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Reverse Logistics Recycling Practice and the Performance of Large Manufacturing Firms in Kenya

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Abstract

Globally there are pressures on organizations to act responsibly in terms of the protection of the environment and create value for all stakeholders. There is a rising global interest in reverse logistics. Product disposal may no longer be the consumer's responsibility as products need to be recycled or remanufactured by the original manufacturer. Increased, strict environmental and packaging regulations are forcing firms to become more accountable for residual and final products, long after the product is sold and is in the hands of the customers. As a result, there is a great opportunity for researchers and academicians to advance the study of reverse logistics to solve the problem of product handling within the supply chain. This study aimed to determine the influence of reverse logistics recycling practice and the performance of large manufacturing firms in Kenya. The study used a descriptive design and the target population was large manufacturing firms that are registered with the Kenya Association of Manufacturers. Data was analyzed using descriptive and inferential statistics. Pearson correlation coefficient for the output indicated that recycling practice was able to explain 31.7% variations in the firm performance. The study concluded that there is a significant positive relationship between recycling practice and firm performance. The beta coefficient for recycling practice was 0.563. This indicates that a unit increase in recycling practice would result in 56.3% increase in manufacturing firm performance. The study recommended that recycling practices be adopted by manufacturing firms as a way of improving firm performance. The study also recommended that all manufacturing farms should adopt Recycling practices to gain material recovery and environmental improvement.

Keywords: *Supply Chain Management, Reverse Logistics, Recycling, Manufacturing Firms, Performance, Practices.*

1.0 Introduction

There is a rising global interest in reverse logistics. Manufacturing industries have the opportunity to increase their profit margins and minimize losses through efficiently handling returns. Many companies are discovering that they can maximize secondary market opportunities to recoup some losses in their returns (Haas, & Krausmann, 2015). There are pressures on organizations to act responsibly in terms of the protection of the environment and create value for all stakeholders (Epstein, & Buhovac, 2014). The global economy is another factor that makes reverse logistics a key improvement area for manufacturing firms that are

expanding. The Ongoing global economic "volatility", as well as the growing global focus on sustainability, are placing more pressure on logistics managers to establish a strategic alternative distribution network such as reverse logistics.

Recycling refers to the process through which waste products and materials are converted into new products and resold to the consumer (Qiang et al., 2013). The product is broken down and "mined" for components that can be reused or resold. Recycling has grown in interest, both in the past and in the present, as the demand for basic needs increased with limited supply. The positive effect on the national economy from recycling has become more and more evident. Recycling has promoted environmental advantages and the convenience of reusing materials. Even though the generation of waste has gradually increased every year, recycling has kept moving forward by increasing the percentage of total waste being recycled. The rate at which waste is generated is higher than the amount of waste being recovered. Thus, recycling remains today an important national and global issue (USEPA, 2008).

With the rapid economic growth and urbanisation that is taking place in Kenya, solid waste generation and management are becoming a major social and environmental issue. The Kenya Government has been trying to increase the recycling rate in the country, which is quite low when compared to other developed countries. Most developed countries have overall recycling rates of 50 percent or higher. This implies that 50 percent of their solid waste is segregated for recycling instead of being thrown away.

In the light of the discussion above, this paper attempts to examine the influence of recycling as a reverse logistics practice on the performance of manufacturing firms in Kenya. Until recently, Reverse Logistics (RL) was not given a great deal of attention in organizations. Implementing RL programs to reduce, reuse, and recycle wastes from distribution and other processes generates tangible and intangible value and can lead to a better corporate image (Carter et al., 1998). Its main drivers are legislation and directives, consumer awareness, and social responsibilities toward the environment (Ravi& Shankar, 2005). Another motivating driver of RL is economic factors. RL can generate profits by reselling valuable components or products (Toffel, 2003). Due to environmental regulations and consumer pressures to increase customer service, companies are focusing on reverse logistics. The growing environmental concern worldwide has forced companies to engage in reverse logistics, such as the re-use of products and materials and recycling. Reverse logistics can lead to improved relationships with supply chain partners, improved profits through reduced costs, improved efficiencies, and higher recovery rates for returns.

Grant et al. (2016) defines logistics as the management of the flow of goods, information, or materials from one point of origin to point of consumption, and in some cases even to the point of disposal. Reverse logistics is the process of planning, implementing, and controlling the efficient, cost-effective flow of raw materials, in-process inventory, finished goods, and related information from the point of consumption to the point of origin to recapture value or proper disposal (Govindan et al., 2015). Reverse Logistics practice is a way/process/method which adds value to products produced by firms in a manufacturing process through managing product EOL (Jabbour et al., 2013).

1.1 Statement of the problem

In 2010 it was estimated that Nairobi County generated 1500 tons of solid waste daily (Anyango & Mwololo, 2013). Later in 2017, the County had an estimated 2,475 tons of waste being produced each day (NEMA 2017) hence causing a lot of environmental damage. Manufacturing firms are hence under pressure to act responsibly in terms of the protection of

the environment, proper utilization of resources as well as creating value for all stakeholders (Nylund, 2012). Currently, manufacturing firms in Kenya are under pressure from the government to improve environmental protection and integrate its solid waste management systems as part of "Vision 2030". However, reverse logistics through recycling is still at an infant stage in Kenya, the government is encouraging manufacturers to promote waste recycling by drafting policies and offering support to private waste management companies with increasing environmental awareness (Lemos &Agrawal, 2006). There is a significant need to identify how to increase the awareness and recycling behaviour among Kenyans. This gap between intention and action regarding recycling and other environmental behaviour has been noted by several studies in other countries (Mee et al., 2004; Tonglet et al., 2004; Woollam et al., 2006), and it is a subject that requires considerable research within Kenya.

1.2 Study Objectives

i. To establish the influence of recycling through returnable packages strategy in reverse logistics and the performance of large manufacturing firms in Kenya.
ii. To determine the influence of recycling through recalls strategy and the performance of large manufacturing firms in Kenya.
iii. To evaluate the influence of recycling through trade-in strategy and the performance of large manufacturing firms in Kenya.
iv. To evaluate the influence of recycling through product recoveries strategy and the performance of large manufacturing firms in Kenya.

2.0 Literature Review

Recycling refers to the process through which waste products and materials are converted into new products and resold to the consumer (Qiang et al., 2013). Organizations have come up with returnable packages that facilitate the process of recycling to avoid the wastage of useful products. The organizations have devised a method that allows packages to be returned to the manufacturers for recycling instead of becoming waste. This can be well illustrated by the beverage companies that have taken it upon themselves to collect bottles for recycling after the consumption of the packed beverages. The preparation of returnable packages has allowed companies to save on the cost of production by the use of the already available packaging devices. The reverse logistics through the use of returnable packages are also available in other manufacturing companies such as the motor vehicle industry pharmaceuticals in the medical industry (Agrawal et al., 2015).

Reusable items or functional returns are related to the consumption, use, or distribution of the main product where products go backward and forwards in the supply chain owing to their inherent function. An example would be reusable containers, bottles, and pallets which can be used in the distribution process because their function is to carry other products and they can serve this purpose several times. The common characteristic is that they are not part of the product itself, but contain and/or carry the actual product (Manzini, 2014). Under reverse logistics, product recalls are also included in this process. This is the process through which an organization takes back products dispatched to customers due to faults or risks posed to consumers if they use them. The discovery of safety issues on a product puts a company's reputation at risk. The process puts the organization at risk of legal action if the customers are harmed by the products. For competitiveness some companies have created revenue for voluntary recalls making them appear more reliable to customers (Elsbach, 2014). Products recall can be costly to companies as they call for a full refund of the purchase money to the customers.

Trade-in is a sales promotion strategy where the consumers are offered a fixed discount which is also called a trade-in allowance on the prices of a new model or item in exchange for an older model or item (Souza, 2013). In reverse logistics, organizations are encouraged to accept trade-ins in lieu of discounts on the initial sale. In some stores discounting and negotiating are a part of daily life, although there are ways to eliminate negotiating. Trade-ins can work to increase overall margins and average sale size, and help recycle used merchandise (Qin, 2014). For operations with designated clearance areas, the organization should set a dollar rate for various trade-in commodities. When negotiating with the customers, one needs to inform them that the organization can only discount a small percentage for cash payment, but there is a trade-in program where they can receive a price discount depending on the item being traded in (Deresky, 2017).

Introduction of product recovery is an environmentally conscious approach where products are returned from users or production lines to be reused. Product recovery aims at recovering the residual value of used products. Recovery options include the extension of the life span of a product or some of its parts through repair and remanufacturing or of materials through recycling (Govindan et al., 2015). Recovery prevents waste by diverting materials from landfills and conserves natural resources (energy and materials). Firms are often encouraged to offer product recovery activities as a demonstration of corporate citizenship.

Literature has found numerous benefits associated with the recycling concept within reverse logistics management. A study carried out by Guerrero et al. (2013) outlined the importance of recycling as a waste management strategy due to its ability to reduce disposal costs and waste transport costs and prolong the life spans of sanitary landfill sites. According to the research, to realize the potential benefits of waste recycling, and organizing and managing recycling programs, entities need to consider appropriate options for recycling programs about financial-economic constraints; the existing situation; regulation; institutional, environmental, socio-cultural, and technical issues.

3.0 Methodology

The study adopted a descriptive design. The target population for this study was the 240 large-scale manufacturing firms in Nairobi County which are registered members of KAM. A sample size of 150 manufacturing firms was selected using purposive sampling method. Data was collected from primary sources through the survey method by use of questionnaires and analyzed using descriptive and inferential statistics.

4.0 Results and Discussions

4.1 Response Rate

Out of the 150 questionnaires distributed, 129 were correctly filled and returned which represents a response rate of 89 percent. According to Kamel and Lloyd (2015) response rate of above 50 percent in business management research should be considered good. Therefore, the 89 percent response rate reported for this study formed an acceptable basis for a conclusion.

Table 1: Response Rate

Response rate	Sample size	Percentage %
Returned questionnaires	129	89
Un-returned questionnaires	21	14
Total	**150**	**100**

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4.2 Descriptive statistics

The Recycling Practices variable consisted of sixteen items. Each scale was rated on a five-point Likert type scale ranging from 1 for "Strongly Disagree," to 5 denoting "Strongly Agree". Average scale ratings ranged from 3.829 to 4.806. This indicated that the respondents believed that Recycling Practices exhibit moderate to high levels of implementation as part of reverse logistics. The highest mean rating was 4.806 for the statement "The Firm allows packages to be returned to the manufacturers for recycling instead of becoming waste." (Std.D= 0.452, n=129). The statement with the lowest mean rating of 3.829 was "Returnable packages provides proper Obsolete." (Std.D= 1.039, n=129). The composite average of Recycling Practices was 4.285 (Std.D =0.786) which was a high rating indicating that on average, recycling practices are highly implemented as part of reverse logistics.

Table 2: Descriptive Statistics

Code	Recycling Practices	SD (%)	D (%)	N (%)	A (%)	SA (%)	Mean	Std. Deviation
RP1	Returnable packages provide proper Obsolete equipment/product disposition	0	0	9	45	47	4.380	0.640
RP2	Returnable packages facilitate the process of recycling to avoid wastage of useful products.	0	13	24	29	33	3.829	1.039
RP3	The Firm allows packages to be returned to the manufacturers for recycling instead of becoming waste.	0	0	2	15	83	4.806	0.452
RP4	Returnable packages have allowed the firm to save on the cost of production by the use of the already available packaging devices.	0	0	28	26	47	4.186	0.846
RP5	The firm recalls products dispatched to customers due to faults detected on the products.	0	0	32	15	53	4.217	0.901
RP6	The firms recall products dispatched to customers due to risks posed to consumers if they use them.	0	1	29	34	36	4.047	0.828
RP7	The firm recalls products to avoid the risk of legal action if the customers are harmed by the products	0	0	13	17	70	4.566	0.716
RP8	The firm has a system of trading in products that the customer would want to dispose	0	5	20	39	36	4.070	0.868

RP9	The process of trade-ins allows the firm to receive discounts on the initial sale.	0	2	2	55	40	4.333	0.641
RP10	Trade-ins increase overall margins and average sale size, and help recycle used merchandise	0	2	19	16	62	4.380	0.877
RP11	The firm has a trade-in facility on prices of the new item in exchange for an older item.	0	2	7	58	33	4.209	0.669
RP12	Use of trade-in systems creates customer satisfaction.	5	0	2	36	57	4.411	0.924
RP13	Use of production recoveries improves the lead time of production process	2	0	12	49	36	4.171	0.821
RP14	Use of production recoveries reduces waste and increases profitability	0	2	8	65	25	4.124	0.637
RP15	Product recovery aims at recovering the residual value of used products.	0	0	12	30	58	4.465	0.696
RP16	Recovery prevents waste by diverting materials from landfills and conserves natural resources	0	0	7	50	43	4.364	0.612
	Composite						***4.285***	***0.760***

Table 3: Recycling Practice contribution to the performance of your firm

	Frequency	Percent
Yes	107	82.9
No	22	17.1
Total	129	100

Table 4: Firm's implementation of Recycling Practice as part of reverse logistics

Frequency	Percent	
Terrible	22	17.1
Fair	25	19.4
Good	50	38.8
Excellent	32	24.8
Total	129	100

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4.3 Correlation between Recycling Practices and firm performance

The results for the effect of Recycling Practices and firm performance were assessed using the Pearson correlation coefficient as shown in the table The output indicated that Recycling Practices had a strong positive relationship with firm performance (r=.563, p<0.05).

Table 5: Correlation Results

		Firm performance	Recycling Practices
Firm performance	Pearson Correlation	1	.563**
	Sig. (2-tailed)		.000
	N	129	129
Recycling Practices	Pearson Correlation	.563**	1
	Sig. (2-tailed)	.000	
	N	129	129

**. Correlation is significant at the 0.01 level (2-tailed).

Influence of Recycling Practices and firm performance

The objective of the study was to determine the influence of recycling and the performance of large manufacturing firms in Kenya. The following null hypothesis was formulated

H0: Recycling in reverse logistics has no significant influence on the performance of large manufacturing firms in Kenya.

Table 6 shows that the R-squared is 0.317 meaning that the Recycling Practices was able to explain 31.7% variations in the firm performance while the rest are explained by the error term.

Table 6: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.563a	0.317	0.311	0.56795

a. Predictors: (Constant), Recycling Practices

The F-statistic is 58.891 with a p-value <0.05 which implies that the regression model is significant. Therefore, the t-statistics and p-values can reliably be used to test the significance of coefficients in the model.

Table 7: ANOVA

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	18.996	1	18.996	58.891	.000b
	Residual	40.967	127	0.323		
	Total	59.963	128			

a. Dependent Variable: Firm Performance.

b. Predictors: (Constant), Recycling Practices

The regression equation obtained from this output is:

Performance = 1.678 + 0.362 Recycling Practices

Table 8: Regression Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.678	0.123		13.603	0.000
	Recycling Practices	0.362	0.047	0.563	7.674	0.000

a. Dependent Variable: Firm Performance.

The beta coefficient for Recycling Practices was 0.563. This indicates that a unit increase in Recycling Practices would result in 56.3 % increase in manufacturing firm performance. The t-statistic and corresponding p-value were 7.674 (0.000). Therefore, at a $P < 0.05$ level of significance the null hypothesis is rejected implying that recycling practices had a significant influence on firm performance. Based on these statistics, the study concludes that there is a significant positive relationship between Recycling Practices and firm performance.

5.0 Conclusion

Data analysis reviewed that the R-squared was 0.317 meaning that the recycling practice can explain 31.7% of variations in the firm performance while the rest are explained by the error term. The F-statistic was 58.891 with a p-value <0.05 which implies that the regression model is significant. The beta coefficient for recycling practice was 0.563. This indicates that a unit increase in recycling practice would result in 56.3 % increase in manufacturing firm performance. The t-statistic and corresponding p-value were 7.674 (0.000). Based on these statistics, the study concludes that there is a significant positive relationship between recycling practice and firm performance. The recycling decision will help the firm in improving the overall reverse logistics and firm performance. Globalization, fast depletion of resources, environmental concerns, and government regulation result in both pressure and drivers for the companies to implement reverse logistics. The study has a relationship close to that of Jack et al. (2010) which illustrated that RL capabilities result in cost savings and improved performance. Similarly, Richey et al. (2005) argued that returned resources could be used to develop innovative RL capabilities to enhance performance and gain competitive differentiation. Manufacturing firms may take advantage of the knowledge found in this study concerning the recycling practice to build strategies for RL implementation, as firm managers occasionally have to improvise strategies when developing RL practices.

6.0 Recommendations

The study is just one effort out of so many empirical attempts that have been performed to help manufacturing firms to understand the importance of reverse logistics and how it can help to improve firm performance. The study is important as it will help managers when making recycling strategy decisions by using the proposed approach for the selection of the best recycling alternative. Although findings from the study cannot be generalized, as it is just an illustration of an approach. Further research may be carried out based on surveys and more case studies using different recycling alternatives to validate the findings. This study suggests that firms should invest more resources in recycling creative solutions; for instance, improving RL information systems and technology would lead to more sustainable environmental protection and economic performance outcomes. Moreover, further empirical research is needed to deepen the knowledge about the factors and implementation of RL practices in the context of emerging economies. Research is also necessary to comprehend and evaluate particularly the barriers hindering the RL implementation in developing countries like Kenya.

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