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Green Disposal and Performance: A Reflection from Manufacturing Firms In Kenya

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Abstract:

Purpose: *The purpose of the study was to examine the effect of green disposal on the performance of manufacturing firms in Kenya. The study focused on how recycling, product reuse, salvage recovery, and environmentally responsible disposal methods influence organizational performance.*

Material/methods: *The study adopted a descriptive survey research design and utilized both quantitative and qualitative approaches. The target population comprised 943 manufacturing firms in Kenya. A sample size of 330 firms was selected using stratified random sampling. Primary data were collected using structured questionnaires administered to operations and procurement managers. The collected data were analyzed using descriptive statistics, correlation analysis, and regression analysis with the aid of SPSS.*

Findings: *The findings revealed that green disposal had a positive and statistically significant effect on the performance of manufacturing firms in Kenya. This implies that firms that adopt recycling, product reuse, salvage recovery, and environmentally responsible disposal practices are more likely to achieve improved organizational performance. However, the study also established that the level of implementation of green disposal practices remained relatively low among manufacturing firms, particularly in recycling scrap materials, product recovery, reuse initiatives, and the formulation of formal disposal policies.*

Conclusion*: The study concluded that strengthening green disposal practices enhances resource efficiency, environmental sustainability, and overall firm performance. Effective implementation of green disposal enables manufacturing firms to reduce waste, recover value from used materials, and improve operational and environmental outcomes.*

Value: *The study contributes to the growing body of knowledge on green supply chain management by demonstrating the role of green disposal in enhancing firm performance. It provides practical insights for manufacturing firms, policymakers, and supply chain managers seeking to improve sustainability practices and organizational competitiveness in Kenya's manufacturing sector.*

Keywords*: Green Disposal, Firm Performance, Recycling, Reuse, Environmental Sustainability, Green Supply Chain Management*

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1. Introduction

Environmental sustainability has become a major concern globally due to the increasing effects of industrialization, economic expansion, climate change, environmental pollution, depletion of natural resources, and biodiversity loss. As economies continue to grow, concerns regarding environmental degradation have intensified, compelling governments, consumers, investors, regulatory agencies, and other stakeholders to demand environmentally responsible business practices from organizations (World Bank, 2012; United Nations Environment Programme, 2012). Consequently, firms are increasingly integrating environmental considerations into their operational and strategic activities through Green Supply Chain Management (GSCM), which seeks to balance economic growth with environmental protection. Green disposal, a key component of GSCM, focuses on the environmentally responsible management of products at the end of their life cycle through recycling, reuse, remanufacturing, and safe disposal methods (Srivastava, 2007; Seuring, 2013).

Globally, organizations have recognized that environmental sustainability can contribute to improved competitiveness and organizational performance. The focus of environmental management has gradually shifted from individual firms to entire supply chains, emphasizing the need for coordinated efforts among suppliers, manufacturers, distributors, and customers to minimize environmental impacts (Brandenburg et al., 2014). As a result, many organizations have adopted green disposal initiatives such as product take-back programs, recycling systems, waste recovery mechanisms, and refurbishment processes aimed at reducing landfill waste and conserving natural resources. According to Winter and Knemeyer (2013), pollution prevention strategies that focus on minimizing waste at the source can significantly improve environmental outcomes while reducing operational costs. Similarly, Bonney (2011) established that investments in environmental management practices improve environmental performance and enhance firm profitability.

The manufacturing sector has been at the forefront of environmental sustainability initiatives because of its substantial contribution to waste generation and resource consumption. Manufacturing firms worldwide are increasingly facing pressure to adopt environmentally friendly practices due to growing concerns regarding carbon emissions, hazardous waste, toxic substance usage, and resource scarcity (Xie & Breen, 2012). Governments and environmental agencies have introduced policies aimed at reducing waste disposal to landfills and encouraging recycling and resource recovery initiatives (Hasan, 2013). Consequently, manufacturers have embraced eco-friendly measures such as green packaging, sustainable transportation, recycling programs, and product take-back systems to reduce their environmental footprints. These practices are not only intended to achieve regulatory compliance but also to enhance operational efficiency, improve corporate reputation, and strengthen competitiveness in increasingly environmentally conscious markets (Murphy, 2012).

Green disposal has emerged as an important environmental management practice because the fate of products after their useful life can significantly affect environmental sustainability. Products may be disposed of in landfills, recycled, refurbished, remanufactured, or reused, with each option presenting varying environmental implications. Recycling and reuse are generally regarded as environmentally preferable alternatives because they reduce waste generation and facilitate resource recovery. Product take-back arrangements, where manufacturers reclaim products at the end of their life cycle for recycling or refurbishment, have become increasingly common in industries such as electronics and automotive manufacturing. These initiatives support circular economy principles by extending product life cycles, reducing environmental

degradation, and creating opportunities for cost savings and improved resource utilization (Srivastava, 2010).

In Kenya, environmental sustainability has gained considerable attention following increased public concern over pollution and waste management challenges. The Kenyan government has implemented several environmental regulations, including the ban on plastic carrier bags and stricter waste management policies aimed at promoting environmental conservation (Mwiti, 2017). Manufacturing firms are increasingly required to adopt environmentally responsible disposal practices to comply with these regulations and meet stakeholder expectations. Additionally, the emergence of international green trade barriers poses a threat to firms that fail to embrace sustainable practices, potentially limiting their access to global markets (Mwaura, Letting, Ithinji, & Orwa, 2016). Although previous studies suggest that green practices can improve environmental and organizational performance (King & Lenox, 2001; Rao & Holt, 2005; Zhou et al., 2013), the specific influence of green disposal practices on the performance of manufacturing firms remains inadequately understood. Given the inconclusive findings in existing literature and the growing importance of sustainability in manufacturing, there is a need to examine the effect of green disposal on the performance of manufacturing firms in Kenya.

2. Empirical and Theoretical Review

2.1.Natural Resource-Based View

The study was anchored on the Natural Resource-Based View (NRBV) Theory, which was developed by Hart (1995) as an extension of the Resource-Based View (RBV) initially proposed by Wernerfelt (1984). The RBV perceives a firm as a collection of resources and capabilities that can be utilized to create and sustain competitive advantage. The NRBV broadened this perspective by incorporating environmental considerations and arguing that firms can achieve superior performance through capabilities that facilitate environmentally sustainable economic activities (Hart, 1995). According to Hart (1995), resources capable of generating sustainable competitive advantage must be valuable, rare, inimitable, and non-substitutable. Earlier scholars such as Penrose (1959) and Barney (1991) similarly emphasized that internal organizational resources significantly influence firm growth and competitiveness. The theory therefore suggests that environmental management practices can become strategic resources that enhance both environmental and organizational performance.

The theory is relevant to the present study because it explains how green disposal practices can serve as strategic capabilities that contribute to improved firm performance. According to Dyer and Singh (1998), organizations can develop valuable capabilities through collaboration and the integration of resources across supply chain partners, while Vachon and Klassen (2008) argued that environmental management initiatives create competitive advantages through knowledge sharing and resource integration. Furthermore, the NRBV explains why firms operating within the same industry and facing similar environmental pressures often adopt different environmental strategies and achieve varying performance outcomes (Testa & Iraldo, 2010). In the context of manufacturing firms in Kenya, green disposal practices such as recycling, product take-back programs, waste reduction, and environmentally responsible disposal methods can be viewed as firm-specific capabilities that improve resource efficiency, reduce operational costs, enhance corporate reputation, and ultimately improve organizational performance. Therefore, the NRBV provides a suitable theoretical foundation for explaining the relationship between green disposal

and performance among manufacturing firms in Kenya (Hart, 1995; Vachon & Klassen, 2008; Testa & Iraldo, 2010)..

2.2. Empirical Literature (Hypothesis Development)

Green disposal has increasingly become an important component of green supply chain management due to its potential to minimize environmental pollution while enhancing organizational performance. The practice involves activities such as recycling, product refurbishment, waste reduction, reuse of materials, and product take-back programs aimed at managing products responsibly at the end of their useful life. According to Zhu et al. (2008), organizations that adopt environmentally responsible disposal mechanisms are able to reduce waste generation and improve resource utilization. Similarly, Ninlawan et al. (2010) observed that recycling and reuse initiatives contribute to reduced environmental impacts and support sustainable manufacturing practices. These findings suggest that green disposal can enhance operational efficiency and environmental sustainability, which may ultimately improve firm performance.

Several empirical studies have established a positive relationship between environmentally sustainable practices and organizational performance. Gezen and Cankaya (2013), in a study involving firms from the automotive, chemical, and electronics sectors in Turkey, found that green manufacturing practices significantly improved environmental and social performance. Similarly, Kankanit (2015) reported that green supply chain practices, including environmentally friendly distribution and disposal mechanisms, positively influenced economic and operational performance among electronic manufacturing firms in Thailand. These studies indicate that environmental initiatives can generate both environmental and economic benefits, thereby supporting the argument that green disposal contributes positively to firm performance.

The importance of green disposal has further been emphasized through studies examining product end-of-life management. Research indicates that products can be recycled, reused, refurbished, or remanufactured rather than being disposed of in landfills, thereby reducing environmental degradation and promoting resource recovery. Product take-back programs have become increasingly common, particularly in the electronics and automotive industries, where manufacturers reclaim used products for recycling or reuse. Such practices not only reduce environmental harm but also lower raw material costs and improve organizational efficiency. Consequently, firms that successfully implement green disposal practices may realize enhanced competitiveness and improved overall performance compared to firms that rely on traditional disposal methods. Despite the growing evidence linking green practices to improved organizational outcomes, limited empirical studies have specifically examined the effect of green disposal on the performance of manufacturing firms in Kenya. Most existing studies have focused on broader green supply chain management practices such as green procurement, green manufacturing, and green distribution, leaving the specific contribution of green disposal inadequately explored. Furthermore, variations in industry characteristics and contextual factors may influence the effectiveness of green disposal initiatives. Therefore, there is a need to empirically investigate the relationship between green disposal and firm performance within the Kenyan manufacturing sector. Based on the reviewed literature, the study hypothesizes that:

H_{01}: *Green disposal has no statistically significant influence on the performance of manufacturing firms in Kenya.*

3. Research Methodology

The study adopted the positivist research philosophy, which emphasizes objective measurement, hypothesis testing, and the use of quantitative methods to establish relationships among variables. Positivism was considered appropriate because the study sought to test the effect of green disposal on firm performance using empirical data and statistical analysis. Guided by this philosophy, the study employed an exploratory research design incorporating both quantitative and qualitative approaches. The design enabled the researcher to investigate the relationship between green disposal practices and performance among manufacturing firms while generating comprehensive insights into the phenomenon under investigation.

Sampling Procedures

The target population comprised 757 manufacturing firms located in Nairobi and Kiambu counties and registered under the Kenya Association of Manufacturers (KAM, 2017). These counties were selected because they host over 80% of Kenya's manufacturing firms. The sample size of 386 firms was determined using the Nachmias and Nachmias (2012) sample size formula for finite populations. Geographical cluster sampling was employed to select firms from different manufacturing sectors, with each geographical cluster representing a stratum. The respondents included procurement managers and operations managers who possess adequate knowledge regarding supply chain management practices within their respective organizations.

Data Collection

Primary data were collected using structured questionnaires based on a five-point Likert scale ranging from strongly disagree to strongly agree. The questionnaire was preferred because it facilitated the collection of standardized data from a large number of respondents within a relatively short period. Prior to the main survey, a pilot study involving 5% of the target population (12 manufacturing firms) was conducted to evaluate the effectiveness of the instrument. Reliability of the questionnaire was assessed using Cronbach's Alpha coefficient, where a threshold value of 0.70 and above was considered acceptable. Validity was established through content validity, criterion validity, and construct validity. Content validity was assessed through expert review and pilot feedback, criterion validity was established by aligning questionnaire items with study objectives and previous studies, while construct validity was tested using Confirmatory Factor Analysis (CFA), with factor loadings of 0.40 and above considered acceptable.

Data Analysis

The collected data were analyzed using the Statistical Package for Social Sciences (SPSS). Descriptive statistics, including means and standard deviations, were used to summarize the characteristics of the study variables, while inferential statistics were employed to establish relationships among variables. Prior to hypothesis testing, diagnostic tests including normality, heteroscedasticity, and autocorrelation tests were conducted to ensure that the assumptions of regression analysis were met. The study utilized simple linear regression analysis to determine the effect of green disposal on firm performance. Statistical significance was assessed using t-tests and F-tests at a 5% significance level, where a p-value less than 0.05 indicated a significant relationship between the variables under investigation.

$$Y = \beta_0 + \beta_1 x_1 + \varepsilon$$

$X_{1:}$ Represents green disposal, Y: Represents the dependent variable (firm performance), 'ε': Represents the error terms, $\beta_{0,:}$ Is a constant representing the Y intercept β_1'represents the effect of slope coefficients denoting the influence of the associated predictor variables over the dependent variable.

4. Findings and Discussions

The descriptive statistics presented in Table 1 indicate that the adoption of green supply chain management (GSCM) has resulted in only modest improvements in the performance of manufacturing firms. The findings show low mean scores across key performance indicators, including profitability (M = 1.24, SD = 0.43), market share (M = 1.40, SD = 0.49), return on investment (M = 1.41, SD = 0.50), sales volume (M = 1.17, SD = 0.37), earnings per share (M = 1.24, SD = 0.64), and energy resource utilization (M = 1.24, SD = 0.43), suggesting that firms experienced minimal changes following the implementation of GSCM practices. Although the percentage change indicators recorded slightly higher mean scores ranging between 1.80 and 2.29, the results still point to relatively limited performance gains. The overall firm performance mean of 1.71 (SD = 0.21) further confirms that GSCM adoption had not significantly transformed the performance of the manufacturing firms. These findings imply that many firms may not have fully integrated green supply chain practices into their operations or aligned them effectively with their strategic objectives, thereby limiting the potential benefits associated with GSCM implementation.

Table 1: Firm performance

n=224	Mean	Std. Dev	Skewness	Kurtosis
Profitability has changed after the introduction of green supply chain management	1.24	0.43	1.22	-0.52
percentage change in profits after introduction of green supply chain management	2.24	0.44	1.38	0.36
Direction of change of market share after introduction of green supply chain management	1.40	0.49	0.40	-1.85
percentage change in market share after introduction of green supply chain management	2.13	0.66	-0.15	-0.72
Direction of change of average return on investment after introduction of green supply chain management	1.41	0.50	0.49	-1.50
percentage change in average return on investment after introduction of green supply chain management	2.21	0.61	0.35	0.47
Direction of change of average sales volume after introduction of green supply chain management	1.17	0.37	1.82	1.31
percentage change in average sales volume after introduction of green supply chain management	2.29	0.61	-0.24	-0.60
Direction of change of earnings per share after	1.24	0.64	2.79	6.97

introduction of green supply chain management				
percentage change in earnings per share after introduction of green supply chain management	2.13	0.67	-0.05	-0.53
Direction of change of company's usage of energy resources after introduction of green supply chain management	1.24	0.43	1.22	-0.52
percentage change in company's usage of energy resources after introduction of green supply chain management	1.80	0.64	0.20	-0.64
Firm performance	**1.71**	**0.21**	**-0.26**	**0.22**

The descriptive statistics presented in Table 2 indicate that the adoption of green disposal practices among manufacturing firms was relatively low. The findings reveal limited implementation of recyclability initiatives, as evidenced by low mean scores for putting products to alternative use after their useful life (M = 2.08, SD = 0.63), recycling scrap materials (M = 2.00, SD = 0.90), and ensuring that all parts and components are recyclable (M = 2.40, SD = 0.64), resulting in a recyclability composite mean of 2.16. Similarly, reuse practices were inadequately implemented, with respondents reporting low levels of returning products to manufacturers for reuse or recycling (M = 2.52, SD = 0.86), processing returned merchandise (M = 2.60, SD = 0.75), and having organizational policies on disposal methods (M = 2.06, SD = 0.64), yielding a reuse mean score of 2.39. Regarding salvage recovery, moderate scores were recorded for product reusability (M = 2.82, SD = 0.96), returnability of products for reuse or recycling (M = 2.58, SD = 0.86), and the sale of by-products for alternative usage (M = 2.42, SD = 0.86), resulting in a composite mean of 2.61. Overall, green disposal recorded a mean score of 2.39 and a standard deviation of 0.57, indicating that manufacturing firms had not fully embraced green disposal practices. The findings suggest that limited emphasis had been placed on recyclability, reuse, salvage recovery, and disposal policies, thereby constraining the potential environmental and operational benefits associated with effective green disposal systems.

Table 2: Green Disposal

n=224	**Mean**	**Std. Dev**	**Skewness**	**Kurtosis**
Products are put on alternative use after useful life	2.08	0.63	1.89	4.82
Scrap materials are recycled	2.00	0.90	0.67	-0.24
All parts and components are recyclable	2.40	0.64	1.33	0.60
Recyclability	**2.16**	**0.61**	**2.17**	**4.09**
The company returns product to the manufacturer for reuse or recycling	2.52	0.86	0.33	-0.65
There is existence of practices that involve processing of returned merchandise	2.60	0.75	0.81	-0.77
The company has organization policies on disposal methods	2.06	0.64	0.37	0.68
Reuse	**2.39**	**0.62**	**0.18**	**-0.87**

The company product and their parts are reusable	2.82	0.96	-0.13	-1.15
The company products can be returned to the manufacturer for reuse or recycling	2.58	0.86	0.24	-0.74
The company byproducts are sold for alternative usage	2.42	0.86	0.55	-0.46
Salvage recovery	**2.61**	**0.70**	**-0.14**	**0.33**
Green disposal	**2.39**	**0.57**	**0.75**	**0.95**

Correlation Results

The results presented in Table 3 indicate that green disposal had a positive and statistically significant relationship with firm performance ($r = 0.517$, $p = 0.000$) at the 0.01 significance level. The positive correlation coefficient suggests that an increase in the adoption of green disposal practices is associated with an improvement in firm performance. The relationship can be classified as moderate, implying that manufacturing firms that emphasize activities such as recycling, reuse, salvage recovery, and environmentally responsible disposal methods are likely to experience better organizational performance. The findings therefore provide preliminary empirical evidence that the adoption of green disposal practices contributes positively to the performance of manufacturing firms.

Table 3: Correlation results

		Firm performance	Green Disposal
Firm performance	Pearson Correlation	1.000	
	Sig. (2-tailed)		
Green Disposal	Pearson Correlation	.517**	1.000
	Sig. (2-tailed)	0.000	

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

Hypothesis testing (regression results)

H_{01} *Green disposal does not significantly impact on the performance of manufacturing firms in Kenya*

The fourth (H_{O1} :) hypothesis postulated that green disposal does not significantly impact on the performance of manufacturing firms in Kenya. Nevertheless, the findings in table 4.26 showed that green disposal has a positive and significant effect on firm performance ($\beta_4 = 0.602$, $p<0.05$) thus, the hypothesis was rejected. This can be explained further by assessing the value of the t-test which indicates that the effect on green disposal would be attributed to the regression model compared 9 times more compared to the effect of the standard error associated with the estimated coefficient ($t = 9.006$). The findings in Table 4 further indicated that the variation in firm performance was attributed by 26.8% change in green disposal. In tally with the findings, Amembaet al. (2013) noted that green packaging involves the use of packaging the goods into smaller units with the goal of reducing the amount of space and the materials used thereby increasing warehouse utilization. In a similar vein, Kyalo (2015) confirmed that manufacturers utilize lean production, use biodegradable

materials and total quality management in their operations with the intent of improving their operational performance.

Table 4: Influence of Green Disposal on Performance of Manufacturing Firms in Kenya

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	0.807	0.171		4.720	0.000
Green disposal	0.602	0.067	0.517	9.006	0.000
Model Summary Statistics					
R	0.517				
R Square	0.268				
Adjusted R Square	0.264				
Std. Error of the Estimate	0.752				
Model Fitness Statistics (ANOVA Results)					
F	81.113				
Sig.	0.000				

a Dependent Variable: firm performance

5. Conclusion and Recommendations

The study concluded that green disposal has a positive and statistically significant effect on the performance of manufacturing firms in Kenya. This finding implies that firms that effectively implement green disposal practices are likely to realize improved organizational performance through enhanced resource utilization, waste reduction, environmental compliance, and operational efficiency. However, the descriptive findings revealed that the level of implementation of green disposal practices among the surveyed firms remains relatively low. Specifically, many firms have not established mechanisms for putting products to alternative use after their useful life, recycling scrap materials, processing returned merchandise, or developing comprehensive organizational policies on disposal methods. Consequently, the manufacturing firms have not fully exploited the potential benefits associated with green disposal practices.

Based on these findings, the study recommends that manufacturing firms strengthen their green disposal initiatives by adopting comprehensive recycling and reuse programs, establishing systems for processing returned products, and ensuring that products and components are designed to facilitate recyclability and recovery. Firms should also develop and implement clear organizational policies and guidelines on environmentally responsible disposal methods. Additionally, management should invest in circular economy practices that promote product recovery, remanufacturing, and alternative use of by-products to maximize resource efficiency and improve overall firm performance.

6. Further Research Recommendations

While the study established that green disposal significantly influences the performance of manufacturing firms, it focused exclusively on manufacturing firms in Kenya. Future studies should examine the effect of green disposal practices in other sectors of the economy, such as service industries, agriculture, and logistics, to determine whether similar relationships exist. Further research could also investigate the moderating and mediating factors that influence the relationship between green disposal and firm performance, such as organizational culture, technological capability, environmental regulations, and innovation. In addition, longitudinal studies may be undertaken to assess the long-term effects of green disposal practices on organizational performance and sustainability outcomes.

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