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Waste Reduction And Performance Of Bottling Companies In Edo State, Nigeria

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Abstract: ***The problem of waste generation and its reduction has become a pressing issue for many manufacturing firms, including Bottling Companies in Edo State, Nigeria.The broad objective of this paper is to determine the relationship between waste reduction and performance of Bottling Companies in Edo State, Nigeria. Specifically, this paper seeks to ascertain the nexus between recycling and performance of the studied firms. This paper utilized the Contingency Theory developed by Fred Fiedler in 1964. Survey research design was utilized for the study, questionnaire was used to elicit information from a sample size of two hundred and six (206) determined by Krejcie and Morgan (1970) sampling technique. Regression analysis was used to test the formulated hypothesis. Findings obtained from a test of the formulated hypothesis revealed that recycling has significant effect on the performance (measured with firm competitiveness) of the two studied firms (β =0.830, t-statistics =13.56425, p<0.05). Base to the findings obtained from a test of the formulated hypothesis, the researcher concluded that the relationship between waste reduction and performance of the studied firms is indeed significant and positive. As a follow-up to the findings and conclusion of the study, the researcher recommend that management of the studied firms should adopt recycling as one of its waste reduction strategies as it could directly impact the competitive position of these firms.***

Keywords: Waste reduction, recycling, performance, competitive position

I. INTRODUCTION

The concept waste reduction has evolved significantly over the past few decades, gaining prominence as a critical component of sustainable development and corporate responsibility. Initially driven by environmental concerns, waste reduction strategies have been increasingly recognized for their economic and operational benefits. The emergence of waste reduction can be traced back to the global environmental movement of the 1970s, which highlighted the adverse impacts of industrial waste on ecosystems and public health (Hoffman, 2020). This period saw the introduction of the "reduce, reuse, recycle" mantra, which has since become a cornerstone of waste management practices. In the 1990s and early 2000s, the concept of waste reduction expanded beyond environmental advocacy to become an integral part of corporate strategies. Companies began to realize that reducing waste could lead to significant cost savings, enhance efficiency, and improve corporate performance and image (Gale & Davison, 2021). The advent of lean manufacturing principles, which emphasize waste minimization and continuous improvement, further propelled the adoption of waste reduction strategies in various industries (Shah & Ward, 2022). The integration of waste reduction into Nigerian businesses has been a relatively recent development, influenced by both global trends and local factors. Nigeria, like many other developing countries, initially struggled with waste reduction due to inadequate infrastructure, regulatory frameworks, and public awareness (Nzeadibe, 2022). However, the past decade has witnessed a significant shift, driven by increasing environmental consciousness, regulatory pressures, and the recognition of waste reduction as a business imperative.

Waste reduction has become a critical aspect of operational efficiency and sustainability in modern businesses. Companies are increasingly recognizing the importance of minimizing

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waste to enhance performance, reduce costs, and meet regulatory and environmental standards (Dahlgaard-Park & Dahlgaard, 2022). The adoption of waste reduction measures not only aligns with global sustainability goals but also significantly impacts the company's performance (Adeleke, 2021). Bottling companies is particularly sensitive to waste management due to the large volumes of waste generated from production processes, including packaging materials, organic waste, and water usage (Jones & Harris, 2020). Effective waste management strategies, such as recycling, reusing materials, and energy recovery, can substantially reduce the environmental footprint of these firms. The concept waste reduction is a multifaceted approach that not only addresses environmental concerns but also significantly contributes to the operational and financial performance of businesses. For business organizations, embracing waste reduction practices could be essential for maintaining its competitive advantage, meeting regulatory standards, and achieving a higher performance level. Performance is a multifaceted concept that encompasses the effectiveness and efficiency with which an organization conducts its operations. It is often evaluated using indicators such as productivity, cost savings, and resource utilization (Ajayi & Adeniji, 2023). In the context of waste reduction, performance can be assessed through various metrics that reflect improvements in operational efficiency, reductions in waste-related costs, and enhancements in overall sustainability. By focusing on waste reduction, companies can achieve various operational and financial benefits that could contribute to their overall success and sustainability.

The problem of waste generation and its reduction has become a pressing issue for many manufacturing firms, including Bottling Companies in Edo State, Nigeria. Despite efforts to reduce waste, significant challenges remain in effectively implementing and maintaining waste reduction strategies. These challenges can hinder the company's performance, leading to increased operational costs and potential regulatory fines (Nzeadibe, 2022). Understanding these dynamics is crucial for developing strategies that not only reduce waste but also enhance the company's competitive position in the market. Though scholars like Adebayo and Oladipo (2024); Brown and Green (2022); Ejiofor and Iwuanyanwu (2023) have suggested an adoption of effective waste reduction strategies by business organizations, most business organizations have failed to adopt effective waste reduction strategies. This gives credence to carrying out this study in Bottling firms in Edo State, Nigeria. The broad objective of this paper is to examine the relationship between waste reduction and performance of Bottling Companies in Edo State, Nigeria. Specifically, this study seeks to ascertain the relationship between recycling and performance.

II. REVIEW OF RELATED LITERATURE

CONCEPTUAL REVIEW

WASTE REDUCTION

Waste reduction is a critical component of modern sustainability and operational efficiency strategies. It involves implementing various practices and techniques designed to minimize the amount of waste produced during manufacturing and other business processes. The primary goal of waste reduction is to decrease the environmental impact associated with waste, conserve natural resources, and enhance overall operational efficiency (Kumar & Garg, 2022). One of the key strategies in waste reduction is improving production processes. This can involve optimizing manufacturing techniques to reduce material wastage, adopting lean production principles, and enhancing process controls to minimize defects and inefficiencies.

Some waste reduction programs used by business organizations includes process optimization, material reuse, and recycling (Ogunleye & Akinbode, 2022). For example, research by Nzeadibe (2022) highlights that companies with robust waste reduction programs experience better financial performance and reduced environmental impact. Similarly, a study by Adeleke (2021) emphasizes that integrating waste reduction strategies into corporate practices can enhance competitive advantage and operational resilience. These findings underscore the need for companies to adopt comprehensive waste reduction measures to achieve both environmental and economic benefits. Waste reduction encompasses a range of strategies and practices aimed at minimizing waste generation, improving resource efficiency, and enhancing sustainability. By focusing on process optimization, material reuse, and recycling, companies can significantly reduce their environmental impact and achieve substantial cost savings. The integration of effective waste reduction practices is essential for maintaining operational efficiency, achieving sustainability goals, and fostering long-term business success. The recycling program is the focal component of this study.

RECYCLING

Recycling is a vital component of waste reduction. This practice involves processing waste materials to create new products, thereby diverting waste from landfills and reducing the demand for raw materials. Recycling can include a wide range of materials, such as metals, plastics, paper, and glass. The effectiveness of recycling programs depends on factors such as the quality of sorting and processing systems, as well as the level of participation by employees and stakeholders (Eze, 2022). By investing in efficient recycling systems and encouraging a culture of recycling within the organization, companies can achieve significant reductions in waste and environmental impact. The environmental and economic benefits of waste reduction are substantial. From an environmental perspective, reducing waste through recycling helps makes the environment friendly. Prior studies reveals that recycling aluminum can save up to 95% of the energy required to produce new aluminum from raw materials (Kumar & Garg, 2022). Economically, effective recycling can lead to significant cost savings by minimizing waste disposal fees and reducing the need for purchasing new materials.

Recycling materials involves incorporating previously used materials back into the production process, thus extending their lifecycle and reducing the need for new raw materials. For example, companies can reclaim and repurpose

used materials. This not only reduces waste but also lowers material costs and resource consumption (Ogunleye & Akinbode, 2022). Furthermore, promoting recycling can significantly cut down on single-use packaging waste, contributing to more sustainable practices.

PERFORMANCE

Performance is a multifaceted concept that encompasses the effectiveness and efficiency with which an organization conducts its operations. It is often evaluated using indicators such as productivity, firm competitive position, cost savings, and resource utilization (Ajayi & Adeniji, 2023). In the context of waste reduction, performance can be assessed through various metrics that reflect improvements in operational efficiency, reductions in waste-related costs, and enhancements in overall sustainability. Productivity is a key performance indicator that measures the output produced relative to the input used. Effective waste reduction practices can enhance productivity by streamlining processes, reducing interruptions, and minimizing the need for rework or disposal. For example, reducing waste in production processes can lead to more efficient use of raw materials and faster turnaround times, thereby increasing overall productivity (Afolabi & Ogundele, 2024).

Similarly, research by Olatunji and Oladipo (2023) demonstrates that waste reduction contributes to better financial performance and operational efficiency, reinforcing the link between sustainability practices and business success. Performance in the context of waste reduction is viewed from how an organization is able to effectively maximize items referred to as scrap or seek alternative sources of supply. Effective waste reduction practices enhance operational efficiency and contribute to a company's competitive advantage and financial health. By focusing on these performance indicators, organizations can achieve significant benefits and support their sustainability objectives. Firm competitiveness was the performance indicator used for this study.

FIRM COMPETITIVENESS

Competitiveness refers to a company's ability to maintain and expand its market share by offering superior products or services in comparison to its competitors. It is a critical factor that determines a company's success and sustainability in a competitive marketplace (Rogers, 2022). Achieving competitiveness involves several key factors, including cost efficiency, product quality, and innovation. Cost efficiency is a crucial aspect of competitiveness. Companies that can produce goods or deliver services at lower costs while maintaining quality can offer better prices to customers or achieve higher profit margins. Effective waste reduction practices contribute significantly to cost efficiency by minimizing waste disposal expenses and reducing the consumption of raw materials. By streamlining operations and reducing waste, companies can lower their production costs and enhance their cost-effectiveness (Jibril & Sani, 2023). Product quality is another important determinant of competitiveness. High-quality products that meet or exceed customer expectations can lead to increased customer satisfaction and loyalty. Waste reduction strategies can improve product quality by ensuring more consistent production processes and reducing defects associated with excess waste or inefficient operations. For example, by reducing the variability in raw materials and improving process controls, companies can enhance the reliability and performance of their products (Ogunleye & Ojo, 2024). Waste reduction plays a significant role in enhancing competitiveness. By lowering operational costs through more efficient waste management, companies can offer more competitive pricing or achieve higher profit margins.

THEORETICAL FRAMEWORK

This study utilized the Contingency Theory. Developed by Fred Fiedler in (1964), Contingency Theory suggests that the effectiveness of management practices is contingent upon the fit between the organization's environment and its internal practices (Fiedler, 1964). Unlike other theories that advocate a one-size-fits-all approach, Contingency Theory emphasizes that there is no single best way to manage an organization; instead, the best management practices depend on the specific context and circumstances of the organization. Contingency Theory is particularly useful for examining how waste reduction practices influence organizational performance because it accounts for the variability in organizational environments and internal processes. The theory posits that effective waste management strategies must be tailored to fit the unique characteristics of an organization, including its operational context, production processes, and environmental challenges.

Contingency Theory provides a flexible framework for understanding the relationship between waste reduction and performance. It emphasizes that waste management strategies must be adapted to fit the specific characteristics and challenges of the organization and its environment. This perspective highlights the importance of context-specific approaches and dynamic adjustments in achieving effective waste reduction and enhanced performance. Recent studies supporting the use of Contingency Theory in waste reduction include the work of Adesina & Ojo (2023), which demonstrates the need for context-specific waste reduction practices. Similarly, research by Brown & Green (2022) highlights the importance of aligning waste reduction strategies with environmental and internal factors to achieve performance improvements.

Therefore, Contingency Theory offers valuable insights into how waste reduction practices can be tailored to fit organizational contexts and environmental factors. By applying this theory, the paper aims to explore how adapting waste management strategies to specific conditions can drive performance improvements and contribute to organizational success.

EMPIRICAL REVIEW

Adebayo and Oladipo (2024) conducted a study titled "Impact of Waste Reduction Practices on Organizational Efficiency" in Lagos, Nigeria. Utilizing a mixed-methods

approach, they combined quantitative surveys with qualitative interviews from 50 manufacturing firms. Their analysis, which involved regression and thematic coding, revealed that effective waste reduction practices like recycling led to notable improvements in operational efficiency and cost savings.

Brown and Green (2022) examined the "Adapting Waste Reduction Strategies to Different Organizational Contexts" in London, UK. Their research utilized a case study methodology involving three diverse organizations, supplemented by interviews and document analysis, and included a survey of 30 industry experts. The study found that the effectiveness of waste reduction strategies varied significantly across different organizational contexts.

Ejiofor and Iwuanyanwu (2023) explored "The Role of Innovation in Waste Reduction and Performance Improvement" in Enugu, Nigeria. They employed a quantitative approach using structured questionnaires distributed to 40 firms, with data analyzed through descriptive statistics and correlation analysis. The study found that innovations in waste reduction, such as advanced recycling technologies, were positively associated with improved performance metrics, including cost reductions and increased efficiency.

Eze and Obi (2023) investigated "Effect of Waste Reduction on Financial Performance in Nigerian Breweries" based in Aba, Nigeria. The study used a longitudinal design, analyzing financial performance data from 20 breweries over a 5-year period with regression analysis. The findings showed significant cost savings and enhanced financial performance in breweries that adopted effective waste reduction strategies.

Ifeanyi and Chukwu (2023) focused on "Waste Management Practices and Their Impact on Resource Efficiency" in Port Harcourt, Nigeria. This study employed a cross-sectional survey involving 35 manufacturing firms, with data analyzed using ANOVA and multiple regression techniques. The findings indicated that effective waste management practices like recycling significantly improved resource efficiency, leading to reduced operational costs and better overall performance.

GAP IN KNOWLEDGE

All the empirically tested did not investigate waste reduction with regard to Bottling Companies performance in Edo State, Lagos, Nigeria. This is the crack in literature which this paper aims to address.

III. METHODOLOGY

RESEARCH DESIGN

This study employed the use of survey research design. This was used due to the nature of study. The research design of survey allows the researcher to conduct a research about what happens to the sample subjects under study without necessarily changing them.

AREA OF STUDY

The study examined Waste Reduction and Performance of Seven Up Bottling Company plant (Iguosa, Benin-city) and Nigerian Bottling Company plant (Eyaen, Benin-city).

POPULATION SIZE

The study was conducted using the population of the researched beverage companies in Edo State. In the Nigerian bottling company, Benin plant there are 265 lower level employees (265)., 124 middle level employees and 26 top level employees). That of Seven up bottling company is 182 (106 lower level employees, 62 middle level employees and 14 top level employees). This gives a total population of 447.

SAMPLE SIZE AND SAMPLING TECHNIQUE

Krejcie and Morgan (1970) sampling technique was utilized by the researcher. The formular is given thus:

$$S = \frac{x^2NP(1-P)}{d^2(N-1) + x^2P(1-P)}$$

Where S= Sample Size

X^2= Table value of chi-square for 1 degree of freedom 0.05 confidence level (3.84)

N= population Size (447)

P= Proportion of population (0.5)

d^2= Accuracy of Degree (0.05)

$$S = \frac{3.84 \quad (447) \quad (0.5) \quad (1-0.5)}{(0.05)^2 \ (447-1) + (3.84) \ (0.5) \ (1-0.5)}$$

$$S = \frac{429.12}{1.12+0.96}$$

$$S = \frac{429.12}{2.08}$$

S=206.3 = 206

As a result of the analysis above, two hundred and six (206) copies of the data collection tool were randomly distributed to respondents of the studied firms.

Bowley's (1926) allocation formula was used to determine the copies of the data collection instrument to be randomly administered to each of the studied organizations. As a result of the analysis above, one hundred and twenty two (122) copies of the data collection instrument were randomly distributed to employees of Nigerian Bottling Company, Benin Plant while eighty four (84) copies of the data collection tool were randomly distributed to employees of Seven Up Bottling Company, Benin plant.

INSTRUMENT OF DATA COLLECTION

The respondents provided this information through questionnaire. The questionnaire was formulated on a five

point likert scale. Strongly Agree (SA), Agree (A), Undecided (U), Disagree (D) and Strongly Disagree (SD).

VALIDITY OF THE INSTRUMENT

The extent to which a research instrument measures what it intends to measure is referred to as validity. Content and face validity test was applied by the researcher for the study.

RELIABILITY OF THE INSTRUMENT

The level of conformity of a research instrument is commonly called as reliability. The researcher made use of Cronbach Alpha reliability test in the study. The reliability coefficient of 0.696 was applied in the research by Suwannoppharat and Kaewsa, (2015). Hence, the study made a benchmark of 0.696.

Reliability Statistics

Cronbach's Alpha	N of Items
.741	5

Source: Field Survey 2025

Table 1: Scale: Reliability Statistics for Waste Reduction

The Cronbach Alpha score of the reliability statistics for Waste Reduction is 0.74. Since it is is greater than 0.696, it makes the instrument reliable.

Reliability Statistics

Cronbach's Alpha	N of Items
.752	5

Source: Field Survey 2025

Table 2: Scale: Reliability Statistics for Organizational Performance

The Cronbach Alpha score of the reliability statistics for Organizational Performance is 0.75. Since it is greater than 0.696, it makes the instrument reliable.

TECHNIQUES OF DATA ANALYSIS

Mean was the descriptive statistics used to analyze the research question using SPSS version 20; regression analysis was the inferential statistics used to test the formulated hypotheses using E-Views 10.

DATA PRESENTATION AND ANALYSIS

Returned (Un-mutilated)	171	83.01%
Returned (Mutilated)	17	08.25%
Unreturned	18	08.74%
Total Copies Administered	206	100.00%

Source: Field Survey, 2025

Table 3: Analysis of Returned and Unreturned Questionnaire

Out of two hundred and six (206) copies of the questionnaires distributed to the respondents, One Hundred and Seventy one (171) copies have returned an un-mutilated questionnaire (83.01%), seventeen (17) questionnaires (08.25%) returned with mutilation, whereas, eighteen (18) questionnaires (08.74%) have not returned. Due to that, One Hundred and Seventy one (171) copies of the questionnaire were employed in the analysis.

Is there a relationship between recycling and performance of bottling companies in Edo State?

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Q1	171	1.00	5.00	3.4000	1.41426
Q2	171	1.00	5.00	3.3000	1.31171
Q3	171	1.00	5.00	3.2000	1.25431
Q4	171	2.00	5.00	3.6000	.96254
Q5	171	1.00	5.00	3.1000	1.10323
Valid N (listwise)	171				

Source: Field Survey, 2025

Table 4: Descriptive Statistics for Recycling

Mean scores based on responses from the questions relating to recycling of the two studied firms are >2.5. This makes the responses appropriate for the study.

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Q1	171	1.00	5.00	2.4432	1.51227
Q2	171	1.00	5.00	3.1632	1.32464
Q3	171	1.00	5.00	3.4126	1.42231
Q4	171	1.00	5.00	3.5215	.97432
Q5	171	1.00	5.00	3.1164	1.15253
Valid N (listwise)	171				

Source: Field Survey, 2025

Table 5: Descriptive Statistics for Organizational Performance (Firm Competitiveness)

Mean scores based on responses from the questions relating to organizational performance (firm competitiveness) of the two studied firms are >2.5. This makes the responses appropriate for the study.

TEST OF HYPOTHESIS

Ho: The relationship between recycling and performance of bottling companies in Edo State is not significant and positive.

Dependent Variable: ORG_PERF
Method: Least Squares
Date: 08/16/25 Time: 08:14
Sample: 1 171
Included observations: 171

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.800000	0.162534	13.56425	0.0000
RECYCLING	0.830000	0.022017	81.20241	0.0000
R-squared	0.812331	Mean dependent var		13.00000
Adjusted R-squared	0.812247	S.D. dependent var		5.422653
S.E. of regression	1.015234	Akaike info criterion		2.531105
Sum squared resid	167.2000	Schwarz criterion		2.414101
Log likelihood	-211.6025	Hannan-Quinn criter.		2.543164
F-statistic	6245.504	Durbin-Watson stat		1.925473
Prob(F-statistic)	0.000000			

Source: Field Survey, 2025

Table 6: Regression Output

Findings obtained from a test of the formulated hypothesis revealed that recycling has significant effect on the performance of the two studied firms (β =0.830, t-statistics

=13.56425, p<0.05). Also, recycling is a predictor of organizational performance (F-statistics=6245.504; R-squared=0.812; p<0.05). The predictor variable explained 81.2% of the variance in performance of the studied firms, while the remaining 18.8% could be as a result of the effect of the extraneous variables. The Durbin Watson value of 1.9 reveals that there is no first order serial correlation. This makes the result appropriate.

IV. DISCUSSION OF FINDINGS

Findings obtained from a test of the formulated hypothesis revealed that the relationship between recycling and performance of bottling companies in Edo State is significant and positive. This corroborates the findings of Adebayo and Oladipo (2024) who conducted a study titled "Impact of Waste Reduction Practices on Organizational Efficiency" in Lagos, Nigeria. Their analysis, which involved regression and thematic coding, revealed that effective waste reduction practices like recycling led to notable improvements in operational efficiency and cost savings. The study of Brown and Green (2022) who examined the "Adapting Waste Reduction Strategies to Different Organizational Contexts" in London, UK also agrees with findings obtained from a test of the hypothesis. The study found that the effectiveness of waste reduction strategies could affect the competitive position of an organization. Also, the study of Ejiofor and Iwuanyanwu (2023) who explored "The Role of Innovation in Waste Reduction and Performance Improvement" in Enugu, Nigeria is also in tandem with findings obtained from a test of the hypothesis. The study found that innovations in waste reduction, such as advanced recycling technologies, were positively associated with improved performance metrics, including cost reductions, firm competitiveness and increased efficiency. The study of Eze and Obi (2023) who investigated "Effect of Waste Reduction on Financial Performance in Nigerian Breweries" based in Aba, Nigeria also agrees with findings obtained from a test of the hypothesis. The findings showed significant cost savings and enhanced financial performance in breweries that adopted an effective waste reduction strategy like recycling.

V. SUMMARY, CONCLUSION AND RECOMMENDATION

SUMMARY

The results of a test of the hypothesized formulation demonstrated that recycling was found to have a great influence on the performance of the two companies studied (b = 0.830, t-statistics = 13.56425, p<0.05). In addition, recycling predicts organizational performance (F-statistics=6245.504; R-squared=0.812; p<0.05).

CONCLUSION

Referring to the results of a test of the hypothesis formulated, the researcher came to the conclusion that the correlation between waste reduction and the performance of the examined firms is really positive and strong. Simply put, efficient use of a waste-reduction approach such as recycling may influence the output level of the examined companies positively.

RECOMMENDATION

The researcher based on the findings and the conclusion of the study recommends that recycling is one of such waste reduction strategies that should be adopted by the management of the studied firms as it may directly influence the position of these firms in the competition industry.

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