

EFFECT OF GREEN SUPPLY CHAIN MANAGEMENT ON ENVIRONMENTAL PERFORMANCE AMONG TEA PROCESSING FACTORIES IN KENYA: A CASE OF NYERI COUNTY

Otieno Judah Onyango Banda¹

Jomo Kenyatta University of Agriculture and Technology

Dr. Ngugi Karanja²

Jomo Kenyatta University of Agriculture and Technology

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ABSTRACT

There has been increasing environmental concern from the government and the general public in the recent past and even today. Much of this concern has been on the impact of corporate activities on the natural environment. Green procurement is one of the most important factors of our environment. This study aimed to bridge such gaps by exploring the effect of GSCM on Environmental Performance among Tea Processing Factories in Nyeri County. This study adopted a descriptive survey. The target population of the study was 174 employees in 10 Tea Processing Factories in Nyeri County. Stratified random sampling was employed to select the sample for the study whereby a 30% sample was picked in each stratum to give a sample size of 52 respondents. The respondents were the managers and general staff in the ten Tea processing Factories. The study carries out a pilot study to pretest and validate the questionnaire. Reliability measured the internal consistency of the instrument which was measured through Cronbach's alpha test while validity was established by the supervisor. The study collected primary data through use of a questionnaire. Data was analyzed using descriptive and inferential statistics. Quantitative data collected was analyzed by use of descriptive statistics using SPSS (Version 22) and presented through percentages, means, standard deviations and frequencies. Qualitative data was analyzed in prose form. The analyzed data was presented by use of bar charts, graphs and pie charts. The study found out that green purchasing, green manufacturing, green distribution, green marketing and reverse logistics affects environmental performance in tea processing firms. The study concludes that green supply chain management affects environmental performance in tea processing firms to a great extent. The study recommends that there should be awareness creation among all stakeholders on how to engage in GSCM, its effects on environmental performance. The study recommends that the staff of tea processing firms should undergo professional experience to increase their technical knowledge on green supply chain management and how it affects the firms and the environment at large.

Key Words: Green Supply Chain Management, Environmental performance, Green distribution, Green manufacturing, Green marketing, Green purchasing, Reverse logistics

1. Introduction

The pressure accompanying globalization has prompted enterprises to improve their environmental performance (Zhu & Sarkis, 2006). Consequently, corporations have shown growing concern for the environment. Increasing environmental concern has gradually become part of the overall institutional culture and, in turn, has helped to re-focus the strategies of corporations. Global warming, reductions in air quality, pollution of waterways and widespread loss of biodiversity are but a few examples of the types of environmental impact that can be attributed to the coordinated activity of organizations in a supply chain. Much of this arises from manufacturing organizations that continue to produce large amounts of unnecessary waste or emissions rather than investing in better technologies or practices to prevent its generation at the source. The “green” component to supply chain management involves addressing the influence of supply chain management on the natural environment. Motivated by an environmentally-conscious mind-set, it can also stem from a competitive motive within organizations (Hervani, Helms & Sarkis 2005).

There is a consensus in the literature that internal environmental management is a key to improving the performance of an enterprise. It is well known that senior managers’ support is necessary and often a key driver for successful adoption and implementation of most innovations, technology, programmes and activities. To ensure environmental excellence, top management must be totally committed (Rao & Holt, 2007). A recent study reported that support from mid-level managers is also a key to successful implementation of EMS practices. A recent study used middle managers to find a positive relationship between middle managers’ perceptions of corporate environmental pro-activity and environmental management.

There has been increasing environmental concern from the government and the general public in the recent past and even today. Much of this concern has been on the impact of corporate activities on the natural environment. This is due to the negative impacts some of these activities have on the environment such as global warming and scarcity of some critical resources. This has led to environmental management becoming a critical business consideration for any company that aims to survive from many regulations and tough business requirements (Yoon *et al.*, 2010). Organizations and people must adopt environmentally responsible production and consumption in order to recover environmental quality, reduce poverty and bring about economic growth, with resultant improvements in healthy working conditions, and sustainability (Nimawat & Namdev, 2012). Every organization including tea processing firms must put measures in place to ensure all dimensions of its operations are environmentally friendly.

Green procurement is one of the most important factors of our environment. Based on this belief, Kenya formed as early as 2007, promoted various environmental strategies, in all areas of corporate activity. These are guided by its corporate philosophy along with the Kenya issued Global Green Procurement Standard. By instituting NEMA, the government of Kenya created a culture that supports waste reduction and green procurement, takes waste reduction as the primary objective, strikes a balance among environment, cost and performance, acquires and comparing environmental performance information, adopts green product criteria, influences market availability and develops green product specifications.

The Kenyan procurement policy needs to be revised to take into account environmental considerations when procuring goods and services – Procurement and Asset Disposal Act. Kenyans need to avoid single use disposable items and purchase products with improved recyclability, higher recycled content, reduced packaging, greater durability, and greater energy efficiency, that utilize clean technology and/or clean fuels, that result in reduced water consumption, that emit fewer irritating or toxic substances during installation or use and that result in reduced production of toxic substances upon disposal.

Statement of Problem

Green Supply Chain Management in itself is not a new concept since literature has been developed in this area from as early as 1989 (Chien & Shih, 2007). Green procurement has emerged as an important new innovation that helps organizations develop “win-win” strategies that achieve profit and market share objectives by lowering their environmental risks and impacts, while raising their ecological efficiency (Ninlawan, Seksan, Tossapol, & Pilada, 2010). However, this literature has not been broadly developed making it difficult to understand the relationship between GSCM and Environmental Performance.

In Kenya, the tea industry is guided by a number of environmental guidelines such as Environmental Management and Coordination Act 1999 on Production, Processing and handling of Tea; The Food, Drug and Chemical Substances (Food Hygiene) Regulations (Cap 254) for the factory and factory Staff handling tea, among green supply chain practices. The Kenya Tea Board conducts continuous tea factories compliance audits on environmental regulations and guidelines. The board audits the tea processing companies on compliance in these regulations. Moreover, to sustainably address the environment and energy use, the tea factories are encouraged to develop and implement sustainable programmes (Kenya Tea Board Report, 2014).

Despite these initiatives, there is continued outcry from environmental conservatists on environmental conservation and sustainable use of natural resources; long-standing concern about land degradation, deforestation and environmental pollution in general (Amemba *et al.*, 2013). It is not clear how the green supply chain management practices being adopted by the tea processing factories is impacting on the environmental performance. Moreover, a review of the local studies conducted shows that Gatari and Were (2014) did a study on the challenges facing implementation of green procurement in manufacturing sector in Kenya. Nderitu and Ngugi (2014) also conducted a study on the effects of green procurement practices on organization performance in manufacturing industry in Kenya. There was very limited research that has been done to relate GSCM with environmental performance. It is against this background therefore that the study sought to explore the effect of GSCM on Environmental Performance among Tea Processing Factories in Nyeri County.

3. Objectives of the Study

The general objective of this study was to establish the effect of green supply chain management on environmental performance among Tea Processing factories in Kenya.

The study was guided by the following specific objectives:

- i. To determine the effect of Green Purchasing on Environmental Performance among tea processing firms in Nyeri County.
- ii. To establish the effect of Green Manufacturing on Environmental Performance among tea processing firms in Nyeri County.
- iii. To assess the influence of Green Distribution on Environmental Performance among tea processing firms in Nyeri County.
- iv. To examine the effect of Green Marketing on Environmental Performance among tea processing firms in Nyeri County.
- v. To determine the influence of Green logistics on Environmental Performance among tea processing firms in Nyeri County.

4. Research Questions

The study sought to answer the following research questions:

- i. What are the effects of Green Purchasing on Environmental Performance among tea processing firms in Nyeri County?
- ii. How does Green Manufacturing affect Environmental Performance among tea processing firms in Nyeri County?
- iii. To what extent does Green Distribution affect Environmental Performance among tea processing firms in Nyeri County?
- iv. What are the effects of Green Marketing on Environmental Performance among tea processing firms in Nyeri County?
- v. How does Green logistics affect Environmental Performance among tea processing firms in Nyeri County?

5. Review of Related Literature

Various researches such as Liu *et al.*, (2011); Huang *et al.*, (2012) have put forward various practices that can be used to achieve GSCM. They argue that different organizations may adopt different GSCM practices depending on their operations and characteristics (Liu *et al.*, 2011) and industrial sector (Huang *et al.*, 2012). Dheeraj and Vishal, (2012) discussed four major practices of GSCM: green purchasing, green manufacturing and materials management, green distribution and marketing and reverse logistics. Ninlawan *et al.*, (2010) on the other hand discussed green procurement, green manufacturing, green distribution, and reverse logistics. Similarly, Amemba *et al.*, (2013) and Srivastava (2007) discussed green procurement, green manufacturing, green operations, reverse logistics and waste management as the major elements of GSCM. In this study, GSCM will be studied under green purchasing and inbound logistics, green manufacturing, green materials management, green distribution/marketing and reverse logistics.

Choi and Zhang (2011) conducted a study on green logistics and business performance in China. They also found out that some organizations have found a match between environmental considerations and profitability. Otago (2009) argued in his findings on green supply management that GSCM helps reduce the ecological impacts of industrial activities thereby enhancing environmental performance. Green *et al.*, (2012) developed a GSCM model focusing

on GSCM practices implemented by manufacturing organizations. They wanted to see whether the adoption of GSCM practices would improve environmental performance. In their findings, it was evident that GSCM had a positive contribution to environmental performance.

Liu *et al.*, (2011) in their study of green supply chain management in China found out a positive relationship between GSCM practices and environmental performances in all the three cases they studied. In these studies, they found out that market actor-oriented models are more sustainable for enhancing GSCM practices than regulation-oriented models as they are based on mutual communications and cooperation among the core stakeholders. They suggested provision of more technical supports and application of market mechanisms other than the mandatory regulations in achieving GSCM. They further suggested production of environmentally friendly products through joint research and making it a requirement for suppliers to satisfy higher environmental standards as strategies for improving the involvement of external green supply chain management practices. It was noted that in all cases, companies entirely focus on the internally proactive environmental management activities because the external part is not implementable. Due to limited scope of their studies, they suggested further studies on interactions between GSCM practices and financial performance, business process and client services and dissemination of successful GSCM practices.

Hsu and Hu (2008) in their study on Green supply chain management in the electronic industry found out that establishment of an environmental database of products, asking for product testing report and top management support; GSCM practices can be attributed to environmental performance. In a study conducted by Chien and Shih (2007) on implementation of green supply chain management practices in the electrical and electronic industry and their relation to organizational performance, it was evident that green procurement and green manufacturing can generate favorable environmental performance.

Mutisya, Munyao, Mutinda and Kipchumba (2013) conducted a study on the effects of GSCM practices on supply chain performance of manufacturing firms in Kenya. The study was limited to manufacturing firms registered with the Kenya Association of Manufacturers (KAM) as per the 2012 directory. This covered 12 distinct sectors under the manufacturing industry in Kenya. It was found out that most of the manufacturing firms in Kenya have adopted and are implementing GSCM practices. In addition, there are immense benefits accruing from adoption and implementation of green practices hence GSCM directly impacts on supply chain performance. They concluded that Green Supply Chain Management practices are yet to be adopted and implemented in full.

Mudgal *et al.*, (2009) conducted a study on greening the supply chain practices in an Indian perspective. They identified the various variables which help in greening the supply chain of Indian manufacturing sector. They focused on societal concern for protection of natural environment, regulations, supplier involvement, customer satisfaction, EMS, employee involvement/empowerment, green product development, green procurement practices, availability of clean technology, green disposal, green transportation, 3R - reduce, remanufacture and recycle, lean manufacturing practices, economic interests, eco labelling of products, reverse logistics practices, competitiveness and corporate image. The authors suggested that a properly designed environmental standard can trigger innovation that lower the total cost of a product or improve its value.

Ottar and Luitzen (2009) conducted a study on green procurement practices at the municipal and country level in Norway. They held that the pressure of customers was the main drive of the enterprise implementing the environment-friendly product in Norway. They indicated that revenues can be positively impacted when customers prefer the products of environmentally friendly firms, resulting in increased market share vis-à-vis less environmentally oriented competitors. Yang and Zhang (2012) also while evaluating the factors of green purchasing practices of 144 Chinese companies revealed that green purchasing is a key strategy for enterprises to reduce waste and improve efficiency and enhance competitiveness; they concluded that leaders' support will boost the green purchasing practices.

Zhu *et al.*, (2007) conducted a study on Green supply chain management pressures, practices and performance within the Chinese automobile industry. The study however found out that the enterprises implementing GSCM in China had only slightly improved environmental and operational performance and GSCM practices had not resulted in a significant economic performance improvement.

6. Research Methodology

This study adopted a descriptive survey. The target population of the study was 10 Tea Processing Factories in Nyeri County. The study targeted both managers and the general staff in the targeted Tea Processing Factories in Nyeri County, who are approximately 174 employees. The study adopted stratified random sampling technique to select the sample. Stratified proportionate random sampling technique produce estimates of overall population parameters with greater precision and ensures a more representative sample is derived from a relatively homogeneous population (Deming, 1990). The study grouped the population into two strata, that is, the managers and the general staff. A sample of 30% was taken as guided by Mugenda and Mugenda (2003) who recommends a sample of 10% to 30% as representative of the entire population. The sample size of the study was therefore to be 52 respondents; that is, 14 managers and 38 general employees who were picked randomly in the 10 Tea Processing Factories in Nyeri County.

Primary data was collected by use of a structured questionnaire. The questionnaire had closed likert questions. The collected data was analyzed using both descriptive and inferential statistics using SPSS (Version 22) and presented through percentages, means, standard deviations and frequencies. The study also conducted a regression analysis to establish the relationship of the variable. The regression model took the following form:

$$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + \varepsilon$$

Whereby Y = Environmental performance, X₁ is green purchasing, X₂= green Manufacturing, X₃= green distribution, X₄= green marketing and X₅= reverse logistic, while β_1 , β_2 , β_3 , β_4 and β_5 are coefficients of determination and ε is the error term.

7. Results and Discussion

The study results show that majority of the respondents (93.2%) reported that green purchasing affect environmental performance in tea processing firms in Nyeri County. Only 6.8% of the respondents indicated that green purchasing did not affect environmental performance. On the other hand, 43.2% of the respondents revealed that green purchasing affect environmental performance among tea processing firms in Nyeri County to a great extent. This was supported by 31.8% of the respondents who indicated to a very great extent. The respondents agreed that the firms select suppliers based on their compliance to environmental standards and requirements; this is shown by the mean scores of 4.20. The respondents also agreed that their firms have a green procurement policy to only outsource from the suppliers who have met environmental standards, as shown by the mean score 4.05. The respondents further agreed that their firms have a participative approach to material selection with their suppliers to ensure environmental standards are met, as shown 3.98 respectively. The above findings are in line with those of Toke *et al.*, (2010) who identified a number of initiatives that can be incorporated in the purchasing function to achieve environmental sustainability; they include developing a supplier environmental questionnaire to help in finding out suppliers' stance on environmental related issues before selecting suppliers; and conducting supplier environmental audits and assessments to monitor supplier compliance to environmental standards and requirements.

On the effect of green manufacturing on environmental performance, majority of the respondents (72.7%) reported that green manufacturing have an effect on environmental performance among tea processing firms in Nyeri County. Further, 47.7% of the respondents revealed that green manufacturing affects environmental performance to a great extent; this was supported by 36.4% who indicated to a very great extent. On the other hand, majority of the respondents revealed that green manufacturing affects environmental performance to a great extent. These findings are in line with those of Al-Odeh and Smallwood (2012) who associated green manufacturing with clean production method, efficient technology, reduced raw materials and resources so as to reach low input, high output and low pollution; thus environmental performance.

On the effect of green distribution on environmental performance, majority of the respondents (65.9%) reported that green distribution affect environmental performance among tea processing firms in Nyeri County. The study findings also show that the respondents agreed that green distribution ensures that products are transported to the market with minimal environmental damage. The respondents also agreed that the firms used varied distribution systems that have less impact on the environment; this is shown by the mean score of 3.94 and 3.70 respectively. According to Nimawat and Namdev (2012) who indicated that green distribution is achievable through; green packaging, green transportation and logistics. The findings are also in agreement with those of Ninlawan *et al.*, (2010) who indicated that green distribution entails green packaging which involves downsizing packaging and use of green packaging materials. They also pointed out the need to cooperate with vendors to standardize packaging, encourage and adopt returnable packaging methods, promote recycling and reuse of packaging materials.

Majority of the respondents (63.6%) revealed that green marketing have an influence on environmental performance among tea processing firms in Nyeri County. Results also show that 41% of the respondents indicated that green marketing influence environmental performance among tea processing firms in Nyeri County to a great extent while 29.5% indicated to a very

great extent. The above findings concur with those of Nimawat and Namdev (2012) who indicated that it was important that environmental concerns are taken care of by offering environmentally friendly products through environmentally friendly distribution and marketing system. On the extent to which reverse logistics affects environmental performance in tea processing firms in Nyeri County; the study results shows that 41% of the respondents indicated to a great extent while 29.5% indicated to a very great extent. These findings corroborates with those of Olaf (2013), who revealed that reverse logistics involves the activities to avoid returns, to reduce materials in the forward system so as to reduce materials flow back and ensure reuse and recycling of materials; thus environmental performance. The above findings also agrees with Zhang and Zheng (2010) who indicated that organizations can implement reverse logistics through recycling and waste logistics which can be established according to the actual need for the collection, classification, processing, packaging, handling, storage, and distribution to specialized treatment facility for processing.

A multivariate regression model was applied to determine the relationship between green supply chain management on environmental performance among tea processing factories in Nyeri County, Kenya.

Table 1: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.792 (a)	0.627	0.554	0.289

a Predictors: (Constant), Green purchasing, green manufacturing, green distribution, green marketing, green logistics

The R^2 is the coefficient of determination and tells us how the dependent variable varies with the independent variables. The results show an adjusted R^2 value of 0.554. This implies that there was a variation of 55.4% between the environmental performance in the tea processing firms and the predictors (Green purchasing, green manufacturing, green distribution, green marketing, and green logistics). This is to mean that green supply chain management (green purchasing, green manufacturing, green distribution, green marketing, and green logistics) explained 55.4% of environmental performance in the tea processing firms in Nyeri County.

Table 2: Coefficients Results

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.087	0.401		2.713	0.008
	Green purchasing	0.242	0.106	0.246	2.289	0.025
	Green manufacturing	0.213	0.081	0.272	2.627	0.010
	Green distribution	0.037	0.084	0.049	0.442	0.660
	Green Marketing	0.003	0.006	0.045	3.447	0.046
	Green logistics	0.018	0.003	0.624	5.742	0.000

a Dependent Variable: Environmental performance

From the regression results, the following model was established:

$$Y=1.087 + 0.242X_1 + 0.213 X_2 + 0.037 X_3 + 0.003 X_4 + 0.018 X_5$$

Results in table 4.14 above shows that there is a positive relationship between environmental performance and all the predictors as predictors as shown: green purchasing ($\beta = 0.242$), green manufacturing ($\beta = 0.213$), green distribution ($\beta = 0.037$), green marketing ($\beta = 0.003$), green logistics ($\beta = 0.018$). The study further found out that there is a statistically significant relationship between environmental performance in tea processing firms in Nyeri County and four of the variables as shown: green purchasing ($p=0.025<0.05$), green manufacturing ($p=0.010<0.05$), green marketing ($p=0.046<0.05$) and green logistics ($p=0.000<0.05$). The above results therefore implies that green purchasing, green manufacturing, green marketing and green logistics are critical elements of green supply chain management that enhances environmental performance among tea processing firms in Kenya.

8. Conclusions

The study concludes that green purchasing affects environmental performance in tea processing firms to a great extent. Green procurement policy adoption helps reduce its impact on the environment and it encourages the sustainable use of resources through maximization of energy efficiency. The study also concludes that there is a significant relationship between green manufacturing and environmental performance in tea processing firms. Green manufacturing supports and sustains a renewable way of producing products and/or services that do not harm people or the environment. It also helps to avoid over-processing, cuts expenditure and limits environmental impact. It also helps minimize waste and pollution as well as reduce and save unnecessary costs of production.

Green distribution also affects environmental performance among tea processing firms to a great extent. Green distribution in the tea processing firms entails using standardized packaging and adoption of returnable packaging methods that promote recycling and reuse of packaging materials. Hence it promotes the use of environmental friendly products that are less harmful to the environment. Green marketing in tea processing firms is geared towards organizations production of products responsible environmentally. Green marketers capitalize on developing strategies that allow consumers to integrate green products into their lifestyles. However,

challenges such as lack of belief by the consumers, high price for the green products and deceptive advertising have been prolonging the success of green marketing.

The study also concludes that reverse logistics affects environmental performance in tea processing firms to a great extent. Reverse logistics suppliers play a role in helping organizations close the loop for products offered by those organizations. It also enables the customers who acquire defective products to return them to their supplier. Moreover, keeping logistics to a minimum helps to reduce fuel costs as well as carbon emissions as well as enhancing supply chain flexibility.

9. Recommendations

The study recommends that there should be awareness creation among all stakeholders (employees, customers, tea farmers and the community) on how to engage in GSCM, its effects on environmental performance and create legally binding policies and framework within the tea industry as a way of embracing environmentally friendly measures as mitigation to climate change and improved health. Engagement of all stakeholders would help in achieving the benefits of GSCM along the whole supply chain.

The study recommends that the staff of tea processing firms should undergo professional experience to increase their technical knowledge on green supply chain management and how it affects the firms and the environment at large. The study also recommends that the companies within the industry to come up with strategic mix or standardized company certification systems within the industry as the use of various certification systems such as ISO, KEBS, NEMA and auditing making it challenging to measure the levels of utilization of GSCM in the companies within the industry.

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