

Stakeholder Engagement and Sustainable E-Waste Competitive Strategies: Evidence from Utility Firms in Kenya

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ABSTRACT

The electronics industry is among the largest and fastest-growing sectors globally, a trend that has resulted in a significant increase in the generation of electronic waste (e-waste). E-waste may be viewed not only as an environmental challenge but also as a strategic resource. Despite the growing importance of e-waste management, empirical research examining the relationship between e-waste disposal strategies and competitive advantage remains limited in the Kenyan context, particularly within the utility sector. This gap persists despite Kenya's unique regulatory, institutional, and socio-economic environment, where weaknesses in the adequacy, coverage, and enforcement of e-waste regulations have contributed to documented environmental and public health incidents, including lead poisoning cases associated with improper disposal of electronic waste. At the same time, Kenya presents opportunities for economic gains through e-waste recycling and reuse. The study examined the influence of e-waste disposal strategies on the competitive advantage of utility firms in Kenya. The study focused on utility companies dealing with electricity, telecommunications, water and sanitation operating across all forty-seven counties, which are among the largest generators of e-waste in the country. The specific objectives were to assess the effect of value addition and transfer of e-waste on the competitive advantage of utility firms in Kenya, with stakeholder engagement applied as a moderating variable. The study was anchored on the resource-based view theory, competition theory, game theory, and waste management theory. Survey research design was adopted, targeting officers drawn from utility firms using a random sample of 235 respondents. Primary data was collected using structured questionnaires administered through hand delivery and electronic mail. Data analysis involved descriptive and inferential statistics, with multiple regression analysis conducted using SPSS version 25. The results revealed that the variables had a positive and statistically significant relationship with competitive advantage of utility firms in Kenya. The regression model yielded R^2 value of 0.302 (30.2%) in Model 1 without the moderating variable. After the introduction of the moderating variable in Model 2, R^2 rose to 0.514 (51.4%). In Model 3, R^2 increased to 0.545 (54.5%) with moderator variable as intercept and slope shifter, indicating that the independent variables jointly explained 54.5% of the variation in competitive advantage, while 45.5% was attributable to factors not captured in the study. After introduction of stakeholder engagement emerged as moderator variable, it had the highest beta of +0.499 which was significant. The study concluded that environmentally compliant and strategically managed e-waste disposal practices enhanced competitive advantage by minimizing social and environmental costs, improving organizational efficiency, and maximizing welfare outcomes. The findings contribute to theory, policy, and practice by demonstrating that sustainable e-waste management is not only an environmental imperative but also a strategic driver of competitive advantage for utility firms in Kenya.

Keywords: e-waste, utility firms, stakeholder awareness, value addition, transfer of e-waste, competitive advantage.

INTRODUCTION

Background

Environmental sustainability has increasingly become a strategic concern for firms operating in resource-constrained and institutionally evolving environments. In particular, the management of electronic waste (e-waste) presents both environmental risks and strategic opportunities for firms in infrastructure-intensive sectors such as utilities. While sustainability research often assumes that environmentally responsible practices enhance firm performance, empirical evidence from emerging economies remains limited and context sensitive.

Barney (1991) developed the traditional format of the Resource-Based View (RBV) theory and Hart (1995) extended the model to Natural (RBV) or NRBV. This latter theory argues that environmental capabilities such as pollution prevention and product stewardship can generate competitive advantage by improving efficiency and reducing long-term risk. Simultaneously, Stakeholder theory suggests that firms derive performance benefits when they align their environmental practices with stakeholder expectations (Freeman, 1984; Mitchell, Agle & Wood, 1997). However, the extent to which sustainable e-waste strategies translate into competitive advantage may depend on the institutional and stakeholder environment within which firms operate. In emerging economies such as Kenya, regulatory enforcement is evolving and stakeholder environmental awareness varies significantly across sectors. Utility firms, due to their public-facing nature and infrastructural footprint, are particularly exposed to stakeholder scrutiny. Yet, little empirical research has examined how specific e-waste management strategies contribute to competitive advantage within this context.

This study argues that the competitive value of sustainability strategies is not universal but contingent upon stakeholder salience. In high-awareness environments, visible practices may generate stronger reputational returns, while internally oriented efficiency strategies may yield diminishing marginal differentiation. This finding and argument is the basis upon which conclusions and recommendations were made.

Stakeholder and E-Waste Strategies in Utility Firms in Kenya

Using survey data from utility firms in Kenya and hierarchical regression analysis, this study investigated: (1) whether value addition and transfer strategies enhanced competitive advantage, and (2) whether stakeholder awareness conditioned these effects. This study contributes to strategic management and sustainability literature in three ways. First, it provides empirical evidence from an underexplored emerging economy context. Second, it extends NRBV by demonstrating that environmental capabilities are stakeholder contingent. Third, it clarifies the role of stakeholder awareness as a structural mechanism shaping competitive outcomes.

Research Objectives

General Objective

To examine influence of e-waste disposal strategies on the competitive advantage of utility firms in Kenya.

Specific Objectives

- (i) To analyze the influence of value addition from e-waste on the competitive advantage of utility firms in Kenya.
- (ii) To investigate the influence of e-waste transfer practices on the competitive advantage of utility firms in Kenya.
- (iii) To investigate the moderating effect of stakeholder engagement on the relationship between e-waste disposal strategies and the competitive advantage of utility firms in Kenya.

RESEARCH HYPOTHESES

- i. H₀₁: Value addition from e-waste has no statistically significant influence on competitive advantage of utility firms in Kenya.
- ii. H₀₂: E-waste transfer practices have no statistically significant influence on competitive advantage of utility firms in Kenya.
- iii. H₀₃: Stakeholder engagement has no statistically significant moderating effect on the relationship between e-waste disposal strategies and the competitive advantage of utility firms in Kenya.

Limitations Of the Study

The survey design applied in this study used cross sectional data that captured one point in time. This made it difficult to infer long-term causal relationships. Organizational behavior may evolve as institutional pressures change. Self-Reported measures mean that responses may have contained bias (Bryman, 2016), especially regarding sensitive topics illegal disposals. The sector specific context focusing on utility companies in Kenya only implied that results may have differed in manufacturing, ICT retail, or other sectors. Finally, the moderation effect limited to stakeholder engagement only meant that other potential institutional moderators have been assumed constant such as regulatory capacity, industry competition, or technological readiness. Lack of their assessment may have affected generalization.

LITERATURE REVIEW

Introduction

This chapter reviewed literature on value addition and transfer of E-waste. The chapter also explored their influence on the competitive advantage of utility companies in Kenya. Relevant theories related to the variables were explored.

THEORETICAL FRAMEWORK

The study applied four theories, namely Resource Based View (RBV) theory which has evolved over time from the traditional RBV to the Natural (NRBV), Competition theory, Game theory and Waste Management Theory (WMT). NRBV as applied in this study assumes that Value addition in e-waste enhances efficiency and innovation. Though not expounded exclusively in this study, Stakeholder Theory assumes that transfer strategies enhance legitimacy and reputation.

Resource-Based View Theory

Firms achieve competitive advantage by leveraging valuable, rare, and inimitable resources (Barney, 1991). Value addition of e-waste constitutes a resource-based capability, converting waste into operational and financial gains. RBV did not originally account for ecological constraints or the natural environment as a strategic consideration. This gap was addressed by Hart (1995), who introduced the Natural RBV (NRBV) and argued that the natural environment represents a fundamental strategic context that shapes firms' resource development and competitive positioning.

Competition Theory

Sustainable practices influence the competitive positioning of firms. Firms adopting visible and effective e-waste strategies may gain market differentiation, signaling environmental responsibility to stakeholders and customers (Porter & Kramer, 2011). This view adds the sustainability dimension to the traditional Porter's competition theory.

Game Theory

Firms' strategic choices in e-waste management can be seen as a non-cooperative game, where the payoff depends on the actions of competitors. For example, adopting transfer strategies may enhance reputation if competitors fail to do so, while mimicking competitors may erode differentiation. Rajendra and Arvind (2013) applied game theory to examine optimal e-waste management strategies in India, demonstrating that cooperative approaches among stakeholders yield higher collective payoffs than non-cooperative strategies.

Waste Management Theory

Waste Management Theory (WMT) Emphasize systematic handling of waste to reduce environmental impact while maximizing economic and social value (Fiksel, 2006). Value addition and transfer strategies operationalize these principles within firm strategy. WMT has evolved from early sanitation and disposal models to a comprehensive, system-based, and strategic framework. It provides conceptual and analytical tools, including industrial ecology, Material Flow Analysis (MFA), and system-level management for optimizing the environmental, social, and economic outcomes of waste handling (Brunner & Rechberger, 2004). When applied to electronic waste disposal, WMT offers utility firms in Kenya a mechanism to convert waste challenges into strategic opportunities, enhancing cost efficiency, regulatory compliance, and long-term competitive advantage.

Variables Used (Constructs)

Value Addition

Value addition refers to processes through which discarded electronic materials undergo transformation through refurbishment to recover economic, environmental, or strategic benefits. In e-waste management, value addition aligns with circular economy principles that promote recycling, refurbishment, and material recovery as mechanisms to extend product life cycles and reduce ecological impact (Brunner & Rechberger, 2004; Sarkis, 2003).

In this study, value addition was measured using Likert-scale items and open-ended questions focusing on recycling practices, including material segregation, processing efficiency, and compliance with best environmental practices. Another set was refurbishment activities, such as repair and upgrading of electronic components for redeployment or resale. The third set was recovery systems, including extraction of metals, plastics, and critical minerals while resource extraction practices reflected how firms harvest residual value from obsolete devices. Prior research shows that firms adopting value-adding e-waste strategies strengthen sustainability performance while reducing operational costs (Fiksel, 2006). As an independent variable, value addition was operationalized as X_1 .

Transfer of E-Waste

E-waste transfer refers to the redistribution of discarded electronic equipment through regulated pathways such as resale, donation, or redistribution to certified recyclers. Transfer strategies help organizations extend the useful life of electronic assets and prevent accumulation of hazardous materials in landfills (Hoffman, 2007; Okutoyi, 2014).

This construct was measured using Likert-scale items and open-ended questions capturing resale practices, including sale of reusable equipment to secondary markets. Other methods were redistribution mechanisms, such as inter-department transfers within firms or redistribution to specialized service providers. The final method was donation practices, including corporate social responsibility (CSR) programs donating functional electronics to schools and community centers. Empirical studies demonstrate that responsible transfer of e-waste supports circularity, reduces handling costs, and promotes positive corporate reputation (Porter & Kramer, 2011). In this study, transfer of e-waste is an independent variable, operationalized as X_2 .

Stakeholder Engagement

In this study, stakeholder engagement refers to employees' understanding, perceptions, and responsiveness to environmental challenges related to e-waste. According to institutional theory, increased awareness amplifies pressure for environmentally responsible practices and influences how firms internalize sustainability norms (Hoffman, 1999; Meyer & Rowan, 1977).

Measured using Likert-scale and open-ended questions, the construct captured such aspects as employees' knowledge of environmental impacts of e-waste. It also examined awareness of organizational policies, recycling guidelines, and compliance requirements. Others were the perceptions of the importance of sustainable e-waste practices. The construct catered for awareness of ESG and CSR expectations from regulators, communities, and international frameworks.

Stakeholder engagement can strengthen or weaken the relationship between sustainable strategies and organizational outcomes. Employees who are well informed are more likely to support recycling, proper disposal, and sustainable procurement practices (Sarkis, 2003).

Thus, stakeholder awareness is conceptualized as a moderating variable, and operationalized as M.

Competitive Advantage

Competitive advantage refers to the extent to which utility firms derive superior performance outcomes from sustainable e-waste strategies. Porter and Kramer (2011) argue that integrating sustainability into core operations contributes to shared value creation, improving both societal benefits and firm competitiveness.

In this study, competitive advantage was measured through a composite index based on revenue generation, reflecting cost savings, resale income, and operational efficiencies arising from sustainable e-waste strategies. Environmental, Social, and Governance (ESG) compliance, including adherence to national environmental regulations (e.g., NEMA standards), international best practice, and organizational environmental policies. Corporate Social Responsibility (CSR) performance, focusing on community engagement, ethical disposal practices, and contributions to environmental protection.

Research shows that firms practicing proactive environmental management achieve legitimacy, improved brand reputation, and regulatory ease. These constitute sources of sustained competitive advantage (Hoffman, 2007). Competitive advantage serves as the dependent variable, operationalized as Y.

CONCEPTUAL FRAMEWORK

Conceptual Model Structure

Independent Variables: Value Addition (X_1) and Transfer of E-Waste (X_2)

Moderating Variable: Stakeholder Engagement (M)

Dependent Variable: Competitive Advantage (Revenue + ESG + CSR composite)

Model Logic: $X_1 \rightarrow Y$, $X_2 \rightarrow Y$, $M \rightarrow Y$, $X_1 \times M \rightarrow Y$, $X_2 \times M \rightarrow Y$

Theoretical Logic:

- NRBV: Value addition enhances efficiency and innovation.
- Stakeholder Theory: Transfer strategies enhance legitimacy and reputation.
- Moderation logic: Stakeholder awareness increases reputational returns from visible sustainability actions.

Figure 2.1 illustrates the conceptual framework in a diagram form.

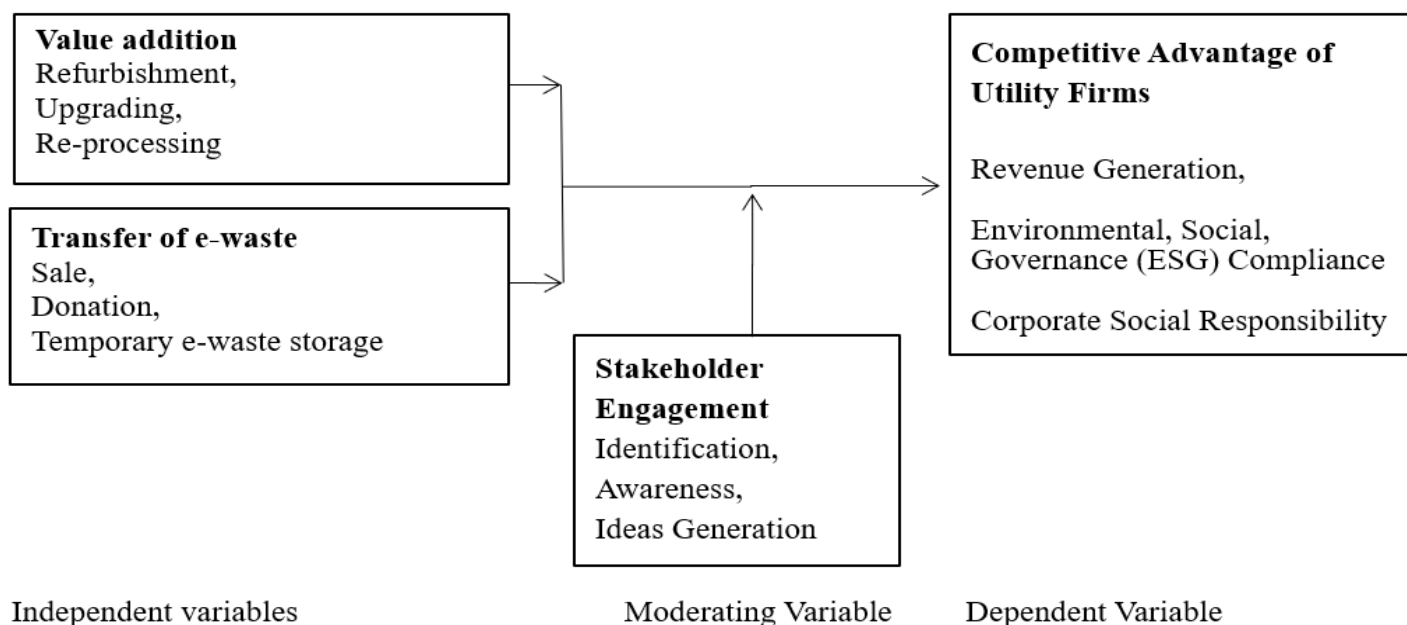


Figure 2.1: Conceptual Framework

METHODOLOGY

Research Design

This study employed survey research design using quantitative survey methods. The philosophy employed was positivism. This emphasizes the use of existing theories to develop hypotheses that can be empirically tested using observable and quantifiable data (Saunders, Lewis, Thornbill, 2019). The methodology aimed at testing the direct and moderating effects of sustainable e-waste strategies on competitive advantage.

Sample And Data Collection

The study population targeted utility firms operating in Kenya in Electricity, Telecommunications, Water and Sanitation. Target population respondents were company personnel involved in handling of e-waste in utility companies in Kenya. Data was collected using structured questionnaires. The sample size was 235 respondents which was obtained using (Krejcie & Morgan, 1970) formula from a population of 601 respondents within the utility companies. The response was received from 190 of the respondents.

Pilot Study

A pilot study was conducted using 24 respondents which was a 10 percent proportion of the sample size. This was carried out to ascertain the feasibility of the study. Reliability test results using Cronbach model are illustrated in Table 3.1. Reliability refers to how well the findings can be repeated with results being similar if carried out by different researchers at different times. It determines internal consistency reliability. In Cronbach formula, when all the scale items are independent from one another then the coefficient (α) is zero. If the items are highly related meaning they have high covariance, then α will approach 1. According to Goforth (2015), a reliability coefficient of 0.65 to 0.8 or higher is considered acceptable in most social science research situations. The constructs were all above $\alpha=0.8$. This showed that there was internal consistency as required.

Table 3.1: Reliability Statistics on the Variables

Item	Description of Variable	Number of Items	Cronbach Alpha	Comments
1	Value Addition	11	0.854	Above 0.8

2	Transfer of e-waste	7	0.818	Above 0.8
3	Stakeholder Engagement	10	0.883	Above 0.8
4	Competitive Advantage	6	0.841	Above 0.8

RESEARCH FINDINGS AND DISCUSSION

Introduction

This chapter examined response rate and descriptive statistics derived from the respondents' views. The chapter also covered analysis of the assumptions of Ordinary Least Squares (OLS) in regression analysis with and without the moderating variable in a three (3) model approach. Discussions on the findings were also included in this chapter.

Descriptive Results

The descriptive results gave the following values for value addition (X_1): Mean = 3.10, SD = 1.197, Transfer of E-Waste (X_2): Mean = 3.00, SD = 1.364, Stakeholder Awareness (M): Mean = 3.50, SD = 1.207 and Competitive Advantage (Y): Mean = 3.66, SD = 1.1507

Value Addition

The mean of 3.10 indicated moderate adoption of value-addition e-waste practices (e.g., refurbishing, recycling, component recovery among others). The SD of 1.197 indicated fair variability among respondents; some companies practice value addition strongly while others barely do.

Transfer of E-Waste

The mean of 3.00 indicated moderate adoption of the practice, meaning companies neither strongly agree nor disagree that they transfer e-waste responsibly. The SD of 1.364 is the highest among variables, large variability, suggesting inconsistent e-waste transfer practices across utility firms.

Stakeholder Awareness

The mean of 3.50 indicated high stakeholder awareness of e-waste handling obligations and practices. SD = 1.207 shows moderate variability, meaning awareness levels differ but are generally strong. This suggested strong influence in determining the relationship between e-waste strategies and competitive advantages of utility firms in Kenya.

Competitive Advantage Results

The mean of 3.66, suggested that utility companies perceived themselves as having a high level of competitive advantage linked to e-waste strategies. The SD of 1.15 suggested consistent responses.

The descriptive statistics in this study analyzed the perceptions of respondents in utility companies in Kenya regarding e-waste disposal strategies and their influence on competitive advantage. The descriptive results indicate that Value Addition (Mean = 3.10) and Transfer of E-Waste (Mean = 3.00) are practiced at moderate levels. This suggests that while utility companies have adopted some e-waste management procedures, such practices are still not consistently or fully integrated into their operational strategies. The relatively high standard deviations (SD = 1.197 and SD = 1.364) further imply variability and inconsistency in the adoption of these practices across different firms.

Stakeholder Awareness (Mean = 3.50) recorded a relatively high mean, indicating that employees, management, regulators and consumers are generally aware of e-waste policies, risks and compliance requirements. This awareness is important because it enhances effective adoption of e-waste initiatives within organizations.

The dependent variable, Competitive Advantage (Mean = 3.66), also registered a high level, suggesting that firms perceive e-waste disposal strategies as contributing positively to differentiation, brand reputation, regulatory compliance and cost efficiencies. The standard deviation (1.1507) shows moderate agreement among respondents.

Tests For Ordinary Least Squares (OLS) Assumptions

This section examined and analyzed the assumptions of Ordinary Least Squares (OLS). These tests were necessary to ensure that the data could be used for multiple regression analysis. The tests included Normality test, Linearity test, Heteroskedasticity test and Correlation tests.

Test for Normality

To test for normality of the dependent variable which in this study was the Competitive Advantage of utility firms in Kenya, the Kolmogorov-Smirnova (KS) and Shapiro-Wilk test (SW) was used. This assisted in establishing the appropriate tests to be conducted and ensured that assumptions of normal distribution are upheld. Following the Shapiro and Wilk (1965), the tests rejected the normality hypothesis if the p-value is less than or equivalent to 0.05. The findings from the test were as presented Figure 4.1 and 4.2.

The analysis from the observed data showed that KS and SW statistics were 0.054 and 0.990 respectively. The p-values were 0.200 and 0.199 for KS and SW respectively. Both are greater than 0.05 level of significance indicating that the hypothesis for normal distribution of data should fail to be rejected concluding that the data is normally distributed.

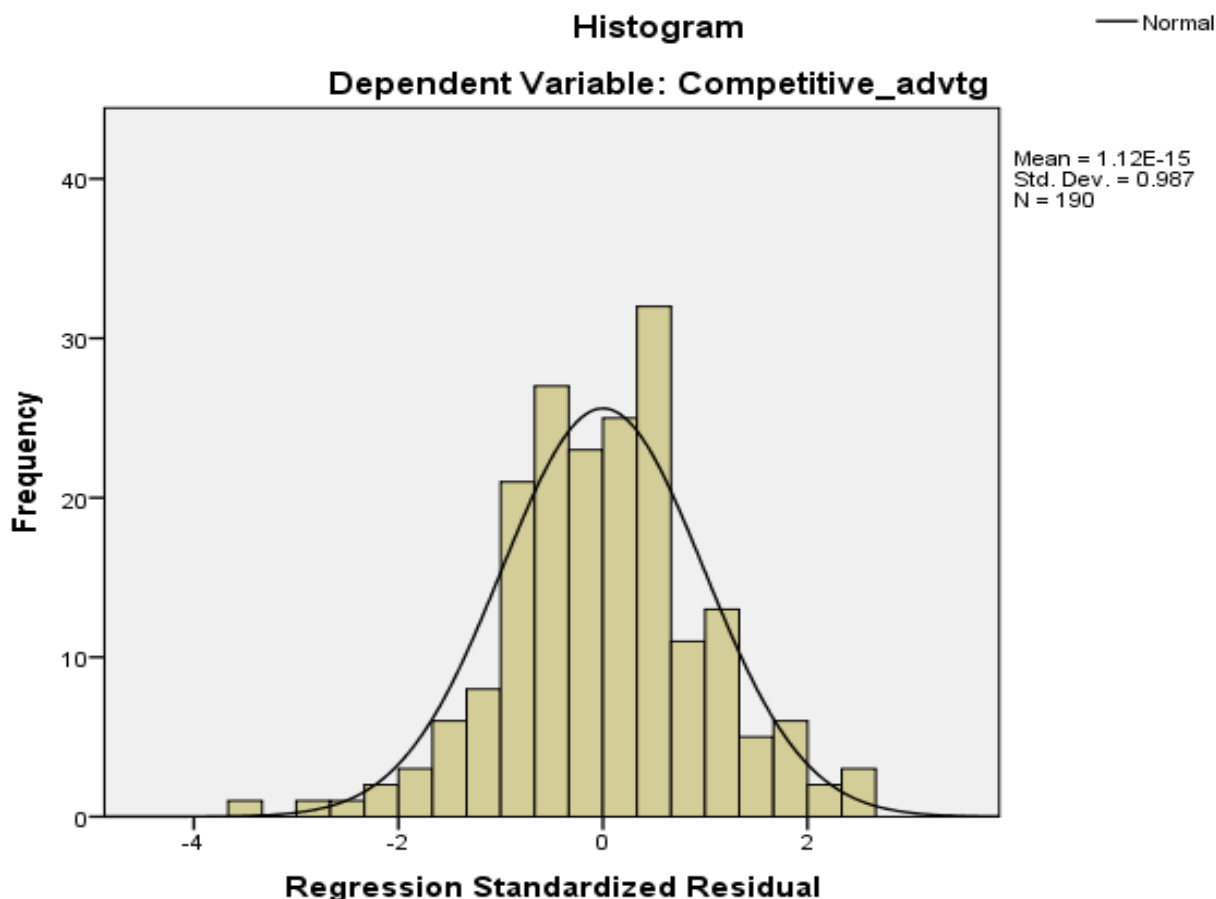


Figure 4.1: Histogram on Normality

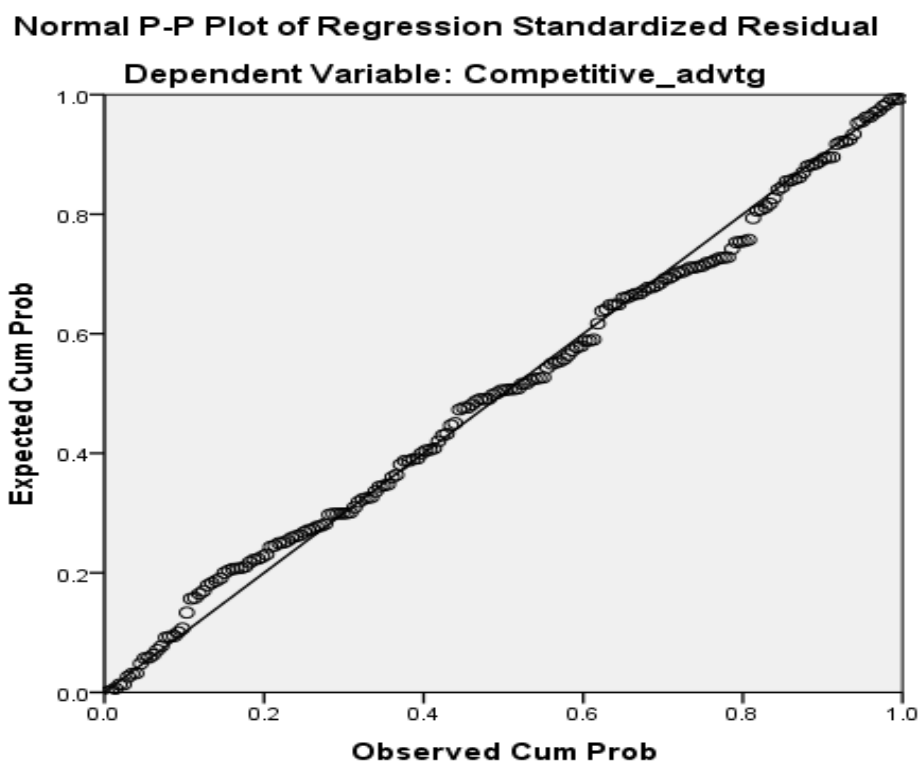
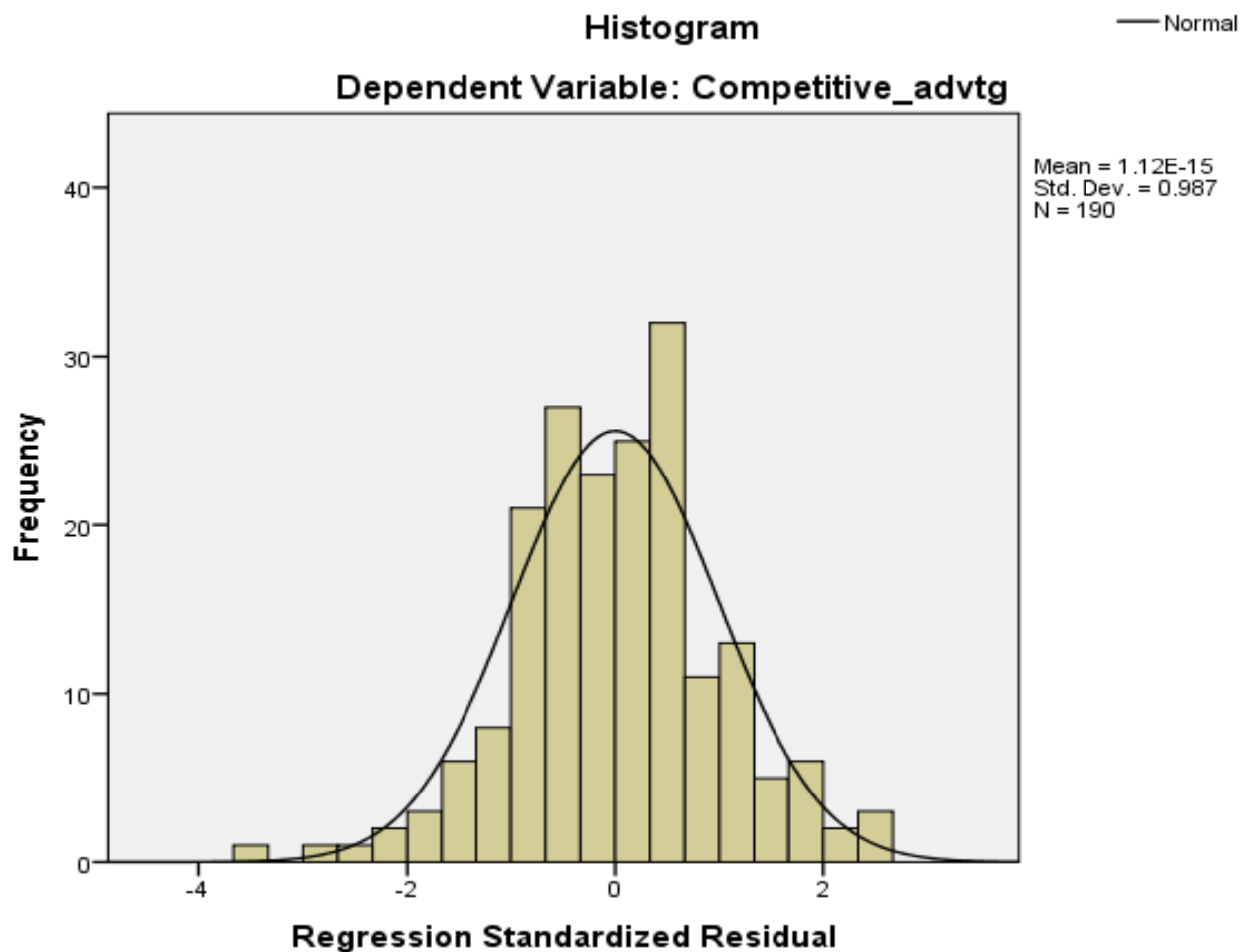


Figure 4.2: Normal PP plot

Multiple Regression Analysis

Analysis Method

Hierarchical multiple regression was employed:

Model 1: Direct effects

Model 2: Intercept moderation

Model 3: Interaction terms (slope moderation)

Model 1: Multiple Regression in the Absence of Moderating Variable

Table 4.1: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.550 ^a	.302	.295	.74077

a. Predictors: (Constant), Zscore(Transfer), Zscore(Value_Addition)

Table 4.2: Model 1 ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	44.401	2	22.200	40.457	.000 ^b
	Residual	102.615	187	.549		
	Total	147.016	189			

a. Dependent Variable: Competitive_advtg
b. Predictors: (Constant), Zscore(Transfer), Zscore(Value_Addition)

Table 4.3: Model 1 Coefficients

Model 1		Unstandardized Coefficients		Standardized Coefficients		sig
		B	Std. Error	Beta	t	
	(Constant)	3.659	.054		68.081	.000
	Zscore(Value_Addition)	.229	.061	.260	3.756	.000
	Zscore(Transfer)	.333	.061	.378	5.470	.000

a. Dependent Variable: Competitive_advtg

$$Y = 3.659 + 0.229X_1 + 0.333X_2 \dots\dots\dots\text{equation 4.1}$$

- Value Addition ($\beta = 0.229$, $p = 0.000$) is Significant
- Transfer ($\beta = 0.333$, $p = 0.000$) is Significant

Model 2: Multiple Regression in the Presence of Moderating Variable

Table 4.4: Model 2 Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.717 ^a	.514	.506	.61966

a. Predictors: (Constant), Zscore(Stakeholder), Zscore(Value_Addition), Zscore(Transfer)

Table 4.5: Model 2 ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	75.596	3	25.199	65.626	.000 ^b
Residual	71.420	186	.384		
Total	147.016	189			

a. Dependent Variable: Competitive_advtg ,
 b. Predictors: (Constant), Zscore(Stakeholder), Zscore(Value_Addition), Zscore(Transfer)

Table 4.6: Model 2 Coefficients

	Unstandardized coefficients		Standardized coefficients		
	B	Std. Error	Beta	t	sig
(Constant)	3.659	.045		81.388	.000
Zscore(Value_Addition)	.116	.052	.132	2.213	.028
Zscore(Transfer)	.115	.056	.130	2.032	.044
Zscore(Stakeholder)	.499	.055	.565	9.013	.000

a. Dependent Variable: Competitive_advtg

$Y = 3.659 + 0.116X_1 + 0.115X_2 + 0.499M$ equation 4.2

- Value Addition remains significant but slightly reduced ($\beta = 0.116, p = 0.028$)
- Transfer remains significant but slightly reduced ($\beta = 0.115, p = 0.044$)
- Stakeholder Awareness is highly significant ($\beta = 0.499, p = 0.000$)

Model 3: Multiple Regression in the Presence of Moderating Variable (Slope Shifter)

Table 4.7: Model 3 Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.738 ^a	.545	.533	.60272

a. Predictors: (Constant), X₂M, Zscore(Value_Addition), X₁M, Zscore(Transfer), Zscore(Stakeholder)

Table 4.8: Model 3 ANOVA

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	80.173	5	16.035	44.139	.000 ^b
Residual	66.842	184	.363		
Total	147.016	189			

Table 4.9: Model 3 Coefficients

	Unstandardized Coefficients		Standardized Coefficients		Sig
	B	Std Error	Beta	t	
(Constant)	3.671	.051		72.130	.000
Zscore(Value_Addition)	.109	.051	.123	2.120	.035

Zscore(Transfer)	.119	.055	.135	2.152	.033
Zscore(Stakeholder)	.506	.057	.574	8.802	.000
X1M	-.163	.049	-.182	-3.340	.001
X2M	.107	.046	.132	2.326	.021

Dependent Variable: Competitive_advgtg b. Predictors: (Constant), X2M, Zscore(Value_Addition), X1M, Zscore(Transfer), Zscore(Stakeholder)

$$Y = 3.671 + 0.109X_1 + 0.119X_2 + 0.506M - 0.163X_1M + 0.107X_2M \dots\dots \text{Equation 4.3}$$

- Interaction $X_1 * M$: Negative, significant ($\beta = -0.163, p = 0.001$)
- Interaction $X_2 * M$: Positive, significant ($\beta = 0.107, p = 0.021$)
- Variance Inflation Factor (VIF) < 5 for all variables, indicating no multicollinearity.

DISCUSSION OF REGRESSION RESULTS

The hierarchical regression results provided strong empirical evidence that sustainable e-waste practices contributed significantly to competitive outcomes and that stakeholder engagement is a transformative mechanism that strengthens or redirects these effects.

Model 1 Analysis

The findings in model 1 established that both value addition and transfer of e-waste have significant positive effects on competitive advantage. The significant coefficients for value addition ($\beta = .229, p < .001$) and transfer ($\beta = .333, p < .001$) indicate that firms that invest in refurbishing, recycling, or converting e-waste into usable inputs achieve efficiencies that enhance competitiveness. This supports arguments that circular economy strategies reduce costs, drive innovation, and create differentiation advantages (Porter & Kramer, 2011; Sarkis, 2003). The finding is consistent with Hoffman’s (2007) assertion that sustainable waste-related practices generate operational benefits that can strengthen firm performance in emerging economies.

Model 2 Analysis

In Model 2, stakeholder engagement was introduced, significantly improving the explanatory power from 30.2% to 51.4%. Stakeholder engagement ($\beta = .499, p < .001$) emerged as the strongest predictor of competitive advantage, aligning with Freeman’s (1984) stakeholder theory, which posits that firms that effectively collaborate with regulators, communities, suppliers, and consumers achieve legitimacy and enhanced performance. The reduction in the effect sizes of value addition (from $\beta = .229$ to $\beta = .116$) and transfer (from $\beta = .333$ to $\beta = .115$) after including stakeholder engagement suggests partial mediation or explanatory overlap. This is consistent with institutional theory (Meyer & Rowan, 1977), which emphasizes that firms gain stability and performance benefits when their practices align with stakeholder expectations and regulatory norms.

Model 3 Analysis

Model 3, which included the interaction terms, provided deeper insights into moderation. Stakeholder engagement ($\beta = .506, p < .001$) still had the strongest predictor (beta) of competitive advantage. The interaction between stakeholder engagement and value addition (X_1M) was negative and significant ($\beta = -.163, p = .001$). This suggests that stakeholder engagement weakens the direct effect of value addition on competitive advantage. One plausible interpretation is that as stakeholder engagement increases, expectations for transparency, compliance, and environmental responsibility rise, thereby increasing the cost and complexity of value addition initiatives and potentially diminishing their relative competitive impact (Brunner

& Rechberger, 2004). In contrast, the interaction between stakeholder engagement and transfer of e-waste (X_2M) was positive and significant ($\beta = .107$, $p = .021$).

The finding indicated that stakeholder engagement reinforced the competitive benefits of responsible e-waste transfer practices. Stakeholders, particularly regulators and communities, tend to reward compliant and socially responsible disposal and transfer practices through legitimacy, market reputation, risk reduction, and cooperation incentives (Fiksel, 2006). These results reinforced the finding that stakeholder involvement shaped the competitive potential of sustainability strategies within institutional environments characterized by rising environmental scrutiny, in emerging economies such as Kenya's waste management sector.

Overall, the results affirm that sustainable e-waste management contributes to competitive advantage and that stakeholder engagement plays both enhancing and constraining moderating roles depending on the type of e-waste strategy employed. Overall, the results suggested that strategic value of e-waste practices is contingent on stakeholder awareness, highlighting a critical institutional mechanism for emerging economies.

Value Addition and Competitive Advantage

Value addition is a significant predictor of competitive advantage, confirming RBV logic: transforming e-waste into value-added resources provides operational efficiency and a financial edge. This supports Hart (1995) and aligns with Waste Management Theory principles, where recycling and refurbishment reduce environmental harm while generating revenue.

The negative interaction with stakeholder awareness suggests Game Theory implications: when all firms adopt value-addition strategies, the competitive payoff diminishes. In other words, in high-awareness environments, internal efficiency strategies alone are insufficient for differentiation, because stakeholders now expect them as standard practice.

This study therefore rejected the null hypothesis and concluded that in the presence of stakeholder engagement:

H_a: Value addition on e-waste has significant influence on competitive advantage of utility companies in Kenya.

Transfer of E-Waste and Competitive Advantage

Transfer strategies are positively significant, and stakeholder awareness strengthens this effect. Competition Theory explains this as a differentiation advantage: firms gain reputational and ESG-related benefits when they visibly redistribute e-waste, particularly if competitors are less proactive. Waste Management Theory supports that redistribution (sale/donation) provides societal and environmental value.

This also reflects Game Theory, where firms that are first movers in visible, socially responsible disposal can increase payoffs, while late adopters may receive fewer reputational benefits.

This study therefore rejected the null hypothesis and concluded that in the presence of stakeholder engagement:

H_a: Transfer of E-waste has significant influence on competitive advantage of utility companies in Kenya.

Stakeholder Awareness as Moderator

Stakeholder awareness is the strongest predictor of competitive advantage. It amplifies the effect of visible strategies and diminishes the relative advantage of internally oriented ones. This aligns with both Stakeholder Theory and Game Theory, highlighting that the strategic environment (stakeholder expectations) shapes the payoffs of e-waste strategies.

This study therefore rejected the null hypothesis and concluded that when stakeholder engagement is used as a moderator:

H_a: Stakeholder engagement has significant influence on competitive advantage of utility companies in Kenya

SUMMARY, CONCLUSION AND RECOMMENDATIONS

Summary

The purpose of this study was to examine how value addition and transfer of e-waste influence the competitive advantage of utility firms in Kenya, and how stakeholder engagement moderates these relationships.

The descriptive statistics in this study analyzed the perceptions of respondents in utility companies in Kenya regarding e-waste disposal strategies and their influence on competitive advantage. The results indicated that Value Addition whose mean was 3.10 and Transfer of E-Waste whose mean was 3.00 were practiced at moderate levels. This suggested that while utility companies have adopted some e-waste management procedures, such practices are still not consistently or fully integrated into their operational strategies. The relatively high standard deviations ($SD = 1.197$ and $SD = 1.364$) further implied variability and inconsistency in the adoption of these practices across different firms.

Stakeholder Awareness (Mean = 3.50) recorded a relatively high mean, indicating that employees, management, regulators and consumers are generally aware of e-waste policies, risks and compliance requirements. This awareness is important because it enhances effective adoption of e-waste initiatives within organizations. The dependent variable, Competitive Advantage (Mean = 3.66), also registered a high level, suggesting that firms perceive e-waste disposal strategies as contributing positively to CSR, ESG and revenue generation as in differentiation, brand reputation, regulatory compliance and cost efficiencies. The standard deviation (1.1507) shows moderate agreement among respondents.

Overall, the descriptive results implied that while Kenyan utility firms had moderately embraced value addition and transfer mechanisms for e-waste, stakeholder awareness is relatively strong, and firms perceive a meaningful connection between e-waste strategies and their competitive advantage.

The multiple regression findings suggested a similar pattern as in descriptive findings. The hierarchical regression analysis showed that the two independent variables positively predict competitive advantage. Stakeholder engagement was revealed as a strong direct predictor, and its interaction effects vary by strategy. Stakeholder engagement weakens the influence of value addition but strengthens the influence of transfer on competitive advantage. This demonstrates that competitive outcomes depend not only on technical sustainability measures but also on the social visible actions of CSR and donations in the institutional environment within which firms operate.

The regression results demonstrated and confirmed that resource-based capabilities such as value addition generate advantage as expected from RBV. Visible transfer strategies such as donation differentiate firms in the market as required in the competition theory. The results also demonstrated that payoffs of e-waste strategies depend on competitors' behavior and stakeholder expectations as per game theory. The results indicated that firms operationalize sustainability into tangible value creation as alluded to by waste management theory

Conclusion

The study concluded that sustainable e-waste strategies were important drivers of competitive advantage in Kenya's utility sector. Value addition and transfer positively contribute, but their strength is shaped by stakeholder engagement. Stakeholder engagement itself is a powerful determinant of competitive advantage, reflecting the growing importance of legitimacy, accountability, and collaborative practices in achieving sustainable performance. Overall, competitive advantage in sustainability-driven contexts is not solely a result

of internal capabilities but is co-created with stakeholders who influence perceptions, compliance outcomes, and operational feasibility.

Overall, the findings suggest that strategic investment in e-waste value addition would enhance the competitive advantage of utility firms in Kenya, consistent with both RBV and circular economy principles, contributing positively to revenue and ESG positioning. However, the negative moderation effect suggests that under high stakeholder engagement, value addition becomes expected rather than differentiating. This nuance extends existing theory by suggesting diminishing marginal signaling effects. Sustainable strategies create enduring advantage when aligned with stakeholder expectations.

Recommendations

Utility firms, who were the subject of this study, should strengthen value-addition processes by adopting cost-efficient technologies, ensuring compliance, and enhancing transparency to mitigate the dampening moderating effect of stakeholder engagement. This recommendation aligns well with similar past authors such as Hoffman (1999). The firms should also expand partnerships with licensed recyclers and certified handlers, as stakeholder engagement strengthens the competitive impact of responsible e-waste transfer which is also a similar recommendation by Sarkis (2003). Stakeholder engagement mechanisms should be institutionalized, including community forums, environmental reporting, co-creation platforms, and regulator consultations, as these significantly predict competitive outcomes. Policymakers should enhance regulatory clarity and incentives to encourage firms to adopt sustainable e-waste practices that are aligned with national environmental strategies as similarly suggested by Porter & Kramer (2011). Future research should explore other moderators, such as regulatory pressure, technological capability, or firm size, to further understand the dynamics of sustainable competitive advantage.

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Appendix I: Site Photos



1. E-waste Collection Centre – for utility customers (Separation of e-wastes)



2. E-waste temporary holding area in utility firm