EFFECT OF GREEN SUPPLY CHAIN MANAGEMENT PRACTICES ON PERFORMANCE OF KENYAN UNIVERSITIES. A CASE OF UNIVERSITY OF NAIROBI

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The Strategic JOURNAL of Business & Change MANAGEMENT
ISSN: 2312-9492 www.strategicjournals.com
Vol. 5, Iss. 2, pp 553 – 574, April 17, 2018. www.strategicjournals.com, ©strategic Journals

EFFECT OF GREEN SUPPLY CHAIN MANAGEMENT PRACTICES ON PERFORMANCE OF KENYAN UNIVERSITIES. A CASE OF UNIVERSITY OF NAIROBI

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Accepted: April 13, 2018

ABSTRACT

This study aimed to establish the effect of green supply chain management practices on performance of Kenyan Universities. The study used descriptive design. The study targeted six colleges within University of Nairobi with 143 members of staff in the administration department that contributed to the overall performance of the University. The study used census survey to cover the 143 respondents. The study collected primary data. The data was collected through use of a questionnaire. The study carried out a pilot study to pre-test the validity and reliability of data collected using the questionnaire. Data was analyzed using descriptive statistics. The study sought to establish whether reverse logistics, green procurement, green packaging and waste management have a positive influence on performance of the public universities.The findings of the study revealed that reverse logistics is positively related to performance of the University of Nairobi; green procurement is positively related to performance of the University of Nairobi, green packaging is positively related to performance of the University of Nairobi and Waste management system is positively related to performance of the University of Nairobi. The study recommended that the management of Kenyan Universities should encourage proper utilization of materials and recycling of materials. The management of Kenyan Universities should integrate green procurement process in all its purchasing processes since it's characterized by a low environmental impact that is products environmentally friendly in nature and produced using environmentally friendly processes. The management of Kenyan Universities should purchase products from manufacturers whose design products minimize consumption of materials and energy, that facilitate the reuse, recycle and recovery of component materials as the study found out that green packaging influences supply chain performance to a great extent. The management of Kenyan Universities should invest more in waste management systems as the study found out that waste management systems treats a controls post combustion emissions, treatment and recycle of waste created and allows for use of alternative fuels.

Key terms: *Reverse Logistics, Green Procurement, Green Packaging, Waste Management, Public Universities*

INTRODUCTION

As customers begin to demand that products and services be provided without damaging the environment, managers will make decisions that support the integration and coordination of environmental practices throughout the supply chain (Vachon & Klassen, 2007). They further point out that organizational competitive advantage can be gained through adoption of an environmental strategy and implementation of environmental collaboration and monitoring practices. According to (Elliot, 2011), while organizations incur higher costs in abating environmental pollution and thus increasing the total costs of some goods and services, the benefits associated with a cleaner environment far outweigh the costs. There has been concern that firms may lose competitive advantage due to the increased costs from implementation of environmental sustainability guidelines. However, on the same issue of loss in competitiveness, (Jaffe *et al,* 2015) conclude that there is little evidence to support the proposition that environmental regulations damage competitiveness. GSCM emerges as a new systematic environmental approach in supply chain management and has been increasingly accepted and practiced by forward thinking organizations. The current environmental requirements that influenced manufacturing activities have increased attention in developing environmental management (EM) strategies for supply chain. Thus the concept of GSCM arises and becoming an important factor for business activities today (Seman *et al,* 2012). Zhu *et al,* (2008) also claimed that GSCM can be regarded as an environmental innovation. By integrating green concept to the supply chain concept, it has created a new research agenda where supply chain will have a direct relation to the environment. Kenya is one of the developing countries in the world and is becoming increasingly industrialized. Kenya faces substantial burden on the environment. The multinational organizations and developed countries are using third world countries as a point for disposal of end-of-life products and this result to environmental impact (Puckett & Smith, 2002).

Globally 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 (Xie & Breen, 2012). 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 (Xie & Breen, 2012). GSCM in itself is not a new concept since literature has been developed in this area from as early as 2009 (Chien & Shih, 2015).

In Africa region, climate change is increasingly recognized as one of the most critical challenges ever to face humankind. Climatic changes are a problem that requires a global response embracing the needs and interests of all countries. The United Nations Framework Convention on Climate Change, which came into effect in 1994, and its Kyoto Protocol that came into effect in 2005 sharing the objective of the Convention to stabilize atmospheric concentrations of greenhouse gases enable such a global response to climate change (Kyoto Protocol Reference Manual, 2014).

Over the last few years there has been rapid expansion in University opportunities in Kenya. The government has continued to award charters to new private Universities and letters of interim authority to institutions to operate as private Universities. In the year 2000, there were six public and five private universities. By the year 2011, we had seven public universities, fifteen constituent collages, fourteen charted private universities, eleven private universities operating with letters of interim charter and two private universities

operating with a certificate of registration. This brings the total number of universities to forty nine in the country (Jan, 2012). In the year 1996/7 34,852 and 5,964 students were enrolled in public and private universities respectively compared to the year 1999/2000 where the numbers increased tremendously to 41,275 and 10,500 in public and private universities respectively. Due to high demand for higher education and competition for top jobs people are enrolling in universities to further their studies, currently the number of students enrolled in both public and private universities in 2011/2012 academic year is estimated to have risen to over 200,000 students (Ministry of Education, Science, and Technology, Statistics Section).

Statement of the Problem

Supply chain management practices contribute 50% to the performance of Universities in Kenya (Kamau, 2014). The performance of universities in Kenya has been affected by use of obsolete supply chain management practices and technologies with poor state of physical infrastructure, limited research and development, poor institutional framework, and inadequate supply chain innovation, technical, and entrepreneurial skills (ROK, 2014). In Kenya, very limited research has been done on the effect of green supply chain management practices on performance. Specifically, no such research has been done on Kenyan Universities.

In Kenya, the government has put in place a wide range of policy, institutional and legislation to govern all business activities in a move towards green procurement, by not going green, UoN would have its image tarnished causing a number of its potential customers to shy away from the institution. Hazardous substances released from UoN laboratories after student practical could cause accidents, and eventually lawsuits. This would result to the University using funds meant to improve its performance in settling lawsuits and compensation of damages caused as a result of the accidents (Ndulu, 2015).

Previous studies in Kenya have not focused and concentrated much on Green Supply Chain management for instance, a research conducted by Kirop (2013) did a study on Green supply chain management in Kenya's Cement industry, it emerged that, an institution that lacks green practices is likely to expend more on costs associated with production besides having its environment polluted that would result to law suits, health hazards and negative reputation. This study seeks to fill the existing research gap by conducting a study to establish the effect of green supply chain management practices on performance of Kenyan universities, with special focus on the University of Nairobi. To enhance UoN performance, it is clear that there is need for further exploration on this area through research so as to bridge the existing gaps. This study aimed to bridge such gaps by establishing the effect of green supply chain management practices on performance of Kenyan Universities.

Objective of the Study

The general objective of the study was to establish the effects of green supply chain management practices on performance of Kenyan Universities. The specific objectives were:-

- To determine the effect of reverse logistics on performance of the University of Nairobi
- To establish the effect of green procurement on performance of the University of Nairobi
- To examine the effect of green packaging on performance of the University of Nairobi
- To establish the effect of waste management system on performance of the University of Nairobi

LITERATURE REVIEW

Theoretical Review

Supply Chain Management Theory

The supply chain management theory was proposed by Rao and Young in 2013. Rao & Young (2013) suggest that firms consider outsourcing of logistics to an external Logistics Services Provider (LSP) when logistics complexity is high. Wilding and Juriado (2011) observe that cost reduction is the main motivation for logistics outsourcing. Welch and Nayak (2012) mentions that firms which outsource for operational and cost-based reasons will tend to restrict the Logistics Service Provider's involvement to the basic logistics functions. Therefore, an outsourcing decision might be influenced by a firm's supply chain characteristics, logistics complexity and demand uncertainty or logistics strategy. The theory supported the variable "performance" in terms of improving the Supply chain efficiency since costs of reverse logistics would be reduced by adopting a strategy such as outsourcing of the logistics function.

Logistics Management Theory

The Logistics Management Theory was pioneered by Morris and Imrie in 2012. According to this theory logistics is defined as the planning, organization, and control of all activities in the material flow, from raw material until final consumption and reverse flows of the manufactured product, with the aim of satisfying the customer's and other interest party's needs and wishes i.e., to provide a good customer service, low cost, low tied-up capital and small environmental consequences (Christopher, 2012). The credibility of this operation is based on how good is the design of the system that leads to this kind of logistics.

Logistics management is that part of procurement management that plans, implements, and controls the efficient, effective forward and reverses flow and storage of goods, services, and related information between the point of origin and the point of consumption in order to meet customer's requirements. Logistics management activities typically include inbound and outbound transportation management, fleet management, warehousing, materials handling, order fulfilment, logistics network design, inventory management, supply or demand planning, and management of third party logistics service providers. To varying degrees, the logistics function also includes sourcing and procurement, production planning and scheduling, packaging and assembly, and customer service. It is involved in all levels of planning and execution strategic, operational, and tactical (Alex, 2013).

Logistics management is an integrating function which coordinates and optimizes all logistics activities, as well as integrates logistics activities with other functions, including marketing, sales, manufacturing, finance, and information technology, (Morris & Imrie, 2012). Through Logistics management theory, the variable "reverse logistics' was supported since costs associated with delays when returning goods such as damaged reputation and stock holding costs would be controlled.

Multi-Attribute Utility Theory

Ellram (1990) pioneered the Multi-Attribute Utility Theory; according to this theory one analytical approach often suggested for solving complex problems is MAUT (Ellram, 1990). MAUT enables the decision maker to structure a complex problem in the form of a simple hierarchy and to subjectively evaluate a large number of quantitative and qualitative factors in the presence of risk and uncertainty. The major strength of MAUT is its ability to deal with both deterministic and stochastic decision environments. In particular, MAUT has three distinctive advantages over MOP in handling multiple and conflicting criteria. These are: MAUT requires less "front-end" analysis than MOP

as MAUT has no constraints to consider explicitly, MAUT requires data than MOP as MAUT does not necessitate parameters for constraints and MAUT poses less computational difficulty than does MOP as MAUT is not burdened with additional constraints. The application of MAUT to the complex problem usually involves identification of the objectives or goals of the decision and defines the problem scope, define a finite set of relevant attributes affecting the decision outcome and structure them into a hierarchical form called a "value tree". Elicit preference information concerning the attributes from the decision maker(s) and determine the relative importance of the attributes. Develop the decision maker's utility function by establishing functional relationships between the attributes and the utility scores. If this relationship is uncertain, the expected utility score for each attribute will be determined by using the appropriate type of probability distributions. Compute the aggregate (overall) utility score for each decision alternative and rank alternatives in terms of aggregate utility scores. This theory supported the variable "Green procurement" as it aided in selecting the most appropriate foreign supplier & materials where green procurement criteria would be given reasonable weight.

Price Premium Theory

The Price Premium Theory was proposed in by Laroche, Bergeron and Barbaro-Forleo (2001). The theory has posited that some social and environmental attributes of products may serve as a differentiation strategy for the firm (Laroche, Bergeron & Barbaro-Forleo, 2001; Reinhardt, 1999). This type of strategy implies that the firm is able to charge a price premium in comparison to competitors. This price premium has been defined as "a percentage over the willingness to pay for the base commodity". Thus, in the case of certification, if certified wood commands a price premium, then some consumers are willing to pay some percentage over and above what they are willing to pay for the base commodity without certification. The willingness to pay a price premium usually has been explained by both psychological variables as well as demographic variables. Our focus here is on developing theory with respect to the variables regarding psychological attitudes toward the environment.

The price premium is related to consumer preferences. From a psychological point of view, the price premium that consumers are willing to pay for public goods is a behavioral intention. However, little research has actually tried to investigate the nature of environmental attitudes and the price premium that an environmentally friendly product is able to command. The theory is of importance to the study as it supports the variable "waste management system" where it would aid in estimating waste disposal costs which was estimated and uncertainty in those estimates handled.

Conceptual Framework

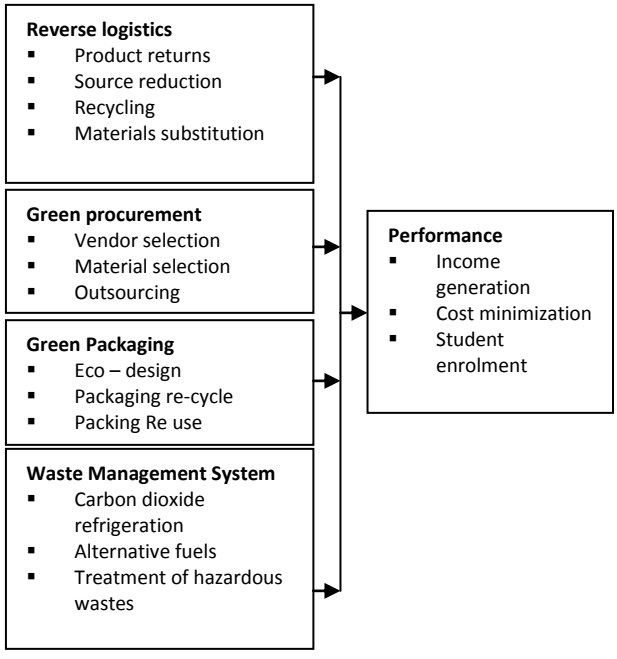

Figure 1: Conceptual Framework

Green supply chain management

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 & 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 & Klassen, 2010). The Green supply chain management practices include:

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 & Breen, 2012).

It would be the responsibility of the 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*, 2014).

Green Procurement

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 organizations. 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 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 & Donval, 2011).

Green 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 *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 that address the available strategies towards sustainable product design and use are 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.

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 summarized into the following categories; reduction of input resources that is implementation of actions aimed at reducing, utilization 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 & Lenox, 2011).

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 achieved by putting measures such as; using reusable instead of disposable materials, eliminating certain items, repair and maintenance of equipment's, using durable products, using recycled products.

Performance

This is the firm's performance measured against standard or prescribed indicators of effectiveness, efficiency, and environmental responsibility such as, cycle time, productivity, waste reduction, and regulatory compliance. Greening of the global product chain forms a challenging business to business shortcut for creating fairer trading relationships, avoiding the long and slow route of negotiating nations. This implies that greening the supply chain ensures closer relationships between trading members in a supply chain. In fact, poor

environmental standards of small suppliers often affect the performance and image of large firms in the same supply chain (Cousins *et al,* 2014). Reverse Logistics is the task of recovering discarded products (cores), and may also include packaging and shipping materials and backhauling them to a central collection point for either recycling or remanufacturing (Jayaraman & Luo, 2013). This performance can be subdivided into three categories: financial performance (profit), internal non-financial performance (productivity) and external non-financial performance (customer satisfaction).

Empirical Review

This section describes other studies done which are related to this study. They are analysed in accordance to the research variables which are reverse logistics, green procurement, green packaging, waste management and performance of Kenyan Universities.

Reverse Logistics and Performance

Serut (2013) conducted a study on the adoption of Reverse Logistics on Performance of Manufacturing Firms in Nairobi. This study was designed to achieve two objectives: establish the extent to which reverse logistics had been adopted by firms and to evaluate the effect of reverse logistics adoption on financial performance of firms. The study was designed as a cross-sectional survey. The study found that 96% of the firms had good infrastructure in place, 94% had well-established supply chains, 86% had put measures to ensure that reverse logistics are as smooth as forward logistics, 80% provided sufficient resources for the adoption of reverse logistics, 66% incorporated reverse logistics practices in their supply chains, 70% incorporated reverse logistics strategies in their strategic plans, and 68% agreed that their employees were aware and knowledgeable about adoption of reverse logistics. The results showed that reverse logistics had a positive and significant impact on performance of manufacturing firms.

Mogaka (2015) conducted a study on the Influence of Reverse Logistics Practices of returned new products on performance of Pharmaceutical Firms in Nairobi City County, Kenya. The research design was a descriptive cross-sectional research design. Data was collected using semi-structured questionnaires administered through emails and drop and pick later method. Relationship between reverse logistics and financial performance had an R2 of 0.61 implying that 61% of the variation in the financial performance was explained by reuse, recycle and landfill reverse logistics practices. The relationship between reverse logistics and market performance had an R^2 of 0.781 implying that 78.1% of the variation in the market performance was explained by the reverse logistics practices.

Green Procurement and Performance

Kamonya (2013) conducted a study on the impact of Green Procurement Practices (GPP) in small and medium enterprises involves spending and the investment process typically associated with economic gain and environmental friendly results at the end of the day. The researcher used the descriptive research design to determine the impact of green procurement practices in Small and Medium Enterprises in Nairobi whereby it was found that; GPP is embedded in the principle of pollution prevention, which strives to eliminate and or to reduce risks to human health and the environment. This means evaluating purchases based on a variety of criteria, ranging from the necessity of the purchase of the product from the first place to the options available for its eventual disposal. Consumers, investors, shareholders and regulatory agencies in SME`s are increasingly demanding that organizations behave in an environmentally responsible manner. Therefore practicing green procurement practices

demonstrates an organization's commitment to considering and minimizing the environmental consequences of its activities thus making both environmental and economic sense. The drivers influencing the adoption of green procurement practices by the SMEs are government laws and regulations requirement, changing customer demands and expectations, the company initiatives, global purchase and production standards, employee initiatives and suppliers influence.

Khisa (2011) conducted a study on green procurement practices in the public sector: the case of parastatals in Kenya. This study surveyed all parastatals in Kenya with a questionnaire that targeted procurement managers. It found out that green procurement management practices were still low in the public sector in Kenya as most of the practices had a mean of 3 and 4. The mean scores indicated that there were eight factors which the respondents considered important drivers of green procurement. The results of descriptive analysis revealed that the major challenge was insufficient knowledge on concept of green procurement. The study also concludes that the most common driver of green procurement was environmental regulations while the least driver was pressure from shareholders. The study concludes that the most important challenge to the adoption of green procurement is insufficient knowledge on the concept of green procurement while the least challenge was financial resources. Consequently the research recommended that with the global warming and environmental concerns from all sectors, there is need for the public sector organization in Kenya to adopt green procurement practices in order to help in the efforts to conserve the environment.

Green Packaging and Performance

Salma (2014) conducted a study on the effect of green operations practices on financial performance of commercial banks in Kenya. This study sought to determine the adoption of green operations practices and their influence on the financial performance of commercial banks in Kenya. The objectives of the study were: to find out the extent to which commercial banks in Kenya have adopted green operations practices, to determine the influence of green operations practices on financial performance of commercial banks in Kenya and to find out challenges commercial banks in Kenya face in adopting green operations practices.

The study adopted a correlational descriptive design. It targeted all the 44 commercial banks in Kenya. Data was collected from both primary and secondary sources. Secondary data on ROI was obtained from published financial reports of the Kenyan banks. Primary data was collected using a structured questionnaire that was administered through the drop and pick later method. The study established that banks have adopted different green operations practices such as environmental policies and goals, green lending, green processes and procedures and green products and services. It also determined that poorly defined objectives, inadequate infrastructure to support the initiatives, limited training and certification for practitioners in operating and Minimal or ineffective enforcement and inspection procedures for green operations practices were the challenges faced by banks in the adoption of green operations practices. Finally, the study found out an insignificant positive relationship between green operations practices adoption and financial performance.

Kirimi (2014) did a study on the influence of green marketing mix strategies on performance of fast moving consumer goods companies in Nairobi

County. The aim of the study was to attempt to answer the questions: to what extent have FMCG's adopted green marketing mix strategies?; and to what extent have green marketing mix strategies influenced organizational performance of FMCG's in Nairobi County?.

A descriptive cross–sectional survey was therefore used to establish the objectives of the study which were to: identify the green marketing mix strategies adopted by FMCG firms in Nairobi; and determine the influence of green marketing mix strategies on organizational performance of Fast Moving Consumer Goods companies in Nairobi County. The study population comprised 21 Fast Moving Consumer Goods companies. Primary data was collected using semi-structured questionnaires. The response rate was 71% which was 15 FMCG's.

Data was then analyzed using descriptive statistics and presented in the form of tables and charts using frequencies, mean scores, standard deviation, and percentages. The findings indicated that organizations have adopted a combination of different green marketing mix strategies with the green place strategy being adapted to a very large extent by the FMCG's. This is due to the fact that it largely contributes to organizational performance of these organizations. Competitiveness was considered a key performance indicator with most of the organizations indicating the green marketing mix strategies influenced their competitiveness to a large extent. The green process management is also largely adopted where organizations indicated that their staff largely influences the performance of their organizations. Further results showed that green physical evidence is the least adopted strategy by FMCG's in Nairobi County with most of them indicating that recycled or reusable furniture at the organization had a small influence on performance of the organizations. Some of the drawbacks the study faced were the fact that the study was conducted in Nairobi County alone and the researcher recommends a similar study be done on the rest of the FMCG's in Kenya.

Waste Management System and Performance

Kanyamu (2011) assessed the effectiveness of waste management strategies on environmental health, the case of Meru Municipality. It is a study that involved major categories of various economic activities in the Meru Municipality. Assessing the effectiveness of present waste management strategies on the environment health implies that urgent steps may be required to upgrade or improve the strategies if they are found not to be effective and further measures for sustainability if they are found to be effective and impacting positively to environmental health. This study therefore focused on the current state of affairs.
The study analyzed the waste management strategies, and their effectiveness and impact on environmental health. Descriptive research design and more specifically a survey design was employed. This in a nutshell involved in depth analysis of the effectiveness of the waste management strategies and their ultimate impact on environmental health. Data was analyzed using statistical package for social sciences (SPSS). The findings revealed that more than half of the solid waste generated in Meru consists of organic matter. It was established that waste collection services were provided only sporadically to low-income areas because of poor accessibility and very high waste generation which cannot be handled with available vehicles and equipment. Similarly, the Municipal Council of Meru experienced inadequate financing, lacked a policy on waste reduction and on involving community groups in waste management.

Osano (2012) conducted a study to establish the factors affecting implementation of centralized waste management system in private healthcare facilities in Nairobi County. The study looked at

various literature reviews on implementation of centralized waste management system and found out that in Kenya private healthcare facilities account for about 36% of health care waste volume generated. Whereas provincial and district hospitals act as centralized waste treatment facilities for public sector, there is no structured centralized waste management system for the private healthcare facilities in Kenya despite its many benefits. The concept of centralized waste management system has been successfully documented in private healthcare sector settings in India and some developed countries.

The study also established that there are no documented studies on factors affecting centralized waste management system in private healthcare facilities in Nairobi County. This study therefore was to examine factors affecting implementation of centralized waste management system in the private healthcare facilities in Nairobi County. The study adopted descriptive research design and purposive sampling of private healthcare facilities that have their waste centrally treated at the Nairobi Women's Hospital Ngong' Road branch. The study used both qualitative and quantitative sampling methods and data was collected using both personal interviews and drop and pick procedure. Data was analyzed and presented using descriptive and inferential statistical techniques. The study found out that there was positive correlation among all factors affecting implementation of centralized waste management system under study. The significant p-values observed between Availability of finance and Revenue stream was JJ= 0.958 was the highest followed by that between Technical preparedness and Availability of finance at p=0.949. Government policy and regulations, and Technical preparedness also had a strong correlation with significant at p-value of p=O.905. The regression results revealed that there is a positive relationship between the dependent variable and independent variables with a coefficient of determination of 0.843, implying that the independent variables (Availability of finance, Revenue stream, Technical preparedness, Government policy and regulation, Management of healthcare facility) could explain 84.3% of variation on the dependent variable (implementation of centralized waste management system).

From the study findings the most significant factor that influences implementation of centralized waste management system in private healthcare facilities in Nairobi County was Management of health care facility with unstandardized items followed by Availability of finance. Technical preparedness, Revenue stream and Government policy and regulation were 3rd, 4th and 5th respectively. Further, it was observed that majority (65%) of health care facilities under study did not have any form of waste treatment equipment and majority (81 %) of waste handlers were not insured against any injuries arising from handling of healthcare waste. It also emerged that majority (94.6%) of the respondents interviewed were not aware of existence of policy and regulatory enforcement for waste management.

Performance

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 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 one of the issues affecting GSCM practices is.

Omonge (2012) conducted study to establish the role of green supply chain management practices on an organizational competitiveness among commercial banks in Kenya. The study adopted a descriptive research design in which involved distribution of questionnaire to the banks. The findings of the study was that different banks adopt different green supply chain practices depending on the activities that they are engaged in and also which green supply chain practice will yield better competitiveness to the bank. It also established that most of the banks' green supply chain practices involved environmental collaboration, monitoring, purchasing and the greening of the production phase. It was also found out that the competitiveness to the banks resulting from the green supply chain practices includes improved operational efficiency, increased customer base, offering superior services, reduction in waste level and all these leads to improved financial performance

RESEARCH METHODOLOGY

The study used descriptive design. According to Cooper & Schindler (2003), a descriptive study is concerned with finding out who, what, where and how of a phenomenon which is the concern of the study. The ANOVA test was used to establish the findings from the study and results presented in graphs and where appropriate.

The Multi linear Regression Model

$Y=\beta_0 + \beta_1X_1+ \beta_2X_2+ \beta_3X_3+ \beta_4X_4 + e$

: Where:

Y= Performance

B0= Reverse logistics

X1= Waste Management System

X2= Green procurement

X3=Green packaging

e= uncontrolled factors

FINDINGS AND DISCUSSIONS

Descriptive Statistics

Effects of Reverse Logistic on Performance

The staff was requested to indicate their level of agreement with the statements in table 1. The results were as indicated in the table 1. From the findings, the staff agreed that the, the University collaborates with its suppliers to ensure recycling of materials takes place with a mean of 4.171 and standard deviation of 0.214, the University ensures material substitution by replacing goods that may be harmful to the environment with the ones that

don't impact the environment negatively as shown by a mean of 4.150 and standard deviation of 0.198, the University efficiently facilitates product returns to their suppliers by a mean of 4.000 and standard deviation of 0.203 and University rationalizes its supply base (source reduction) in efforts to improve response time of the suppliers when returning goods with non-conformities by a mean of 3.979 and standard deviation of 0.176. The findings concur with Kumar et al., (2014) who stated that it would be the responsibility of the 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. These findings agree with Serut (2013) who found that reverse logistics had a positive and significant impact on performance of manufacturing firms.

Table 1: Effects of Reverse Logistic on Performance

Question	Strongly Disagree	Disagree	Moderate	Agree	Strongly agree	Mean	Std Deviation
The University efficiently facilitates product returns to their suppliers	5	8	14	68	45	4.000	0.203
The University rationalizes its supply base (source reduction) in efforts to improve response time of the suppliers when returning goods with non-conformities	6	11	16	55	53	3.979	0.176
The University collaborates with its suppliers to ensure recycling of materials takes place	4	7	10	59	60	4.171	0.214
The University ensures material substitution by replacing goods that may be harmful to the environment with the ones that don't impact the environment negatively	0	9	18	56	57	4.150	0.198

Effects of Green procurement on performance

The staff was asked to indicate their level of agreement on the statements in table 2. The results were as presented in table 2. According to the findings, the staff agreed that the University does material selection to ensure materials selected are less harmful to the environment by a mean of 4.136 and standard deviation of 0.202, the University uses green procurement criteria in vendor selection by a mean of 4.107 and standard deviation of 0.188 and the University outsources its procurement function for green procurement reasons by a mean of 3.914 and standard deviation of 0.163. The findings agree with Kamonya (2013) who argued that the drivers influencing the adoption of green procurement practices by the SMEs are government laws and regulations requirement, changing customer demands and expectations, the company initiatives, global purchase and production standards, employee initiatives and suppliers influence. The findings agreed with Khisa (2011) who established that green procurement management practices were still low in the public sector in Kenya.

Table 2: Effects of Green procurement on performance

Question	Strongly Disagree	Disagree	Moderate	Agree	Strongly agree	Mean	Std Deviation

The University uses green procurement criteria in vendor selection	2	13	17	44	64	4.107	0.188
The University does material selection to ensure materials selected are less harmful to the environment	6	9	11	48	66	4.136	0.202
The University outsources its procurement function for green procurement reasons	9	12	15	50	54	3.914	0.163

Effects of Green packaging on performance

The staff was asked to indicate their level of agreement with the statements in table 3. The results are as shown in table 3. From the findings, the staff agreed that, the University observes packaging re use after procuring or using materials by a mean of 3.900, the University eco-designs packaging materials for the products it produces by a mean of 3.850 and standard deviation of 0.2143and standard deviation of 0.170 and the University obverses packaging re-cycle after procuring or manufacturing goods by a mean of 3.793 and standard deviation of 0.152. The findings concur with Kirima (2014) who stated that the green process management is largely adopted where organizations indicated that their staff largely influences the performance of their organizations. The findings agree with Salma (2014) who found out an insignificant positive relationship between green operations practices adoption and financial performance.

Table 3: Effects of Green packaging on performance

Question	Strongly Disagree	Disagree	Moderate	Agree	Strongly agree	Mean	Std Deviation
The University eco-designs packaging materials for the products it produces	6	15	23	46	50	3.850	0.143
The University obverses packaging re-cycle after procuring or manufacturing goods	9	19	12	52	48	3.793	0.152
The University observes packaging re use after procuring or using materials	7	12	16	58	47	3.900	0.170

Waste Management System

The staff was requested to indicate their level of agreement on the statements in table 4. From the findings, the staff agreed that the University has adopted alternative sources of fuels from those that pollute the environment by a mean of 3.979 and standard deviation of 0.190, the University has put a system in place to treat hazardous wastes that result from student practical and mechanical activities by a mean of 3.936 and standard deviation of 0.167 and the University has a strategy in place to contain carbon dioxide emissions that result from fuel combustion in laboratories, workshops and substance production units by a mean of 3.943 and standard deviation of 0.183. The findings agree with Osano (2012) who notes that the concept of centralized waste management system has been successfully documented in private healthcare sector settings in India and some developed countries. The findings agree with Muchiri (2011) who 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.

Table 4: Waste Management System

Question	Strongly Disagree	Disagree	Moderate	Agree	Strongly agree	Mean	Std Deviation
The University has a strategy in place to contain carbon dioxide emissions that result from fuel combustion in laboratories, workshops and substance production units	1	19	13	61	46	3.943	0.183
The University has adopted alternative sources of fuels from those that pollute the environment	6	11	12	62	49	3.979	0.190
The University has put a system in place to treat hazardous wastes that result from student practical and mechanical activities	9	12	14	49	56	3.936	0.167

Performance of the University

The staff was asked to indicate their level of agreement in the statements in table 5. From the findings the staff agreed that Growth of number of students enrolled in a given year would be an indicator of performance of the University by a mean of 4.043 and standard deviation of 0.194, Performance of the University is largely indicated by efficiency in its operations (cost cutting) by a mean of 3.978 and standard deviation of 0.172 and Performance of the University is indicated by its level of generated income in a given year by a mean of 3.950 an standard deviation of 0.176. The findings agree with Green and Zelbst (2012) who found that 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.

Table 5: University's Performance

Question	Strongly Disagree	Disagree	Moderate	Agree	Strongly agree	Mean	Std Deviation
Performance of the University is indicated by its level of generated income in a given year	11	13	10	44	62	3.950	0.176
Growth of number of students enrolled in a given year would be an indicator of performance of the University	9	10	8	52	61	4.043	0.194
Performance of the University is largely indicated by its efficiency in utilizing available resources	8	11	14	49	57	3.978	0.172

Inferential Statistics

Correlation

The correlation analysis is used to analyze the association between independent and dependent variables. The study used the Pearson Moment Correlation analysis to determine the association between Reverse logistics, Waste Management System, Green procurement, Green packaging with performance. The results were as shown in Table 6. The results revealed that there was a strong positive correlation between Reverse logistics and

performance as shown by r = 0.771, statistically significant p = 0.001<0.01; there was a positive correlation between Waste Management System and performance as shown by r = 0.805, statistically significant P = 0.000; there was a positive correlation between Green procurement and performance as shown by r = 0.764, statistically significant P = 0.001; there was a positive correlation between Green packaging and performance as shown by r = 0.791, statistically significant P = 0.001. This implies that Reverse logistics, Waste Management System, Green procurement, Green packaging with performanceare related. The findings concurred with Green and Zelbst (2012) who found 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.

Table 6: Correlations Coefficient

		Performance	Reverse logistics	Waste Management	Green procurement	Green packaging
Performance	Pearson Correlation	1				
	Sig. (2-tailed)					
	N	140				
Reverse logistics	Pearson Correlation	.771**	1			
	Sig. (2-tailed)	.001				
	N	140	140			
Waste Management	Pearson Correlation	.805**	.344	1		
	Sig. (2-tailed)	.000	.060			
	N	140	140	140		
Green procurement	Pearson Correlation	.764**	.511	.519	1	
	Sig. (2-tailed)	.001	.049	.071		
	N	140	140	140	140	
Green packaging	Pearson Correlation	.791**	.333	.435	.296	1
	Sig. (2-tailed)	.001	.068	.064	.182	
	N	140	140	140	140	140

A multivariate regression analysis was used to establish the relationship between the dependent and the independent variables. The regression model was; $Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \varepsilon$

Whereby: β_0 is the regression intercept; $\beta_1 - \beta_4$ are the regression coefficients; Y is the dependent variable (performance); X_1 is reverse logistics; X_2 is green procurement; X_3 is green packing; X_4 is waste management systems; and ε = Error term.

Regression Analysis

The four independent variables namely Reverse logistics, Waste Management System, Green procurement, Green packaging that were studied; explain a variation 71.4% of performance of Kenyan Universities as represented by adjusted R^2. This therefore means that other factors not studied in

this research contribute 28.6% of performance of Kenyan Universities. This showed that there are other factors that influence performance of Kenyan Universities. The findings are related to the findings Omonge (2012) who found out that the competitiveness to the banks resulting from the green supply chain practices includes improved operational efficiency, increased customer base, offering superior services, reduction in waste level and all these leads to improved financial performance.

Table 7: Model Summary

Model	R	R Square	Adjusted R Square
1	.857[a]	.735	.714

Analysis of Variance

The table 8 showed the analysis of variance. The results indicated that the model was significant since the p-value is 0.000 which is less than 0.05. The model is statistically significance in predicting how reverse logistics, green procurement, green packaging and waste management system influence performance of Kenyan Universities. F calculated (93.557) at level of significance 0.005 is greater than F critical (2.439).This shows goodness of fit of the model.

Table 8: Analysis of Variance

Model		Sum Squares	Df	Mean Square	F	Sig.
1	Regression	13.5	4	3.375	93.557	0.000
	Residual	4.87	135	0.036		
	Total	18.371	139			

Beta Coefficients

The regression equation was;

$Y = 1.471 + 0.426 X_1 + 0.241 X_2 + 0.333 X_3 + 0.111 X_4 + \varepsilon$

The regression equation above has established that taking all factors into account (reverse logistics, green procurement, green packing and waste management systems) constant, the performance of Kenyan Universities will be 1.471 units. The findings presented also show that there is a positive significant relationship between reverse logistics and performance of Kenyan Universities as shown by a coefficient of 0.426 (p-value=0.000). This shows that a unit increase in reverse logistics would lead to a 0.426 increase in performance of Kenyan Universities. In addition, there is a positive significant relationship between green procurement and performance of Kenyan Universities as shown by a coefficient of 0.241 (p-value=0.021). A unit increase in green procurement leads to a 0.241 improvement in performance of Kenyan Universities.

Further, the findings show that there is a significant positive relationship between green packing and performance of Kenyan Universities as shown by a coefficient of 0.333 (p-value = 0.000). A unit increase in green packing would lead to a 0.334 increase in performance of Kenyan Universities. Lastly, there is a positive significant relationship between waste management systems and performance of Kenyan Universities as indicated by a coefficient of 0.111 (p-value = 0.032). The findings agree with Green and Zelbst (2012) who found that

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.

Table 9: Beta Coefficients

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	1.471	0.306		4.807	0.000
Reverse logistics	0.426	0.113	0.431	3.770	0.000
Green procurement	0.241	0.076	0.251	3.171	0.021
Green packaging	0.333	0.095	0.337	3.505	0.000
Waste management system	0.111	0.031	0.118	3.581	0.032

From these findings we can infer that reverse logistics influences the performance of Kenyan Universities most followed by green packaging, green procurement and waste management systems. Reverse logistics, green procurement, green packing and waste management systems were found to positively influence performance of Kenyan Universities.

CONCLUSIONS AND RECOMMENDATIONS

The first objective of the study was to determine the effect of reverse logistics on performance of the University of Nairobi. The study established that reverse logistics affect the performance of the University of Nairobi. Further, the University rationalizes its supply base (source reduction) in efforts to improve response time of the suppliers when returning goods with non-conformities, the University efficiently facilitates product returns to their suppliers and the University collaborates with its suppliers to ensure recycling of materials takes place. The findings concur with Kumar et al., (2014) who stated that it would be the responsibility of the 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. These findings agree with Serut (2013) who found that reverse logistics had a positive and significant impact on performance of manufacturing firms.

The study also aimed to establish the effect of green procurement on performance of the University of Nairobi. The study found out that procurement affect the performance of the University of Nairobi. The University eco-designs packaging materials for the products it produces, the University observes packaging re use after procuring or using materials and the University obverses packaging re-cycle after procuring or manufacturing goods. . The findings agree with Kamonya (2013) who argued that the drivers influencing the adoption of green procurement practices by the SMEs are government laws and regulations requirement, changing customer demands and expectations, the company initiatives, global purchase and production standards, employee initiatives and suppliers influence. The findings agree with Khisa (2011) who established that green procurement management practices were still low in the public sector in Kenya.

The third objective was to examine the effect of green packaging on performance of the University of Nairobi. The study found out that that green packaging affects the performance of the University of Nairobi. The University eco-designs packaging materials for the products it produces, the

University observes packaging re use after procuring or using materials and the University obverses packaging re-cycle after procuring or manufacturing goods.

The fourth objective was to establish the effect of waste management system on performance of the University of Nairobi. The study established that waste management system affect the performance of the University of Nairobi. The University has adopted alternative sources of fuels from those that pollute the environment, the University has put a system in place to treat hazardous wastes that result from student practical and mechanical activities and the University has a strategy in place to contain carbon dioxide emissions that result from fuel combustion in laboratories, workshops and substance production units. The findings agree with Osano (2012) who notes that the concept of centralized waste management system has been successfully documented in private healthcare sector settings in India and some developed countries. The findings agree with Muchiri (2011) who 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.

Conclusions

From the finding the study revealed that there is a positive significant relationship between reverse logistics and performance of Kenyan Universities, this shows that a unit increase in reverse logistics would lead to increase in performance of Kenyan Universities. The study concludes that reverse logistics positively influence the performance of Kenyan Universities.

The study established that there is a positive significant relationship between green procurement and performance of Kenyan Universities, the study revealed that a unit increase in green procurement leads to increase in performance of Kenyan Universities. From the finding the study concludes that green procurement positively influence the performance of Kenyan Universities.

Further, the findings show that there is a significant positive relationship between green packing and performance of Kenyan Universities. A unit increase in green packing would lead to increase in performance of Kenyan Universities. The study thus concludes that green packing positively influence the performance of Kenyan Universities. The findings concur with Kirima (2014) who stated that the green process management is largely adopted where organizations indicated that their staff largely influences the performance of their organizations. The findings agree with Salma (2014) who found out an insignificant positive relationship between green operations practices adoption and financial performance.

Lastly the study found that there is a positive significant relationship between waste management systems and performance of Kenyan Universities as indicated by a coefficient of 0.111. From these findings we can infer that waste management system positively influences the performance of Kenyan Universities.

Recommendations

The study recommends that the management of Kenyan Universities should encourage proper utilization of materials and recycling of materials as the study found that reverse logistics affects the performance of Kenyan universities positively.

The study recommends that the management of Kenyan Universities should integrate green procurement process in all its purchasing processes since it's characterized by a low environmental impact that is products environmentally friendly in

nature and produced using environmentally friendly processes.

The study recommends that the management of Kenyan Universities should purchase products from manufacturers whose design products minimize consumption of materials and energy, that facilitate the reuse, recycle and recovery of component materials as the study found out that green packaging influences supply chain performance to a great extent.

The study recommends that the management of Kenyan Universities should invest more in waste management systems as the study found out that waste management systems treats an controls post combustion emissions, treatment and recycle of waste created and allows for use of alternative fuels.

The study sought to establish the effects of green supply chain management practices on performance of Kenyan Universities. A study should be conducted on the challenges in using green supply chain management practices in public Universities in Kenya. The study found that the study variables namely Reverse logistics, Waste Management System, Green procurement, Green packaging that were studied; explain a variation 71.4% of performance of Kenyan Universities as represented by adjusted R^2. This therefore means that other factors not studied in this research contribute 28.6% of performance of Kenyan Universities. The study recommends that other studies should be conducted to cover other factors that influence performance of Kenyan Universities to cover 28.6%.

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