

## **EFFECTS OF WASTE REDUCTION STRATEGY ON FIRM PERFORMANCE: A SURVEY OF PUBLISHING FIRMS IN KENYA**

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### **Abstract**

*This study focuses on the effect of waste reduction strategy on the performance of publishing firms in Kenya. Kenya is a regional publishing powerhouse (newspaper publications selling) in East and Central Africa. The industry contributes about 10% of the GDP and one of the fastest growing in the manufacturing sector. Unfortunately, Kenya does not produce most of the raw materials for publishing. In addition, the publishing industry in Kenya is faced with high rate of waste and returns. The study focused on the effect of adopting waste reduction strategy as a possible solution to the dwindling raw materials, increasing costs and high rate of returns. It used descriptive research design. The study population consisted of 357 firms from which a sample of 189 firms was taken using stratified random sampling and 138 responses were obtained. The data collection instrument was pre-tested before launching the final test. Empirical findings confirmed that indeed returns and wastes were high in publishing industry in addition to establishing that indeed adopting waste reduction would enhance performance of publishing forms. The study recommends that the firms view waste reduction as an investment with returns and not a cost.*

*Keywords: Waste reduction strategy, Publishing, Firm Performance, Reverse supply chain, Kenya*

## INTRODUCTION

Kenya is home to the regional publishing houses, both in the text book industry, periodical publications and promotional materials. According to Kenya Publishers association, it's 28 members distribute their products in Eastern Africa consisting of Kenya, Rwanda, Tanzania, Uganda, Democratic Republic of Congo, Malawi and Zambia. A few like Longhorn Publishers and Oxford University have distribution in South Africa. On periodicals, local media houses like Nation Media Group has publications circulating in Uganda, Rwanda, Tanzania and Kenya. With the World Bank reporting modest economic growth rate above 5% for the region in 2011 (Gok, 2012), and an increasing middle class, the industry is positioned for growth, which will definitely call for more innovative ways of accessing raw materials and energy.

While publishing plays a critical role in disseminating news, information, entertainment and educational materials, Elmas & Erdogmus (2011) noted that the industry has one of the highest rates of returned products. Cheng & Wu (2006) found that publishing firms deal in products with very short shelf life, just below a day for newspapers and hardly a month for magazines. Even educational text books are used within a semester or a year before the users outlive them. This means publishing firms have to employ huge resources in obtaining raw materials for continuous publications. De Brito (2004) and Gobbi (2011) agree on high costs and scarcity of raw materials as major challenges, especially for the publishing industry, implying that in the short run, the industry has to cope with high production costs leading to low profit margins (Cheng, 2006), and interrupted production due to dwindling source of raw materials. Innovative application of reverse supply chain strategies as suggested by Klapolva (2012) include recycling, waste reduction and reselling of returns and wastes could improve the performance of the publishing firms and ensure sustainable exploitation of the publishing materials.

### Statement of the Problem

Publishing firms play a critical role in disseminating news, information and entertainment. World Bank (2008) estimates that about 5,000 people in Kenya are directly employed in this sector, with another 20,000 indirectly deriving their livelihood from the sector. About 14 million school going children use published books in Kenya every year. The publishing industry contributes significantly to the economy, which is about 5% of Kenyan GDP in 2010 (GoK, 2012). Publishing is one of the key sectors in the manufacturing industry in Kenya which the government expects to grow at 10% per annum for the Vision 2030 to be realized (GoK, 2007). Already educational publishing has grown in leaps and bounds. For instance, the Kenyan government's introduction of free primary education and subsidized secondary education has led to unprecedented growth

in educational publishing industry (Rotich, 2005). However, this growth is in doubt given the industry is faced with challenges of increasing cost of raw materials (Gobbi, 2011), dwindling source of raw materials (Jack *et al*, 2010), high returns occasioned by unique distribution arrangement of published products in which distributors return unsold products at publisher's cost (Rogers, 2009).

Gobbi (2011) and Li & Olorunniwo (2008) suggest that applying recycling strategy could address this situation. A comprehensive literature review on recycling in publishing by Ellram (2006) shows that most of the research has focused on environmental aspects. Wu & Dunn (2005) adds that the factors influencing adoption of recycling activities differ from those of traditional supply chain. In Kenya, there has been minimal research on application of recycling by publishing firms (Kamande, 2011). In deed the existing research had not provided clear evidence and a broader picture on the link between recycling and firm performance. The study therefore investigated the effect of recycling strategy on performance of publishing firms in Kenya.

### **Research Objective and Hypothesis**

The objective of the study was to determine whether waste reduction strategy influenced performance of publishing firms in Kenya.

The study on waste reduction strategy was guided by hypothesis:

*(H<sub>0</sub>): Waste reduction strategy does not have significant effect on firm performance*

## **LITERATURE REVIEW**

### **Theoretical Review**

For this study, reverse supply chain theories Transaction Cost Economics and Resource based view were identified. Transaction Cost Economics (TCE) specifies the conditions under which a firm should manage an economic exchange internally within its boundary or externally through inter-organizational arrangement (Li *et al*, 2006). TCE focuses on minimizing the total transaction costs of producing and distributing a particular good or service. According to Srivastava (2006), the external (or macro) environment comprises four sectors, namely input (referring to suppliers), regulatory (referring to government and interested aggregators such as lobbying groups), output (referring to buyers), and competitive (referring to competitors). The internal environment consists of strategic factors (such as strategic costs, overall quality, customer service, environmental concerns, and legislative concerns) and operational factors like waste reduction. Waste reduction strategy synchronizes with the TCE in maximizing on firms internal resources to remain competitive (Deshmukhet *al.*, 2006) and profitable (Gobbi, 2008).

Application of waste reduction strategy has been found to lead to higher than average return on investment (Gunasekaran, Patel and McCaughey, 2004), improved cycle time (Hult, Ketchen Jr and Slater, 2004), higher marketing performance (Li, Ragu-Nathan, Ragu-Nathan and Rao, 2006), greater efficiency and effectiveness (Spekman, Kamauff Jr and Myhr, 1998; Tan *et al.*, 1999), and improved firm financial performance over competitors.

A firm's resources and capabilities include all financial, physical, human and organizational assets used in a firm to develop manufactures and deliver products or services to the customers. These resources create a sustainable competitive advantage for a firm if they have the following characteristics: Value adding (Valuable), rareness (Scarce), Costly to imitate and non-tradable (limited transferability). Cooper *et al* (2011) identifies scarcity of raw materials for publishing and the overall cost saving of reverse supply chain strategies. RBV also accounts for the incorporation of reverse supply chain as part of long-term company business strategies by some large corporations in order to attain sustainable competitive advantage (Porter, 1980). And Li (2006) notes that publishing firms which perfect the application of waste reduction enhance their competitiveness in both efficiency and profitability.

### **Secondary research**

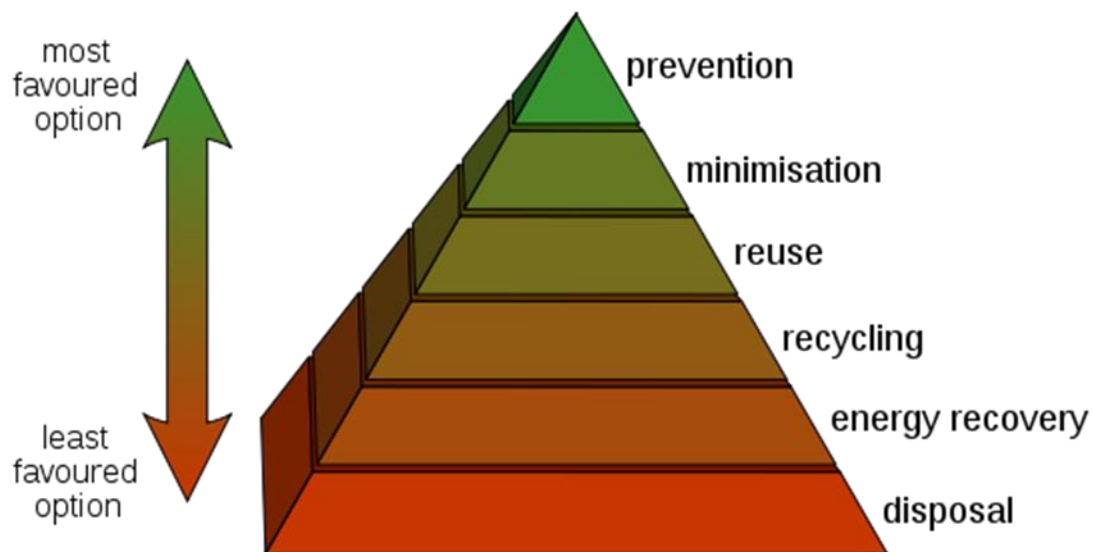
Liu (2008) defines waste reduction as the process and the policy of reducing the amount of waste produced by an entity. This is shared by Wang (2005) who adds that waste reduction involves efforts to minimize resource and energy use during manufacture. For the same commercial output, usually the fewer materials are used, the less waste is produced. Waste reduction usually requires knowledge of the production process and detailed knowledge of the composition of the waste. In any manufacturing process, there will always be wastes and scraps. In Srivastava (2008), waste is further defined as unnecessary work or holding stocks as a result of errors, poor organization or communication, while scrap refers to defective product or material that cannot be repaired, used or sold. Gobbi (2011) found that reasons for the creation of waste sometimes include requirements in the supply chain. For example, a company handling a product may insist that it should be packaged using particular packing because it fits its packaging equipment.

TQM philosophy advocates for getting it right the first time and all the times (Lysons, 2006). This would ensure minimum waste is generated in the supply chain. Material waste in publishing includes tree parts not turned into pulp, packaging materials, rejected print runs and wastes, returns and used publications (Agrawal, 2012). In addition, Prahinski & Kacobasoglu (2006) argues that idle labour time as a waste leads to increased overhead costs. In efficient production processes and defective equipment may also lead to increased wastes, which

Cheng (2006) notes would have disastrous implications in form of repairs, recalls and image control.

A waste management hierarchy puts emphasis on waste prevention, followed by minimization. Beyond the two strategies, Cheng (2006) and De Brito (2004) suggest reuse and recycling approaches. Lysons (2006) summarizes all the above and add energy recovery before disposal. According to Retzlaff-Roberts (1997), the waste hierarchy classifies waste management strategies according to their desirability in terms of waste minimization. The waste hierarchy remains the cornerstone of most waste minimization strategies. The aim of the waste hierarchy is to extract the maximum practical benefits from products and to generate the minimum amount of waste.

Figure 1: Waste Management Hierarchy



Source: Steven (2004)

Zhu et al. (2008) observed that based on RBV firms that waste management as a strategic resource will have higher chances of minimizing cost of production through lowering waste management fees, lowering hazardous material management fees, less time and costs for reporting; savings from conserving energy, water, fuel and other resources which will positively impact on performance. In efficient production processes and defective equipment may also lead to increased wastes, which Li & Olorunniwo (2008) observed would have disastrous implications in form of repairs, recalls and image control. Thus waste reduction strategy would have direct impact on cost, labour and time savings. This led to the following hypothesis:

*(H<sub>0</sub>): Waste reduction strategy does not have significant effect on firm performance*

## Empirical Review

Waste is defined by Gobbi (2008) as unnecessary work or holding stocks as a result of errors, poor organization or communication. Contributing to the same, Li & Olorunniwo (2008) focused on the disastrous implication of having wastes in the form of repairs, recalls and image control. On their part, Elmas and Erdogmus (2011) summarize the importance of waste reduction as positive environmental impact, legal compliance, competitiveness advancement and improved customer service.

A number of researches in the recent past also focused on barriers of adoption of waste reduction strategy. Rogers and Tibben-Lembke (2002), identify the main barrier for waste reduction being it not receiving priority within the company. Another barrier is company policies which might be motivated by fearing the danger of waste reduction costs. To emphasize the significance of waste reduction strategy, Rogers and Tibben-Lembke (2002) focused on quantitative implication in which they found that waste reduction strategy accounts for approximately four percent of their total logistics costs in the publishing industry. In the retail and manufacturing sectors, it is estimated that waste reduction accounts for 5-6 percent of total logistics costs

## RESEARCH METHODOLOGY

Tronvoll *et al* (2011) asserts that supply chain researchers have adopted a number of ontological paradigms, including realism to describe their own perspective of the worldview under investigation where each is linked to an epistemology that deals with how the world is perceived and the relationship between the researcher and the known view. According to Easterby-Smith *et al.* (2002) the arguments among social scientists can be mapped by looking at three main ontological positions: represent positivism, relativism and nominalism. Cooper & Schindler (2006) added a fourth position in which they argue that realism asserts the idea that facts are out there just waiting to be discovered. The study adopted positivism approach in order establish the effect of waste reduction strategy as an accurate reflection of reality in order to predict an outcome and thereby control the strategy to the benefit of organizational performance.

In order to clearly examine the effect of waste reduction strategy on organizational performance, the study adopted a descriptive research design. As explained by Fei & Isa (2010) and Orotho (2003), this method of research is preferred because a researcher is able to collect data to answer questions concerning the current status of the subject of study. The study focused on publishing firms in Kenya as the unit of analysis. From this, 357 publishing firms as listed in Printers, Publishers and Stationers directory in Kenya formed the target population (List

of publishers, 2013). In each publishing firm, the head of supply chain was the unit of observation. Given the study looked at waste reduction strategy, the head of supply chain was most suitable, given this is the operational driver of strategy at operational level. The sampling frame of this study is a list of 357 publishing firms in Kenya appearing in the Printers, Publishers and stationer's directory as at July 2013, while two-step sampling involving stratified sampling followed by purposive sampling was applied. From the 357 firms a sample of 189 firms was selected, and distributed across the strata according to different sectors in publishing. The working sample was guided by Yumane's formula as used in Fei (2010).

$$n = \frac{N}{1 + N(e)^2} = 357/1 + 357(0.05)^2 = 189$$

Where n = the number of samples, N = the total population size, and e = 1 - Confidence level (the margin of error).

While both interview and questionnaire augurs very well with descriptive research design (Saunders, 1997), a questionnaire was the most appropriate for wider outreach within a relatively shorter time. Questionnaire also enables respondents to reflect and put well thought and structured responses which can be compared with other respondents. Therefore, a questionnaire was used to collect the data linking the recycling strategy to firm's profitability as a performance measure. To ascertain the validity and reliability of the proposed questionnaire, a pilot was conducted on 19 respondents, which was about 10% of the sample frame, in line with recommendation by Corbin (2008) and Kothari (2004).

The results of the research were both qualitative and quantitative. The data collected was keyed in and analyzed using SPSS, and descriptive statistics presented on each research question, followed by requisite analysis of the data and finally inferential analysis using correlation and regression.

## EMPIRICAL FINDINGS AND DISCUSSION

From a sample of 189 heads of supply chain, 138 questionnaires were received back which constituted 73.02%, which according to Creswell (2008), response rate above 60% is sufficient for descriptive research. Related studies like 'Reverse Supply Chain for commercial returns' by Blackburn *et al* (2005) had 68% response rate. Similarly, Guide *et al* (2006) conducted a study on 'Time value of commercial product returns' which had a response rate of 71%. Hanafi *et al* also had a response rate of 70% in a study on 'Reverse logistics for end of life product', in addition to Creswell's (2008) threshold of at least 60%, the study's response rate is within the norm of related studies.

To ascertain the validity and reliability of the proposed questionnaire, a pilot study was conducted on 19 respondents, which was about 10% of the sample frame, in line with recommendation by Corbin (2008) and Kothari (2004). Cronbach Alpha test was conducted to test the reliability of the research questionnaires as suggested by Zikmund (2003) and recycling scored 0.799 which is acceptable. Different aspects of validity were considered including content related validity, criterion related validity and construct related validity. Exploratory factor analysis was employed to check the dimensionality of the questionnaire. The instrument met the required reliability threshold to deliver the intended purpose.

### **Descriptive Findings on Recycling Strategy**

In order to understand the waste reduction practices adopted by various publishing firms in dealing with the wastes and returns, respondents were given various options of potential practices that can be applied. From the feedback, the firms employed multiple practices, with digital printing and Total quality management being practiced by 74% and 70% of the firms respectively as per Table 1 below;

Table 1.Waste reduction practices adopted

<b>Practice</b>	<b>Frequency</b>	<b>Percentage Value</b>
Total Quality Management	97	70%
Just in time procurement	81	59%
Digital printing	117	74%
Materials management system	23	17%

### **Responses on the influence of waste reduction strategy**

On whether waste reduction strategy had influence on firm performance, various performance indicators influenced by waste reduction strategy were proposed. Respondents were asked to identify extent to which they agreed with proposition that waste reduction strategy influenced each of the various performance indicators. Of all the reverse supply chain strategies proposed, 76.1% of the respondents confirmed waste reduction strategy as a significant factor influencing performance of publishing firms. All the respondents agreed with the strategy as significant contributor to firm performance with savings on obsolescence costs having the highest a mean score of 4.82, and storage cost savings as the least score at mean score of 4.07. Table 2 below summarizes the respondents' feedback;

(Keys: 1. No influence at all 2. Influence to very small extent 3. Influence to small extent 4. Significant influence 5. Influence to very large extent)



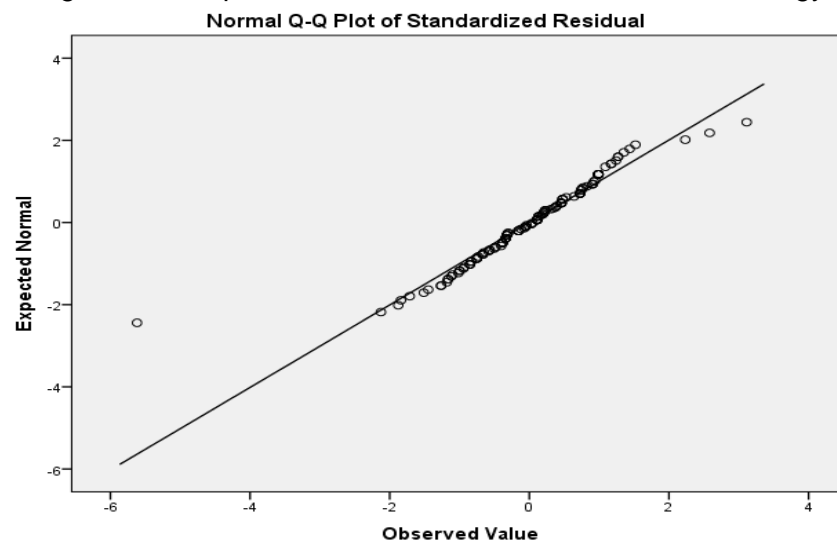
Table 2: Responses on the influence of waste reduction strategy

Performance Indicator	Percent					Mean	Standard Deviation
	1	2	3	4	5		
Disposal expenses	0.73	0.73	2.9	24.1	71.5	4.65	0.648
Storage costs	-	2.2	13.9	55.5	28.5	4.10	0.710
Labor costs	-	1.5	16.1	56.2	26.3	4.07	0.693
Materials usage	-	0.73	5.2	28.7	65.4	4.59	0.626
Security costs	0.73	2.2	13.9	54.0	29.2	4.09	0.762
Maintenance costs	2.2	2.2	16.8	47.5	31.4	4.04	0.878
Supplier relations	-	1.5	11.7	59.9	27.0	4.2	0.658
Noncompliance costs	-	-	2.9	24.8	72.3	4.69	0.522
Production processes	-	0.73	9.5	20.4	69.3	4.58	0.693
Obsolescence costs	-	-	1.5	14.6	83.9	4.82	0.418

### Requisite Analysis

Field (2005) observed that the data collected should be pretested to establish whether further analysis would yield the desired relationships. There are several methods that can be used, but this study will be limited to Normality Test. Given the unit of analysis was head of supply chain or equivalent, the data obtained ought to be more or less standard. In Dancey (2004), a quantile-quantile plot (Q-Q plot) test can be used to test for normality by plotting standardized data against the standard normal distribution. The correlation between the sample data and normal quantiles, or measures of the goodness of fit shows how well the data is modelled by a normal distribution. For normal data the points plotted in the Q-Q plot should fall approximately on a straight line, indicating high positive correlation. To test for normality with reference to the data obtained on Recycling strategy, the Q-Q Plot test as per Figure 2 shows the distribution of the data was normal passed the goodness of fit (Dancey, 2004).

Figure 2: Q-Q plot Test for Data on Waste reduction Strategy



### Inferential Analysis

From the requisite analyses above, the data obtained yielded the desired relationships. In Saunders (2007) inferential analysis is used to generalize the results obtained from a sample, back to the population. In the study, the inferential findings are used to describe the relationship between reverse supply chain strategies and performance of publishing firms in Kenya. While there are many methods of inferential analysis, Pearson correlation and multiple regressions model models have been used. Both models are suitable in descriptive research design where there are many variables, and focus is on relationships, nature and extent of influence among the variables (Field, 2005).

### Correlation Analysis

Gujarati (2007) simplifies correlation as the measure of linear relationship between variables, which could either be positive or negative. A hypothesis was developed to guide the research as follows; A Null hypothesis ( $H_0$ ); *Waste reduction strategy does not have significant effect on firm performance*. Alternative hypothesis ( $H_1$ ); *Waste reduction strategy has significant effect on firm performance*. Waste reduction Strategy had a coefficient correlation with firm performance of .482 which was above zero. The null hypothesis was then rejected and the alternative hypothesis accepted. Further, Dancey (2004) contends that this is a significant correlation. The study therefore found that there is a significant association between Waste reduction strategy and firm performance

Table 3: Correlation coefficient of Waste reduction strategy and firm performance

Strategies	Waste reduction	Firm Performance
Waste reduction	1	
Firm Performance	.482	1

### Regression Analysis

To regress the effect of waste reduction strategy on firm performance, the following model was used;  $y = \beta_0 + \beta_1 x_1 + \varepsilon$  Where;  $y$  is the dependent variable -firm performance,  $\beta_0$  (Alpha) is constant or intercept,  $\beta_1$  is the slope or change in firm performance given a unit change in Waste reduction strategy,  $X_1$  is the independent variable –Waste reduction strategy. The findings show that calculated P-value < 0.5 at 95% confidence level, implying Null hypothesis ( $H_0$ ); *Waste reduction strategy does not have significant effect on firm performance* is rejected, Alternative hypothesis ( $H_1$ ); *Waste reduction strategy has significant effect on firm performance* is accepted. The value of variance  $R^2 = 0.281$  implies that 28.1% of Firm performance is

influenced by Recycling strategy. The F-value = 151.453 and P-value <0.05 shows that Waste reduction strategy statistically significantly influence firm performance. From the analysis above, the regression model would be as follows;

$$\text{Firm Performance} = 1.286 + 0.762 \times \text{Waste reduction Strategy}$$

Comparing the waste reduction strategy analysis to the theoretical review, the findings agree with the tenets of Total Cost Economics theory (TCE), in which waste reduction strategy offers greater efficiency and effectiveness (Tan *et al.*, 1999), and improved firm financial performance over competitors. Kangethe (2013), Ellram (2011) and Gobbi(2008) all observed that waste reduction is a significant competitive strategy that may be employed by a firm, in line with the Resource based View theory.

Table 4: Regression of Waste reduction strategy and Firm Performance

Strategy	Parameter estimate	Std. Error	t-Value	P> t
Waste Reduction	.762	.062	12.307	<0.05
Intercept	1.286	.272	4.723	<0.05

Table 5: Model Summary

Measure	Statistics
R <sup>2</sup>	0.232
R <sup>2</sup> - Adjusted	0.229
P-Value	<0.05
F-Value	151.453

## SUMMARY OF FINDINGS AND RECOMMENDATIONS

The study found that waste reduction strategy had significant influence on performance of publishing firms in Kenya. Correlation analysis of effect of waste reduction strategy on firm performance yielded a positive correlation coefficient score of 0.482, which according to Dancey (2004) is significant. Regression analysis of waste reduction strategy on firm performance found that waste reduction strategy had 23.2% influence on firm performance as shown in the analysis of value of variance  $R^2 = 0.232$ . The regression analysis yielded a relationship model: *Firm Performance* = 1.286 + 0.762 x *Waste reduction Strategy*. This finding compares with a study by Banar (2009), in which waste reduction was found to have many strategic benefits including; reducing storage space, reducing energy usage, and reducing labour costs. Lysons (2006) and Ellram (2006) also noted that waste reduction is advantageous for many reasons as it reduces amount of waste sent to landfills, conserves natural resources, saves energy and reduces greenhouse gas emissions, this translates to cost savings which in turn improves profitability.

From the findings above, the study recommends to publishing firms to embrace waste reduction strategy as an investment for improved performance, thereby moving towards sustainable growth which is one of the foundations of Kenyan Vision 2030. While digital printing was found to be the most applicable method of waste reduction in printing industry, it would be insightful to establish its impact on the waste reduction strategy and influence on firm performance given the technology is advanced and widespread.

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