organization is able to contact suppliers quickly	4.10	0.788
6	Database of suppliers can easily be maintained	3.76	0.811
7	Leads to better supplier relationship management	3.98	0.957
8	Monitoring stock movement is made easier	3.51	0.993
9	It assists in improving the quality of services offered to the customers	3.99	0.567
10	There is efficiency in the entire supply chain	4.12	0.662
11	In general integration has enhanced the performance of our supply chain	3.91	0.813

Source: Author (2014)

The study findings indicated that the respondents agreed with most of the statements concerning the performance of supply chain in the organization. However, the respondents rated the statement Monitoring stock movement is made easier with a mean of 3.51 meaning it was rated moderately among the respondents.

4.15 Rate the performance of supply chain in the company

The researcher wanted to determine the rate of performance of the supply chain in the respondents company with regards to the parameters listed below.

Table 7: rate of performance of supply chain in the company

Parameters	Mean	Std. deviation
Flexibility in ordering	3.94	0.97
Accuracy of orders delivered	4.01	0.61
Timeliness of deliveries	4.03	1.09
Action on customer complaints	4.19	1.18
Supply Chain decisions are made on time	3.99	1.29
Environment friendly Packaging	3.65	0.87
Supplier response time	3.98	0.95
Inventory control	4.18	0.92
Security of stocks	4.09	0.81
Packaging	3.72	0.94

Source: Author (2014)

The study findings indicated that the respondents agreed to a great extent with the parameters for rating the performance of supply chain. The mean of most of the parameters were above 3.70 indicating that the respondents agreed with the parameters to a great extent. Only one parameter i.e. environment friendly packaging had a mean of 3.65 which means the respondents did not agree to a great level.

4.16 Inferential Statistics

This section presents a discussion of the results of inferential statistics. Correlation analysis was used to measure the strength of the relationship between the independent variables i.e. the relationship between business goals, evaluation of supply chain, source reduction, green supply chain. Regression analysis established the relative significance of each of the variables on organizational performance.

4.16.1Correlation Analysis

The Pearson product-moment correlation coefficient (or Pearson correlation coefficient for short) is a measure of the strength of a linear association between two variables and is denoted by *r*. The Pearson correlation coefficient, *r*, can take a range of values from +1 to -1. A value of 0 indicates that there is no association between the two variables.

A value greater than 0 indicates a positive association, that is, as the value of one variable increases so does the value of the other variable. A value less than 0 indicates a negative association, that is, as the value of one variable increases the value of the other variable decreases.

4.16.2 Correlation coefficient

The table below shows the correlation coefficient matrix of the predictor variables.

Table 8: Correlation coefficient

	business goals	evaluation of supply chain	source reduction	green supply chain	Organizational f
business goals	1				
evaluation of supply chain	0.8345	1			
source reduction	0.8507	0.8679	1		
green supply chain	0.7612	0.8163	0.7568	1	
Organizational performance	0.8713	0.9711	0.9287	0.7681	1

Source: Author (2014)

The study in table 11, show that all the predictor variables were shown to have a positive association between them at a significant level of 0.05 and hence included in the analysis. There was strong positive relationship between evaluation of supply chain and business goals (correlation coefficient 0.8345), source reduction and business goals (correlation coefficient 0.8507), green supply chain and business goals (correlation coefficient 0.7612), source reduction and evaluation of supply chain (correlation coefficient 0.8679) green supply chain and evaluation of supply chain (correlation coefficient 0.8163) and between green supply chain and source reduction (correlation coefficient 0.7568).

4.17.3 Regression Analysis

The following are the results of regression analysis.

4.17.4 Model Summary

Analysis in table 13 shows that the coefficient of determination (the percentage variation in the dependent variable being explained by the changes in the independent variables) R2 equals 0.843, that is, customer focus, employee involvement, process approach and continual improvement explains 84.3% of observed change in university performance. The P- value of 0.000 (Less than 0.05) implies that the regression model is significant at the 95% significance level.

Table 9: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.918(a)	.843	.805	.51038	.843	1.242	4	96	.000

Source: Researcher (2014)

Predictors: (Constant), business goals, evaluation of supply chain, source reduction, green supply chain

Dependent Variable: organizational performance

4.17.5 Analysis of Variance (ANOVA)

The researcher sought to compare means using analysis of variance.

Table 10: Analysis of Variance (ANOVA)

	Sum of Squares	df	Mean Square	F	Sig.
Regression	.852	4	.213	1.242	.000
Residual	20.35	119	.171		
Total	22.64	123			

Source: Researcher (2014)

Predictors: (Constant), business goals, evaluation of supply chain, source reduction, green supply chain

Dependent Variable: organizational performance

ANOVA findings (P- value of 0.00) in table 14 show that there is correlation between the predictors' variables (business goals, evaluation of supply chain, source reduction, green supply chain) and response variable (organizational performance).

4.17.6 Regression coefficients

The table shows the results of the regression coefficients required to form the multiple regression model.

Table 11: Regression coefficients

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	0.913	0.123		7.367	0.000
	business goals	0.046	0.028	0.158	2.021	0.045
	evaluation of supply	0.034	0.027	0.101	1.157	0.210
	source reduction	0.036	0.030	0.105	1.194	0.234
	green supply chain	0.047	0.028	0.147	1.686	0.093

Source: Author (2014)

a. Dependent Variable: supply chain performance

From the Regression results in table below, the multiple linear regression model finally appear as

$$Y = 0.913 + 0.046\ BG + 0.034ESC + 0.036\ SR + 0.047GSC + 0.123$$

The multiple linear regression models indicate that all the independent variables have positive coefficient. The regression results above reveal that there is a positive relationship between dependent variable (organizational performance) and independent variables (business goals, evaluation of supply chain, source reduction and green supply chain). From the findings, one unit change in business goals results in 0.046 units increase in organizational performance. One unit change in evaluation of supply chain results in 0.034 unit increase in organizational performance, a unit change in source reduction results in 0.036 unit increase in the organizational performance and a unit increase in green supply chain cause 0.047 changes in organizational performance.

The t statistics helps in determining the relative importance of each variable in the model. As a guide regarding useful predictors, we look for t values well below -0.5 or above +0.5. In this case, the most important variable was business goals followed by green supply chain, source reduction and evaluation of supply chain respectively.

4.18 Discussion

The demographic information of the study indicated that majority of the respondents were male which represented 65.71% while 34.29% were female. Looking at the age bracket of the respondents most of the respondent's majority (22.86%) indicated that their age bracket was between 25-30years. Considering the level of education majority (40.0%) of the respondents had attained university degrees and had a working experience.

The study findings indicated that the firm had implemented practices in the management of its supply chain to a large extent. The firm had also evaluated its supply chain as a single life cycle system in the management of its green supply chain implementation. Apart from that the firm had implement the recycle and reuse programs in management of its supply chain.

The correlation analysis indicated that the dependent and the independent variables correlate in that There was strong positive relationship between evaluation of supply chain and business goals (correlation coefficient 0.8345), source reduction and business goals (correlation coefficient 0.8507), green supply chain and business goals (correlation coefficient 0.7612), source reduction and evaluation of supply chain (correlation

coefficient 0.8679) green supply chain and evaluation of supply chain (correlation coefficient 0.8163) and between green supply chain and source reduction (correlation coefficient 0.7568).

Also the regression model indicated that one unit change in business goals results in 0.046 units increase in organizational performance. One unit change in evaluation of supply chain results in 0.034 unit increase in organizational performance, a unit change in source reduction results in 0.036 unit increase in the organizational performance and a unit increase in green supply chain cause 0.047 changes in organizational performance.

CHAPTER FIVE
SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the summary of the findings from chapter four, and also gives conclusions and recommendations of the study based on the objectives of the study.

5.2 Summary

The main objective of the study was to determine the green supply chain practices implemented by battery manufacturing firms in Kenya and establish the relationship between green supply chain implementation practices and supply chain performance. The study specifically focused on the extent to which business goals affects supply chain performance, extent to which evaluation of supply chain affects supply chain performance, extent to which source reduction affects supply chain performance, and the extent to which green supply chain affects supply chain performance.

The findings of the study emerged out with revealing that the male gender dominated in the group and most of the participants were aged 25-30 years. Majority are educated upto university indicating enough education to execute their roles respectively. The findings also have indicated that on working experience most of the respondents had worked for less than one year.

The findings indicate that the respondents agreed on the indicators of the firm's implementation practices in the management of its supply chain. Further the findings

indicated that the respondents agreed to a great extent with the indicators showing the extent to which the firm has implemented the recycle and reuse programs in management of its supply chain. The researcher also found out that supply chain effectiveness and efficiency was ensured by the organization.

The performance metrics and measures needed to fully integrate the supply chain to maximize effectiveness and efficiency were also ensured present by the organization. The study also sought from the respondents to indicate effects of green supply chain implementation practices on the supply chain performance. The study findings indicated that the respondents agreed with most of the statements concerning the performance of supply chain in the organization. However, the respondents rated the statement Monitoring stock movement is made easier with a mean of 3.51 meaning it was rated moderately among the respondents.

5.3 Conclusions

This study concludes that green supply chain implementation practices are important in the supply chain performance. With this evidence about the positive relations between green supply chain implementation practices and supply chain performance, it is therefore vital that issues of green supply chain implementation practices be at the forefront of organization's agenda on all management levels. The study findings concluded from multiple linear regression models that all the independent variables had a positive coefficient. The regression results concluded that there is a positive relationship

between dependent variable (supply chain performance) and independent variables business goals, evaluation of supply chain, source reduction and green supply chain.

5.4 Policy Recommendations

The study recommends that the management should provide full support of the green supply chain the government should adopt product stewardship programs for key consumer and industrial products. These programs should be designed to minimize the end-of-life impacts of key products and to encourage reuse and recycling by requiring manufacturers to take back, recycle or properly dispose of those products. Product categories to be addressed in the stewardship programs should include: consumer electronics, batteries, paint, tires, carpet, mercury-containing products (like thermostats and fluorescent lights), bottles and Cans.

The programs would be designed to share responsibility among government, manufacturers and consumers of products as follows:

1) Government will establish goals and timelines for recovery and recycling of each product category, and will launch programs to educate consumers and manufacturers on the aims and requirements of the stewardship programs.
2) Establish voluntary projects of green supply chain to encourage enterprises to participate in such projects. The government can sign voluntary agreements of green supply chain with enterprises, and effectively realize the implementation of green supply chain.

5.5 Limitations of the study

The validity and reliability of the study's information, which was obtained from the staff, depended on how honest they were. Selecting a representative sample was tricky as too large a sample rendered it difficult to collect information economically and yet too small a sample yield a results that are not representative of the overall staff population.

5.6 Areas of further research

Areas of further research that were identified include a similar study to be carried out on other sectors of battery manufacturing firms, A study on the green supply chain implementation practices used in the other sectors of higher education; and lastly the challenges faced in Quality Management implementation in the other sectors of higher education's academic function. Crucially further research is should be done to determine how green supply chain implementation practices can contribute to supply chain performance and to what extent can the benefits if any be quantified by the manufacturing firms.

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APPENDIX I

QUESTIONNAIRE

Dear correspondent, this questionnaire aim to collect information related to green supply chain implementation practices and supply chain performance in battery transportation of building materials in the construction sector in Kenya. The information given is for academic purposes and it will be treated confidentially in accordance with University of Nairobi regulations.

This questionnaire is for collecting relevant data for the research project. Therefore, your input and participation will be highly appreciated, while being treated with confidentiality.

Please give your answers to the following questions:

SECTION A: PERSONAL DETAILS

1. **Gender**

Male ☐ Female ☐

2. Age Bracket (years)

18 – 25 ☐ 35-40 ☐

25-30 ☐ 40 – 45 ☐

30-35 ☐ 45 years and Above ☐

3. Highest level of education attained

Certificate ☐

Diploma ☐

Degree ☐

Masters Degree ☐

4. Work Experience

Less than 1 year ☐

1 – 2 years ☐

2 – 5 years ☐

5 – 10 years ☐

10 years and above ☐

SECTION B: GENERAL SUPPLY CHAIN IMPLEMENTATION PRACTICES.

3. To what extent has the firm implemented the following practices in the management of its supply chain (Very great extent=1,great extent=2, Moderately=3, Small extent=4, very small extent=5)

(a)

Indicators	Very Great extent **(1)**	Great extent (2)	Moderate extent (3)	Small extent (4)	Very small Extent (5)
The firm has included in its supply chain the green practices					

The firm has incorporated environmental issues in the design of its products					
The firm recognizes greening the supply chain as a source of sustainable product					
The firm has increased its supply chain visibility by including green practices in its supply chain					
The firm has refined its efficiency in its supply chain by including green practices in its supply chain					
The firm has minimized costs by including green practices in its supply chain					
The firm has offered frequent internal trainings to its employees to increase in its involvement in GSCM					
The firm has improved its environmental performance by going green in its supply chain					

The firm has improved its operational performance by going green in its supply chain					.
The firm has improved its economic performance by greening its supply chain					

4. To what extent has your firm evaluated its supply chain as a single life cycle system in the management of its green supply chain implementation

Indicators	V. Great Extent (1)	Great extent (2)	Moderate Extent (3)	Small extent (4)	Very small extent (5)
The firm always takes a holistic view from the raw materials procurement to disposal					
The firm recognized the holistic view of the supply chain and has led to improved competitive advantage					

The firm has recognized the procurement of raw materials to disposal as a way of lowering costs					
Has the firm experienced full visibility in the entire supply chain in its supply chain processes					
The firm has improved its distribution channels it its supply chain					
The firm has identified opportunities to deliver business value in its supply chain					
The firm has gained a competitive edge through proper flow of materials in the supply chain					

.

Any other? Please indicate.

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……

5. To what extent has your firm implemented the recycle and reuse programs in management of its supply chain.

INDICATORS	Very great extent (1)	Great Extent (2)	Moderate extent (3)	Small extent (4)	Very small extent (5)
The firm has made use of the recycle and reuse					
The firm has embraced source reduction as a way of reducing wastes.					
Waste reduction, reuse					
Treatment and control of post combustion emissions					
Use of alternative fuels					
Use of biodegradable materials					
Implementation of waste-to-energy process					

Reduction of hydro fluorocarbons					
Waste recycling approaches					

SECTION C: SUPPLY CHAIN PERFORMANCE

6.

(a) Does your organization ensure that the supply chain is effective and efficient?

Yes ☐ No ☐

Please explain ……..

…….

…….

(b) Has your organization developed the performance measures and metrics needed to fully integrate their supply chain to maximize effectiveness and efficiency?

Yes ☐ No ☐

Please explain ……..

…….

…….

(c) What are the effects of green supply chain implementation practices on the supply chain performance in your organization?

Very High ☐

High ☐

Moderate ☐

Poor ☐

Not at all ☐

Please explain ……..

…….

…….

(c) Please indicate the extent to which you concur with the following statements concerning the performance of your supply chain.

Use the scale of: 1= strongly disagree 2= Disagree 3= Undecided 4= Agree 5= strongly agree

No	Statement	1	2	3	4	5
1	Sharing of information improves supply chain performance					
2	Information moves faster and this reduces lead time in the organization					
3	Orders and deliveries are easily processed to avoid delays					

4	Supply chain decisions are made in time					
5	Organization is able to contact suppliers quickly					
6	Database of suppliers can easily be maintained					
7	Leads to better supplier relationship management					
8	Monitoring stock movement is made easier					
9	It assists in improving the quality of services offered to the customers					
10	There is efficiency in the entire supply chain					
11	In general integration has enhanced the performance of our supply chain					

12. Any other? Please indicate.

……

……

……

……

(d). Please tick appropriately how you rate the performance of your supply chain in your battery company with regards to the parameters listed.

Use the scale of: 1= very small extent 2= small extent 3= moderate extent 4= Large extent 5= To a very large extent

Parameters	Very large extent	Large extent	moderate extent	Small extent	Very small extent
Flexibility in ordering					
Accuracy of orders delivered					
Timeliness of deliveries					
Action on customer complaints					
Supply Chain decisions are made on time					
Environment friendly Packaging					
Supplier response time					
Inventory control					
Security of stocks					
Packaging					.

Any other? Please indicate.

……

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……

……

END

Thanks for your time and you comments/opinions – we value them.

For clarification or further details, contact: BRENDA KORIR-0722700447

APPENDIX II

List of Companies

i. Eveready East Africa Ltd

ii. Chloride Oxide (k) Ltd

Source : www.kra.go.ke-(2013)