



Environmental Accounting Practice and Financial Performance of Listed Aviation Firms in Nigeria

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Environmental accounting practices is a concept that has received attention in recent times especially after the world experienced the adverse effect of environmental abuse. It was however discovered that the discourse focused majorly on the manufacturing sector with little attention on another sensitive sector such as the aviation industry. This study, therefore, investigated the effect of environmental accounting practices on the financial performance of Nigerian aviation firms, with a specific focus on their environmental research and development, environmental pollution control policy, and environmental waste management. *An ex-post facto* research design was used in the study. The population comprised the five aviation firms listed on the Nigeria Exchange Group as of 31st December 2021. A census sampling technique was used which automatically made the five firms the sample size of the study. Data were obtained from secondary sources through the published annual reports of the firms covering the period of 2016 – 2021. Data collected was

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analyzed using descriptive statistics and ordinary least squares (OLS) regression analysis. Findings revealed that environmental research and development, and environmental waste management had a negative and significant effect on return on assets; while environmental pollution control policy positively and significantly affect the return on assets of Nigeria aviation firms. The study concluded that environmental research and development, and environmental waste management could adversely affect financial performance if not well managed. It is recommended that the environmental management of firms should be given priority in order to maximize financial performance.

Keywords: *Environmental accounting practices; financial performance; environmental research and development; environmental pollution control policy; environmental waste management; aviation.*

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1. INTRODUCTION

Aviation provides the only rapid global transportation network, which makes it an undisputed transport service for businesses worldwide. Aviation generates economic growth, creates jobs, and facilitates international trade and tourism (Aviation Benefits Report, 2019). The social and economic benefits of aviation come with an environmental cost. Aviation carbon emission is a key contributor to global warming. This global warming will continue to increase as long as there is an increase in the world population and an increasing need for air transportation. Over the years, concerns have arisen among various stakeholders on the ongoing impacts of organizations and their operations on their environments. In the pre-covid-19 periods, almost all the global industrial sections had shown interest in estimating the negative influence it has on the environment most especially, the transport industry which is a substantial air polluter [1]. As a result of the importance accorded to environmental and social responsibilities by varying stakeholders, business environments are now made more competitive [2].

Olivier et al. [3] and Sher et al. [4] opined that Africa will continue to contribute to global warming and low air quality as the continent keeps growing its air transportation systems. Despite increased global awareness of the need to drive a sustainable environment by aviation firms, African businesses continue to grapple unsuccessfully with the idea [5]. Developing nations suffer greatly whenever disasters, particularly; man-made disasters occur. Air disasters not only affect lives and properties but also, vegetation and habitats had been greatly destroyed in Africa due to the effect of air

pollution [6]. The degrading effects of the activities of various companies are often ignored in Africa, most especially in Nigeria [7]. Adesina [8] opined that the quest to maintain sustainability has triggered the emergence of many institutions developing varying standards that guide human and corporate interactions with the environment.

Corporate's interaction with both internal and external environments enables value creation and efficient business management. This is achieved by considering the impacts business activities have on stakeholders [9]. This consideration has triggered global businesses toward environmental responsibility [10]. The global understanding of stakeholders about the environmental responsibilities of companies necessitated the evaluation of companies' performance via their financial reports [11]. Various research works had been conducted on an organization's environmental accounting practice and financial performance. Few among many are, Igbekoyi et al. [2]; Ngozi and Ike [12]; Bassey et al. [13] found that good environmental accounting practices affect the profitability of organizations. Korean researchers, Suttipun and Saton [14] stated that there is no link between environmental accounting and an organization's profitability. Environmental accounting of listed firms in India has a negative relationship with return on capital employed, earnings per share, and dividend per share, but is positively related to profit margin as shown by Makori and Jagongo [15]. Osemene et al. [16] maintained that environmental accounting has no effect on return on assets.

Above mentioned studies were conducted in different countries, at different periods of time, on different forms of company, and different

variables of environmental accounting and financial performance were measured, while not very much attention has been given to the aviation industry. The aviation industry provides services, and this nature of business will not enable us to adopt the general and universal results of past studies on the proposed variables of this study. Therefore, this study focuses on how environmental accounting practices affect the financial performance of the aviation industry in Nigeria. The effect of environmental pollution control, research and development, and waste management on the return on assets of aviation firms shall also be examined.

Having presented the introductory aspect of the study, related literature shall be reviewed and presented in the second section, while the third and fourth sections shall focus on methods of data collection, analysis, and interpretation respectively. The last section will contain the conclusion of the study and the recommendations envisaged.

2. LITERATURE REVIEW

2.1 Conceptual Clarifications and Hypothesis Development

Enerson and Adegbeie [17] conceptualized environmental accounting practice as an accounting strategy developed to communicate and report the environmental responsibilities of business to stakeholders. Environmental accounting practice is regarded as acts of establishing, costing, and presenting the effects that activities of business have on the environment in the financial report [18]. A healthy environment is a necessity for all living and it is unethical and unprofessional for the activities of an organization to affect individuals or groups of individuals without being compensated. This is the more reason that various groups ensure that organization performs environmental-friendly practices [19].

The major goal of establishing a business is not only to make profits but also to impact and improve the quality of living of the people. Based on this, organizations are expected to put mechanisms in place to monitor, guide and report the performance level of impacts of a business on the people and society from time to time [20]. Schaltesser and Burritt [21] concluded that the importance of environmental accounting practices demands organizations to show their different environmental practices, methods of measurement and reporting, and their effects on

decision-making and performance measurement. For this study, sustainable environmental practice refers to the act of protecting, managing, preserving, and restoring natural ecosystems and ecological habitats.

Environmental accounting practice in this study is rooted in the stakeholder theory propounded by Richard Edward Freeman in 1984. The theory opined that a stakeholder is a set of non-primary principals or individuals or any group who can affect or be affected by the operation and achievement of the organization's objectives. Kabir & Akinlusi [22] stated that an organization is a network of different interests, therefore, the organization must recognize and honor the interests of different stakeholders in the business and ensure the equilibrium of the conflicting interests.

In separate studies, Adegbeie et al. [23]; Dagunduro et al. [24], and Nwoba and Udoikah [25] related stakeholders to include individual, group, employee, customer, supplier, government, investors, regulator, local community, and the general populace, with an interest in the organization and are duty bound to know, at all times, the social environmental impacts of company's activities. Nigeria stakeholders are no exemption, as they also might have interest and expectations in a company or be affected by a company's activities. These expectations are to be converted to environmental accounting practices, which if adopted and implemented, could enhance the image and value of the organization, and in the long run boost its performance of the organization [26,27].

This study measured environmental accounting practices based on the Global Report Index (GRI) 2021. GRI 2021 and the Sustainability outlook of 2021 placed much emphasis on environmental research and development, pollution control policy, and the need for better and effective waste management and its disclosure in the financial report of the organization. This study shall analyze how discoveries and development of new service systems, cleaner software, environmental pollution regulation strategies, waste reduction, waste accounting, and waste management influence the financial performance of aviation firms in Nigeria.

Odugbemi and Igbekoyi [10] defined financial performance as the broad measurement of an organization's economic well-being and overall

financial health over a period of time. In a liberal term, financial performance refers to the level of effectiveness and efficiency of an organization in managing and controlling its economic resources to achieve desired returns. It is the economic condition of an organization such as income generation and fund management, which are measured by various yardsticks like profitability, liquidity, solvency, leverage, etc. These are regarded as key performance indicators [28]. Financial performance can summarily be seen as the achievement of an organization in terms of revenue generation, profit-making, and wealth maximization [24]. This study considered the return on asset (ROA) for performance measurement of the listed aviation firms.

Academic researchers have been engaging in different studies on environmental accounting. Al-Mawali et al. [29] investigated the relationship between environmental strategy, environmental management accounting, and organizational performance with evidence from the United Arab Emirates market. The research was rooted in contingency theory. Questionnaires were sent to 120 UAE listed firms among all firms listed on the UAE stock markets (ADX and DFM) to collect data and engaged in structural equation modeling to analyze the data. The findings of the study revealed a positive relationship between environmental strategy, environmental management accounting, and organizational performance. This correlated with the findings of a study in China by Haixa and Jianping [30] on the relationship between environmental disclosure and financial performance with special reference to the mediating effect of noneconomic development and information penetration.

The study of Huang and Fu [31] x-rayed the relationship between the environmental and financial performance of corporates that have adopted the system of environmental accounting in Taiwan. Annual reports of 32 companies listed on the Taiwan stock exchange provided data for the study, which were analyzed through regression and ANOVA. The study results showed a positive relationship between environmental accounting and the financial performance of the companies. The findings of this study justify the results of the survey by Ghanaian scholars Kaodui et al. [20] on social environmental accounting reporting and financial performances. However, research on the influence of green accounting and environmental performance on profitability conducted by Sumiati et al. [32] in Indonesia with a population of 107 listed companies on the Indonesia stock

exchange proved that green accounting has a significant negative on the profitability of listed mining and manufacturing firms in Indonesia. This confirms the findings of Nigerian and Kenyan researchers Amaegbu and Onyali [33]; Orake and Egbunike [34]; Magara et al. [35].

Norhasima et al. [36] studied the effect of environmental disclosure on financial performance in Malaysia. The top 100 listed companies of Malaysian market capitalization were engaged using secondary data obtained from their annual reports. The data was analyzed through Spearman correlation. Findings revealed that a significant relationship exists between environmental disclosure and profit margin while return on asset, return on equity, and earnings per share showed a negative relationship with environmental accounting disclosure. The findings of this study were disproved by the results obtained from the studies of Yahaya [37]; Igbekoyi et al. [38]; Dordum et al. [39]. They showed that a significant positive relationship exists between environmental accounting disclosure and return on asset, return on equity, earnings per share, and value of the share.

Libian researcher Mahmes [40] examined the influence of corporate environmental disclosure on the economic performance of companies in the manufacturing sector of Libya. The study covered the eight largest manufacturing companies in Libya. He used a five-point Likert-scale questionnaire to obtain data from employees in the accounting department of the selected companies. Analysis of the data was done using descriptive statistics and a one-sample t-Test. The result showed that there is a significant influence of companies' environmental disclosure on economic performance. Muhammad et al. [19], studied the relationship between environmental accounting and non-financial firms' performance in Pakistan. Companies listed on the Pakistan stock exchange were engaged in the study. The regression analysis technique on e-view version 5 was deployed to analyze data collected from the companies' annual financial reports from 2006-2016. It was revealed from the study that a significant positive relationship exists between environmental accounting and a company's size. However, an insignificant relationship exists between environmental accounting, earnings per share, and return on capital employed.

The study conducted by Uniamikogbo and Ali [41] on environmental accounting disclosure and the financial performance of manufacturing firms

in Nigeria revealed that environmental accounting disclosure has a significant effect on the share price, return on assets, and return on equity of manufacturing firms in Nigeria. Their results are similar to the findings of Bassey et al. [13]; Osemene et al. [16]; Oyedokun et al. [42]. However, Charles and Muyiwa [43]; Igbekoyi et al. [38]; Ngozi and Ike [12] found a negative and insignificant relationship between environmental accounting disclosure and return on an asset but a positive effect on earnings per share, when they investigated accounting disclosure and financial performance of listed multinational firms in Nigeria.

Hwerien [44] evaluated environmental accounting, financial reporting, and profitability in six Nigerian oil and gas companies out of twelve (12) companies listed in Nigeria Exchange. Data were extracted from the annual reports of the firms and explored panel and data pool, ordinary least square, and multiple regression to analyze the data. He found out that there is no significant relationship between environmental accounting and return on asset and leverage of oil and gas companies in Nigeria. A significant relationship exists between environmental accounting disclosure and return on equity while capital employed and net profit margin has a negative relationship with environmental accounting disclosure in the study conducted by Charles et al. [45] to investigate the relationship that exists between environmental accounting disclosure and financial accounting performance of selected food and beverage companies in Nigeria.

A critical evaluation of the above-mentioned past studies showed that the studies were conducted by different authors, who applied different theories and models, conducted their studies in different countries at different periods of time, on different forms of company and different environmental accounting and financial performance variables was measured, which resulted in varying findings. However, the aviation industry has not received much attention as compared to other industries. It is against this challenge that this research intends to study how environmental accounting practices affect the financial performance of the aviation industry in Nigeria. The hypothesis of the study was stated as follows:

H_0 : Environmental accounting has no significant effect on financial performance of aviation firms in Nigeria.

3. DATA AND METHODS

To achieve the objective of this study, an *ex-post facto* research design was adopted. The population of the study comprised five aviation firms listed on the Nigeria exchange group. Adopting the census sampling method, all five listed firms shall be engaged for the study due to the small size of the population. Data were gathered from the annual reports of four firms, between the years 2016 – 2021, obtained from the firms' website and Nigeria exchange group facts book, as one of the five sampled firms has no published report for the year 2016. The limitation in the number of years of data source was a result of the enlisting period of the aviation firms on the NGX. In order to obtain a robust observation, firm size was introduced in the study. Descriptive statistics and multiple regressions were explored to analyze the data.

The model for this study was developed in line with the study of Odugbemi and Igbekoyi [10], on environmental disclosure practices and the economic performance of quoted oil and gas firms in Nigeria. However, this study deviated by replacing economic performance and earnings per share with financial performance and return on assets respectively, and removing, energy policies, compliant with environmental laws and regulations, gas emission, green/ozon-depleting substances policy, environmental award received, and biodiversity from list of variables to be measured. Thus, below is the study model:

$$ROA_t = \beta_0 + \beta_1 ERD_t + \beta_2 EPCP_t + \beta_3 EWM_t + \beta_4 EFZ_t + \mu t \quad (1)$$

Where:

FP= Financial Performance
 ROA= Return on Assets (ratio of net income to the total assets.)
 ERD= Environmental Research and Development
 EPCP= Environmental Pollution Control Policy
 EWM= Environmental Waste Management
 FZ= Firm size
 t= Period of the survey (2016-2021)
 β_0 = Parameter to be estimated
 $\beta_1, \beta_2, \beta_3$ = Gradient of the independent variables.
 μt = Error term
A priori expectation= $\beta_1 > 0; \beta_2 > 0; \beta_3 > 0$

4. DATA ANALYSIS AND DISCUSSION OF FINDINGS

4.1 Descriptive Statistics

The descriptive statistics reported in Table 1 show that returns on Assets (ROA) across the aviation firms on average is -3.5968 which is an indication that aviation firms usually have negative performance as related to the use of resources in their control. The standard deviation of 14.0981 implies that ROA is invariably high across the firms considering its distance from the mean value having a coefficient of variation of 31 percent. The firm with the least ROA has a value of -41.51794 and the firm with the highest returns on assets has a value of 7.53158. Data for the variable is negatively skewed (-1.81446) and has an abnormal distribution with a kurtosis value higher than 3 having a value of 4.969314. The average value of environmental research and development (ERD) is .0048 with a standard deviation of .00978 indicating that in the aviation industry, only 0.004 percent of the revenue was expended on environmental research and development with a coefficient of variation of over 200 percent. There are firms with no research and development responsibility as the minimum value is 0 and the maximum value of .028 percent. The data for the variable is positively skewed at 1.5233 and normally distributed with a kurtosis value of 3.458. Also, from the table, environmental pollution and control policy (EPCP), have a mean value of .4583 with a standard deviation of .5089, this means there is a high variation in the reporting of pollution control policy having a coefficient variation over 100 percent. The minimum value is 0 and the maximum of 1 and the data is positively skewed having .1672 and normally distributed with a kurtosis value of 1.0279.

In addition, from Table 1, waste management has an average value of .17038 with a standard deviation of .2631, indicating there is high variability in the waste management responsibility of aviation firms. The minimum value is 0 and the maximum of 0.88. It is positively skewed with 1.4096 and a kurtosis value of 3.6814. Lastly from Table 2, it is shown that the average size of the aviation firm is 16.864 with a standard deviation of .8425 implying that there is moderate variation in the size of the firms considering its nearness to the mean value with 4.9 percent of the coefficient variation. The minimum value is 15.845 while the maximum is 18.7393. The data is positively

skewed having a value of .6265 and a kurtosis value of 2.2529

4.2 Environmental Accounting Practices and Financial Performance

The regressed result is the effect of environmental practices such as environmental research and development (ERD), environmental pollution and control policy (EPCP), and waste management (WM) on the financial performance as stated in the specified model after meeting the basis for a Best Linear Un-bias Estimate (BLUE) is shown in Table 2. It was indicated that there is a problem of heteroskedasticity and serial correlation and these were corrected through panels corrected standard errors (PCSEs) regression.

The Hausman specification test conducted produced a p-value of 0.0138, which was significant at 5%. This implies that the variation in unique features across firms is assumed to be fixed. However, the fixed effect model was not interpreted due to the failure in some post-estimation tests, so the panels corrected standard errors (PCSEs) regression was interpreted and the basis of judgment used is the t-statistics and probability value. The R-Squared test indicates 0.5283 and this implies that the explanatory variable has a 52.83 percent influence on the dependent variable and the remaining percent is captured by the error term, implying that there are other significant environmental accounting practices that could affect financial performance besides identified variables.

The gap in the explanatory power may also be because the firms engage in special business with minimum focus on them as they are not listed on the Nigeria Exchange group. However, the Wald chi2 affirms that the explanatory variables are significant and the null hypothesis that the coefficients are not simultaneously equal to zero is rejected as the result shows 20.27 at 4 degrees of freedom. Since the probability value of the model is 0.0004 and is less than the 0.05 criterion, it implies that the model is statistically significant at percent.

The overall result shows that environmental accounting practices negatively and significantly affect the financial performance of Nigerian firms in the aviation industry. The regression result for the individual explanatory variables revealed that environmental research and development (ERD)

has a z-stat of -2.78 and a probability value of 0.000. This indicates that ERD has a negative effect on the performance of aviation firms. Also, the effect of environmental pollution policy on returns in assets (ROA) is positive and significant having z-statistics of 2.11 and a probability value of 0.035. Likewise, from Table 2, it is shown that waste management has a negative effect on the performance of aviation firms showing z-statistics of 2.72 and a probability value of 0.007. And lastly from the table, the size of the firm positively affects its performance of the firm as the result shows z-statistics of 2.52 and 0.012 probability values.

There are many implications for these results and it is observed that the significant negative effect of environmental research and development on the performance of the firms indicates that aviation firms are yet to harness the benefit of environmental research and development. The implication is that the firms lack green innovation which can be of help in this era of economic hardship and this could explain the reason while Nigerian firms in the aviation industry are in distress because they constantly make losses. The findings align with the results of Igbekoyi et al. [38] and Ngozi and Ike, [12] who found a negative and insignificant relationship between environmental accounting disclosure and return on asset of listed multinational firms in Nigeria. Furthermore, the positive and significant effect of environmental pollution and control policy on the financial performance of aviation firms shows that reporting environmental strategies to curb pollution has an influence on their performance.

The implication is that firms that want to thrive in the industry should strictly have a workable environmental policy to combat pollution, and the fact that this special business mostly trade internationally, they must have been under pressure in developed territories to have a strong policy that aids the environmental sustainability

goals. The results align with the findings of Uniamikogbo and Ali, [41] who found that environmental accounting disclosure has a significant effect on the return on assets and return on equity of manufacturing firms in Nigeria. In a similar study carried out in Libya, Mahomes, (2016) confirmed that environmental disclosure has a significant economic impact on manufacturing companies in Libya.

It was equally observed that waste management has a significant negative effect on the performance of aviation firms in Nigeria and this implies that the cost used in cleaning up the waste generated by the firms reduces their returns and this cannot be done otherwise since the firms on the average have negative financial performance. The company definitely needs a more sustainable way of managing its waste so that its loss will not be aggravated by the cause of environmental practices. This result confirms the findings of Sumiati et al. [32] who found a significant negative effect of green accounting on the performance of mining firms in Nigeria and the findings of Amaegbu and Onyali, [33] who studied Nigerian firms and found a negative effect of waste management on profitability of sampled firms. In Kenya, Orake and Egbunike, [34] also have the same result.

The result showing the effect of firm size on the returns on assets implies that when the size of the firm is measured in terms of assets, the environmental accounting practices will yield a positive result. This indicates that the control of firm size on how and extent of environmental accounting practices is a determinable factor of its effect which most times is expected to be positive. This result contradicts the findings of Etale and Tiemo, (2021) as they found a positive and non-significant relationship with return on the asset when firm size is used as an intervening variable between environmental accounting practices and the performance of deposit money banks in Nigeria [46-48].

Table 1. Descriptive statistics

Variables	ROA	ERD	EPCP	WM	FSZ
Obs	24	24	24	24	24
Mean	-3.596822	.0048567	.4583333	.1703838	16.86419
Std. Dev.	.14.09812	.0097878	.5089774	.2631128	.8425446
C.V	1 -3.919606	2.015336	1.110496	1.544236	.0499606
Min	-41.51794	0	0	0	15.8453
Max	7.53158	.0282223	1	.8805401	18.73931
Skewness	-1.81446	1.523313	.1672484	1.409692	.6265684
Kurtosis	4.969314	3.458045	1.027972	3.681439	2.252958

Source: Researcher's Computation (2022)

Table 2. Panels corrected standard errors regression results

ROA	Coef.	Std. Err.	Z	P>z
ERD	-751.3204	270.1177	-2.78	0.005
EPCP	10.16399	4.817763	2.11	0.035
WM	-26.86596	9.875594	-2.72	0.007
FZ	10.73555	4.252826	2.52	0.012
_cons	-180.5563	70.70874	-2.55	0.011
Number of Obs	= 24			
R-squared	= 0.5283			
Wald chi2(4)	= 20.2			
Prob > F	= 0.0004			

Source: Researcher's Computation (2022)

5. CONCLUSION AND RECOMMENDATIONS

The study examined environmental accounting practices and financial performance of listed aviation firms in Nigeria; using environmental research and development, pollution control, and waste management on return on asset. The study found that environmental accounting practices negatively and significantly affect financial performance. Individually, the result shows that research and development and waste management had a significant negative effect, while positive and significant effects of environmental pollution and control policy manifested in the financial performance of the aviation firms. The study, therefore, concluded that environmental accounting practices have the ability to influence the financial performance of aviation firms in Nigeria.

The study, therefore, recommends as follows:

- i. Firms in the industry should invest more in research so as to develop innovations, in line with global practices, that could, in the long run, increase the profit of the organizations.
- ii. Pollution control policies implemented by the firms should be sustained, as it increases the profitability of the firms.
- iii. Waste management systems should be reviewed so as to reduce the cost, and new methods of waste management which include waste recycling should be adopted by the firms.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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