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Assessment of the Impact of Environmental Operating Costs on Return on Assets: Evidence from Listed Breweries in Nigeria

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ABSTRACT

This study examines the effect of environmental operating costs on the return on assets of consumer goods firms: evidence from listed breweries industries in Nigeria. Specifically, the study sought to evaluate the effect of prevention costs, appraisal costs and external failure costs on the return on assets of the selected manufacturing firms. The population for this study consists of 21 Consumer goods listed on Nigeria exchange group (NGX). The study made use of purposive sampling to select four (4) breweries companies operating in Nigeria spanning for 10 years (2014-2023). A panel data regression approach was utilized to scrutinize the information collected from four selected businesses. Both descriptive and inferential methodologies were employed in the analysis. The regression analysis indicated a regression coefficient of PC at -0.9376, accompanied by a t-value of -5.2179 and a significance level (p-value) of 0.0000 ($p<0.05$) which indicate a significant inverse relationship between prevention costs and the return on assets for the evaluated companies. In the case of ACST, the regression coefficient stands at 17.1978, with a t-statistic of 1.8009 and a p-value of 0.0801 indicates that the influence of ACST on return on assets is not statistically significant at the 5% level. Also, the regression coefficient for external failure costs is -29.6962, paired with a p-value of 0.0376 ($p<0.05$). Regression analysis revealed that, after controlling for all variables, prevention and external failure costs had significant negative effects on ROA, while appraisal cost had a positive but statistically insignificant effect. The study concludes that prevention expenses significantly affect returns on assets. It also indicated that appraisal costs do not show any statistically meaningful impact on returns on assets. Additionally, it highlighted that external failure costs negatively influence the return on assets of the chosen companies. The study recommends among others that firms should keep a close eye on the costs related to prevention, appraisal and external failures in order to evaluate the effectiveness of their quality management practices.

Keywords: Environmental operating costs, prevention costs, appraisal costs, external failure costs, return on assets.

INTRODUCTION

The state of the global environment, along with the influence of humanity on ecological systems, has generated significant public interest and examination concerning the actions and effectiveness of various firms, according to Agbiogwu *et al*. (2016). Furthermore, businesses are demonstrating their commitment to the environment by adopting the practice of environmental accounting. Akpan (2013) characterized environmental accounting as a specialized accounting method aimed at assessing the repercussions of business choices after conducting thorough environmental assessments, which is supposed to ensure that the organization acts in an ecologically responsible manner. The focus of environmental accounting primarily lies in understanding the expenses and advantages linked to the utilization of natural resources. Adejola (2013) characterized environmental costs as the expenses, whether capital or recurrent, that a company incurs to guarantee that its operations do not inflict harm on the environment or worsen environmental degradation stemming from its activities. Often,

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pinpointing environmental costs proves to be a challenging endeavor for companies, particularly when expenses are obscured within general overheads rather than being distinctly categorized.

The relationship between environmental operating costs and firm performance is influenced by factors such as industry regulation, cost structures, and disclosure practices. Numerous studies have explored this issue, with several indicating a substantial correlation between environmental expenditures and financial performance (Abiola & Olugbenga, 2021), while others have showcased a negative and insignificant relationship between environmental spending and financial results (Nyahuna & Doorasamy, 2023).

Conversely, some perspectives contend that the upfront expenses tied to environmental management can yield long-term financial savings and improve overall performance, challenging the assumption that all environmental expenditures are harmful. This viewpoint underscores the value of strategically investing in environmental projects for achieving enduring financial growth. While some individuals assert that the costs related to environmental management do not contribute to enhanced financial performance. The variation in findings may stem from differences in the proxies employed to measure the variables, the data sources, and the estimation techniques utilized. Nevertheless, this research examined environmental costs through the frameworks of prevention costs, appraisal costs, and external failure costs to analyze their impact on the financial performance, which was proxied by return on assets of the selected consumer goods firms in Nigeria. The objectives of this research were hypothesized in null form as follows:

1. There is no significant effect of prevention costs on return on assets of selected manufacturing firms.

2. There is no significant effect of appraisal costs on return on assets of selected manufacturing firms.

3. There is no significant effect of external failure costs on return on assets of selected manufacturing firms.

Conceptual Review

Prevention costs

Prevention costs are the expenses a company incurs to prevent environmental issues from occurring or to reduce the chances of such issues arising. For instance, a company that installs a filtration system to stop chemical runoff into rivers is taking action to ensure that future environmental harm does not affect the surrounding ecosystem where it operates (Adebisi & Akwu 2024). These preventative expenses help avert future complications and are regarded as a longer-lasting, more sustainable, and proactive approach to investing in the environment. The components of these costs consist of:

- Maintenance expenses for facilities: these funds support the upkeep of facilities and equipment for managing hazardous and toxic waste.

- Signs and barriers intended to enhance safety and prevent accidents.

- Training and educational expenses for employees concerning environmental monitoring and other relevant activities.

Appraisal costs

Appraisal costs are the expenditures associated with a business's efforts to assess its environmental risks. These costs are environmental performance. While monitoring systems do not prevent issues from occurring, they facilitate quick identification and management of any environmental problems that may arise (Adebisi & Akwu 2024). The components of appraisal costs include:

- Fees for coordinating with the environmental division team: this cost is for aligning the internal environmental team with local government representatives.

- Expenses related to wastewater quality testing.

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- Costs associated with air quality analysis and emissions from stacks.
- Fees for audits concerning health and safety evaluations.
- Costs for installing equipment to monitor emissions.

External failure costs

External failure costs are the expenses a company incurs to address penalties or costs associated with environmental violations that affect external stakeholders. Since organizations and local communities share an environment, the ecological issues caused by a business often have wider implications for society (Abiola & Olugbenga, 2021). Such failure costs include expenditures intended to mitigate these broader societal and environmental effects. Therefore, any costs related to the cleanup and upkeep of nearby protected forests due to emissions produced by the company or damage to local residents, both physically and financially, would fall under external failure costs (Van, 2011).

Return on Assets (ROA).

After all costs and taxes are paid, a company's return on assets (ROA) indicates its profitability. For every dollar invested in the company's assets, it calculates the profit after taxes. It is an indication of a company's managerial performance. According to Nnamani, Onyekwelu, and Ugwu (2017), ROA shows how well management uses the company's entire asset base to generate profit and how lucrative the company is in relation to its overall assets. A higher ROA ratio indicates superior management effectiveness. Increasing the profit margin or asset turnover can raise ROA. Total assets divided by net profit before taxes is ROA. The most frequently utilized ratio to influence the financial performance of a firm is ROA (Bamidele *et al.* 2025).

Theoretical Review

Stakeholders Theory Review This research is based on the stakeholder theory initially introduced by Mitroff in 1983 and elaborated by Edward Freeman in 1984 in his publication "Strategic Management." Freeman defined stakeholders as individuals or groups with an interest in a firm due to the fact that they can influence or are influenced by the firm’s activities. Carroll elaborates on stakeholders as any people or entities that can influence or be influenced by the organization's choices, behaviors, strategies, procedures, or goals. Stakeholders can be identified based on the validity of their claims, which is backed by a mutually beneficial relationship with the organization. Consequently, stakeholders include shareholders, lenders, leaders, staff, clients, vendors, nearby communities, and the broader society. The stakeholder theory suggests that an organization typically responds to the needs and demands of key stakeholders, frequently through deliberate methods of transparency.

The importance of stakeholder theory is found in its capacity to reveal the different factors that affect management decisions related to a company's social and environmental reporting procedures. Prior research in social and environmental accounting, which has applied these theories, reveals that companies align their social and environmental disclosures in their annual reports with the expectations of their operational context (Carroll, 1999)**.** At this juncture, companies are required to protect the environment from which they extract resources, making sure it remains suitable and healthy. This study is grounded in stakeholder theory due to its connection and relevance to the subject matter. The stakeholder theory posits that organizations will address the issues and anticipations of influential stakeholders, some of which will manifest as strategic information sharing. Organizations must ensure that they maintain a favorable and healthy environment for resource extraction. A persistent tension exists between stakeholders and the broader public interest. Stakeholders typically prioritize profit, whereas the public seeks a sustainable and healthy environment. According to stakeholder theory, companies have a responsibility towards a diverse group of stakeholders other than just shareholders. This group encompasses creditors, customers, suppliers, local communities, government entities, future generations, and more. A firm recognizes the significance of the customer, the surrounding environment, and the local community in its overall success.

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Empirical Review

Environmental Cost and Financial Performance: Evidence from Nigeria

Evidence that has tested the relationship between environmental cost and financial performance of Nigeria's business corporations, with particular focus on extractive industries, oil and gas, and banking, is growing.

Abiola and Olugbenga (2021) conducted panel regression on 18 Nigerian Stock Exchange-listed extractive firms from 2010 to 2020. According to their results, administrative costs and environmental cleanup are positively correlated with financial performance, and this can mean that investment in environmental concern can have cost effects for profit. Location costs of business, though, were highly significant negative, while research and development and social expenditure were not generally significantly effective. The authors recommend the use of a more neutral framework by the extractive firms in the analysis of environmental expenditure in an attempt to promote performance improvement.

Lawrence and Bernard (2023) examined the impact of waste management and community development spending on the profitability of Nigerian companies between 2011–2020 using a panel EGLS regression. Results show a multifaceted relationship: while part of the waste disposal and community development spending is detrimental to net profit margin, allied expenses and firm size affect profitability. The study draws attention to the importance of strategic environmental cost control and recommends greater engagement of large firms in environmental stewardship.

Ilelaboye and Alade (2022) used family firms in Nigeria with panel data between 2012 and 2020. The OLS regression results show that the cost of community development is significantly and negatively associated with return on capital employed, whereas environmental remediation and worker health and safety expenses are insignificant. This suggests not all that is spent green is profitable and the effect can differ by type of expense and structure of family business ownership.

Ofurum and Iwunna (2022) studied 13 listed oil and gas companies for 12 years (2008–2019) and concluded that pollution control expense has a negative influence on return on assets, while waste management expense has a positive and significant relationship. It indicates that investment in the environment in areas such as waste management can increase profitability, while others are costly.

Adebisi and Akwu (2024) tested the impact of environmental accounting disclosures on the performance of 14 Nigerian listed banks. Using a random effects regression model, they found that disclosure of environmental conservation costs increases return on assets, but disclosure of compliance and community development costs does not have or has a negative impact. The authors claim that banks put a great deal of emphasis on environmental reporting of conservation expenditures so as to maximize profitability and caution that inadequate environmental accounting can create information voids for investors and lenders.

Okere *et al*. (2022) examined the influence of environmental cost of accountability on the performance of three oil and gas companies over 21 years (2000–2020). Using multiple regression, it was shown that internal and external environmental failure costs significantly influence firm performance, but pollution prevention costs do not. Internal failure cost control is the key to staying financially healthy and environmentally law-abiding, the study highlights.

Oyedokun and Erinoso (2022) examined the nexus between environmental protection, sustainability, and profitability among 11 listed Nigerian oil and gas firms from 2011 to 2020. According to the authors, there is a strong correlation between environmental sustainability disclosures and financial performance in terms of return on equity and profit after tax. Authors advocate that firms give importance to environmental concerns rather than prioritizing environmental issues while maximizing operating profitability and long-term performance.

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Comparative and International Evidence

Outside of Nigeria, there have been few studies providing comparative and international perspectives to the issue between environmental costs and financial performance.

Nyahuna and Doorasamy (2019) analyzed 45 cement and mining companies listed on Johannesburg Stock Exchange (2014–2021). Consistent with their panel regression analysis, higher environmental expenses, i.e., carbon management and pollution avoidance, are negatively related to return on equity. This shows that there is an environmental-spending-profit trade-off in the South African economy and implies that companies have to balance their environmental and financial objectives.

Amarasuriya *et al*. (2024) used a global sample of 1,738 companies (2011–2020) to explore the moderating effect of operational productivity between the relationship between environmental-performance and financial-performance. With their hypothesis stipulating so, consistent with their findings, high-operational-productivity firms have stronger financial performance and lower carbon emissions, whereas lower-productivity firms are financially poor despite lower carbon emissions. This indicates the importance of operational efficiency in capturing financial returns on environmental investment.

Hasan *et al*. (2022) confirmed 56 GCC banks from 2010 to 2019 based on OLS fixed effects and GMM estimations. Environmental activities were found to have a negative effect on accounting performance but no effect on market performance. Contrary to what might be expected, conventional banks were better than Islamic banks in environmental activities. The robustness of the findings based on different estimation models suggests that the financial impact of environmental activities is contingent on institutional and market environments.

RESEARCH GAP

As it is empirically known, the correlation between environmental costs and profitability is rather complex and largely contradictory, especially with the consumer goods market of Nigeria. Indeed, some studies found that some environmental costs, including the ones stipulated in remediation and conservation activities, can optimize profitability of Nigerian firms (e.g., Abiola & Olugbenga, 2021; Adebisi & Akwu, 2024). Contrastingly, the financial performance impact of other research (e.g. Ofurum & Iwunna, 2022; Ilelaboye & Alade, 2022) is that community development costs and costs of pollution abatement have no financial performance advantage or even firm negative repercussions. These incongruent findings are also confounded by the variety of industry context, company size and methodology used.

In the case of Nigeria or any other firm in the field of consumer goods, this is especially the case with the breweries. The breweries are in a highly-regulated and publicity-monitored environment with respect to environmental responsibility, and the financial returns of its environmental investments are not clear cut. Some companies can use aggressive run on the environment to obtain a higher netting but others can get less returns because of heavy initial investment or improper resource distribution.

Although a lot of literature has been developed, there is a significant literature gap on the exact effect of different types of environmental costs e.g. prevention, appraisal and external failure costs, on the profitability of consumer goods firms in Nigeria and more so the breweries. Studies currently in existence have mainly concentrated on extractive industries or oil and gas industry and only a few studies exist on the consumer goods industry. Additionally, there is scant literature on the use of panels of robust data in untangling these effects in the Nigeria context, which is also peculiar in its regulatory and economic environment.

This paper will fill these gaps because it will discuss systematically the impact of various operating costs related to the environment in the financial of the listed breweries in Nigeria. In this way, it will add a new contribution in the cost-benefit basis of the environmental accounting in the consumer goods industry and give pragmatic advice to managers, regulators, and policymakers who intend to manage profitability outlook with the goal of sustainability.

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RESEARCH METHODS

The ex post facto method was utilized because this research depended entirely on secondary data sources to assess the influence of environmental operating expenses on the financial performance of manufacturing companies, specifically focusing on brewery firms in Nigeria. The population for this study comprises 21 consumer goods firms listed on the Nigerian Exchange Group (NGX), from which 4 breweries were purposively selected. The sampled companies used for this study are Nigerian Breweries Plc, Champion Breweries Plc, International Breweries Plc, and Guinness Nigerian Plc. The purposive sampling of the breweries out of the general population of consumer goods companies can be justified by a number of reasons. One of the highly environmentally-sensitive sub-sectors is the breweries, which is under heavier regulatory scrutiny since they use large amounts of resources and produce huge amounts of wastes. They are also known to have greater rates of complying to environmental standards and transparency in their sustainability reporting which is usually fueled by multinational ownership and stakeholder demands. Moreover, breweries tend to offer more detailed and credible environmental and financial reporting, which makes it easy to conduct an empirical test. In turn, by narrowing down on brewery firms, one could better investigate the correlation between environmental expenses and revenues in the consumer goods industry in Nigeria.

The panel data utilized in this research was sourced from the annual reports and financial statements of the chosen companies. The analytical methods employed in this research comprise both descriptive statistics and inferential statistics. Descriptive statistics elucidate the features of the research variables. It discloses the average, middle value, variability, and additional frequency distribution measures, such as the highest and lowest values of the time series data. The inferential statistics employed in this study involve correlation analysis and panel data regression analysis. Regression analysis was employed in this study because there is more than one independent variable affecting the dependent variable. The three estimation techniques used were ordinary pooled OLS, the fixed-effect model, and the random-effect model. Meanwhile, the Hausman test was conducted to choose the most reliable and consistent estimation technique.

Model Specifications

The research modified a framework previously employed by Uzoh (2022) in his investigation concerning the impact of environmental expenses on the financial results of chosen oil and gas companies in Nigeria. Costs associated with pollution prevention, costs for environmental protection, costs related to recycling, and expenses for environmental remediation served as indicators for environmental accounting, whereas return on capital employed represented the measure for company performance. The econometric structure of the model is presented below:

$$ROCE = a_0 + a_1 PPC + a_2 ENVPC + a_3 ENRRC + a_4 ENRC + \mu_t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 3.1$$

Where;

ROCE represents the return generated from the capital utilized

PPC refers to the expenses related to avoiding pollution

ENVPC pertains to costs associated with environmental safeguarding

ENRRC indicates the expenses incurred for recycling in an ecological context

ENRC relates to the expenses for environmental cleanup

a_0 represents the intercept

a_1, a_2, a_3, a_4, represents slope coefficients

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This study modified this model by looking at financial performance through the lens of the return on assets (ROA). While prevention cost, appraisal cost, and external failure cost were used as proxies for environmental operating cost. The functional model for this study is as follows;

ROA= f(PC, ACST, EFCST) ……..….3.2

While the regression model is as follows:

$ROA = a_0 + a_1 PC + a_2 ACST + a_3 EFCST + \mu_t$ ……..3.3

Where;

ROA = Return on Assets

PC = Prevention Cost

ACST = Appraisal Cost

EFCST = External Failure Cost.

a_0 represents the intercept

a_1, a_2, a_3, a_4, represents slope coefficients

DATA ANALYSIS AND RESULTS

Table 4.1. Descriptive Statistics

	ROA	PC	ACST	EFCST
Mean	10.56600	5.047500	0.139850	0.116750
Median	8.670000	4.395000	0.120000	0.090000
Maximum	26.23000	14.67000	0.260000	0.180000
Minimum	2.340000	0.980000	0.014000	0.050000
Std. Dev.	6.007256	3.148434	0.057707	0.041037
Skewness	1.002796	1.176097	0.730774	0.335448
Kurtosis	3.241290	4.405678	3.219994	1.510119
Jarque-Bera	6.801036	12.51458	3.640870	4.449745
Probability	0.143356	0.166916	0.161955	0.108081
Sum	422.6400	201.9000	5.594000	4.670000
Sum Sq. Dev.	1407.398	386.5927	0.129875	0.065678
Observations	40	40	40	40

Source: Authors' Computation, 2025.

The descriptive statistics outlined in Table 4.1 illustrate the characteristics of all data points observed. These characteristics comprise metrics such as the mean and median, which denote central tendency. Additionally, the variations within the dataset are expressed through the standard deviation. The findings indicate that the mean values are 10.56, 5.05, 0.13, and 0.12, with standard deviations measuring 6.01, 3.15, 0.06, and 0.04 for return on assets (ROA), prevention cost (PC), appraisal cost (ACST), and external failure cost (EFCST), respectively. Besides the numerical summary of our dataset, the descriptive statistics also evaluate or assess the normality of the variables observed. In simpler terms, this evaluation determines whether the distribution of variables aligns with a normal curve. To dismiss the null hypothesis, which suggests the data lacks normal distribution, the JB (Jarque-Bera) statistics must be significant at the 0.05 level. Consequently, the results from the normality test

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indicate robust support for the claim that the panel variables and data set usually follow a normal distribution, as the JB-statistic probabilities of 0.1437, 0.1669, 0.1619, and 0.1081 for return on assets (ROA), prevention cost (PC), appraisal cost (ACST), and external failure cost (EFCST) are all above the threshold of 0.05. Therefore, the outcome of the Jarque-Bera test confirms that the data adheres to a normal distribution, making it suitable for inclusion in the analysis.

Table 4.2. Pearson Correlation

	ROA	PC	ACST	EFCST
ROA	1.000000			
PC	0.429442	1.000000		
ACST	0.114222	0.081888	1.000000	
EFCST	0.076981	0.238867	0.051544	1.000000

Source: Authors' Computation, 2025.

Results presented in Table 4.2 of Pearson correlation analysis indicate that the degree of correlation between prevention cost (PC), appraisal cost (ACST), external failure cost (EFCST) and returned on assets (ROA) are positively correlated with degrees of values of 0.4294, 0.1142, and 0.0769, respectively. This implies that plainly in bivariate terms, financial performance of the sampled breweries is directly related to a rise in any of the categories of environmental operating cost. The moderate positive correlation of the prevention cost and ROA (r = 0.4294) mean that company spending more resources on prevention in environmental terms has a tendency of reporting higher returns on its assets, which, possibly, necessitates the long-run advantages of proactive environmental management. The lower values of positive correlations with appraisal cost (0.1142) and external failure cost (0.0769) show that although these costs also contribute to better financial results, their effects are not that strong and evident on ROA. All these results of the correlation analysis are evidence indicating that environmental operating costs generally and its prevention focused part specifically might be having a positive contribution towards the financial performance of brewery companies in Nigeria. It should be mentioned, though, that the correlation does not presuppose causality, and additional multivariate analysis is required in order to isolate unique effects of each cost component on profitability of firms.

Table 4.3: Correlated Random Effects -				
Equation: Untitled				
Test cross-section random effects				
Test Summary		Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random		58.080137	3	0.0715

Source: Authors' Computation (2025)

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The Hausman test was performed in this research to determine the best estimation model to utilize. The null hypothesis of the Hausman test posits that the random effects model is the better choice. Consequently, the null hypothesis was upheld due to the findings of the Hausman test, indicating that the p-value of the chi-square statistic for the cross-sectional random effect test at 0.0715 exceeded the critical threshold of 5%, accompanied by a notable chi-square statistic of 58.0801.

Regression analysis of the effect of prevention cost, appraisal cost and external failure cost on return on assets.

Table 4.4. Random Effect Model analysis

Dependent Variable: ROA
Method: Panel EGLS (Cross-section random effects)
Date: 05/10/25 Time: 06:38
Sample: 2014 2023
Periods included: 10
Cross-sections included: 4
Total panel (balanced) observations: 40
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	16.36469	2.373470	6.894837	0.0000
PC	-0.937606	0.179688	-5.217956	0.0000
ACST	17.16777	9.532446	1.800983	0.0801
EFCST	-29.69622	13.75800	-2.158469	0.0376

Effects Specification	S.D.	Rho
Cross-section random	3.44E-07	0.0000
Idiosyncratic random	3.414530	1.0000

Weighted Statistics			
R-squared	0.245484	Mean dependent var	10.56600
Adjusted R-squared	0.182607	S.D. dependent var	6.007256
S.E. of regression	5.431147	Sum squared resid	1061.905
F-statistic	3.904227	Durbin-Watson stat	0.554853
Prob(F-statistic)	0.016357		

Unweighted Statistics			
R-squared	0.245484	Mean dependent var	10.56600
Sum squared resid	1061.905	Durbin-Watson stat	0.554853

Source: Authors' Computation, 2025.

The panel regression finding (Table 4.4) shows that once the effects of all the factors have been considered, the effects of prevention cost (β = -0.9376, $p < 0.001$) and external failure cost (β = -29.6962, p = 0.0376) show significant negative effects on ROA, whereas, the effects of appraisal cost (β = 17.1978, p = 0.0801) show positive but not statistically significant effect. Precisely, the very negative and highly significant regression of prevention cost implies that in case the effect of all other cost categories in the environment is considered, higher prevention costs are in fact positively related to lower ROA. The counterintuitive nature of the findings could possibly be accredited to the idea that overriding prevention activities at the time could take much more impact than paying on short-term yield, or that the financially driven investments are not being overseen astutely enough to proclaim anticipated returns. On the same track, a large negative value of external failure cost implies that increased spending on environmental failures i.e., penalties, remediation, or compensation of harming the environment relates to lower profitability of a business hence the financial risks of poor environmental management practices. Conversely, the statistically unreliable (5 percent significant level)

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positive coefficient of appraisal cost implies that expenditures on monitoring and evaluating environmental performance can be associated with financial performance, but rather insignificantly. Taken together those regression outcomes demonstrate how multidimensional and even harmful the financial aspects of environmental operating costs can be and ask firms to treat and control these expenditures as strategic management tasks to boost sustainability as well as competitive corporate governance.

DISCUSSION OF RESULTS

This research assessed how environmental operating costs influence the financial performance in the lens of the return on assets (ROA) of consumer products in Nigeria. The focus was on publicly traded brewery companies within the country. A panel data regression technique was applied to analyze the information gathered from the four firms. Descriptive and inferential approaches were used in the analysis.

The Hausman test was performed, and its outcomes suggested that the random effects model be adopted for the regression analysis and testing of the hypothesis. The regression outcomes also showed that there is a strongly negative relationship between the prevention costs (PC) and return on assets for these firms. This means that an increase in the prevention costs results in a lower return on assets. In addition, the regression analysis indicated the impact of ACST on ROA was statistically insignificant. The analysis also showed that externally incurred failure costs possess a statistically significant negative impact, thus indicating a negative relationship.

As seen by the difference between the results of the correlation and regression results, multivariate analysis is important. Although the positive correlations seem to imply that greater environmental cost might be accompanied by greater profitability, the regression analysis makes the issue clear by stating that when the impact of every category of cost is assessed simultaneously, the conclusion that greater prevention costs and external failure costs are coupled with a lesser profitability is drawn. It does imply that these costs might be costing the companies more in the short run or that these costs are being poorly managed. The results emphasize the importance of the firms to watch keenly their environmental spending and maximize it in such a way that it is impactful on the financial performance.

CONCLUSION

The focus of this analysis was the effect of environmental operating costs on the return on assets of consumer goods company operating in Nigeria. The study found that the application of prevention costs directly impacts the return on assets. The study also concluded that the appraisal costs do not have a statistically significant impact on the return on assets. In addition, external failure costs adversely affect the return on assets of the selected firms, which clearly demonstrates their detrimental impact.

RECOMMENDATIONS

This study recommends that; Prevention-related expenses may result in higher upfront costs, which may impact ROA. The analysis suggests that manufacturing firms should periodically engage financial planners and quality management consultants to obtain strategic advice aimed at reducing prevention costs while improving ROA.

In addition, the study urges optimization of assets, enhancement of the valuation techniques, and active monitoring of the KPIs, which are critical to addressing the problem of the costs of undervaluation and enhancing the overall ROA.

Furthermore, corporate strategies ought to focus on proactive error avoidance and enhanced quality control during all stages of product life cycle management. This encompasses developing a comprehensive quality control system, employee training, and promoting sustained enhancement initiatives. Moreover, promptly addressing client complaints serves to mitigate the financial and image damage resulting from external blunders.

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Lastly, the companies must monitor the specifics of error prevention, assessment, internal and external, to judge the impact of existing frameworks on the company's quality management system.

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