

**GREEN MANAGEMENT PRACTICES AND SUPPLY CHAIN PERFORMANCE
OF PHARMACEUTICAL COMPANIES IN NAIROBI, KENYA**

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DECLARATION

I declare that this research project is my original work and has never been submitted to any other University for assessment or award of a degree.

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This project has been submitted with my authority as the university supervisor.

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Dedication

To my family, for your love and support.

Acknowledgements

The pursuit of knowledge is a humbling experience; it makes one realize just how much he doesn't know.

My sincere gratitude goes to the University of Nairobi for granting me the opportunity to pursue my post graduate degree. I appreciate the efforts of my supervisor Mr. Michael Chirchir bringing out the best in me. I wish to acknowledge my parents for their moral support and continued encouragement. The list is too long to permit individual mention and so I give gratitude to everyone who played a role directly or indirectly to enable my successful completion of my MBA. Indeed "It takes a village to raise a child" and the greater challenge of giving back to the society lies ahead. May the almighty God enable me transform the great ideas I have attained into a reality.

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LIST OF ABBREVIATIONS

| | |
|------|--|
| GSC | -Green supply chain management |
| KEBS | -Kenya Bureau of standards |
| SCP | -Supply Chain Performance |
| NEMA | -National Environment Management Authority |
| BSC | -Balance Score card |

ABSTRACT

This study is about the relationship between green management practices and supply chain performance among pharmaceutical companies in Kenya. The study had three objectives to achieve: To determine the extent to which green supply chain management is practiced in the pharmaceutical industry in Nairobi, Kenya; to determine the relationship between Green Supply Chain Management practices and supply chain performance in pharmaceutical industry in Kenya and to establish the challenges faced in the implementation of Green Supply Chain management practices by the pharmaceutical industry in Nairobi, Kenya.

The research design was a descriptive study. Data was collected using a questionnaire that was administered through drop and pick later method. Percentages and frequencies were used to analyze objective one and three whereas regression analysis was used to analyze the relationship between business integration and supply chain performance. The findings were presented in tables. It was also clear that there was a significant relationship between green management practices and supply chain performance represented by R^2 value of 0.794 which translates to 79.4% variance explained by the five independent variables of green management practices improves supply chain performance.

The study focused on pharmaceutical companies in Nairobi only as per the Export Processing Zone website, it did not include all GSCM practices. The study confirmed that Green supply chain management practices is significant in enhancing the performance of supply chains. The study recommends that pharmaceutical companies should assure proper utilization of materials by customers. The companies should also find appropriate business processes needed in implementing green supply chain management practices. The pharmaceutical companies should practice waste reduction, reuse and recycling approaches in order to enhance effectiveness in the supply chain.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Awareness of the world's environmental issues such as global warming, carbon emissions, toxic substance usage, and resource scarcity has escalated over the past decades. Policy makers and activists are advocating for going green, and many organizations throughout the world have responded to this by applying green principles (Xie and Breen, 2012).

Supply chain management has traditionally been viewed as a process where raw materials are converted into final products, and then delivered to the end-consumer. This process involves extraction and exploitation of the natural resources. It is important to note however that we live in a decade where environmental sustainability has been an important issue to business practice. The waste and emissions caused by the supply chain have become one of the main sources of serious environmental problems including global warming and acid rain. Green supply chain policies are desirable since reactive regulatory, to proactive strategic and competitive advantages. Green supply chain management (GSCM) is gaining increasing interest among researchers and practitioners of operations and supply chain management (Kumar and Chandrakar, 2012).

1.1.1 Green Supply Chain Practices

Supply chains are value chains extending from suppliers' suppliers to ultimate customers. As such, supply chain managers must work to integrate and coordinate the production, marketing, and finance functions of their individual organizations with those of supply chain partners (Whitten, Green Jr and Zelbst, 2012).

The concept of Green SC Management (GSCM) emerged in the late 1990s, and encompasses the reactive monitoring of general environmental management programs, moving to more proactive practices such as the recycling, reclamation, remanufacturing and reverse logistics (RL), as well as incorporating innovations (Zhu and Sarkis, 2004). Green Supply Chain Management is where firms seek to minimize negative environmental impacts in their supply chains. It also includes the consideration of social issues in the supply chain, such as ensuring suppliers have decent working conditions, or ensuring goods are sourced ethically and fairly along the supply chain. The economic aspect of sustainable SCM can include buying from local suppliers to support local economic regeneration. Organizations vary in the focus of their sustainable supply chain activities, with some firms putting greater emphasis on green issues and others prioritizing social aspects (Walker and Jones, 2012).

Environmental sustainability is a supply chain imperative rather than an organizational imperative. Development of environmentally friendly processes, products, and services requires a unified effort by all members of the supply chain to avoid sub-optimization at the partner level. The implementation of GSCM practices is expected to result in improved environmental performance as measured by reductions in air emissions, effluent waste, solid waste, and the consumption of toxic materials (Green Jr and Zelbst, 2012).

1.1.2 Supply Chain Performance

Supply chain management is the coordination and management of a complex network of activities involved in delivering a finished product to the end-user or customer. All stages of a product's life cycle will influence a supply chain's environment burden, from resource extraction, to manufacturing, use and reuse, final recycling, or disposal (Ninlawan and Seksan, 2010). Supply chain performance refers to the evaluation of supply

chain management, and includes both tangible for example cost and intangible for example utilization factors (Chang, Tsai and Che- Hsu, 2013).

Sustainable SCM incorporates a variety of concepts such as environmental or green SCM, where firms seek to minimize negative environmental impacts in their supply chains. It also includes the consideration of social issues in the supply chain, such as ensuring suppliers have decent working conditions, or ensuring goods are sourced ethically and fairly along the supply chain. The economic aspect of sustainable SCM can include buying from local suppliers to support local economic regeneration. Organizations vary in the focus of their sustainable supply chain activities, with some firms putting greater emphasis on green issues and others prioritizing social aspects (Walker and Jones, 2012).

Supply Chain Performance Measurement can be done through Triple-A supply chain construct which are those supply chains that exhibit agility, adaptability, and alignment. Agility is the ability to respond to short-term changes in demand or supply quickly and handle external disruptions smoothly. Adaptability is the ability to adjust the supply chain's design to meet structural shifts in markets and modify the supply network to reflect changes in strategies, technologies, and products. Alignment is the ability of great firms to align the interests of all of the firms in their supply chains with their own (Whitten, Green Jr and Zelbst, 2012).

1.1.3 Pharmaceutical Industry In Kenya

Medication is produced and prescribed in large volumes every year. Disposal of expired or unwanted medication can be very costly and harmful to the environment, and medications have been detected in sewage effluent, surface water, ground water and even drinking water. In line with the guidance, community pharmacies are bound by contractual obligation to offer a returns service for medication the strategic aim of which

is to facilitate safe disposal, remove excessive storage of medicines in the home and to reduce the environmental damage from inappropriate disposal methods (Xie and Breen, 2012). The Pharmaceutical Supply Chain (PSC) is a supply chain where pharmaceutical medications are produced, transported and consumed. Disposal of the medication waste is harmful to the environment and costly (Verma and Gangele, 2012).

The pharmaceutical industry consists of three segments namely the manufacturers, distributors and retailers. All these play a major role in supporting the country's health sector, which is estimated to have about 4,557 health facilities country wide. Kenya is currently the largest producer of pharmaceutical products in the Common Market for Eastern and Southern Africa (COMESA) region, supplying about 50% of the region's market. Out of the region's estimated of 50 recognized pharmaceutical manufacturers; approximately 30 are based in Kenya. It is approximated that about 9,000 pharmaceutical products have been registered for sale in Kenya.

These are categorized according to particular levels of outlet as free sales or OTC (Over the Counter), pharmacy technologist dispensable, or pharmacist dispensable or prescription only (Export Processing Zones Authority, 2005).

There are 42 companies listed as local pharmaceutical manufacturers in Kenya. Amongst these, there is only one multinational, GlaxoSmithKline (GSK). Together, these companies constitute an important pharmaceutical manufacturing centre in the region. Local pharmaceutical companies are characterized by common product lines, low capacity utilization, need for greater production efficiencies and shortage of qualified personnel. Local pharmaceutical companies in Kenya face competition on two fronts which include competing with each other collectively and facing stiff competition from imports (United Nations Industrial Development Organization Vienna, 2010).

1.2 Statement of the 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).

The Pharmaceutical sector in Nairobi, Kenya has continued to grow by opening branches in various parts of the city. This is attributed to the increased level of competition in the sector coupled with enlightened customers on environmental rights and more stringent measures from regulatory bodies like NEMA and KEBS. As such the pharmaceutical companies can use the GSCM practices to reduce their cost and improve their performance and efficiency in their operation to remain competitive.

Obiso (2011) study found that majority of the independent petroleum marketing firms were not aware of GSCM and could not understand what is green supply chain practices are hence there is need to know if pharmaceutical 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 procurement practices. From his findings there was need for the public sector organizations in Kenya to adopt green procurement 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 Pharmaceutical companies in Nairobi are aware of green procurement practices as it is one of the GSCM elements.

Abuko (2011) study shows that adoption of Green Supply Chain practice 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 pharmaceutical companies in Nairobi, Kenya have the same notion and if they are aware of the GSCM practices.

According to Verma A. et al, (2012) found out that Green Supply Chain Management is a relatively new green issue for the majority of India corporations, does this also apply in Kenya in that pharmaceutical industry are not aware of GSCM practices.

Chege (2012) carried out research on GSCM practices and supply chain performance of private hospitals in Nairobi Kenya, she found that GSCM practices have a significant relationship with supply chain performance. However, the study did not cover the pharmaceutical industry and the public hospitals in Nairobi Kenya hence creating a need for further studies in these areas. There is need to fill this knowledge gap of identifying the GSCM practices and Supply chain performance in pharmaceutical companies in Nairobi. The research questions for this study include, what is the extent to which green supply chain management is practiced in the pharmaceutical industry in Nairobi, Kenya? What is the relationship between green supply chain management and supply chain performance in the pharmaceutical industry in Nairobi, Kenya? What are the challenges faced in the implementation of green supply chain management practices in the pharmaceutical industry in Nairobi, Kenya?

1.3 Objectives of the Study

- i. To determine the extent to which green supply chain management is practiced in the pharmaceutical industry in Nairobi, Kenya;

- ii. To determine the relationship between Green Supply Chain Management practices and supply chain performance in pharmaceutical industry in Kenya;
- iii. To establish the challenges faced in the implementation of Green Supply Chain management practices by the pharmaceutical industry in Nairobi, Kenya.

1.4 Value of the Study

The findings will be of benefit to the management of pharmaceutical sector at large who will gain insight into how their organization could effectively manage and use GSCM practices.

The study will offer an understanding on the importance of adopting GSCM and as such will improve their performance and competitiveness in the pharmaceutical sector.

Understanding the GSCM practices adopted by pharmaceutical companies will help policy makers in the line of ministries of the governments and other state agents involved with environmental matter including NEMA and KEBS to come up with targeted policies and programs that actively stimulate the growth and sustainability of the pharmaceutical sector.

It will be of value to academicians as they will find useful gaps that will stimulate interest in further studies.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter will provide information from publications on the topics related. It will examine findings from various scholars and authors about GSCM practices. The chapter will cover GSCM practices, supply chain performance and conceptual framework of the study.

2.2 Green Supply Chain Management

Green supply chain is fairly new concept. It is based on two concepts; the supply chain management concept and the environmental management concept. Green supply chain management is the integration of environmental management into supply chain management. It aims at confining the wastes within the supply chain system in order to conserve energy and prevent the release of dangerous materials into the environment (Muchiri, 2011).

GSCM integrates ecological factors with supply chain management principles to address how an organization's supply chain processes impact the environment. Organizations are increasingly becoming aware of the impact of tight integration of supply chain and environmental management systems in enabling a sustainable business strategy. Many are now seeking out solutions and guidance on how to implement a sustainable supply chain. A sustainable supply chain is a supply chain that is not only optimal for the organization, but is optimal relative to its limited environmental impact (Congizant, 2008).

Perotti, Zornin and Cagno (2012) investigated the GSCP adopted by third party logistics (3PLs) in Italy in terms of specific practices implemented and level of adoption of each practice, and to explore how this adoption can affect the company performance. They found out that even though there is overall increasing interest towards environmental issues, the current level of adoption of GSCP is still limited amongst the 3PLs investigated as well as their benefits in terms of company performance. Some players have shown a more proactive attitude and started benefiting substantially from the adoption of GSCP, mainly in terms of environmental and economic performance.

Green Jr, and Zelbst (2012) carried out a study to contribute significantly to the first wave of empirical investigations related to the impact of green supply chain management

(GSCM) practices on performance. Their paper also aimed to theorize and empirically assess a comprehensive GSCM practices and performance model. The model incorporates green supply chain practices that link manufacturers with supply chain partners (both suppliers and customers) to support environmental sustainability throughout the supply chain. Their finding was that generally, the adoption of GSCM practices by manufacturing organizations leads to improved environmental performance and economic performance, which in turn, positively impact operational performance. Operational performance enhances organizational performance.

According to Menzel, Smagin and David (2010), who carried out a study to investigate the trend and effect of environmentally friendly manufacturing on the financial performance of companies in the European automotive and pharmaceutical industries, they found that specific attention was given to resource utilization. The study showed no significant relationship between greener manufacturing and corporate performance; however a trend in decreasing resources, specifically electricity, was found. Furthermore, a trend in reducing Carbon dioxide was found which is one of the issues affecting GSCM practices.

2.3 Green Supply Chain Management Practices

Green or sustainable supply chain management is defined as the strategic, transparent, integration and achievement of an organization's social, environmental, and economic objectives in the systemic coordination of key inter-organizational business processes for improving the long-term performance of the firm and its supply chain partners. This implies that specific criteria have to be applied by all supply chain partners. At the same time, responsible environmental and social behavior must be promoted as well for the good of the entire chain (Wu and Dunn, 2012). Green supply chain management practices

can refer to a variety of activities and initiatives implemented by an organization in an attempt to reduce their impact on the natural environment (Awaysheh and Klassen, 2010).

The Green supply chain management practices include:

2.3.1 Reverse Logistics

It is the process of planning, implementing and controlling the efficient, cost-effective flow of raw materials, in process inventory, finished goods and related information from the point of consumption to the point of origin for the purpose of recapturing or creating value or for proper disposal. Product recall requires organization to be able to reverse the normal logistics flow from suppliers to customers so that inventory deemed unsuitable can be located by customers and returned to suppliers in a timely and cost effective manner (Xie and Breen, 2012).

It would be the responsibility of the pharmaceutical companies to develop the reverse logistics networks and the flow options in order to avoid the dissatisfaction of the customers, counterfeit drugs, and return of outsourced drugs. This would also involve developing credit rules to guide the returns process for the customers and suppliers and creating a framework of metrics for the supplier relationships. Each of these sub-processes are defined by activities such as initiation of a return request, determining the right routing to keep the reverse logistics at a minimal cost, averting counterfeit drugs, crediting consumers and suppliers, thus analyzing the returns and performance of the reverse supply chain (Kumar et al, 2008).

2.3.2 Green Procurement/ Inbound logistics

The “green procurement” can be defined as the process of formally introducing and integrating environmental issues and concerns into the purchasing process, seeking to acquire goods and services characterized by a low environmental impact that is products environmentally friendly in nature and produced using environmentally friendly

processes. The initiatives to minimize environmental impact in inbound supply chain, according to the “green procurement” approach include eco-labeled product purchase, adoption of environmental criteria into the supplier assessment system environmental and collaboration with suppliers (Colicchia et al, 2011).

Beyond requirements that procurement departments have traditionally been promoting over the years, such as the respect of work conditions and non-discrimination, new issues arise about reinforcing environmental requirements towards suppliers. Green Procurement enables better compliance with existing norms, improvement of brand image for consumers and better ranking by non-financial notation organisations Buyers will preferably choose suppliers with certified processes ISO 14001 for instance, to create a balance in green procurement companies will encourage suppliers who have a low raw material consumption, controlled emissions and pollution levels and raw material tracking. Furthermore they tend to select products made out of a large proportion of recycled and recyclable materials, and stamped by reliable eco-labels (Loebich and Donval, 2011).

2.3.3 Eco-design and Packaging

This is a GSCM practice which requires that manufacturers design products that minimize consumption of materials and energy, that facilitate the reuse, recycle, and recovery of component materials and parts, and that avoid or reduce the use of hazardous products within the manufacturing process. Eco – design and Packaging will include packaging design for reduced environmental impact, packaging re-cycle or re-use and use of biodegradable materials (Green Jr et al, 2012).

According to Jumadi and Zailani (2010) a reduction in the product environmental impact may be achieved not only through an appropriate product design, but also a proper use by

consumers. In this sense, consumers must become more aware of the environmental implications related to the products they are using, so that sustainability may be perceived as a value-added element for the society, as well as a distinguishing feature for companies. Two main areas have been identified addressing the available strategies towards sustainable product design and use, namely product design, and packaging design. As for product design, possible strategies lie in reduction of product environmental impact within the supply chain and reduction of product environmental impact in the consumer use.

2.3.4 Waste Management System

This involves the use of Carbon dioxide refrigeration systems, treatment and control of post combustion emissions, use of alternative fuels (e.g. cleaner fuels), treatment and recycle of hazardous wastes, process optimization implementation of waste-to-energy process, waste reduction, reuse and recycling approaches. Carbon dioxide capture and reduction of hydro fluorocarbons (HFC) and per fluorocarbons (PFC) and the use of carbon dioxide refrigeration systems (Colicchia et al, 2011). There are a number of contributions addressing the environmental impact of the manufacturing phase. The proposed approaches to greening the production process can be summarised into the following categories reduction of input resources that is implementation of actions aimed at reducing utilisation of input resources and, consequently, the wastes of materials and energy during the production process. In this sense, lean production practices and total quality management can lead to improved environmental performances and reduction of wastes and hazardous emissions to human beings and environment e.g. solid and liquid wastes, air emissions and noise (King and Lenox, 2001).

Muchiri (2011) notes that waste management may also involve source reduction the recycle and re-use waste management programs focuses on management of waste after it has

been created. On the other hand Source Reduction focuses on the prevention or the 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 measure such as; using reusable instead of disposable materials, eliminating certain items, repair and maintenance of equipments, using durable products, using recycled products.

2.3.5 Internal Environmental Management

This is the practice of developing green supply chain management as a strategic organizational imperative through commitment and support of the imperative from senior and mid-level managers. General management support is a critical element of adoption and implementation of innovations in an organization, especially environmental systems. Organizational innovations may remain stuck at the initial idea stage. (Perotti et al., 2012).

Kumar and Chandrakar (2012) notes that top management support can affect new system initiatives success. Cross-functional efforts like GSCM are likely to benefit too. Like most other major environmental efforts, GSCM is a broad-based pervasive organizational endeavor with cross-functional programs. As such, it has the potential to benefit from top management support. It is not just top-level managers from whom support is needed; support from mid-level managers is also important to successful implementation of environmental practices. Support from middle-management levels is important because environmental management is related to almost all departments in an organization, and cross-departmental cooperation is important to successful practices. Strong communication between business managers and environmental professionals with management support is also necessary for effective management of both business and environmental issues.

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

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).

2.5 Challenges in GSM Implementation

Implementing GSCM has never been easy. Organizations are likely to face certain challenges some of which include: Lack of appropriate technology and business processes needed. Technology provides energy efficient solutions that have a more favorable impact on the environment. Information technology can make the supply chain greener by optimizing the resources required to support the business and also enable more effective supply chain planning, execution and collaboration, thereby reducing resource requirements. Green supply chain technologies cannot work independent of the business processes in the supply chain. Both the green supply chain and the supply chain are a complement of one another. A supply chain technology cannot work without which is provided by the business process, there is need therefore to have a process that captures such data (Muchiri, 2011).

Failure to integrate supply chain optimization efforts with green supply chain efforts is another GSCM challenge. According to (Wilkerson, 2003) most firms implementing green supply chain practices do not actually integrate environmental considerations into their supply chain management processes. Their approach is usually driven by a need to green an existing process or a piece of the chain. Although this may have a positive impact on the environment, the environmental aspects are frequently not considered when those responsible for reviewing a business's overall supply chain performance make changes in the supply chain. They furthest argue that it is only after changes the changes

in the supply chain have been implemented and their effects on the environment revealed that the idea of greening the supply chain has the opportunity to emerge.

Lack of information about the green supply chain possess also as a challenge. The lack of information on regulations and green supply chain environment best practices and metrics into the entire best practices has left organizations with a limitation of what to do and implement (Cognizant, 2008). Lack of tools to optimize the supply chain with environmental management also posses as a challenge, which lies in selecting the right tool. Tools that have metrics to measure the effects of greening, including carbon and the environmental footprint, emission costs per unit, energy costs as a percent of production costs, waste produced as a percent of production, and returned products disposed of versus remanufactured.

2.6 Summary of Literature Review

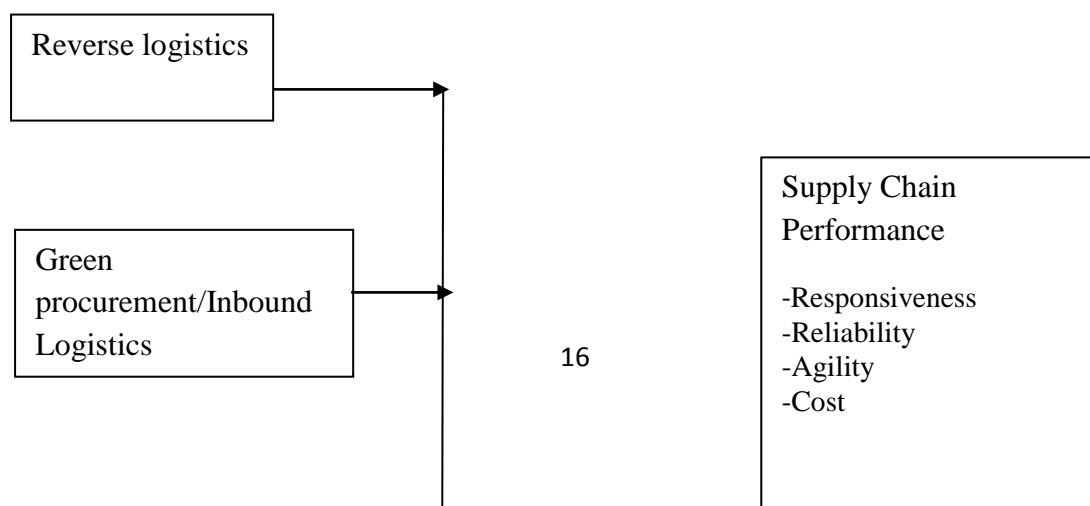
The literature review confirms that there is a link between GSCM practices and supply chain performance. Whereas there is awareness on GSCM practices in various countries and organizations around the world, it does not apply in Kenya where no studies have been carried out on GSCM practices and SCP in the pharmaceutical industry in Kenya. It is therefore clear that there is need to find out the GSCM practices and SCP in pharmaceutical companies in Kenya.

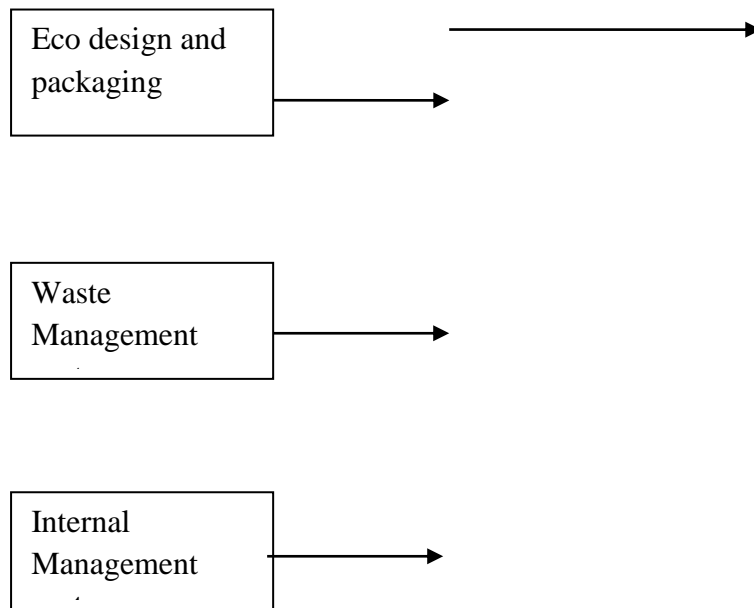
2.7 Conceptual Model

Conceptual Model links GSCM practices and supply chain performance.

Indicators

Dependent variable





Source (Author; 2013)

Application of GSCM practices is expected to have an impact on supply chain performance. Localized sourcing will lead to reduced short procurement distance and inventory costs. Reverse logistics will reduce space and time; this is expected to have an impact in reliability and responsiveness. Waste management solutions will reduce solid wastes and as such affect Supply Chain Management costs. Green procurement will lead to timely delivery of materials, products and improved service to customers.

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 management practices and supply chain performance of private hospitals in Nairobi, Kenya. This design was deemed appropriate as it allowed the researcher to draw conclusion on the link between GSCM practices and supply chain performance.

3.3 Population and Sample

The study population were the registered pharmaceutical companies in Nairobi, Kenya. According to Export processing zone project on Kenya's Pharmaceutical Industry there are 23 pharmaceutical companies (see appendix ii). All the 23 pharmaceutical companies were used; there was be no need of sampling.

3.4 Data Collection

The study used primary data which was collected with the help a structured questionnaire. The use of the primary data was to establish the Green supply chain management practices and supply chain performance of pharmaceutical companies in Nairobi. The

study respondents were the pharmaceutical company managers of all the 23 pharmaceutical companies in Nairobi or other persons carrying the same responsibility.

There was an introduction to the questionnaire explaining the study topic and the purpose of the study. Drop and pick method was used as a method of administering the questionnaire so that the respondent could fill the questions at their convenient time.

The questionnaire was 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 was on the pharmaceutical company profile; section B covered information on the extent of Green supply chain management practices of pharmaceutical companies in Nairobi; C; highlighted the relationship between GSCM practices and supply chain performance; and part D covered the challenges faced on implementing green supply chain management practices.

3.5 Data Analysis

The data was analyzed by use of multivariate data analysis techniques to allow simultaneous investigation of more than two variables. The researcher utilized the Stastical Package for Social Sciences (SPSS) software. The following regression equation was used. $S = a + b_1 x_1 + b_2 x_2 + b_3 x_3 + b_4 x_4 + b_5 x_5 + e$. Where: S= Supply chain performance; a= the S intercept, b_1 , b_2 , b_3 , b_4 , and b_5 are regression coefficient of respective variables; e is the error term; x_1 = Reverse Logistics; x_2 = Green Procurement/ Inbound logistics; x_3 = Eco-design and Packaging; x_4 = Waste Management Systems and x_5 =Internal environmental management.

CHAPTER FOUR

DATA ANALYSIS AND INTERPRETATION

4.1 Introduction

This study was carried out to establish the Relationship between Green Supply Chain Management practices and Supply chain performance in Nairobi, Kenya. Data was collected from pharmaceutical company managers who were in charge of pharmaceutical companies. The findings are presented next.

4.2 Response Rate

A total of 23 questionnaires were distributed to pharmaceutical companies through their headquarters based in Nairobi. Out of the 23 questionnaires, 17 were returned to the researcher. This represents a response rate of 74%. This percentage was considered sufficient for this study. The 26% who never returned the questionnaires cited busy schedules as the main reason for lacking time to fill them.

Table 4.1: Duration of operation

Duration Pharmaceutical companies have operated

| | Frequency | Percent |
|--------------------|-----------|---------|
| under 5 | 6 | 35.3 |
| 6-10 years | 8 | 47.1 |
| Valid 11- 15 years | 1 | 5.9 |
| over 16 years | 2 | 11.8 |
| Total | 17 | 100.0 |

The researcher sought to establish the duration the respective pharmaceutical companies had been in operation. The findings as illustrated in Table 4.1 above confirm that 47.1% of the pharmaceutical companies in Kenya have been in operation for between 6-10 years. This is an indication that majority of the pharmaceutical companies have been in operation for a long time and they are familiar with their supply chains operations.

Table 4.2: Duration of Employment

| | Frequency | Percent |
|-------------------|-----------|---------|
| less than 2 years | 4 | 23.5 |
| 2- 5 years | 13 | 76.5 |
| 6-10 years | 0 | 0 |
| Above 10 years | 0 | 0 |
| Total | 17 | 100.0 |

Source; Research Data (2013)

The respondents were asked to indicate the duration they had served in the company. They were provided with options to choose from. The findings in Table 4.2 above confirm that 76.5% of the respondents have worked for their companies between 2-5 years. This indicates that the respondents are familiar with the various operations of pharmaceutical supply chains.

Table 4.3: Branches of pharmaceutical company in Nairobi

| | Frequency | Percent |
|----------|-----------|---------|
| 0-5 | 17 | 100 |
| 6-10 | 0 | 0 |
| 11-15 | 0 | 0 |
| Above 16 | 0 | 0 |
| Total | 17 | 100.0 |

Source; Research Data (2013)

The respondents were asked to indicate the number of branches of their company in Nairobi. They were provided with options to choose from. The findings in Table 4.3 above confirm that 100% of the respondents have between 0-5 branches in Nairobi, Kenya.

4.3 Green Supply Chain Management Practices

Table 4.4: Duration of establishment in Green Supply Chain Management

| | Frequency | Percent |
|--------------------------|-----------|---------|
| considering it currently | 7 | 41.2 |
| 1 year | 4 | 23.5 |
| 2 years | 5 | 29.4 |
| 3 years | 1 | 5.9 |
| More than 4 years | 0 | 0 |
| Total | 17 | 100.0 |

Source; Research Data (2013)

The researcher sought to establish the duration the respective pharmaceutical companies had established Green Supply Chain Management. The findings as illustrated in Table 4.4 above confirm that 41.2% of the pharmaceutical companies in Kenya have been considering the establishment of green Supply Chain Management, this indicates that majority of the pharmaceutical companies are not practicing the green supply chain practices.

Table 4.5: Extent Organization Practice Reverse Logistics

The study sought to know the respondent level of agreement with statements related to organization practicing Reverse Logistics. The results are presented on table 4.5

| Reverse Logistics | Mean |
|---|----------------|
| Assuring Proper utilization of material by customers | 1.5294 |
| The Pharmaceutical company control environmental risk associated with supplier operations | 2.4706 |
| The Pharmaceutical company manages reverse flow of material | 2.5294 |
| The pharmaceutical company manages environmental packaging and distribution | 2.6471 |
| Materials reuse whenever possible | 2.9412 |
| Total | 12.1177 |
| Average | 2.4235 |

Source; Research Data (2013)

From the results majority of the respondents agreed that organizations practiced reverse logistics with the materials reuse whenever possible as shown by a mean score of 2.9412, managing environmental packaging and distribution has a mean score was of 2.6471; reverse flow of materials had a mean score of 2.5294; controlling environmental risk

associated with supplier operations mean score was 2.4706 and assuring proper utilization of materials by customers had the mean score of 1.5294. The average mean score was 2.4235 which is closer to the mean score of the pharmaceutical company control environmental risk associated with supplier operations this would mean that an average of the companies do the same. From the above results majority of pharmaceutical companies do not assure proper utilization of materials by customers as it had the lowest mean score.

Table 4.6: Extent Organization Practice Green Procurement/ Inbound Logistics

The study sought to know the respondent level of agreement with statements related to organization practicing Green procurement/ Inbound Logistics. The results are presented on table 4.6.

| Green Procurement / Inbound Logistics | Mean |
|--|----------------|
| Adoption of environmental criteria into the supplier assessment system | 2.4118 |
| Environmental collaboration with suppliers | 2.6471 |
| Eco-labelled product purchase | 2.9412 |
| Supplier's requirement to have an environmental certification | 3.0588 |
| Total | 11.0589 |
| Average | 2.76473 |

Source; Research Data (2013)

According to the findings; the respondents agreed that the pharmaceutical companies required supplier's to have an environmental certification by a mean score of 3.0588; Eco-labelled product purchase was shown by a mean score of 2.9412, environmental collaboration with suppliers was shown by a mean score of 2.6471 and adoption of environment criteria into the supplier assessment system was shown by a mean score of

2.4118. The average mean score was 2.76473 which is closer to environmental collaboration with suppliers means score meaning that majority of the pharmaceutical companies are practicing the same. The results above show that the pharmaceutical companies required their supplier's to have an environmental certificate.

Table 4.7: Extent Organization Practice Eco-design and Packaging

The study sought to know the respondent level of agreement with statements related to organization practicing Eco-design and Packaging. The results are presented on table 4.7.

| Eco-Design and Packaging | Mean |
|---|----------------|
| Reduction of product impact in the consumer use | 2.4118 |
| Reduction of product impact within the supply chain | 2.4706 |
| Reduction of packaging impact | 2.4706 |
| Use of biodegradable materials | 3.2353 |
| Total | 10.5883 |
| Average | 2.64708 |

Source; Research Data (2013)

According to the results majority of the respondents agreed that pharmaceutical companies use of biodegradable materials by a mean score of 3.2353; reduction of packaging impact had a mean score of 2.4706; reduction of product impact in the consumer use had a mean score of 2.4118 and reduction of product impact within the supply chain had a mean score of. 2.4706. The average mean score was 2.64708 which is closer to reduction of packaging impact and reduction of product impact within the supply chain, which would mean pharmaceutical companies practice the same. From the result above the pharmaceutical companies do not reduce the product impact in their supply chain since it had the lowest mean score. The results above also show that

pharmaceutical companies use biodegradable materials since it had the highest mean score.

Table 4.8: Extent Organization Practice Waste Management

The study sought to know the respondent level of agreement with statement related to organization practicing waste management. The results are presented on table 4.8

| Waste management Systems | Mean |
|---|----------------|
| Waste reduction, reuse and recycling approaches | 2.3529 |
| Use of alternative fuels e.g. cleaner fuels | 2.7059 |
| Implementation of Waste-to-energy process | 2.7647 |
| Treatment and control of post combustion emissions | 3.3529 |
| Treatment and control of Hydro fluorocarbons(HFC) and Per fluorocarbons (PFC) | 3.4706 |
| Total | 14.647 |
| Average | 3.66175 |

Source; Research Data (2013)

According to the results majority of the respondents agreed that pharmaceutical companies reduced the emissions of hydro fluorocarbons and per fluorocarbons as shown by a mean score of 3.4706, the pharmaceutical companies had invested in the treatment and control of post combustion emissions as shown by a mean score of 3.3529, they implemented of waste-to-energy process by a mean score of 2.7647; the pharmaceutical companies use of alternative fuels e.g. cleaner fuels is shown by a mean score 2.7059 and waste reduction, reuse and recycling approaches is shown by 2.3529. The average mean score was 3.66175 which is closer to treatment and control of Hydro fluorocarbons(HFC)

and Per fluorocarbons mean score this would mean that an average of the respondents treat and control fumes during the manufacturing process. Waste reduction, reuse and recycling had the lowest mean score this shows that pharmaceutical companies are not using these approaches to ensure minimal negative effects to the environment.

Table 4.9: Extent Organization Practice Internal Environment Management

The study sought to know the respondent level of agreement with statement related to organization practicing internal management. The results are presented on table 4.9

| Internal Environment management | Mean |
|--|----------------|
| Total quality environmental management | 2.2353 |
| Support for GSCM from mid-level managers | 2.5882 |
| Commitment of GSCM from senior managers | 2.7059 |
| Support of regulations environment | 2.7647 |
| Eco-labeling of Products | 2.9412 |
| Total | 13.2353 |
| Average | 2.64706 |

Source; Research Data (2013)

According to the results majority of the respondents agreed that the pharmaceutical companies carry out eco-labeling of Products by mean score of 2.9412, Support of regulations environment had a mean score 2.7647, Commitment of GSCM from senior managers had a mean score 2.7059, Support for GSCM from mid-level managers had a mean score of 2.5882 and total quality environmental management has a mean score of 2.2353. The average mean score was 2.64706 which is closer to commitment of GSCM from senior managers, this would mean that there is commitment from senior managers from the majority of the pharmaceutical companies in green management practices. Total

quality environment management had the least mean score this means that pharmaceutical companies agreed that majority of them did not carry total quality environmental management.

4.4 Supply Chain Performance

Table 4.10: Performance of Supply Chain with Regards to Reliability

The study aimed at knowing the respondent level of rate with performance of supply chain in the pharmaceutical companies with regard to reliability. The result are presented in table 4.10

| Reliability | Mean |
|----------------------------------|---------------|
| Environmental friendly packaging | 1.65 |
| Timeliness in deliveries | 1.71 |
| Flexibility in ordering | 2.00 |
| Packaging | 2.29 |
| Total | 7.65 |
| Average | 1.9125 |

Source; Research Data (2013)

According to the results majority of the respondents agreed with performance of supply chain in the pharmaceutical company with regards to reliability on environmental friendly packaging having a mean score of 1.65 this is the lowest mean score from the results above; it shows that the companies do not dwell on environmental friendly packaging; timeliness in deliveries had a mean score 1.71; flexibility in ordering had a mean score of 2.00; and overall packaging had the highest mean score of 2.29 which means the pharmaceutical companies rate their overall packaging highly. The results also show an average score of 1.9125 which is closer to the mean score of flexibility on ordering this

would mean that an average of the respondents carry out their ordering process in a good manner.

Table 4.11: Performance of Supply Chain with Regards to Responsiveness

The study aimed at knowing the respondent level of rate with performance of supply chain in the pharmaceutical companies with regard to responsiveness. The result are presented in table 4.11

| Responsiveness | Mean |
|-------------------------------|-------------|
| Action on customer complaints | 1.59 |
| Supplier response time | 1.88 |
| Accuracy of order delivered | 2.18 |
| Information dissemination | 2.65 |
| Total | 8.3 |
| Average | 2.075 |

Source; Research Data (2013)

The results show majority of the respondents agreed that performance of supply chain in the pharmaceutical company with regards to responsiveness on action on customer complaints having a mean score of 1.82 this is the lowest mean score from the results above; it show that the companies do not respond well to customer complaints. Supplier response time had a mean score of 1.88, accuracy of order delivered had a mean score 2.18, information dissemination had a mean score of 2.65, being the highest mean score as per the result above. It means that the pharmaceutical companies communicate better with their customers. The average mean score is 2.075 which closer to information dissemination which would mean that an average of the pharmaceutical companies communicate with members of their supply chain about their products.

Table 4.12: Performance of Supply Chain with Regards to Agility

The study aimed at knowing the respondent level of rate with performance of supply chain in the pharmaceutical companies with regard to agility. The result are presented in table 4.12

| Agility | Mean |
|---|-------------|
| Supply chain decisions are made on time | 1.82 |
| Total | 1.82 |

Source; Research Data (2013)

According to the results majority of the respondents agreed with performance of supply chain in the pharmaceutical company with regards to agility on supply chain decisions being made on time having a mean score of 1.82.

Table 4.13: Performance of Supply Chain with Regards to Cost

The study aimed at knowing the respondent level of rate with performance of supply chain in the pharmaceutical companies with regard to cost. The result are presented in table 4.13

| Cost | Mean |
|-------------------|-------------|
| Inventory control | 2.00 |
| Security of stock | 2.18 |
| Total | 4.18 |
| Average | 2.09 |

Source; Research Data (2013)

According to the results majority of the respondents agreed with performance of supply chain in the pharmaceutical company with regards to cost on inventory control and security of stock with each having a mean score of 2.00 and 2.18 respectively. Security

of stock having the highest mean score would mean that the pharmaceutical companies rate their supply chain performance high with regards to cost.

4.5 Relationship between Green supply Chain Management Practices and Supply Chain Performance.

The study also sought to determine the relationship that exists between Green Supply Chain Management practices and Supply chain performance among pharmaceutical companies in Nairobi, Kenya. The researcher conducted a regression analysis to explain this relationship. The study adopted the following linear regression model to depict the expected relationship between the above variables: $S = a + b_1 x_1 + b_2 x_2 + b_3 x_3 + b_4 x_4 + b_5 x_5 + e$. Where: S= Supply chain performance; a= the S intercept, b_1 , b_2 , b_3 , b_4 , and b_5 are regression coefficient for the respective variables; e is the error term; x_1 = Reverse Logistics; x_2 = Green Procurement/ Inbound logistics; x_3 = Eco-design and Packaging Systems; x_4 = Waste Management and x_5 =Internal environmental management.

All the five independent variables were also measured using the responses on each of the variables obtained from the respondents. The results are illustrated and explained next.

Table 4.14 T TEST FOR COEFFICIENTS

| Coefficients ^a | | | | | | |
|---------------------------|-------------------------------------|-----------------------------|------------|---------------------------|--------|------|
| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | -.467 | .518 | | -.901 | .387 |
| | Reverse logistics | .254 | .313 | .234 | .810 | .435 |
| | Green procurement/Inbound logistics | .235 | .345 | .275 | .681 | .510 |
| | Eco-design and packaging | .800 | .234 | .687 | 3.414 | .006 |
| | Waste management system | -.475 | .281 | -.493 | -1.692 | .119 |
| | Internal environmental management | .178 | .365 | .200 | .488 | .635 |

a. Dependent Variable: Supply chain performance

$$Y = 0.467 + 0.254 x_1 + 0.235 x_2 + 0.800 x_3 + 0.475 x_4 + 0.178 x_5$$

Where: x_1 = Reverse Logistics; x_2 = Green Procurement/ Inbound logistics; x_3 = Eco-design and Packaging; x_4 = Waste Management Systems and x_5 = Internal environmental management. The model illustrates that when all variables are held at zero (constant), the value of supply chain performance would be at 0.467. However, holding other factors constant, a unit increase in Reverse logistics would lead to .254 increase in supply chain performance, a unit increase in green procurement would lead to .235 increase in supply chain performance, a unit increase in eco-design and packaging would lead to .800 increase in supply chain performance, a unit increase of waste management would lead to .475 a decrease in supply chain performance and a unit increase in internal management would lead to .178 increase in supply chain performance. There is a positive significance relation between supply chain performance and eco-design and packaging $p=0.006$

This means that in eco-design and packaging supply chain is a suitable predictor of Y.

This means that for every unit increase in measure of eco-design and packaging, the measure of performance increases by 0.800 units.

Table 4.15 COEFFICIENT OF DETERMINATION, R²

| Model Summary | | | | |
|----------------------|-------------------|----------|-------------------|----------------------------|
| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
| 1 | .891 ^a | .794 | .700 | .526 |

a. Predictors: (Constant), Internal environmental management, Eco-design and packaging, Reverse logistics, Waste management system, Green procurement/Inbound logistics

Table 4.14 indicates that there is an R² value of 79.4%. This value indicates that the five independent variables explain 79.4% of the variance in the performance of supply chains of pharmaceutical company. These independent variables are the benefits that accrue as a result of green practices. It is clear that they contribute to a large extent to the level of performance that is achieved in the supply chains of pharmaceutical companies in Kenya. It therefore suffices to conclude that green practices are essential in enhancing the performance of supply chains given that the unexplained variance is only 20.6%.

Table 4.16: F TEST FOR THE FULL MODEL - ANOVA TABLE

ANOVA^b

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|-------|------------|----------------|----|-------------|-------|-------------------|
| 1 | Regression | 11.722 | 5 | 2.344 | 8.466 | .002 ^a |
| | Residual | 3.046 | 11 | .277 | | |
| | Total | 14.768 | 16 | | | |

a. Predictors: (Constant), Internal environmental management, Eco-design and packaging, Reverse logistics, Waste management system, Green procurement/Inbound logistics

b. Dependent Variable: Supply chain performance

The study used ANOVA to establish the significance of the regression model from which an F-significance value of $p < 0.002$ was established. This shows that the regression model has less than 0.002 likelihood (probability) of giving wrong prediction. Hence, the regression model is overall statistically significant, meaning that it is a suitable prediction model for explaining how green management practices affects the supply chain performance and the extent.

Table 4.17: Challenges in practicing Green Supply Chain Management

The study aimed at investigating the challenges experienced in practicing green supply chain management practices.

| Challenges | Mean |
|--|----------------|
| Failure to integrate supply chain optimization efforts with green supply chain efforts. | 2.7647 |
| Lack of appropriate technology needed in implementing green supply chain management practices. | 2.8824 |
| Lack of information about the green supply chain. | 3.0588 |
| Lack of tools to optimize the supply chain with environmental management | 3.0588 |
| Lack of appropriate business processes needed in implementing green supply chain management practices. | 3.1176 |
| Total | 14.8823 |
| Average | 2.97646 |

Source; Research Data (2013)

According to the study as shown on table 4.10, majority of respondents acknowledged that there were challenges they experienced with lack of information about the green supply chain being the major challenge by a mean score of 3.1176, lack of tools to optimize the supply chain with environmental management was the second challenge shown by a mean score of 3.0588, failure to integrate supply chain optimization efforts with green supply chain management practices was the third challenge shown by a mean score of 3.0588, lack of appropriate technology needed in implementing green supply chain management practices was shown by a mean score of 2.8824 and lack of appropriate business processes needed in implementing green supply chain management practices was shown by a mean score of 2.7647. The average mean score was 2.97646 which is closer to lack of tools to optimize the supply chain with environmental management mean score, this would mean that an average of the respondents experience

this as a challenge. The result above shows that the major challenge experienced by the pharmaceutical companies is lack of information about the green supply chain.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This study was carried out to establish the relationship of green supply chain practices and the supply chain performance of pharmaceutical companies in Nairobi, Kenya. The study had three objectives: To determine the extent to which green supply chain management is practiced in the pharmaceutical industry in Nairobi, Kenya; To determine the relationship between Green Supply Chain Management practices and supply chain performance in pharmaceutical industry in Nairobi, Kenya and to establish the challenges faced in the implementation of Green Supply Chain management practices by the pharmaceutical industry in Nairobi, Kenya This chapter presents the summary of findings for the three objectives mentioned above, the conclusions, limitations, recommendations made based on findings and the suggestions on areas that need to be researched as far as this study is concerned.

5.2 Summary of Findings

The study established that most pharmaceutical companies that operate in Kenya have been in existence between six to ten years. Majority of the pharmaceutical companies are not practicing the green supply chain practices. On organizations practicing Reverse Logistics majority of the respondents practiced reverse logistics with the materials reuse whenever possible. As Xie and Breen, (2012) state product recall requires organization to be able to reverse the normal logistics flow from suppliers to customers so that inventory deemed unsuitable can be located by customers and returned to suppliers in a timely and cost effective manner. The companies also manage environmental packaging and

distribution. Even though the pharmaceutical companies required supplier's to have an environmental certification, majority of the pharmaceutical companies have not adopted the environment criteria into the supplier assessment system.

On Eco-design and Packaging the pharmaceutical companies stated that majority of them use of biodegradable materials. The results show that the companies do not reduce the product impact within the supply chain. The Pharmaceutical companies agreed that they reduced the emissions of hydro fluorocarbons and per fluorocarbons during the manufacturing process of the drugs; they also stated that they do not carry out waste reduction, reuse and recycling approaches. There is need for the companies to carry out these approaches as noted by Muchiri (2011) that waste management involves source reduction the recycle and re-use waste management programs focuses on management of waste after it has been created.

While the pharmaceutical companies agreed that majority of them carry out eco-labeling of products, the same does not apply to total quality environment management, this would lead to negative effects to the environment from various activities within the pharmaceutical supply chain. Majority of respondents acknowledged that there were challenges they experienced with lack of information about the green supply chain being the leading challenge, many of the pharmaceutical companies are not aware of what green supply chain management practices are; there is need to create awareness on the same. This is in line with Cognizant, (2008) who states that lack of information on regulations and green supply chain environment best practices and metrics into the entire best practices has left organizations with a limitation of what to do and implement.

It is also clear from the study that the five independent variables of Green Supply chain management practice improves supply chain performance; on time supply chain decisions; better supplier relationship management and efficiency in supply chain

management explain 79.4% of the variance in supply chain management. However, eco-design and packaging in supply chain management explains the highest variance since it has a slope that is higher and a sig. value that is equal to .006.

5.3 Conclusions

The study concludes that pharmaceutical companies in Nairobi, Kenya are currently considering green supply chain management practices. There is need for the companies to be aware of these practices by being educated on same through attending of seminars or training sessions in their companies. Green Supply chain management practices will assist the pharmaceutical companies to enhance the performance of their supply chains. This is supported by the results from a regression analysis conducted that indicated that there is a strong relationship between supply chain performance and green management practices.

5.4 Recommendations

The study has confirmed that Green supply chain management practices is very significant in enhancing the performance of supply chains. The study recommends that Pharmaceutical companies should assure proper utilization of materials by customers. The companies should also find appropriate business processes needed in implementing green supply chain management practices. The pharmaceutical companies should practice waste reduction, reuse and recycling approaches in order to enhance effectiveness in the supply chain.

5.5 Limitations and Suggestions for further Research

There are limitations to this study that should be considered when interpreting the study results. First the study focused on pharmaceutical companies in Nairobi only as per the Export Processing Zone website; secondly this study did not include all GSCM practices.

The study has determined various green supply chain management practices and their impact on supply chain performance in pharmaceutical companies in Nairobi, Kenya as per Export processing Zone Website. The pharmaceutical industry in Kenya is comprised of various pharmaceutical companies in Kenya which differ in their way of management and have different settings all together. There is need for another study which would ensure generalization of the study findings for all pharmaceutical companies in Nairobi and Kenya and hence pave way for new policies. The study therefore recommends further study to be carried out to investigate the factors influencing green supply chain management practices and their impact on supply chain performance in Kenya pharmaceutical companies or in other industries such as the service industry.

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Appendices

Appendix I

Research Questionnaire

Introduction

This questionnaire has been designed for the sole purpose of collecting data on the Green Supply Chain Management Practices and Supply Chain Performance of the pharmaceutical industry in Nairobi, Kenya. The data collected will be treated with a very high degree of confidentiality and it is meant for academic purpose only.

Section A: General Information

1. How long has your company been in operation?
 - a) Under 5 years ☐
 - b) 6-10 years ☐
 - c) 11- 15 years ☐
 - d) Over 16 years ☐
2. How long have you worked in this company?
 - a) Less than 2 years ☐
 - b) 2 to 5 years ☐
 - c) 6 to 10 years ☐
 - d) Above 10 years ☐
3. How many branches of your pharmaceutical company do you have in Nairobi if any?
 - a) 0-5 ☐
 - b) 6-10 ☐
 - c) 11-15 ☐
 - d) Above 15 ☐
4. How long has your organization established Green Supply Chain Management?
 - a) Considering it currently ☐
 - b) 1 years ☐
 - c) 2 years ☐
 - d) 3 years ☐
 - e) More than 4 years ☐

Section B: Extent of Green Supply Chain Management Practices of pharmaceutical companies in Nairobi, Kenya.

5. Please indicate the extent to which you agree with the following statements on the extent to which your organization has been practicing the following green supply chain practices. The scale below will be applicable:

1= To a very large extent 2= Large extent 3= moderate extent 4= small extent 5=very small extent

| No | Reverse Logistics | 1 | 2 | 3 | 4 | 5 |
|----|--|---|---|---|---|---|
| 1 | The Pharmaceutical company manages reverse flow of material, | | | | | |
| 2 | The Pharmaceutical company control environmental risk associated with supplier operations. | | | | | |
| 3 | Assuring proper utilization of material by customers | | | | | |
| 4 | The Pharmaceutical company manages environmental packaging and distribution. | | | | | |
| 5 | Materials reuse whenever possible | | | | | |
| | Green Procurement/ Inbound logistics | 1 | 2 | 3 | 4 | 5 |
| 1 | Eco-labelled product purchase | | | | | |
| 2 | Adoption of environmental criteria into the supplier assessment system | | | | | |
| 3 | Environmental collaboration with suppliers | | | | | |
| 4 | Suppliers' requirement to have an environmental certification | | | | | |
| | Eco-Design and packaging | 1 | 2 | 3 | 4 | 5 |
| 1 | Reduction of product impact within the supply chain | | | | | |
| 2 | Reduction of product impact in the consumer use | | | | | |
| 3 | Reduction of packaging impact | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 4 | Use of biodegradable materials | | | | | |
| | Waste Management systems | 1 | 2 | 3 | 4 | 5 |
| 1 | Waste reduction, reuse and recycling approaches | | | | | |
| 2 | Use of alternative fuels e.g. cleaner fuels | | | | | |
| 3 | Treatment and control of post combustion emissions | | | | | |
| 4 | Reduction of hydro fluorocarbons(HFC) and per fluorocarbons (PFC) | | | | | |
| 5 | Implementation of waste-to-energy process | | | | | |
| | Internal Environment management | 1 | 2 | 3 | 4 | 5 |
| 1 | Commitment of GSCM from senior managers | | | | | |
| 2 | Support for GSCM from mid-level managers | | | | | |
| 3 | Total quality environmental management | | | | | |
| 4 | Support of regulations environment | | | | | |
| 5 | Eco-labeling of Products | | | | | |

6. Any other? Please indicate

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Section C: Relationship between Green Supply Chain Management practices and Supply chain performance measurement.

7. Please tick appropriately how you rate the performance of your supply chain in your pharmaceutical company with regards to the parameters listed.

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

| No | SUPPLY CHAIN PERFROMANCE PARAMETERS | 1 | 2 | 3 | 4 | 5 |
|----|---|---|---|---|---|---|
| 1 | Flexibility in ordering | | | | | |
| 2 | Accuracy of orders delivered | | | | | |
| 3 | Timeliness of deliveries | | | | | |
| 4 | Action on customer complaints | | | | | |
| 5 | Environment friendly Packaging | | | | | |
| 6 | Supply Chain decisions are made on time | | | | | |
| 7 | Supplier response time | | | | | |
| 8 | Inventory control | | | | | |
| 9 | Security of stocks | | | | | |
| 10 | Information dissemination | | | | | |
| 11 | Packaging | | | | | |

8. Any other? Please indicate.

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PART D. Challenges of implementing green supply chain management practices.

9. Please tick the extent to which the following challenges are experienced in your organization in practicing green supply chain management practices.

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

| No | CHALLENGES | 1 | 2 | 3 | 4 | 5 |
|----|--|---|---|---|---|---|
| 1 | Lack of appropriate technology needed in implementing green supply chain management practices. | | | | | |
| 2 | Failure to integrate supply chain optimization efforts with green supply chain efforts. | | | | | |
| 3 | Lack of information about the green supply chain. | | | | | |
| 4 | Lack of appropriate business processes needed in implementing green supply chain management practices. | | | | | |
| 5 | Lack of tools to optimize the supply chain with environmental management, | | | | | |

11. Any other? Please indicate.

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Thank you for participating

Appendix II

List of Pharmaceutical Companies in Nairobi, Kenya

| | | |
|----|---|-----------|
| 1 | Alpha Medical Manufacturers Nairobi | Nairobi |
| 2 | Aventis Pasteur SA East Africa | Nairobi |
| 3 | Bayer East Africa Limited | Nairobi |
| 4 | Beta Healthcare (Shelys Pharmaceuticals) Nairobi | Nairobi |
| 5 | Cosmos Limited | Nairobi |
| 6 | Dawa Pharmaceuticals Limited | Nairobi |
| 7 | Didy Pharmaceutical | Nairobi |
| 8 | Diversey Lever | Nairobi |
| 9 | Eli-Lilly (Suisse) SA | Nairobi |
| 10 | Elys Chemical Industries Ltd | E Nairobi |
| 11 | Glaxo SmithKline | Nairobi |
| 12 | High Chem East Africa Ltd | Nairobi |
| 13 | Ivee Aqua EPZ Limited | Nairobi |
| 14 | Mac's Pharmaceutical Ltd | Nairobi |
| 15 | Manhar Brothers (Kenya) Ltd | Nairobi |
| 16 | Novartis Rhone Poulenc Ltd | Nairobi |
| 17 | Novelty Manufacturers Ltd | Nairobi |
| 18 | Ivee Pfizer Corp (Agency) | Nairobi |

| | | | |
|--|----|--|---------|
| | 19 | Pharmaceutical Manufacturing Co (K) Ltd Nairobi | Nairobi |
| | 20 | Pharmaceutical Products Limited Nairobi | Nairobi |
| | 21 | Phillips Pharmaceuticals Limited Nairobi | Nairobi |
| | 22 | Regal Pharmaceutical Ltd Nairobi | Nairobi |
| | 23 | Universal Pharmaceutical Limited | Nairobi |

Source: www.epzakenya.com/UserFiles/.../Pharmaceutical%20Sector%20profile, 2013