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Impact of waste management on corporate sustainability: a case study of Nigerian breweries Plc

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Abstract

The issue of improper waste management has attracted global concerns as the inability to manage waste can lead to economic loss and environmental threats to human health and existence. Therefore, this study focused on waste management's effect on Nigerian Breweries Plc's corporate sustainability in Enugu State, Nigeria. Specifically, the study examined the impact of waste recycling and landfills on economic sustainability. The study adopted a survey research design. The population comprises the top management cadre (176) and the human resource department (22). Stratified and convenience sampling techniques and Taro Yamenes' formula was used to determine the sample size at 132. With the aid of SPSS IBM version 25, multi-regression was used to test the hypotheses. Results obtained from the test of the formulated hypotheses revealed that waste recycling positively affects the economic sustainability of Nigerian Breweries Plc ($P < 0.05$; $t = 3.198$). The study's findings also showed that landfills positively impact the economic sustainability of Nigerian Breweries Plc ($P < 0.05$; $t = 3.851$). The study concluded that organic and inorganic waste management is strategically necessary for corporate sustainability. Waste recycling is recommended to ensure corporate sustainability, thereby reducing production costs and improving profitability.

Introduction

Waste management is a problem in the world, but developing or underdeveloped countries have more severe problems than developed countries. Solving the waste problem is becoming more difficult for developing countries because of the lack of proper capital, and the particular country's population does not correctly recognise these problems. Waste management involves collecting, transporting, and disposing of waste in the best possible way to limit or eliminate the harmful effects of garbage (Amasuomo & Baird, 2016). Today, solid waste management becomes a complex and multidisciplinary problem that needs to be approached from technical, economic, and social points of view in order to ensure its sustainability since the concept of

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environmental and economic sustainability is a crucial criterion for designing waste management systems (Manfredi & Christensen 2009, cited in Ndubuisi-Okolo, Anekwe & Attah, 2016). Globally, of the total of 1.5 gigatonnes generated municipal solid waste (MSW) per year worldwide, over 50% are discarded in landfills and dumps. Of the remaining waste, approximately 20% is recycled, and 14% is treated with energy recovery (IPCC, 2011, cited in Fält & Gunnarsson, 2020). This can attest to the fact that improper waste disposal is a global phenomenon, and there's a need to map a way of transforming those to economic sustainability.

In Nigeria, FGN (2012) and Ojo and Bowen (2014) reported that ineffective solid waste disposal is one of the environmental problems bedevilling the country, which produces over 63 million metric tonnes (0.45 kg/capita/annum). A low waste collection rate, accumulation of waste, or illegal dumping or burning of waste could represent improper waste management. The activities of manufacturing industries through improper waste disposal and emissions that may arise from their plants could cause human and environmental hazards, creating nuisance and odour problems, air and environmental pollution, fire hazards, and generally threatening the physical well-being of the populace (Aliyu, Borori, Abdullahi, Jamiu, & Haruna, 2023). Wastes are poisonous substances or materials injurious to the public's well-being and the environment (Uzoagu & Eheazu, 2022). The efforts to develop the environment have led to increasingly unfavourable climate changes and natural disasters, aided by political and socio-economic instability. The attempts to advance the environment have caused changes in behaviour, aiming towards more rational and efficient management of all resources that will allow less pressure and environmental impact (Klarin, 2018).

In recent years, Nigeria has been facing an environmental waste management problem due to increased emissions, indiscriminate exploration, and industrial pollution. This can be attributed to a lack of transparency from government agencies in monitoring and regulating the level and rate of industrial waste disposal, recycling, and sand filling in Enugu State, Nigeria. If left unchecked, this could lead to environmental degradation, a lack of clean water, and poor environmental sanitation. Numerous earlier studies imply a connection between waste management and organisational success. In the body of existing literature, a number of researchers, including Sahar (2019), Ndubuisi-Okolo et al. (2016), Olayiwola, Iyobhebhe, and Solihu (2023), and others, have argued that waste management is a crucial instrument for achieving good performance in commercial firms. It is realised yet that there is a lack of clarity regarding the method that can assist Nigerian breweries in utilising these waste management practices to improve corporate sustainability and performance. Therefore, in order to close this gap, research is required to look at how waste management—namely, how landfills and trash recycling affect it—affects business sustainability, specifically using economic sustainability as an indicator.

Review of Related Literature

Waste Management

Waste management is a by-product of most human activities, which is tremendously unavoidable (Uzoagu & Eheazu, 2022). Waste management is an organised way of monitoring waste, energy, and other consumption that aims to transfer the tax burden

on waste users as an incentive to increase further efficiency, green investments, and innovations in the consumption field (Todorovic, 2019). Waste management is based on the collection, transportation, disposal, handling, and monitoring of waste materials to facilitate the cleanliness of our environment. Adewole (2009) and Ndubuisi-Okolo et al. (2016) viewed waste management as the collection, keeping, treatment, disposal, and recycling of waste in such a way as to render it harmless to human, animal, and ecological life. Waste management cannot be overemphasised because the production manufacturing industry is a daily routine. Waste management can be done in a hierarchical order, which involves reducing the amount of waste produced, reusing some or all the waste produced, recovering the waste (recycling, composting, or converting waste to energy), and finally, landfilling (Aliyu et al., 2023). Consequently, waste management remained undermined, resulting in the waste becoming a problem for everyone, and it has developed as an issue in the country. Each nation around the globe has once faced this issue. Extraordinarily, developing nations are facing this problem more than developed ones.

Recycling

Recycling is the process of separating secondary materials that can be reused. This process significantly reduces uncontrolled waste disposal and creates job opportunities. Although the process demands a lot of infrastructure, governance, and financial aid (Eawag, 2008, cited in Fält & Gunnarsson, 2020), waste recycling is the organised collection, classification, and treatment of waste materials (Pattnik & Reddy, 2009). Waste recycling is the most environmental waste management method in Nigeria. The direct socioeconomic advantage of recycling is the potential for income generation for the community and for formal/informal recyclable collecting companies and recycling companies (Menikpura, Gheewala, Bonnet, & Chiemchaisr, 2013). As far as environmental friendliness is concerned, recycling activities have significant positive influences by preventing greenhouse gas emissions and water pollution, saving energy by avoiding virgin production process chains, and diverting the waste from landfills and incinerators (Agarwal, Singhmar, Kulshrestha, & Mittal, 2005). Cited in Menikpura et al., 2013).

Landfill

A landfill occupies a large area (hectares) of land specifically designed and built to receive waste. Landfill sites used to dispose of unwanted items also pollute the air, water, and land (Anagor, 2016). The appropriateness of the landfill's location, operational effectiveness, economic viability, environmental impact, future sustainability, and community acceptance are all important elements that affect its performance (Aidoo, Nandakumar, Mwinkume & Raj, 2024; Nanda & Berruti, 2021). The dumping of garbage in landfills can result in air pollution, groundwater contamination, and the creation of landfill gas, all of which are factors in climate change (Abiriga, Jenkins & Vestgarden, 2021; Vasarhelyi, 2021). Communities that are close to landfills may be impacted in terms of health and wellbeing. The residents of the homes near the landfill site now face serious health risks as a result of this activity. While resistance can result in calls for improved waste management techniques, effective landfill management can boost community acceptance (Aidoo et al., 2024; Ozbay, Jones & Gadde, 2021). (Vaverková, 2019). Reliable landfill services must be provided while

covering costs and making a profit (Vivien, 2023) for landfills to be considered economically viable.

Ramke (2009) suggests that environmental pollution can be avoided if a well-constructed and operated landfill is designed to collect and treat the emissions of leachate and landfill gas. Leachate is the fluid that is extrapolated from environmentally hazardous waste. When the wastes in landfills decompose, certain chemicals discharge into the soil, such as chlorides and heavy metals, which pass through rainfall and end up in our drinking water (Anagor, 2016).

Corporate Sustainability

Corporate sustainability is a long-term survival strategy for a company to maintain and improve its economic, environmental, and social performance. A sustainability-related construct called the triple bottom line (TBL) provides a framework for measuring the business's performance and the organisation's success using three performance criteria: economic, social, and environmental (Alhaddi, 2015). Corporate sustainability aims to improve companies' economic, environmental, and social performance.

According to Bista (2019), sustainability has been referred to as a developmental approach that meets the needs of the present without compromising the ability of the future. Corporate sustainability is defined as a process of analysis and decision-making across business functions, obtained through a committed and clear understanding of transitions that may occur in the present or the future (Odunsi, 2024). Geissodoerfer, Savaget, Bocken, and Hultink (2017) described sustainability as the balanced and systemic integration of intra- and intergenerational economic, social, and environmental performance. Corporate sustainability is the implementation of management instruments, concepts, and systems that lead to long-term survival, also known as sustainability management tools (Johnson & Schaltegger, 2016).

Economic Sustainability

Economic sustainability reflects the company's long-term profitability and financial sustainability as measured in terms of long-term operational effectiveness, efficiency, productivity, earnings, return on investment, and market value. Economic performance strategies relate to strategic financial management practices in firms; they consist of goals, patterns, or alternatives designed to improve and optimise financial management to achieve corporate results (Karadag, 2015).

Reddy and Thomson (2015) said that economic sustainability would be a mirage where the use of natural resources exceeds its limits and the phenomena that drive past growth are dependent non-stop. The sustainable economy is recognised as one of the subsystems of sustainability and refers to its capability to survive and evolve in the future to support future generations (Spangenberg, 2005). The economic aspect refers to the ability of an economically sustainable system to produce goods and services continuously, maintaining, at the same time, manageable levels of government and external debt and avoiding extreme sectoral imbalances that may damage agricultural and industrial production (Harris, 2003, cited in Koktsidis, 2016). To suffice, sustainable economics is an organisation's capacity to grow economically by focussing

on the organisational and economic value and policies provided to its surrounding system so that it prospers and supports future generations.

Theoretical Framework

Resource-Based View Theory

The study was anchored on the Based View (RBV) theory, which holds a reasonable explanation for the relationship that might exist between waste management and corporate sustainability. Developed by Wernerfelt (1986), it emphasises the importance and influence of an organisation's resources on its short-term performance and long-term survival. To such an extent, corporate sustainability is also dependent on the resources at the disposal of firms. Moreover, resources in this context could either be human or material. Therefore, resources used in this study include all assets, especially inventory and secondary materials. As practiced by trained and skilled managers, waste management can harness and recycle other resources in the possession of business entities for economic sustainability and overall profitability. Resource-based perspective theory is relevant because it offers a strong framework for comprehending how Nigerian Breweries Plc can efficiently manage waste and advance corporate sustainability. Through the utilisation of distinctive resources, innovation, and a long-term orientation, the brewery may bolster its competitive edge and make a constructive impact on environmental sustainability.

Empirical Review

The impact of landfill viability on sustainability dynamics in the Cape Coast Metropolis was evaluated by Aidoo et al. (2024). Using the SmartPLS4 Structural Equation Modelling and the uncapacitated facility location problem paradigm, the study examined the sustainability and viability of the landfill locations that were suggested. Using a stratified sampling technique, 400 samples were chosen for investigation within the Cape Coast Metropolis; of these, 320 valid respondents served as the foundation for the analysis. Significant relationships between community acceptance, environmental effect, facility accessibility, site sustainability, and operational efficiency were found through statistical research. However, there was no discernible relationship between site sustainability and economic viability. Additionally, there was no statistically significant relationship between the suggested indirect mediation pathway through facility accessibility, operational efficiency, and site sustainability.

Aliyu et al. (2023) highlighted the present condition of solid waste management in Federal Polytechnic Nasarawa, Nigeria. A descriptive survey using the research method was used. A total of one hundred (100) questionnaires were administered to gather information on primary sources, and seventy (70) were returned. The method of data collection was through questionnaire administration and direct physical observation. The collected data were analysed using simple percentage statistical techniques to achieve the desired results. The findings revealed little orientation on the importance of reduce, reuse, and recycle approach. Moreover, laxity on the part of the authorities to punish environmental saboteurs. Olayiwola et al. (2023) conducted a study on waste management administration and environmental sustainability in Nigeria. The study employed a survey research design. The population comprised 700 waste administrators in the Ikeja Local Government Area; 250 were selected using the Yamen sample

technique. However, 233 of the 250 distributed questionnaires were retrieved. In order to determine the ANOVA and coefficient results, linear regression (at a significance level of 5% or 0.05) was utilised. The results revealed a negative correlation between waste management agency operations and environmental sustainability, as well as between waste disposal, waste separation, and environmental cleanliness. Furthermore, a negative correlation between waste recycling and pollution control was discovered.
The impact of garbage recycling on the financial performance of small and medium-sized businesses (SMEs) in Nigeria was investigated by Oranefo (2022). The questionnaires that were given to the respondents produced the data. With the help of SPSS version 20.0, regression analysis was performed to evaluate the proposed hypothesis at the 5% level of significance. The study discovered that the profitability of small and medium-sized businesses (SMEs) in Nigeria is significantly impacted by waste recycling, resource recycling, solid waste management, and municipal garbage collection crews. This impact was statistically significant at the 5% level of significance.

Sahar (2019) examined waste management analysis from an economic-environment sustainability perspective in Malaysia. The study aims to investigate the general public and informal garbage collectors' perceptions from social, environmental, and economic aspects. 300 respondents (125 households and 125 informal garbage collectors) were interviewed from seven districts of Faisalabad. The results reported that most residents blamed themselves for poor solid waste management, leading to different environmental issues. Lack of awareness among the general public about waste management practices is one of the critical factors for environmental issues. Further, solid waste collection by informal garbage collectors would improve social and environmental sustainability and serve as a source of income (economic value). The ordinary least squares (OLS) method was also used to check the impact of different factors on garbage collectors' income levels. Working hours were the only variable that had a significant impact on income.

Ndubuisi-Okolo et al. (2016) investigated Nigeria's waste management and sustainable development, mainly referring to the Anambra State Waste Management Agency (ASWAMA). A survey research design was adopted, and the primary instrument used for data collection was a structured questionnaire. Pearson product Moment Correlation coefficient and one-sample Kolmogorov Smirnov Test were employed to analyse the data generated. The findings revealed that waste management practice significantly impacts environmental sustainability in Anambra State.

Gap in Knowledge
Following the empirical review done in the work, it could be seen that much study has been carried out in the past in the area of waste management and its components and how it affects corporate sustainability or one aspect of sustainability. However, all these studies are seen as different from the current study. Some were carried out in different countries and states with different operational environments and policies, while others used techniques different from those used in this study. Others used a different dependent variable, while some were relatively old. For instance, Aliyu et al. (2023) used a different dependent variable and studied a different industry from the present study. Sahar (2019) carried out their studies in a different country. Ndubuisi-Okolo,

Anekwe, and Attah (2016) in Nigeria used an environmental agency, and the study took place in different states. Some of the old studies are Danthurebandara et al. (2015). All these spotted gaps are what this present study seeks to bridge when completed.

Methodology

The researcher employed a descriptive survey and correlation design. The survey method is relevant to the study since the design enables the researcher to observe and measure the variables needed (Franken & Wallen, 2009), and correlation design was appropriate for this study because it enabled researchers to analyse the relationships among a large number of variables in a single study (Borg & Gall, 1983). The target population was 198 staff, comprising the top management cadre (176) and the human resource department (22). Stratified and convenient sampling techniques and Taro Yamenes' formula was used to determine the sample size of 132. The sampling technique was chosen to allow personal choice in selecting the sample. Emphasis was placed on the staff knowledge and information concerning the study. The study used structured questionnaires as research instruments. The questions were pattern after Likert's five-point scale format. The content and face validity were used to validate the research instrument through the expert option. The reliability of the instruments was ensured by piloting the questionnaire with fifteen staff who are not part of the study element. From Table 1 below, the result reveals that the coefficient of the construct of the Cronbach Alpha reliability test is.884, which shows that the instrument has strong internal consistency and is considered to be fit. The study hypotheses were tested using multiple regression analysis. The study encountered some limitations from the management-level staff who were reluctant to fill out the questionnaire until they were assured of confidentiality.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
884	.886	3

Source: SPSS Output IBM version 25

Model Specification

$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_n X_n + \varepsilon$ - - - - - - - (1)

In line with the objectives and hypotheses of the study, the models are stated thus;

$ES = f(WR, LF)$ - - - - - - - - - (2)

$ES = \beta_0 + \beta_1 WR + \beta_2 LF + \varepsilon$ - - - - - - - (3)

Where;

Y = the predicted or expected value of the dependent variable

X_1---X_n = distinct independent or predictor variables

β_0 = value of Y when all of the independent variables (X_1 through X_n) are equal to zero

β_1 --β_n = the estimated regression coefficients

ε = Stochastic error term representing other possible factors not considered in the model that could influence the dependent variable

WR = Waste Recycling

LF = Landfills

ES = Economic Sustainability

Results

The presentation and analysis of the respondents' data on the effect of waste management on corporate sustainability were covered in this part. Out of 132 questionnaires distributed, 122 were filled correctly and used in this study.

Analysis of Data Related to Research Question

Decision Rule:

The decision in the analysis section is determined by the average of the response of respondents. Strongly Agreed (5 points), Agreed (4 points), Undecided (3 point), Disagreed (2 points), and Strongly Disagreed (1 points). The average of the responses:

$$\frac{(5 + 4 + 3 + 2 + 1)}{5} = 3.0$$

Therefore, mean score below 3.0 would be considered as rejected and mean score of 3.0 and above will be considered as accepted.

Table 2: Analysis of responses to the question on the impact of waste recycling on economic sustainability

S/N	Items	SA	A	N	D	SD	Mean	Remark
	Waste Recycling	**5**	**4**	**3**	**2**	**1**		
1	Organic waste is recycled into nutrient-rich soil	30 (25%)	52 (42%)	12 (10%)	20 (16%)	8 (7%)	3.62	Agree
2	Waste recycling reduces disposal costs.	40 (33%)	48 (39%)	8 (7%)	18 (15%)	8 (7%)	3.77	Agree
3	Wastewater is treated before discharge	50 (41%)	42 (34%)	6 (5%)	20 (17%)	4 (3%)	3.93	Agree
	Economic Sustainability							
4	Waste management enhance firm profitability	30 (24%)	56 (46%)	10 (8%)	24 (20%)	2 (2%)	3.72	Agree
5	Waste management fosters community support	66 (54%)	24 (20%)	6 (5%)	18 (15%)	8 (7%)	4.00	Agree
6	A market monitoring plan exists with the goal of identifying opportunities for waste management	40 (33%)	54 (44%)	6 (5%)	18 (15%)	4 (3%)	3.89	Agree

Source: Filed Survey, 2024

Table 2 analysed the responses of the respondents regarding the impact of waste recycling on economic sustainability in Nigerian Breweries Plc. From the data analysis, items 1, 2, 3, 4, 5, and 6 obtained a mean rating above the criterion mean of 3.0. The

result of the analysis indicated that the majority of the respondents supported that waste recycling has an impact on the economic sustainability of Nigerian Breweries plc.

Table 3: Analysis of responses to the question on the impact of landfills on economic sustainability

S/N	Items	SA%	A	N	D	SD	Mean	Remark
	Landfills	**5**	**4**	**3**	**2**	**1**		
1	The community is engaged in landfill design	48 (39%)	46 (38%)	10 (8%)	16 (13%)	2 (2%)	4.00	Agree
2	Landfills are used as centres for waste handling.	26 (21%)	68 (56%)	6 (5%)	20 (16%)	2 (2%)	3.79	Agree
3	Landfills involve high costs of maintenance	44 (36%)	50 (41%)	6 (5%)	18 (15%)	4 (3%)	3.92	Agree
	Economic Sustainability							
1	Waste management enhances firm profitability	30 (24%)	56 (46%)	10 (8%)	24 (20%)	2 (2%)	3.72	Agree
2	Waste management fosters community support	66 (54%)	24 (20%)	6 (5%)	18 (15%)	8 (7%)	4.00	Agree
3	A market monitoring plan exists with the goal of identifying opportunities for waste management	40 (33%)	54 (44%)	6 (5%)	18 (15%)	4 (3%)	3.89	Agree

Source: Field Survey, 2024

Table 3 analysed the responses of the respondents regarding the impact of the landfills on economic sustainability in Nigerian Breweries Plc. From the data analysis, items 1, 2, 3, 4, 5, and 6 obtained a mean rating above the criterion mean of 3.0. The result of the analysis indicated that the majority of the respondents supported that the landfills have an impact on the economic sustainability of Nigerian Breweries Plc.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.480[a]	.230	.211	.64989

a. Predictors: (Constant), Recycling, Landfills

Source: SPSS Output version 25

ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	10.355	2	5.178	12.259	.000[b]
	Residual	34.633	120	.422		
	Total	44.988	122			

a. Dependent Variable: economic sustainability

b. Predictors: (Constant), Recycling, Landfills

Source: SPSS Output version 25

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	T	Sig.
1	(Constant)	5.215	1.390		3.751	.000
	Recycling	.288	.090	.310	3.198	.002
	Landfills	.293	.076	.373	3.851	.000

a. Dependent Variable: economic sustainability

Source: SPSS Output version 25

Interpretation

The regression table (Table 4, 5, 6), waste recycling, and landfill variables are evaluated for their influence on corporate sustainability. Table 4, the model summary, reveals that waste recycling and use of landfills have a moderate impact on economic sustainability (as seen in the R column). The adjusted R 2 value (.211) signifies that up to 21.1 percent of the economic sustainability is predicted by waste recycling and use of landfills, and 78.9 percent is unexplained by the model. It implies that 21.1% of variation in waste recycling and use of landfills can be explained by a unit change in economic sustainability, while the remaining 78.9% is explained by other variables. This implies that effective use of landfilling will enhance the economic sustainability of Nigerian Breweries Plc, and poor landfilling practices will reduce it. Furthermore, good waste recycling practices will improve the economic sustainability of Nigerian Breweries Plc, and the poor or lack of proper waste recycling will reduce it.

The F-test (12.259, p<0.05) of the relationship in Table 5 indicates that the overall prediction of the independent variable to the dependent variable is statistically significant. Therefore, the regression model fits the data well and provides sufficient evidence to conclude that waste recycling and use of landfills significantly influence economic sustainability. Analysis of the regression model coefficients is shown in Table 6. The regression coefficient (B), the intercept (α), and the coefficient's significance in the model are subjected to the t-test to test the null hypothesis that the coefficient is zero.

From Table 6, waste recycling has a significant and positive impact on economic sustainability (β = .31, t = 3.20, p < 0.01). Therefore, the null hypothesis is rejected, and it is concluded that waste recycling has a significant and positive impact on the economic sustainability of Nigerian Breweries Plc. The implication is that effective waste recycling will help the organisation save on waste disposal costs and enhance their profitability.

Discussion

The outcome of hypothesis 1 reveals that waste recycling has a significant and positive impact on the economic sustainability of Nigerian Breweries Plc, Enugu State, Nigeria. This finding supports the resource-based view theory, which states that the ability of the

organisation to manage their organic or inorganic waste will give them a competitive advantage and improve their economic sustainability. This outcome is in tandem with the findings of Oranefo (2022) and Sahar (2019) but disagrees with the findings of Olayiwola et al. (2023), who found a significant but negative correlation between waste recycling and pollution control.

The result from Hypothesis 2 reveals that use of landfills has a significant and positive impact on the economic sustainability of Nigerian Breweries Plc, Enugu State, Nigeria. This finding supports the resource-based view theory, which states that the ability of the organisation to effectively use landfills for waste handling will give them a competitive advantage and improve their economic sustainability. This finding is in line with the studies of Danthurebandara, Van-Passel, Vanderreydt, and Van-Acker (2015) but contradicts the finding of Aidoo et al. (2024) that use of landfills has no significant impact on economic sustainability.

Conclusion

Waste management is imperative for a sustainable environment and corporate growth. Management of organic and inorganic waste is strategically necessary for corporate sustainability.

Recommendations

The following recommendations were made. First, management should incorporate modern practices like resource recovery and landfill gas capture to promote circular economy and enhance sustainability, as that will reduce the rate of methane, which is very harmful to humans and the environment. Second, the management of Nigerian Breweries Plc should promote effective waste recycling practices for a sustainable future. This will ensure long-term corporate sustainability, reduce production costs, and improve profitability.

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