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EFFECT OF GREEN SUPPLY CHAIN MANAGEMENT PRACTICES ON THE PERFOMANCE OF CONSTRUCTION FIRMS WITHIN NAIROBI CITY COUNTY

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ABSTRACT

The main objective of the study was to investigate the effect of green supply chain management practices on the performance of construction firms within Nairobi City County. The study variables used for this study were green purchasing, green distribution and their relationship or effects on the performance of construction firms. The study employed descriptive research design, and the data collection instrument was the questionnaire. A pilot test was carried out to establish the reliability and validity of the research instrument. A response rate of 66.5% was realized. Data finding were subjected to inferential statistics, Analysis of Variance for analysis. Regression analysis was done to determine the relationship between variables. Test for statistical significance of the variables was done, and the study found out that there is a positive relationship between green purchasing, and green distribution with performance of construction firms. The study conclude out that overall, construction firms are embracing green practices and with every attempt to do so, an increase in indicators of performance such as improved quality, customer satisfaction and improved company image are being experienced.

Key Words: Green Supply Chain Management Practices, Green Purchasing, Green Distribution, Performance, Construction Firms, Nairobi City County

Background of the Study

Strong emphasis has been placed on the responsibility of every industry in Kenya and beyond to contribute to environmental wellbeing as they strive to meet their commercial and social obligations. All industries, manufacturing, construction, extraction and all forms of trade, should continuously strive to conform to the paradigm shift of development versus environment.

According to Hervani, Helms and Sarkis (2005), the important issue is that of making an attempt to seek out procedures to fulfill dire consumption demand of products during this era of growing international markets, whereas promoting positive ecological and social impacts throughout the whole chain.

According to Nasiche &Ngugi (2014), the world's population has a responsibility to develop and implement procurement policies that promote a sustainable approach to making goods and services. Green procurement is an integral part of a green supply chain management system. The Chartered institute of Purchasing and Supplies (CIPS) (2007), defines green procurement as a consideration to the environmental, social and economic consequences of design, materials used (renewable and non-renewable), manufacturing methods, logistics and disposal. Companies are therefore, in reference to this statement, expected to practice greening of their supply chains.

Guenther (2010), brings out insights on how various researchers have examined the positive linkage between green procurement and its contribution towards reduction sources of waste and promotion of recycling among other benefits. It is in line with this kind of background that the study seeks to explore the influence of Green Supply chain practices on the construction firms within Nairobi City County.

Statement of the Problem

It is important to note that a firm's environmental and social performance positively impact its economic performance. According to UNDP (2018), for Kenya to remain globally competitive, it has to manage and sustain her environment and natural resource base. The construction industry is undoubtedly the largest consumer of the natural resource base, ranging from wood, timber, steel and other metals, glass, sand, stone and cement. This fact combined with high rising demand of buildings and other infrastructure, residential and commercial, pose a threat to depletion of natural resource reservoirs.

Another important fact concerning the environment during construction processes is that noise pollution from machinery, dust and dangerous gases such as NOx and CO threaten the safety and health of workers and those living nearby(Kaul, N., 2021). High pollution levels are experienced, especially in the case of particulate matter. Statistics show that industry and power plants are the major source of PM2.5 air pollution at 35%, while other main sources are biomass fuels and road transport. This clearly shows how the distribution system should be overhauled by embracing other transport media other than roads.

The NCA is the institution responsible for enforcing implementation of rules and regulations in the construction industry in Kenya. All construction professionals; engineers, masons, plumbers, welders and electricians have to be registered with the NCA. The Building Code which dates back to the colonial period, have been the guiding pillar in the construction industry, but have not been taking into account technological and environmental changes. A new building code have however been proposed following a revision of the National Construction Authority act in March 2020, that takes into consideration technological changes as well as social and environmental sustainability measures in construction.

Several scholars in their research have come up with findings concerning green supply chain management practices. For instance, Daft (2018), resonates that to protect the environment, businesses should go green in order to enhance economic development that generates wealth while

meeting the needs of the current generation while saving the environment for the future generation. And yet, other scholars like Godstein (2015), are of a different opinion. He argues that the costs associated with adopting green supply chain practices outweigh the benefits. The costs he meant include cost of new technology, specialized staff recruitment, and training and development.

The lack of a middle ground and inadequate information prompts this scholar to undertake this study. In Kenya today, not much is known in terms of to what extent the concept of GSCM have been implemented by the local companies (kibaara, M.J. 2016). The author will seek to bridge the existing gap of knowledge and contribute to the existing pool.

Objectives of the Study

i. To assess the contribution of green purchasing on the performance of construction firms within Nairobi City County
ii. To ascertain the effect of green distribution on the performance of construction firms within Nairobi city county

LITERATURE REVIEW

Theoretical Framework

Social Learning Theory

This theory states that people learn by observing other people, whom they trust are knowledgeable and credible.it also implies that a behavior that is compensated tends to be recurrent. A model's behavior or skill that satisfies is adopted by the observer. According to this theory, education, new skills and behaviors comes from directly undergoing the concerns of using that behavior, skills or the process of observing others and seeing the consequences of their behavior (Sternberg and Lubart, 1991)

Resource Based Theory

According to Werner,(1984) and Barney,(1991),Resource based Theory holds that organizational supply chain performance is determined by the manner in which companies deploy, manage and position their internal resources and capabilities. These resources and capabilities include a bundle of tangible and intangible assets which include people, equipment, information and knowledge, management skills, organizational routines and processes that a company has control over Barney (1991).The Resource based view takes the company as a primary unit of analysis and draws conclusions that the differences in performance between firms solely depends on how those firms employ resources and capabilities.

Conceptual Framework

A conceptual Framework is a graphical or diagrammatic representation of the basic relationship between variables in a study (Hammond &Wellington, 2012). It helps the researcher to quickly and easily see the relationship in a summary.

Green Purchasing

Green purchasing include all purchasing activities starting from vendor selection, material selection, outsourcing and Negotiation, buying, delivery and materials management (Toke et al (2010). Betiol et al (2015) describes green purchasing as all purchasing decisions and award of contracts that are based on environmentally friendly factors, including price and quality.

Amemba et. al (2013), defined green purchasing as environmental purchasing that involve activities such as reduction , re-use and recycling of materials(3 Rs) in the process of purchasing. Toke et al (2010) further identified a number of initiatives that organizations can incorporate into the purchasing function if they are to achieve environmental sustainability. He suggests that

organizations can employ the use of questionnaires to help find out suppliers stance on climate change and general conservation, regular audit and assessments on suppliers to monitor their compliance to environmental standards and requirements.

Ninlawan et al (2010), adds to the above by suggesting that organizations may opt for a participative approach to green purchasing by jointly developing cleaner technology and processes with their suppliers.\

Green Distribution

Green distribution encompasses all aspects of distribution, that is, packaging, handling, transportation and even storage that takes into consideration both human safety and environmental wellbeing.

According to Gilbert and Schreyer (2017), green distribution is the incorporation of environmental thinking into product design, packaging and product labeling. Bilali H.A.(2018) suggests a raft of considerations to be made to achieve a green distribution chain; packaging must be appropriate to reduce environmental harm, and should reflect environmental and financial considerations that can be transferred to the customer or final user. Packaging should also reduce the amount and scale of a product, to minimize use or storage space, promote friendly handling, breakage and leakage free, and labeling should be clear and highly informative.

Transportation media play a great role in environmental conservation. The paradigm shift from the traditional fuel powered vehicles to electric vehicles will transform the transport sector for the better. This will guarantee more effectiveness and efficiency for firms, as well as guarantee major steps in conservation and sustainability efforts.

Conceptual Framework

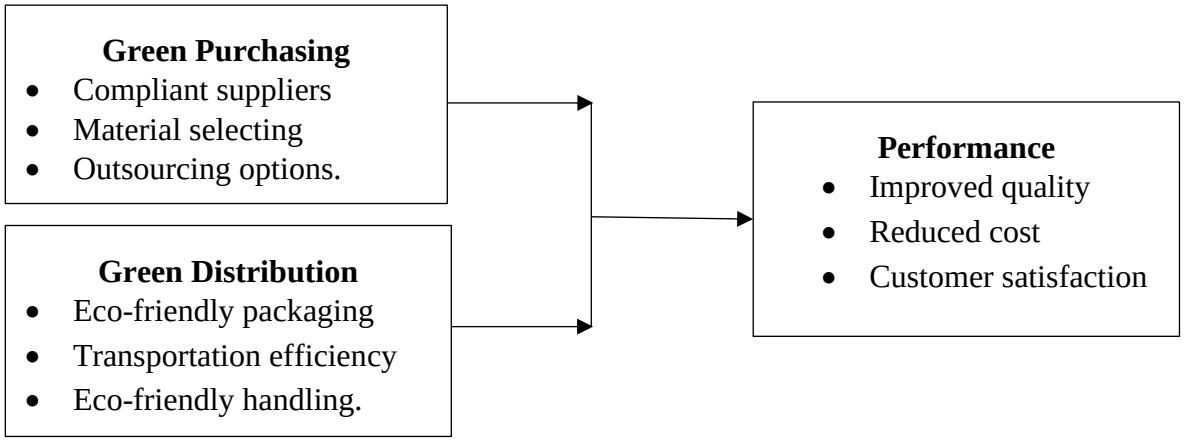

Figure 1 Conceptual Framework

Empirical Review

Green Purchasing

Green purchasing is rooted in the principle of pollution prevention, which strives to eliminate or reduce risks to human health and environment (Bolton, 2010). Purchasing of materials for construction should therefore be evaluated basing on a variety of criteria, ranging from the necessity of the purchase in the first place to the options available for eventual disposal (Berger & Luckmann, 2007). Suppliers for construction material need to be up to date with regulations pertaining sustainability, and strive to meet obligations on their part.

According to Sarkis (2013), the run for green materials involves opting for materials which are either recyclable, re-usable or have it self been recycled. Construction firms in Kenya are becoming more aware of the need for greener materials, and this fact is driving firms to be more and more innovative in developing building materials.

The Kenyan government has also put in place a wide range of policy, institutional and legislative, to govern all business activities to ensure there is protection of the environment.(Odhiambo, 2012)

Green Distribution

Various scholars have delved on green distribution, as a contributing factor to a greener supply chain, and thereafter sustainability of firms and environments. According to Al-Odeh &Smallwood (2012), factors like fuel, modes of transport, infrastructure and operational practices are important factors to consider when developing green distribution systems.

Studies have revealed that emissions from road transport make up to of total carbon emissions. In September 2023, Kenya hosted a congregation of the Africa Climate Summit in Nairobi, which was a decision of the 36th ordinary session of the African Union Heads of States and governments. The carbon menace and its destruction of the ozone layer, which have culminated into climate change, took Centre stage, with leaders demanding urgent action. Going into the future, the use of electric vehicles among other measures would emerge as achievements of that summit, with Kenya leading from the front in the continent.

Performance

Performance is a measurement of desired result. Poor performance in business is often attributed to poor strategies, non -compliance to policy and lack of proper operations guidelines. The state of remaining indifferent to the ever changing business environments make firms lag behind in terms of competitiveness and performance. Customer dissatisfaction, poor quality of outcomes and inefficiency are some of the measures of poor performance.

On the other hand, good performance entails improved quality of outcomes, reduced costs and customer satisfaction. A firm that performs well can be termed as one which has competitive advantage over the others. Competitive advantage can be achieved by differentiation and cost (Porter, 1990). Quality is the basic parameter that has to be met all the way in the supply chain. However, Rao & Holt (2005), argue that competitiveness go beyond a quality product delivered in time. They contend that competitiveness relates to improved quality, efficiency, productivity and cost savings.

Green practices and economic performance are positively interlinked. Improved environmental performance lead to increased competitive advantage and hence superior performance. Good economic performances at industry level culminate into improved country wide economic performance. This statement, though, is easier said than done. Stock, *et al* (1998), states that competitive priorities can be seen as areas in which a firm chooses to excel in order to meet customer requirements.

Firms are at any one point have priority strategies which propel it towards achieving high profits as desired. Coming up with such other strategies as greening, may disorient firms, and find themselves stuck in the middle. Trade-offs as to whether to go green or keep the status quo must be made.

RESEARCH METHODOLOGY

The researcher in this study will employ descriptive research design. This design is concerned with finding out who, what and how of a phenomenon, which is the concern of the study. (Cooper and Schindler 2003). The researcher in this study targets 150 respondents consisting of senior level management, middle and low level management in five construction companies namely Apex

Steel Ltd, Smart Glass Industries, Infretech Ltd, Epco Builders Limites and Intex Construction Limited. The researcher employed stratified random sampling technique on the five construction firms operating within Nairobi City County. A total number of 172 respondents constituted the sample size in this study. The following formula was used to determine the sample size.

$$\mathrm{n} = \frac{N}{1 + (N-1)e^2}$$

Where n = the required sample size

N = the target Population

e = accuracy level required, standard error = 5%

Calculation $\mathrm{n} = \frac{N}{1+(N-1)e^2}$ $\mathrm{n} = \frac{300}{1+(300-1)0.05^2}$

$\mathrm{n} = \frac{300}{1.7475}$ $\mathrm{n} = 172$

The researcher plans to collect primary data by use of questionnaires. The researcher employed inferential analysis on the data. Analysis of Variance (ANOVA) was used as an appropriate model in analyzing data from the research Quantitative data which was processed by use of statistical tools such as the SPSS software, by presenting it in form of tables, pie charts and bar charts, while qualitative data was analyzed by use of descriptive statistics (frequencies and percentages) as well as inferential statistics (Kothari, 2008).

RESEARCH FINDINGS

The sample size that was used for this study constituted of one hundred and fifty respondents working in construction firms within Nairobi City County. Out of the 172 questionnaires distributed, 136 were dully filled and returned, translating to 79% response rate. This was an excellent response rate, as proposed by Mugenda and Mugenda, (2012), and Kothari (2007) that a 50% response rate is good, 60% is adequate, and over70%, excellent.

Descriptive Statistics

Green Purchasing

The research study sought to investigate the extent to which GSCM practices affect the performance of construction firms within Nairobi City County. The respondents were required to provide data which was then used to generate the findings of the research. From the research findings, a good number of respondents indicated that they agreed with most of the statements concerning their organization s attempts to integrate green purchasing in a bid to improve their performance.

Table 1: Findings on Green Purchasing

Statements	SD	D	M	A	SA
The firm has intergrated a formal environmental plan in its purchasing function	0%	10.5%	7%	69%	13.5%
The firm deals with suppliers who are environmentally conscious	0%	3.7%	6.7%	65%	24.6%
The firm outsources some of its purchasing activities to environmental experts	0%	11.5%	15.9%	71.5%	1.1%
The firm have introduced or recognized the use of recycled or re-usable materials	0%	17.5%	22%	58%	2.5%
The firm does staff sensitization environmental matters	0%	0%	18%	72.6%	9.4%

Green Purchasing on Performance

The table below shows the mean and the standard deviation which defines the significance of the statements in showing the relationship between green purchasing and the performance of construction firms. A mean of 2.5 and above indicate a strong significance, which means most respondents agreed with most of the statements. A small standard deviation on the other hand means an insignificant deviation from the mean, which confirms the validity of the statements.

Table 2: Green purchasing on Performance

Statements	Mean	STD dev.
The firm has integrated a formal environmental plan in its purchasing function	4.10	0.32
The firm deals with suppliers who are environmentally conscious	3.95	0.36
The firm outsources some of its purchasing activities to environmental experts	4.01	0.44
The firm have introduced or recognized the use of recycled or re-usable materials	3.99	0.65
The firm does staff sensitization environmental matters	3.95	0.36

Green Distribution

The respondents were requested to indicate the extent of their agreement to the statements made concerning green distribution in their firms. From the research findings, most respondents disagreed on most of the statements, clearly indicating that there is little effort that has been made by the majority of construction firms. Green Distribution is achievable through green packaging, green transportation and logistics. Warehousing is another important facet of distribution that can be leveraged on to make a greener distribution system. Shultz & Holbrook, (2009), asserts that transportation is a key element to distribution. It is clear from the study that most construction firms are stuck in the old distribution models, and much need to be done to shift to a greener system. A summary of the findings is illustrated below.

Table 2: Findings on Green Distribution

Statements	SD	D	M	A	SA
The firm has invested in modern infrastructure that are cleaner and saves on costs	6%	70%	6.7%	10%	7.3%
The firm has introduced alternative modes of transport that save fuel	25%	57.5%	5.7%	10.8%	1%
The firm have implemented optimal routing and scheduling to save fuel and improve delivery time	3%	21%	0%	65.7%	10%
The firm has invested in packaging that is friendly to handlers and saves space	5%	64.6%	3%	19.4%	8%
The firm has considered the use of biodegradable packaging materials	10%	63.3%	0%	21.5%	5.2%

Green distribution on Firm performance

The table below shows the mean and the standard deviation which defines the significance of the statements in showing the relationship between green distribution and the performance of construction firms. A mean of 2.5 and above indicate a strong significance, which means most respondents agreed with most of the statements. A small standard deviation on the other hand means an insignificant deviation from the mean, which confirms the validity of the statements.

Table 3: Green Distribution on performance

Statements	mean	Std Dev.
The firm has invested in modern infrastructure that are cleaner and saves on costs	3.01	0.44
The firm has introduced alternative modes of transport that save fuel	3.01	0.44
The firm have implemented optimal routing and scheduling to save fuel and improve delivery time	3.99	0.65
The firm has invested in packaging that is friendly to handlers and saves space	2.10	0.32
The firm has considered the use of biodegradable packaging materials	3.95	0.36

Firm's Performance

Every organization has its goals and objectives (0utputs. The difference between realizations of intended output versus the actual output largely depends on how an organization strategies. Some desirable outcomes for every organization include increased market share, improved cost efficiency, increased customer satisfaction due to improved quality, lead time and improved customer relationship and loyalty. In this study, firm's performance was the dependent variable, and the researcher wanted to find out from the respondents the extent to which performance in their firms had been affected by GSCM. From the findings, it is evident that indeed GSCM practices positively impact the performance of construction firms.

Table 4: Findings on Firms Performance

Statements	SD	D	M	A	SA
The firm has experienced improved quality of structures/products	10%	1.5%	10%	55%	23.5%
The firm has experienced expression of improved customer satisfaction	6.8%	4.2%	10%	67.5%	11.5%
The firm have experienced reduction of production costs	3.5%	6.3%	8.5%	76%	5.7%
The firm have had its image improved due to adherence of environmental conservation expectations	5.4%	9.2%	6.7%	68%	10.7%

Inferential Statistics

Correlation Analysis

The strength of a relationship between two or more variables is termed as correlation. High correlation define a strong relationship between variables, while low correlation defines a weak variables, while that of -1.00 represents a perfect negative relationship, and that of +1.00 represents a perfect positive relationship.

The Pearson R Correlation Coefficient, also known as product moment correlation, is the most commonly used tool to determine correlation of variables. Pearsons correlation of variables.

Results revealed that there was a strong positive correlation between green purchasing and performance as shown by r=0.765, statistically significant p=0.001; there is a positive relationship between green distribution and performance as shown by r=0.795. These findings concur with Green & Zelbst (2012) who found out that generally, the adoption of Green supply chain management practices by manufacturing organizations leads to environmental performance and economic performance, which in turn positively impact operational performance.

Regression Analysis

Regression analysis model is used to describe how the mean of the dependent variable adjusts to changing conditions. It analyses the variation of dependent variable due to the changes in the independent variables.

An adjusted R squared was 0.665, implying that there was 66.5% variation of performance of construction firms within Nairobi City County, due to the changes in green purchasing, and green distribution. The remaining 33.5% imply that there are other factors that led to performance of construction firms within Nairobi City County which were not discussed in the study. R is the correlation coefficient which shows the relationship between the study variables as shown by 0.832.

Table 5: Model Summary

Model	R	R Squared	Adjusted R. Squared	Standard Error
1	.832[a]	0.692	0.665	0.004

a. Predictors (constant), Green Purchasing, Green Distribution.

Analysis of Variance

The results of ANOVA, which show a p value of 0.01, indicated that the regression model significantly show that the GSCM practices studied, that is, green purchasing, green distribution, affects the performance of construction firms within Nairobi City County. The ANOVA test, determines if the model is statistically significant, and the probability of being misinterpreted is very low.

Table 6: ANOVA

Indicator	**Sum of Squares**	**Df**	**Mean square**	**F**	**Sig.**
Regression	9.709	4	2.427	122.593	0.00
Residual	1.445	73	0.02		

Regression coefficients.

Table 7: Regression Coefficients

Model	**Unstandardized coefficient**		**Standardized coefficients**	**T**	**S**
	B	**Std Error**	**Beta**		
Constant	0.241	0.56	-	2.503	0.015
Green purchasing	0.632	0.223	0.798	2.234	0.002
Green Distribution	0.703	0.143	0.821	2.103	0.000

a. Dependent variable: performance of manufacturing firms

The Regression Equation being

$$Y=0.241+0.632X_1+0.703X_2$$

Where Y=Performance of construction firms

0.0241 =constant

0.632 = green purchasing

0.703 =green distribution

Conclusion

The study concludes that the study variable; green purchasing, green distribution

all had positive significant relationship with performance of construction firms. From the data analysis it was established that for every unit of increase for the sudy variables, there was an equivalent increase in the unit of performance. It can be concluded that improved performance of construction firms going forward cannot be achieved if businesses maintain the status quo. Firms must realize that green supply chain management practices can greatly differentiate a firm from its peers in the industry, especially with increased customer awareness of their environment. The ever evolving policies, rules and regulations imposed by the state and other stakeholders in environmental conservation space also push firms to the limits. Innovativeness and technological advances go hand in hand with sustainability, both for the firm and for the environment.

Recommendations

The researcher recommends that more efforts should be made by construction firms to fully incorporate environmentally conscious purchasing. Firms should also seriously engage suppliers in proactively chatting a way forward in terms of construction supplies that consider environmental wellbeing. With the rampant diminishing rate of natural resources, which should at the same time be conserved for a balanced eco-system, it is high time firms consider alternative sources of construction materials, and suppliers should be on the lookout for these. Innovativeness takes center stage, and this calls for industry leaders to lead the way.

On green distribution, it is evident from the research that there are many aspects of green distribution that are yet to be implemented by construction firms. The researcher recommends that construction firms invest more on fuel saving strategies. Warehousing strategies can be employed, to aid in bulk movement and storage, rather than transportation of small batches of materials

Areas for Further Research

The researcher recommends further research on other variables other than the ones studied in this research, such as reverse logistics, packaging, warehousing and procurement. Further research should also be undertaken outside Nairobi City County, as the problem is not limited to Nairobi, but is experienced in other counties also, especially among urban communities. Further research on the effect of green supply chain management could also be conducted on other firms in other industries, like hospitality, mining, agriculture, engineering and others.

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