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Reverse Logistics in Sustainable Supply Chain and Performance of Horticultural Sector in Kenya

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Abstract

Reverse logistics is one of the essential sustainable supply chain practices that has been applauded for its ability to promote sustainability and enhance firm performance. This paper sought to assess the influence of reverse logistics as one of the aspects of sustainable supply chain on the performance of horticultural industry in Kenya. The paper also seeks to evaluate the moderating effect of value addition on the relationship between reverse logistics and performance of horticultural industry in Kenya. The study adopted a descriptive research design while the target population was 289 horticultural firms in Kenya. A simple random sampling was used whereby 259 firms were included in the study. Questionnaire was used to collect the study data while the data was analysed through mixed analysis where both qualitative and quantitative techniques was used. Inferential analysis was used to establish the relationship between variables. The data was presented in form of tables and figures. The study found a positive relationship between reverse logistics and performance in the Horticultural Industry in Kenya. It was also established that value addition significantly moderated the relationship between reverse logistics and performance of horticultural industry in Kenya. The study recommends that the management of the horticultural companies should embrace sustainable supply chain through reverse logistics as a way of saving on costs, promoting customer satisfaction and enhancing performance.

Keywords: Sustainable Supply Chain, Reverse Logistics, Firm Performance, Horticultural Industry

Introduction

Background to the Study

Every aspect of the society is continually encouraged to make any contribution that reduces environmental pollution and promotes the welfare of the society now and in future. This outlines the role played by the sustainable supply chain network the board in advancing the sustainable development goals (Prajapati, Kant, & Shankar, 2019). Sustainable supply chain

has been broadly characterized as the administration of material, information and capital streams as well as participation among organizations along the supply chain network while taking into account objectives from every one of the three elements of environmental conservation, i.e., monetary, natural and social into record which are gotten from client and partner prerequisites (Sathish & Jayaprakash, 2017). In sustainable supply chains, natural and social criteria should be satisfied by the individuals inside the inventory network, while it is normal that intensity would be kept up through gathering client needs and related financial criteria (Alshamsi & Diabat, 2015).

Reverse logistics as a supply chain concept emerged alongside other green supply chain management practices in an attempt to enhance sustainability in organizational operations (Green et al., 2012). Since its emergence, scholars have conducted studies to relate reverse logistics with various components of supply chain management like supply chain performance and supply chain efficiency (Morgan *et al.*, 2016). Studies have also related reverse logistics with aspects of organizational performance such as environmental performance, social performance and economic performance.

Reverse logistics can also be defined as the backward movement of products, components, materials, and equipment and technical systems (Morgan et al., 2016). In a production set up, faulty products are normally recalled for rework and surplus materials returned from the production floor. Agrawal et al (2015) define reverse logistics as 'the process of planning, implementing, and controlling the efficient, cost effective flow of materials (faulty goods, surplus goods, packaging materials and related information) back into the organization from the lower loop of supply chain. Sangwan (2017) characterizes switch coordination as 'the way toward arranging, executing, and controlling the proficient, savvy stream of crude materials, in-process stock, completed products and related data from the purpose of utilization to the point of cause to recapture esteem and ensuring proper disposal of wastes and excess materials.

Value addition is any additional activity that in one way or the other changes the nature of a product thus adding to its value at the time of sale (Govindan & Bouzon, 2018). Value adding is the process of changing or transforming a product from its original state to a more valuable state (Boland, 2009). Value addition can therefore be said to be a process of enhancing a product to gain more from it. In agriculture the role of value addition is to maximize production and economic value of a produce. It is production process phase that involves enhancing product quality for the consumer and hence brings about higher net value.

The horticulture industry in Kenya plays an important role in food security, employment creation, and poverty alleviation (Agricultural Sector Coordination Unit [ASCU], 2011). The sector contributes enormously to food security and household incomes to a majority of Kenyan producers who carry out one form of horticultural production or another and employs over six million Kenyans both directly and indirectly thus improving on their livelihoods (Ministry of Agriculture, 2010a). However, the potential for horticultural production in the Arid and Semi-Arid Lands (ASALs) of Kenya has not been fully utilized to be of help to the communities living in those regions (Ministry of Agriculture, 2010b). This is because farming in Kenya is mainly rain fed and the arid and semi-arid regions lack sufficient rainfall to support sustainable rain fed farming (Ministry of Agriculture, 2010b).

Generally, the arid and semi-arid regions of the world are vulnerable to frequent and often severe droughts due to unreliable and erratic rainfall that these regions receive leading to massive crop failures and therefore lack of food security (HCDA, 2010). According to the Kenya

Horticultural Council (2017), horticulture is ranked third after tourism and tea in foreign exchange earnings.

Statement of the Problem

The Government of Kenya's Medium-Term Plan Three (2018-2022) underscores the pivotal role of the horticultural subsector comprising of cut flowers, vegetables, nuts and herbs to Kenya's export drive, economic growth and development at large (GOK, 2018). Kenya's Vision 2030 lists limited value addition coupled with high production costs among other factors as making Kenyan agricultural exports less competitive in the global market (GOK, 2017). The performance of the horticultural subsector which is the fastest growing in the Kenyan agricultural sector (Kenya Horticulture council- KHC, 2017) is affected by factors such as stringent production standards and trade regimes, climate change and variable weather, sluggish recovery in Europe, internal structural and institutional issues such as inefficiencies in supply chain (AFA, 2017). From the year 2008, Kenya's global market share fell from 1.28% in 2008 to 1.03% in 2017. Moreover, the growth in agriculture value added declined from 5.5% in 2015 to 4.0% in 2016 and further declined to 1.6% in 2017 with underdeveloped value chains cited as a major challenge in the horticultural subsector (GOK, 2018).

Sustainable supply chain has been considered a key aspect in promoting performance through a well embraced way of differentiating organizational products from those of the competitors (ILO, 2013; VIETRADE, 2014). However, very little has been done to link sustainable supply chain and performance in the horticultural industry which has been facing shrinking competitiveness in the global market over the recent past. This study seeks to fill the existing gaps by unveiling the influence of sustainable supply chains while narrowing down to reverse logistics on performance of the horticultural sector in Kenya.

Objectives of the Study

1. To establish the relationship between reverse logistics and performance in the Horticultural Industry in Kenya
2. To analyse the moderating effect of value addition on the relationship between reverse logistics and performance in the Horticultural Industry in Kenya

Research Hypotheses

H_{A1}: Reverse Logistics have a significant positive influence on performance in the Horticultural Industry in Kenya

H_{A2}: Value addition has a significant positive moderating effect on the relationship between reverse logistics and performance of the Horticultural Industry in Kenya

Literature Review

Theoretical Review

The paper was informed by the Theory of Reasoned Actions (TRA). The TRA model, developed by Ajzen and Fishbein (1980), is a conviction frame of mind social goal model, which proposes that a person's impression of what others consider significant is influenced by their goal and that disposition assumes a noteworthy job in foreseeing conduct (Rossmann, 2021; Paul et al., 2016). In this investigation, green obtaining is identified with a company's expectation to purchase an item that is less harmful to the earth and the general public on the loose.

Voss et al (2006) confirmed that customer's goal to purchase green items is incredibly impacted by uplifting disposition and the apparent green estimation of the items. An

examination by Mishra et al (2014) additionally discovered that purchaser's disposition impacts his or her green item buy goal. The hypothesis has been exposed to reactions by a few creators, the most significant analysis is that the hypothesis of contemplated activity isn't falsifiable since a hypothesis must be falsifiable to be a decent hypothesis, henceforth if the hypothesis of contemplated activity isn't falsifiable, then it is not a good theory regardless of how many researchers believe it to be useful. The theory is useful in the study of reverse logistics as it explains a firm's deliberate decision to engage in activities that promote the environmental and social wellbeing of the society.

Conceptual Framework

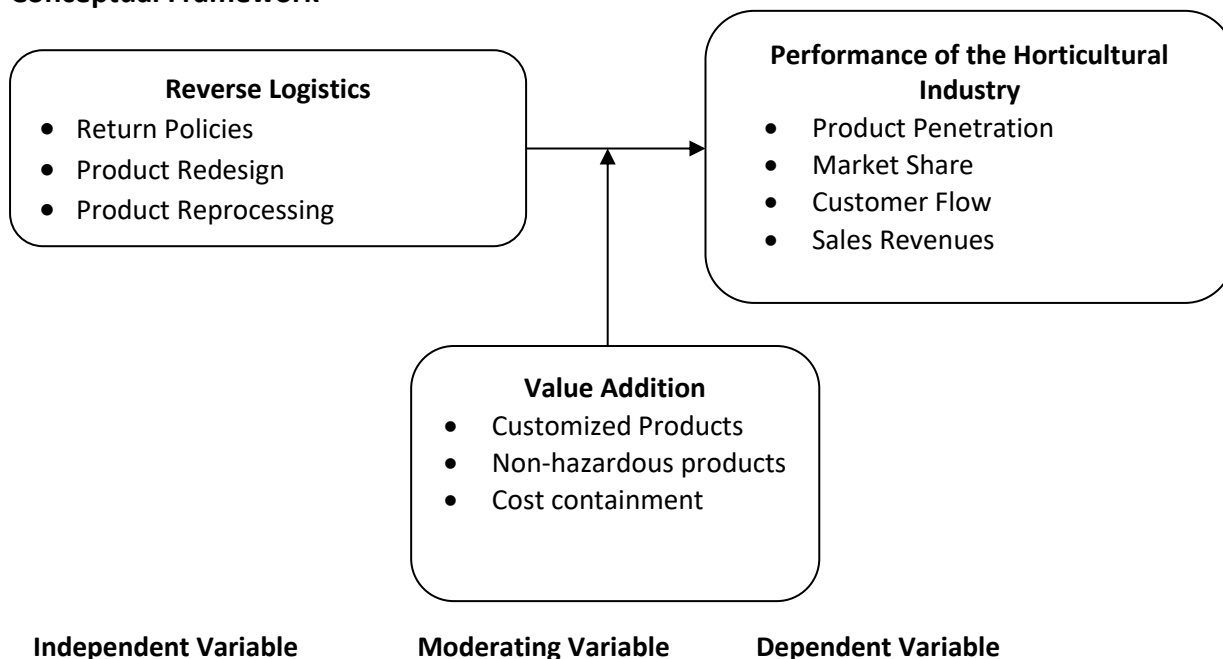


Figure 1: Conceptual Framework

Empirical Review

Reverse logistics is the process by which commodities are moved from the buyer/consumer to the producer through use of the distribution channel. In most cases, reverse logistics is termed as the ability of an unsatisfied customer or a customer who wants to have purchased commodities used elsewhere to use a given distribution channel to return the goods to the producer. This is one of the ways of promoting green and sustainable supply chain management by reducing waste and enabling the manufacturer to reproduce or re-use already sold goods or packages. Badenhorst (2013) carried out a framework for prioritizing practices to overcome cost-related problems in reverse logistics. The aim of the study was to analyse the prospects of reverse logistics in terms of costs so as to enhance the latter for better performance of the procurement process and promote value addition. The study established that reverse logistics was key in promoting value addition through which goods that needed to be reprocessed to enhance quality as well as enhance proper disposal were effectively taken back to the supplier. According to Badenhorst (2013), promoting reverse logistics played a significant role in achieving the green supply chain management but still required cost saving measures due to the processes and costs involved in returning the commodities to the supplier.

Jayant et al (2012) did a study on the perspectives in reverse supply chain management. The study was based on literature review of previous studies on reverse logistics and sustainability of green supply chain and value addition. The study found that as a way of promoting the effectiveness of procurement process and meeting the customer needs, reverse logistics was necessary through which the customers could return their goods if not meeting the standards or in the right description. Jayant et al (2012) contemplated that reverse logistics played a role in value addition where the customer is facilitated to return the goods to the supplier thus giving the supplier more room to handle quality and other related concerns.

Elsewhere, Udin (2012) did a study on the impact of reverse logistics product disposition towards business performance in Malaysian E&E Companies. The study aimed at establishing the effect of reverse logistics on business performance among Electrical and Electronic companies in Malaysia. The study adopted a descriptive research design and had a sample of 160 respondents. The study established that reverse logistics contributed to business performance through which both parties stood a chance to get the best out of the business by ensuring that whatever that is supplied is to the optimal requirement of the customer and that the supplier gets what is with the range of quality supplied (Udin, 2012).

Roheim *et al* (2007) analyzed the value of brands and other value addition activities meant to target specific segments in the frozen fish market. They used purchased retail point scanner data of 687 frozen fish products, collected weekly over three years (2002-2005). The sales data included quantities sold and prices by brand, package size, and product promotions. The data was analyzed using hedonic pricing model and results appeared to indicate that consumers preferred “natural” fish that was less processed, and less value added, and they were ready to pay a premium for that. This is to be expected in markets where health and wellness concern override other factors influencing demand. The other observation is that traceability is gaining more value among dealers because quality of their products has a direct impact on their reputation.

Punjabi (2007) observed that it has become clear worldwide that the most rapid growth in agriculture has been occurring on the part of post-production activities. This is being driven by growth of middle-income consumers even in low income countries and their demands for better quality value added products. Absence of agro-industry and agribusiness resulting in low levels of value addition of agricultural commodities has been one of the main causes of stagnation in rural incomes. A substantial agribusiness sector generating a high outflow of value-added commodities is always correlated with high agricultural GDP and high rural incomes.

Mapiye *et al* (2007) analysed the potential for value addition of Nguni cattle products in the communal areas of South Africa. They concluded that development and research programmes aimed at reintroducing the Nguni breed in the rural areas should take a holistic and participatory approach in agro-processing and value-addition of Nguni cattle products. Increased value addition can be achieved by provision of appropriate incentives for the establishment of agro processing industries in the rural areas and promotion of partnerships between communal farmers and agribusiness.

Research Methodology

The study used a descriptive cross-sectional research design. This is a design that mixes both descriptive and cross-sectional research designs. The descriptive is meant to obtain and analyse both qualitative and quantitative data while cross-section is utilized so as to enable the study to compare the relationship between variables, using a regression model. The target

population for the study comprised of the horticultural companies in Kenya. There are approximately 289 horticultural firms in Kenya. Supply chain managers in these companies were targeted as the units of observation.

To establish the appropriate sample size for the study, Yamane' (1967) formula was used as shown below:

$$n = \frac{N}{1+N*e^2}$$

. Where:

n is the sample size

N is the target population (289)

e is the error margin (0.02)

$$n = \frac{289}{1+289*0.02^2}$$

n = 259

The sample size for the study was therefore 259 supply chain managers from the horticultural companies in Kenya. The firms were randomly selected through simple random sampling from the 289 registered horticultural companies.

Primary data was the main data used in the study. The data was collected using a structured questionnaire. The questionnaire was administered both physically/manually and through electronic means. This ensured ability to reach out to different kinds of respondents and in different localities.

The study used both descriptive and inferential statistics to analyse data. Descriptive statistics such as frequency distribution and measures of central tendency was used to analyse the demographic data. First, preliminary analysis was performed. This involved screening the data to check for errors by inspecting the frequencies of each variable, including all the individual items that make up the scales. Descriptive statistics was used to describe the characteristics of the sample and to check for statistical conclusion validity by looking for violation of the assumptions underlying the statistical techniques used to address the specific research questions. In order to establish the influence of the independent variable on the dependent variable, a linear model was used. Therefore, the model for this study was consolidated as:

$$Y = \alpha + \beta_1 X_1 + \varepsilon$$

Research Findings and Discussion

Response Rate

The sample size of the study comprised of 259 heads of the supply chain section in horticultural firms in Kenya. Out of 259 questionnaires which were distributed, 221 were duly filled and returned, implying a response rate of 85.3% which was considered adequate for analysis, drawing conclusions and reporting.

Reverse Logistics

The study sought to determine the relationship between reverse logistics and competitive advantage of horticultural industry in Kenya. Table 1 presents the findings obtained. The study established that additional measures taken by the firm can take to enhance reverse logistics in the procurement processes were knowing why returns happen in the first place, having a transparent monitoring systems in place, tracking all aspects of reverse logistic, collaboration with retailer and wholesalers, rethinking transport and logistics, having clearly established

return plan, investing in the right technology for reverse logistics and having a return labels to the original packaging.

The findings concur with Badenhorst (2013) who established that reverse logistics was key in promoting value addition through which goods that needed to be reprocessed to enhance quality as well as enhance proper disposal were effectively taken back to the supplier. Further, promoting reverse logistics played a significant role in achieving the green supply chain management but still required cost saving measures due to the processes and costs involved in returning the commodities to the supplier. Jayant, Gupta and Garg (2012) found that as a way of promoting the effectiveness of procurement process and meeting the customer needs, reverse logistics was necessary through which the customers could return their goods if not meeting the standards or in the right description.

Table 1

Influence of reverse logistics on performance

Statement	Mean	Std. Dev
Our firm has a supply chain framework provides for product Returns.	3.961	1.476
We have embraced a mainstream to allow our stakeholders to return goods that do not their standard or need to be remanufactured	3.856	1.525
The organization has enhanced systems for screening of defective and unwarranted returned merchandise	3.830	1.441
We are realizing cost savings because of our reverse logistics activities	3.955	1.546
Our organization has a well-organized channel for reverse logistics	3.836	1.426
The company has laid out proper measures to ensure reprocessing and rebranding of returned goods	3.994	1.343
Redesigning defective merchandise has been emphasised in our firm to meet customer demands and avoid wastage	3.988	1.475

Value Addition

The study sought to establish the moderating effect of value addition on the relationship between reverse logistics and competitive advantage of Horticultural Industry in Kenya. Table 2 presents the findings obtained. The study revealed that horticultural firms enhance value addition to achieve its competitiveness and enhance performance, through creation superior products than competitors, having environmentally friendly products that are of higher quality, creating customized products for different market segments and having unique products that are hard to imitate in the market. The findings concur with Hammes *et al* (2020) concluded that organization, stage in the value chain and market power are important to innovation, and that Wholesalers and retailers tend to have a larger number of new products, whereas manufacturing firms tend to invest more in research and development. Mapiye *et al.* (2007) indicated that increased value addition can be achieved by provision of appropriate incentives for the establishment of agro processing industries in the rural areas and promotion of partnerships between communal farmers and agribusiness.

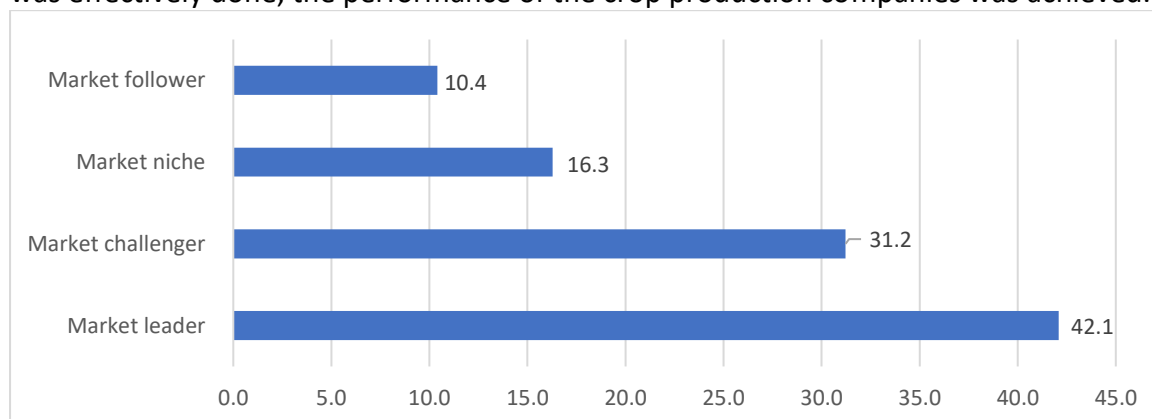
Table 2

Value addition in the Horticultural Industry

Statement	Mean	Std. Dev
Our company has ensured access and availability of customized products across all our supply chains	3.738	1.168
The company is committed towards having non-hazardous products across all its product lines in the market	3.988	1.182
Since the company started focusing on sustainable supply chain management the operational costs have been contained to some percentage	3.902	1.235
The company has increased its internal efficiency as a result of focusing on sustainable supply chain management	3.850	1.220
Value addition in the products by our company has contributed to the company's performance	3.909	1.359

Competitive advantage of the Horticultural Industry

The study sought to determine the competitive advantage of the horticultural firms. The study findings are present in Figure 2. From the findings the study revealed that major source of performance for horticultural firms was quality of the products, adherence to environmental laws in their operations, market segmentation through products for each market, packaging products that differentiate us from the competitors, having collaboration with suppliers who observe environmental laws and involvement in environmental corporate social responsibility activities. The findings concur with Liao, Hu, and Ding (2017) who revealed that performance was to a great extent determined by the innovativeness of an organization. Subba (2016) established that through proper measures of supply chain management and ensuring that it was effectively done, the performance of the crop production companies was achieved.

**Figure 2: Competitive Position of Organization in Relation To Other Players****Hypothesis Testing**

H_{A1}: Reverse Logistics have a significant positive influence on performance in the Horticultural Industry in Kenya

The regression model analysis through linear regression was carried put to establish the extent to which reverse logistics influenced the performance of horticultural industry in Kenya. The model summary as shown in Table 3 revealed that the R-square for the model was

0.452. This is an indication that 45.2% of the variation in competitive advantage of horticultural industry in Kenya is due to reverse logistics.

Table 3

Model Summary on Reverse Logistics

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.672 ^a	.452	.450	.56796

a. Predictors: (Constant), Green Logistics

The ANOVA test results are as shown in Table 4. As the results portray, the F-value for the model was 180.710 at a significant level of $0.000 < 0.05$. This is an implication that the model can reliably predict the relationship between reverse logistics and competitive advantage of horticultural industry in Kenya.

Table 4

ANOVA for Reverse Logistics

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	58.293	1	58.293	180.710	.000 ^b
1 Residual	70.644	219	.323		
Total	128.937	220			

a. Dependent Variable: competitive advantage

b. Predictors: (Constant), Reverse Logistics

The regression results for the model are as shown in Table 5. Analysis of the model yielded the Beta coefficient for the level of income of 0.632. This implies that reverse logistics influence 71.4% of the competitive advantage of horticultural industry in Kenya. The relationship between reverse logistics and competitive advantage of horticultural industry in Kenya is significant at $P=0.000 < 0.05$. To this effect, the alternative hypothesis is accepted.

Table 5

Regression Coefficients on Reverse Logistics

Model		Unstandardized Coefficients		Standardized Coefficients Beta	t	Sig.
		B	Std. Error			
1	(Constant)	.959	.152		6.306	.000
	Green Logistics	.632	.047	.672	13.443	.000

a. Dependent Variable: Competitive advantage

H_{A2}: Value addition has a significant positive moderating effect on the relationship between sustainable supply chain and competitive advantage of the Horticultural Industry in Kenya

The coefficients findings of the moderated regression analysis were used to test the final research hypothesis: Value addition has a significant positive moderating effect on the relationship between sustainable supply chain and performance of the Horticultural Industry in Kenya.

From the results, it can be deduced that the moderated reverse logistics has a positive (0.097) influence on competitive advantage of the horticultural industry. The influence is significant with a p-value of 0.016. The findings therefore suggest that we accept the alternative

hypothesis that value addition has a significant positive moderating effect on the relationship between reverse logistics and competitive advantage of the horticultural industry in Kenya.

Table 6

Moderated Beta Coefficient

Model	Un standardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	.909	.336		2.707	.007
Reverse Logistics* Value addition	.097	.040	.072	2.442	.016

Conclusions and Recommendations

Conclusions

The study found that reverse logistics and competitive advantage of the Horticultural Industry in Kenya are strongly related. The findings further showed that the relationship. The findings also showed that reverse logistics has a positive influence on performance in the Horticultural Industry in Kenya. The study accepted the alternative hypothesis that reverse logistics have a significant positive influence on performance in the Horticultural Industry in Kenya. The study concludes that reverse logistics is positively related to performance in the horticultural industry in Kenya.

The study found that horticultural firms are committed towards having non-hazardous products across all its product lines in the market, value addition in the products by companies have contributed to the company's performance, since the firms started focusing on sustainable supply chain management the operational costs have been contained to some percentage, the companies have increased its internal efficiency as a result of focusing on sustainable supply chain management and firms have ensured access and availability of customized products across all supply chains.

Recommendations

The management of the horticultural companies is mandated to ensure effective performance of the companies by promoting key and essential measures that ensure cost-saving, enhanced customer satisfaction and increased quality of products. This would be mainly achieved by embrace of sustainable supply chain practices such as reverse logistics, where most of these practices uphold minimization of costly and environmentally unfriendly materials and processes.

The study also recommends that the companies should ensure that their reverse logistics are properly structured. This would ensure that customer needs are met, ensuring customer loyalty and making it difficult for competitors to imitate simple services that are geared towards value creation and the environment.

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