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Effect of Green Logistics Practices on Performance of Supply Chains in Multinational Organizations in Kenya

Lameck M.Mogeni
Masters student, Jomo Kenyatta University of Agriculture and Technology, department of Entrepreneurship and Procurement, School of Human Resource and Development, P.O. Box 62000-00200, Nairobi, Kenya

Dr. David .M. Kiarie
Supervisor, Jomo Kenyatta University of Agriculture and Technology, department of Entrepreneurship and Procurement, School of Human Resource and Development, P.O. Box 62000-00200 ,Nairobi, Kenya

Abstract
The purpose for this paper was to explore the effect of green logistics practices on performance of supply chains in multinational organizations. The study was carried on 10 multinational organizations in Kenya, specifically focusing on the following departments; procurement, human resources, environment specialists, and administrators, where the study picked at least four senior officers from each. In developing countries like Kenya green logistic practices in paramount for tomorrow's energy ingesting. This study did pilot test to ascertain the reliability of the instruments. ***Objective****:* The study aimed at findings of remedial measures on performance of supply chain in multinational organizations in Kenya. This resulted to great significance of the study and a replication of the findings in the Kenyan context. The study recommends similar studies to other national organizations so as to validate their outcomes with this study and, then a comparative analysis for future strategies in this area.
Keywords: eco design, green purchasing, reverse logistics, responsive packaging and performance of supply chain

1. Introduction

Green Supply Chain Management integrates environmental concerns into supply chain management. Supply chain includes activities associated with the transformation and flow of goods or services from materials sources to the end consumers including the integration of those activities internal and external to the firm (Arlbjørn and Lu¨thje, 2012). Similarly, Green Supply Chain Management (GSCM) can be viewed at multiple levels including external and internal GSCM perspectives. This study considered environmental management practices that include transactions with suppliers and customers as external supply chain activities; those activities without direct supplier or customer involvement such as eco design, environmental management and financial policies within a manufacturer's direct control are considered as internal activities (Zhu et al., 2013). These practices and categories are further described and operationalized in the methodology section.

The implementation of green practices into logistics systems is gaining worldwide importance. Green logistics practices within companies, once considered proactive measures now influence entire value chains, and their presence has become a requirement for doing business. What are the current global practices of choice, and what challenges do companies face in applying them in emerging market economies? Previous studies showed that the direct effects between GSCM and performance improvement were significant but performance improvement was not always obvious (Sarkis, 2012). The studies have also found that internal GSCM practices such as internal environmental management and eco design had been adopted and implemented on a greater scale than those of external GSCM practices such as cooperation with suppliers and customers.

1.1.1 Global Perspective on Green Logistics Practices

The negative impact of business activities globally has given rise to the formulation of various approaches for achieving sustainable methods of development. According to Chan, He, Chan, & Wang (2012) the goal of sustainable development is to address growing concerns about environmental issues while simultaneously responding to socioeconomic imperatives. Companies around the world are feeling pressure to implement green practices into their value-creation systems. This pressure emanates from growing environmental awareness on the part of consumers in many countries, as well as increasing prices for raw materials and energy, environmental legislation, and influence exerted by dominant actors in the value chain (Giovanni and Vinzi, 2012).

The solutions that have been proposed and applied to respond to these trends cover entire value chains, from the reduction of raw material consumption and industrial contamination to cutting down on solid domestic residuals at the end-of-life of products and their reintegration into new value creating processes (Lysons and Farrighton, 2012). Green logistics practice concerns had led to the development of legislations along all these areas. Many inducements are being provided by the governments in form of tax incentives for embarking on greening the supply chain. Based on the past studies as discussed above and global pressures felt across the globe,

multinational organizations cannot ignore the aspect of implementing green practices into their value-creation systems. This pressure emanates from growing environmental awareness on the part of consumers in many countries, as well as increasing prices for raw materials and energy, environmental legislation, and influence exerted by dominant actors in the value chain.

1.1.2 Local Perspective on Green Logistics Practices

At the national level and in line with Kenya's Vision 2030, regulatory bodies such as National Environment Management Authority (NEMA) protect the environment with EPP regulations such as ROHS largely classified as regulatory (bans, permits and standards), financial (gains for adherence and reduction) and educational (environmental reporting, audits, product labeling and so on). The county's national income stands at $55.2 billion and GDP per capita of $1256 (KNBS, 2014). There is widespread approval, and queries in equal measure; partly due to deteriorating performance of supply chain, in part due to the effect of institutional pressures driven by market and regulatory demands (Hitchcock, 2012). The multinational organizations used in this research study are a combination of diplomatic missions, off-shore companies, media industry, hospitality industry distribution centers, courier services, and importing agents. Studying a population from this type of firms is likely to give more accurate responses to the study's questionnaire considering their location, experience in the international trade, internal strength, as well as opportunities behind their motivation to open operations in Kenya. According to Lysons & Farringhton (2012) procurement organizations can realize incremental savings up to 12% of cost when they adopt sustainable initiatives

1.2 Statement of the Problem

The problem of performance of effect of Green Logistics Practices on Supply Chains in Multinational Organizations in Kenya has been a pertinent issue for quite some time. According to Sarkis (2012) he stated that interest is mirrored by the increasing attention in the environment and climate change and the efforts by governments and organizations around the world to minimize their impact on the environment. Despite this increasing popularity, there are still several areas of green supply chain management (GSCM) that require further research studies particularly as effect of green logistics practices in performance of supply chains for multinational organizations in Kenya. Green supply chain has been identified as a key issue of sustainable procurement (Amemba, Getuno and Osoro, 2015).

This study examined the problem of effects of green logistics practices on performance of supply chains for multinational organizations in the Kenyan context and this was in line with the findings of (Large and Thomsen, 2011), who had done research on green practices and recommended a further studies on multinational organizations. Despite the afore-mentioned findings, it was established that the studies available had only focused on general green environment aspects but none of them touched on the effects of green logistics practices on performance of supply chains in multinational organizations in Kenya. This prompted a research to be done in this area in order to validate whether there is any significance with the existing literature. Noteworthy was that the available studies were from outside the country or region hence, the need to do a research in the Kenyan context and compare the finding with other studies.

The result from this study filled the existing gap; the research added new knowledge to the existing literature where policy makers, academicians and Government agencies could use the generated best practices to make prudent decisions in related green practices intended to enhance performance of the supply chain. This study therefore sought to explored what past scholars have done on the effect of green logistics practices on performance of supply chains in multinational organizations and the throughput of their findings.

1.3 General Objective

The general objective of this research project was to establish the effect of green logistics practices in performance of supply chains in multinational organizations in Kenya. The specific objectives were: eco design, green purchasing, reverse logistics and responsive packaging.

2. Conceptual Framework

Conceptual framework is an analytical tool that gives a pictorial relationship between independent variables and the dependent variable in a study (Mugenda and Mugenda, 2008). In this study, both the independent and dependent variables have been measured. In trying to identify the effect of green logistics practices on performance of supply chains, this study explored the variables below.

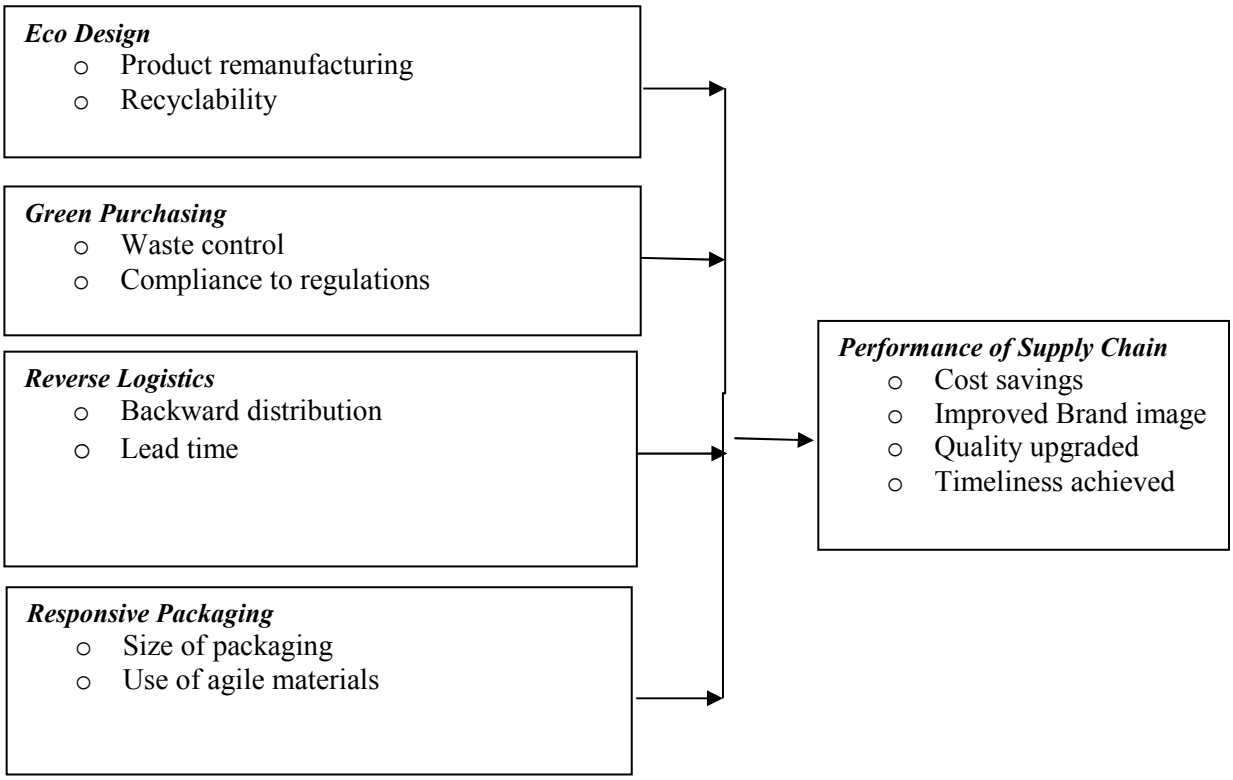

Figure 2.1 Conceptual Framework

2.1 Eco Design

The inference here is that it is important for organizations to ensure that their products conform to sustainable designs, design manufacturing and ability of product to be reused or recycled. This study will measure product related eco design by the proportion product contains recycled or used materials, the use of lifecycle assessment to evaluate the environmental load of products, and ensuring that recyclable or reusable contents are designed into the products (Arlbjørn and Lu¨thje, 2012). Importance of the design process in environmental management is well demonstrated by the existing literature. Reuse stands for both the use of a product without re-manufacturing and is a form of resources savings. Recycling is the process which makes disposal materials reusable by collecting, processing, and remanufacturing into new products (Teuteberg and Wittstruck, 2012).

2.2 Green Purchasing

According to Lee et al.(2011) green purchasing is the adoption of certain environment friendly policies whereby organizations ensure that suppliers meet their environmental objectives, the buying firm may deploy collaboration-based activities that include training, environmental information sharing and joint research (Arlbjørn and Lu¨thje, 2012). To implement GLP organizations should follow practices which consist of environmental supply chain management guidelines. Numerous studies have tried to identify green practices in organizations which are referred to as environmental and quality management systems. Internal environmental management is critical to improving the organization's environmental performance.

According to Zhu & Sarkis (2011) they observed that quality management lubricates implementation of GSCM. They suggest that under rigorous quality control, organizations can improve their environmental practice by learning from experiences of their quality management programs. By receiving "green" certificates such as the ISO series of environmental management systems-EMS and standards, organizations are able to create structured mechanisms for continuous improvement in environmental performance. As firms play along together in the supply chain to achieve competitive advantage and win the order at the bottom line, all members of the chain need to synchronize their strategies toward the end customers' direction.

According to Braunscheidel et al. (2011) he observed that supply chain strategy and competitive advantage must fit together and the consistency between customer priorities and supply chain capabilities must exist. In order to achieve the strategic fit, firms should be able to understand and wisely exercise their customer needs to match their service requirements. It is further postulated that firms are able to design supply chain in delegating tasks as to outperforming competitors from other value chains by matching the competitive advantages the supply chains have with those the customers desire (Eltayeb, Zailani, and Ramayah, 2011).

2.3 Reverse Logistics

This is the eco-efficient management of the forward and reverse flows of products and information between the point of origin and the point of consumption (Giovanni and Vinzi, 2012). According to Huang et al. (2012) he observed that reverse logistics practices that have been identified in previous studies include product returns and remanufacturing, recovery, recycling and reuse, and redistribution. It is further affirmed that these practices apply to final products, their components and packaging material (Das, 2012).

As an environmental practice, resource reduction enables firms to minimize waste which results in more efficient forward and reverse distribution processes (Zailani et al., 2012). Eco design and design for supply chain management, enables organizations to improve their supply chain performance and close the supply chain loop by handling product functionality while minimizing life-cycle environmental impacts. According to Declan (2013) he stated that reverse logistics activities apply to both the upstream and the downstream supply chains. He further posits that classic supply chain performance is a lifecycle throughout the sourcing, production processes, inventory management, order and demand management, warehousing, and transportation and distribution.

2.4 Responsive Packaging

Responsive packaging is typified by waste minimization through use of agile materials and order-filling that is, using appropriate packaging size. This can be achieved through use of recyclable containers, biodegradable bags, agile materials that may be reused, and eco-packaging which is basically reduction of hazardous material in packaging (Large & Thomsen 2011), and eco labelling. According to Koh, Gunasekaran, & Tseng (2012) who established that effective use of materials and waste reduction can lead to better costs for the organization and better use of materials can positively impact environmental performance leading to improved brand image. In recent years, numerous studies have attempted to find and explore GSCM. Green supply refers to the way in which innovations in supply chain management and industrial purchasing may be considered in the context of the environment (Wu et al., 2011). According to Zailani et al., (2012) findings, responsive packaging is described to mean use of agile packing materials, reduced materials, recycling, reuse, and the substitution of materials.

2.5 Performance of supply chains

This was the criterion of this study. This study examined the intricate relationship between GLP and performance of supply chain within the context of the business strategy adopted by multinational organizations (Buyukozkan & Cifci, 2012). Supply Chain Management focuses on how organizations control their suppliers' processes, technology, and capability to improve competitive advantage (Agami et al., 2012). Performance of supply chain in multinational organizations is measured by studying a comparison both in terms of international trade and from the perspective of innovative practices adopted by other companies in the domestic market (WEF, 2013).

Supply chain performance measurement models are divided into four categories; cost and customer responsiveness, activity time, and flexibility (Lee et al., 2012). According to (Wachira, 2014) suggested that supply chain performance measurement system needed to be enhanced by developing metrics and an assessment of implementation barriers to overcome in implementing the existing measurement system. That resources were associated with supply chain efficiency including total cost, distribution cost, manufacturing cost, inventory cost, and return on investment. According to (Agami, Saleh, and Rasmy, 2012) who observed that the output stands for the level of customer satisfaction including service, sales, profit, on-time deliveries, backorder/stock-out, customer response time, manufacturing lead time, shipping errors, and customer complaints. Flexibility is defined as the ability to respond to uncertainty which is related to volume, distribution, responsiveness; product and/or new product flexibility.

3. Methodology and Research Design

Research design is a detailed outline of how an investigation will take place (Kothari, 2011). This research project used both qualitative and quantitative research design and worked with both descriptive and exploratory information. This was necessary because the two designs complement each other. Secondary data which is largely qualitative was described in the same way as it is without variations from the original scholar in supporting the content of this research study. Questionnaire was the main tool used to collect primary data for this study. Primary data being quantitative in nature was described in an exploratory format incorporating evidence from past studies. The findings were finally represented using pie charts, frequency tables, graphs, and percentages.

3.1 Sample and Sampling Techniques

According to Mugenda & Mugenda (2008) states that sampling is a method of picking a small sample from the

entire population. A census survey was carried out since the targeted population was very small so as to give chance of achieving a hundred percent of the targeted population. This type of sampling is called purposive random sampling where the researcher samples the whole population because they have similar characteristics, experience, and exposure and one belief.

3.2. Pilot Study and Reliability Test

According to (Saunders, Lewis, & Thornhill, 2012) they observed that pilot testing is an activity used to validate the usability of data collection tools. Fundamentally, piloting is a pre-test used to check if the questionnaire will be filled without problems by different respondents and be able to produce measurable variables as intended and to test the design and instrumentation of the research. This project used one percent of the target population to conduct piloting so as to test usability of the questionnaire tool before data was collected. The pilot test results were not included in the final analysis. Reliability is a measure of the degree to which a research instrument yields consistent results after repeated trials (Mugenda and Mugenda, 2008). It is basically a probability of the measurements. A measure is considered reliable if a persons' score on the same test given twice is similar. The study used the Cronbach's Alpha (α) to indicate the extent to which a set of test items could be treated as measuring a single variable's value; and where the value was equal or greater than 0.7 was considered acceptable.

4. Findings from Reliability Analysis

This study undertook a pilot study with a view to determining the reliability of the data collection instruments, that is, the questionnaires. To this end, the Cronbach's alpha measure of internal consistency was the statistical operation conducted. According to (Saunders et al., 2012) observed that the Alpha value threshold was at 0.7 and above. Alpha values greater than 0.7 is acceptable (Kothari, 2011). The study benchmarked its reliability test against these alpha values for all the variables under this study.

Table 1.1 Reliability Coefficients

Variable	*Cronbach's Alpha*
Eco Design Practice	0.911
Green Purchasing	0.827
Reverse Logistics	0.830
Responsive Packaging	0.723
Performance of Supply Chain	0.933

4.1 Effect of Performance on Eco Design Practice

Majority (32)80%, of the respondents agreed that their organization saved costs through product recovery, followed by (29)72.5% who stated design products for reuse (recycle), and (28)70% who said new opportunities for innovation. A further (30)75% affirmed waste management, (27)67.5% on reduced use of hazardous materials, and (26)65% mentioned disclosure of environmental practices. Only (21)52.5% were of the opinion that reduced consumption of energy/materials improved performance of supply chains while (20)50% stated improved on-time deliveries. As many as (25)62.5% thought increased consumer satisfaction resulted to better performance along the supply chain. A bout (22)55% of the respondents were identified with increased total sales. A similar statistic was replicated when the respondents were asked to state how they thought recyclability affected performance of their supply chains (refer table 1.2).

Respondents were further asked to state if there was improvement in performance of supply chain after they adopted waste control mechanisms in their organization. According to table 4.5 below, a majority of respondents stated reduction of the environmental impact on products (3.925); followed by active management of all aspects of product life-cycle (3.757); then more opportunities towards innovation (3.639). A further (3.592) said real-time monitoring of impacts on the environment by ISO systems; rapid information sharing on environmental objectives (3.401); certified audit for suppliers' internal management (3.398); purchase of items that are eco-labelled (3.000); cooperation with suppliers for environmental objectives (2.867); and (2.790) consideration of suppliers who are ISO certified. From the foregoing, it can be deduced that a majority of MNO explored waste control aspects as part of their green purchasing policies to influence performance of supply chains.

Table 1.2 Effect of performance on Eco Design Practice of Supply Chains

Supply Chain Performance	*Product Remanufacturing*	*Recyclability*
Product Recovery	80%	80%
Waste Management	75%	75%
Disclosure on Environmental practices	65%	65%
Reduced use of hazardous materials	67.5%	67.5%
Increased total sales (product returns)	55%	55%
Improved on-time deliveries	50%	50%
Design products for reuse (recycle)	72.5%	72.5%
Reduced consumption of energy/materials	52.5%	52.5%
Increased Consumer satisfaction	62.5%	62.5%
New opportunities for innovation	70%	70%

4.2 Effect of Performance on Green Purchasing

Majority (30)75.0% of the respondents affirmed with optimum consumption of energy / materials; a bout (28)70% of the respondents indicated that there are design of products for reuse (recycle); a further (32)80% felt that strict compliance to ISO certifications; and by (26)65% stating supplier/customer training and inclusivity in order to improve performance of supply chains. It was followed by a distant (20)50% who mentioned full disclosure on environmental practices. Only (18)45% said more opportunities towards innovation. The same statistic was replicated when the respondents were asked to state how they thought compliance to regulations affected performance of their supply chains (refer Table.1.3).

Table 1.3 Effect of Performance on Green Purchasing of Supply Chains

Green Purchasing Concepts	*Waste Control*	*Compliance to Regulations*
More opportunities towards innovation	45%	45%
Optimum consumption of energy/materials	75%	75%
Full disclosure on Environmental practices	50%	50%
Strict Compliance to ISO certifications	80%	80%
Supplier/Customer training and inclusivity	65%	65%
Design of products for reuse (recycle)	70%	70%

4.3 Effect of performance on Reverse Logistics

From the result analysis majority of the respondent indicated that there is improved performance along their supply chain after the uptake of reverse logistics into their systems, this resulted to backward distribution management of (3.920); followed by active lead time management (3.839); then increased product returns by saving on energy / material use (3.577). A further (3.401) said reduction in overall inventory carrying-costs; increased profits as a result of customer loyalty (3.348); and (3.295) improved end of product-life cycle(refer table 1.4).

Table 1.4 Supply Chains Performance based on Reverse Logistics

Reverse Logistics aspects	*Mean*	*Std. Dev*
Increased product returns by saving on energy / material use	3.577	1.1718
Improved end of product-life cycle	3.295	1.2092
Active lead time management	3.839	1.3317
Backward distribution management	3.920	1.4001
Reduction in overall inventory-carrying costs	3.401	0.9912
Increased profits as a result of customer loyalty	3.348	0.8615

Majority (33)82.5% of the respondents rated timely disposal of scrap materials. A bout (7)17.5% of the respondents ranked concept as having moderate effect. A further (32)80% ranked preserving of product quality as having very high. Only (8)20% ranked the same aspect as high. A majority (30)75% thought reduced down-time for faulty machines was a reverse logistics practice that contributed to enhanced performance of supply chains moderately, while (10)25% were of the opinion the effect was only high. By (29)72.5% affirmed very high the increased reach of brand presence while (11)27.5% were of the contrary opinion. A further (28)70% rated minimum waste on disposal of scrap as low, and (12)30% rated the same aspect as low. This was followed by a score of (27)67.5% who scored preserved original quality of product as low when the balance (13)32.5% rated the same aspect at very high. That was distantly followed by (26)65% who rated reduction in distribution cost as moderate with (14)35% rating that model as high. The lowest of the rated construct was reduced customer complaints who rated it very high at (24)60% while (16)40% rated the same construct as high (refer table 1.5).

Table 1.5 Effect of Performance on Reverse Logistics Practices of Supply Chain

Supply Chain Performance	*Very Low*	*Low*	*Moderate*	*High*	*Very High*
Reduced customer complaints				16	24
Preserved quality on timely delivery				8	32
Reduced down-time for faulty machines			30	10	
Minimum waste on disposal of scrap		12	28		
Timely disposal of scrap materials			7		33
Reduction in distribution cost			26	14	
Preserved original quality of product		27			13
Increased reach of brand presence	11				29

4.4 Effect of Performance on Mechanism for Responsive Packaging

Majority (16)40% of the respondents cited upstream Environmental collaboration along the supply chains, followed by (15)37% who stated legislation and regulatory framework, and a distant (9)23% who stated incentive programs for organizations adopting responsive packaging (Refer Figure 4.1)

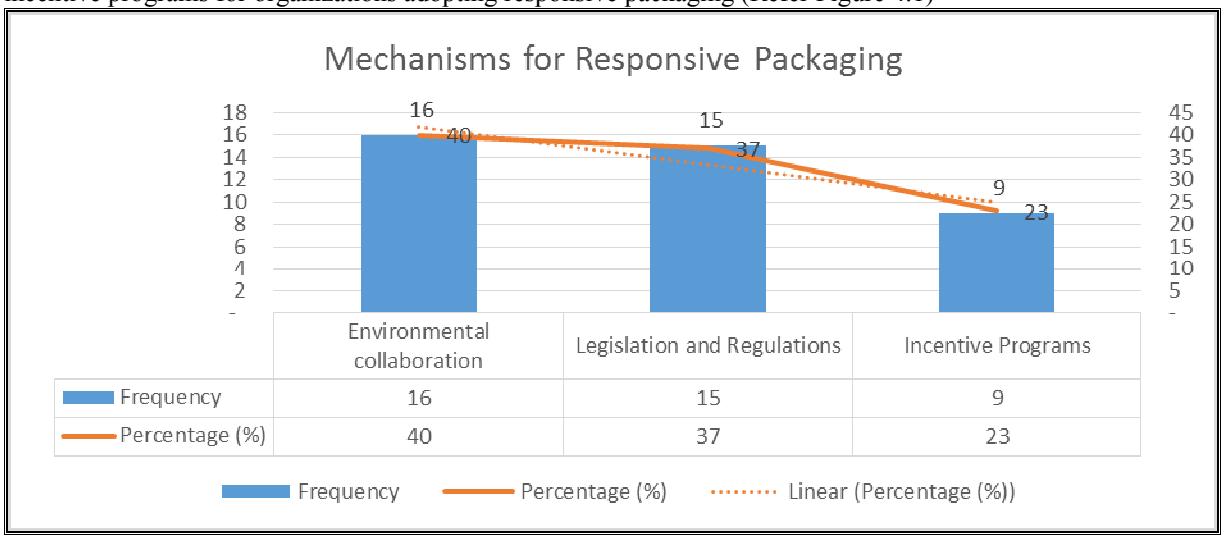

Figure 4.1 Mechanisms in place for Responsive Packaging

From the results, majority (27)67.5% of the respondents rated brand image as moderate while (13)32.5% ranked improved brand image as high. A further (22)55% rated cost savings as very high whereas (18)45% rated concept as high. This was followed by (21)52.5% who graded quality upgraded as high as opposed to (19)47.5% who thought the construct graded moderately. A majority (24)60% graded timeliness advanced as moderate, the balance (14)40% ranked timeliness as low (refer table 1.6).

Table 1.6 Impact of Responsive Packaging on Performance of Supply Chains

Supply Chain Performance	*Very Low*	*Low*	*Moderate*	*High*	*Very High*
Cost Savings				18	22
Improved Brand Image			27	13	
Quality upgraded			19	21	
Timeliness Advanced		14	26		

4.5. Measurement of Performance of Supply Chains

From the result most of the respondents voiced that their organization had saved (3.901)2012, (2.873)2013, (2.546)2014, and (2.197)2015 over a period of 5 years. Further, supply chains had saved between 10% - 19% of costs by (2.144)2012, (.759)2013, and (1.517)2015 in five years. It was also found that over 20% of costs had been saved by (.921)2012, (2.608)2013, and by (1.568)2014 over a period of five years (refer table 1.7).

Table 1.7 Measuring Performance of Supply Chain Costs saved over 5-year Period

Category / Year	*2011*	*2012*	*2013*	*2014*	*2015*
Cost Savings by up to 9%	-	3.901	2.873	2.546	2.197
Cost Savings by between 10% - 19%	-	2.144	.759	-	1.517
Cost Savings by 20% and over	-	.921	2.608	1.568	-

4.6 Pearson Correlation Analysis

From the findings, a positive correlation is seen between each green logistics variable and Supply Chain

Performance. The strongest correlation was established between Green purchasing and Supply Chain Performance (r = 0.7723), and the weaker relationship found between Reverse logistics and Performance (r = 0.6933). Eco design practice and Responsive packaging were found to be strongly and positively correlating with performance of Supply Chains correlation coefficient of 0.7134 and 0.7318 respectively. All the independent variables were found to have a statistically significant association with the dependent variable at over 0.05 level of confidence.

Table 1.7 Pearson Correlation Matrix

	Performance	*Eco-design practice*	*Green purchasing*	*Reverse logistics*	*Responsive packaging*
Performance	1				
Eco design practice	0.7134	1			
	(0.017)				
Green purchasing	0.7723	0.547	1		
	(0.039)	(0.002)			
Reverse logistics	0.6933	0.684	0.539	1	
	(0.006)	(0.076)	(0.032)		
Responsive packaging	0.7318	0.682	0.629	0.572	1
	(0.028)	(0.003)	(0.061)	(0.042)	

4.7 Model Goodness of Fit

Regression analysis was used to establish the strengths of relationship between Supply Chain Performance (dependent variable) and the predicting variables; Eco design, Green purchasing, Reverse logistics, and Responsive packaging (independent variables). The results showed a correlation value (R) of 0.753 which depicts that there is a good linear dependence between the independent and dependent variables.

Table 1.8 Model Goodness of Fit

R	*R^2*	*Adjusted R^2*	*Std. Error of the Estimate*
0.771	0.594	0.587	0.046

a. Predictors: (Constants), Eco-design practices, Green purchasing, Reverse logistics, and Responsive packaging
b. Dependent Variable: Supply Chain Performance

With an adjusted R-squared of 0.587, the model shows that Eco design practices, Green purchasing, Reverse logistics and Responsive packaging explain 58.7 percent of the variations in Supply Chain Performance while 41.3 percent is explained by other factors not included in the model. Measures of goodness of fit typically summarize the discrepancy between observed values and the values expected under the model in question (Lee *et al,* 2011).

4.8 Analysis of Variance (ANOVA)

From the results, ANOVA statistics was conducted to determine the differences in the means of the dependent and independent variables to show whether a relationship exists between the two.

Table 1.9 Analysis of Variance (ANOVA)

	Sum of Squares	*Df*	*Mean Square*	*F*	*Sig.*
Regression	4.181	3	1.394	3.135	.508a
Residual	6.102	35	.325		
Total	**10.283**	**38**			

From the results, the P-value of 0.058 implies that Supply Chain Performance in Multinational Organizations has a significant joint relationship with Eco design practice, Green purchasing, Reverse logistics and Responsive packaging which is significant at 5 percent level of significance. This also depicted the significance of the regression analysis done at 95% confidence level. This implies that the regression model is significant and can thus be used to assess the association between the dependent and independent variables. According to (Saunders, Lewis, & Thornhill, 2012) observed that ANOVA statistics analyzes the differences between group means and their associated procedures (such as "variation" among and between groups).

4.8 Regression Coefficients of Determination

Using the multiple regression model; where; $Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon$; then, Performance of supply chain = 6.751 + 1.722 (Eco design practice) + 1.779 Green purchasing + 1.644 (Reverse logistics) + 1.740 (Responsive packaging). A unit change in Eco-design would thus lead to a 1.722 change in Supply Chain Performance ceteris paribus; a unit change in Green purchasing would lead to a 1.779 change in Supply Chain Performance ceteris paribus and a unit change in Reverse logistics would lead to a 1.644 change in Supply Chain Performance ceteris paribus while a unit change in Responsive packaging would lead to a 1.740 change in

Supply Chain Performance. This implies that among other factors, Eco-design practices, Green purchasing, Reverse logistics, and Responsive packaging are strong and significant determinants of Supply Chain Performance in Multinational Organizations (refer table 1.10).

Table 1.10 Regression Coefficient Results

	Unstandardized Coefficients		*Standardized Coefficients*	*T*	*Sig.*
	B	*Std. Error*	*Beta*		
(Constant)	7.724	5.006		1.543	.043
Eco design practice	1.722	.697	.338	2.471	.033
Green purchasing	1.779	.720	.362	2.471	.023
Reverse logistics	1.644	.689	.287	2.386	.032
Responsive packaging	1.740	.589	.296	2.954	.017

a. Dependent Variable: Supply Chain Performance,
b. Constant: Eco design practice, Green purchasing, Reverse Logistics, and Responsive Packaging

5. Summary

The most popular sub-construct with effect on performance of supply chains was found to be product remanufacturing and recyclability followed by waste minimization attributes; which include but not limited to design products for reuse (recycle), reduced use of hazardous materials, full disclosure of environmental practices, and reduced consumption of energy/materials. Green purchasing as a method of lean operation has been topical the world over and has been tested enterprise-wide. Practices such as waste minimization, compliance to regulations, and customer & supplier involvement along the value chain were found to be some of the best practices that an organization may adopt in its up-stream or down-stream supply chain to enhance performance. Noteworthy was the finding that reverse logistics positively affected performance of supply chains in Multinational Organizations; with key achievable being coordinated backward distribution, shorter lead time, and timely disposal of scrap/material.

This means that the use of agile materials, using the right packaging size for a given product, and increased use of environment-friendly materials this contributed to the improvement of performance of their supply chains by increasing their product returns over time. From the foregoing, it is noteworthy that green logistics practices significantly influence performance of supply chains in Multinational Organizations, most notably through the adoption of eco design practice, green purchasing, reverse logistics, and the up-take of responsive packaging. It is notable that for performance of supply chains to be effective, green logistics practices must be in place, or gradually be adopted as a framework of best-practices in the industry in order to seamlessly optimize the supply chain.

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The International Journal was edited byDr. Anthony Osoro, Jomo Kenyatta University of Agriculture and Technology,P.O. Box 6200-00200, Nairobi, Kenya.