
Environmental Disclosure and Return on Assets of Manufacturing Companies Listed in Nigeria

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Abstract

The return on assets indicator informs existing and potential investors how effectively management has optimally utilized its resources from investments. Studies have advanced that manufacturing companies' level of commitment has the ability to enhance earnings and corporate return on assets. Lack of optimal utilization of corporate assets and non-compliance with environmental requirements has weakened the earnings of manufacturing companies. Evidence has revealed that not many manufacturing coming have integrated environmental disclosure into their operations. This study examined the effect of environmental disclosure on the return on assets of manufacturing companies listed in Nigeria. The study adopted an ex-post facto research design. The population consisted of the 66 listed manufacturing companies listed on the Nigerian Exchange Group as of December 31, 2021. Purposive sampling was used to select 29 manufacturing businesses. Validated data were taken from the public financial statements of the selected manufacturing enterprises for 16 years (2006-2021). A statutory audit of the financial accounts was used to ensure the data's veracity. Descriptive and inferential (multiple regression) statistics were utilized to assess the data. The study revealed that environmental disclosure affects the return on assets of manufacturing companies listed in Nigeria (Adj.R2 = 0.017, F(5, 458) = 8.333, p < 0.05). The study recommended that managers of manufacturing companies should integrate environmental disclosure as a critical duty as evidence of policies in practice in protecting the environment towards gaining legitimacy and patronage in deepening the return on assets of the companies.

Keywords: Environmental policies, Environmental Management, Energy conservation, Emission reduction, Pollution control, Return on assets

1. Introduction

The ability of the supply chain to efficiently source raw materials, produce products, and distribute those products to customers is vital for manufacturing businesses on a global scale. The manufacturing industry must effectively and optimally utilise its productive business assets, personnel, and capital resources to realise the anticipated sustainable stock return targets. The characteristic of the animosity displayed by some shareholders has its roots in the growing information asymmetries and the lack of proper transparency in corporate organisation management across the globe. Evidence from the literature showed that most business organisations that are dedicated to achieving goals sometimes struggle when shareholders'

objectives for stock returns are ignored while making strategic decisions (Zaid et al., 2020; Zarewa, 2019).

It has never been simple to satisfy shareholders' demand for sustainable performance; therefore, management faces many complex problems due to managerial inefficiency in this area (Bellucci et al., 2019). Moreover, given the various and varied expectations of all investors and other stakeholders, achieving effective resource management to achieve acceptably sustained stock returns can be complicated, multidimensional in scale, and multidirectional in nature (Amran & Devi, 2018). According to Lu and Li (2020), managerial disincentives and incompetence in managing corporate competitive advantages, inability to control a sizable market share, inability to ensure adequate information disclosure management and strategic decisions prioritizing the economic value advancement of shareholders over all other corporate interests were to blame for the difficulties in generating a return on assets (Fasan & Mio, 2017; Awadzie et al., 2022).

Globally, evidence abounds that corporate performance based on desired stock returns of the manufacturing companies has been a multifaceted issue that has sparked vast interest in adjusting market mechanisms, short-term stock performance, and stock price manipulations (Hynan, 2019; Ortas et al., 2019). According to Venturelli et al. (2018), shareholders within European countries have shown comfortable responses to efforts made to respect environment disclosure policy requirements, yet there have been cases of reported inefficiencies and inadequate risk assessment strategic management, plunging corporate efforts below legitimate expectations of the shareholders when the issue of return on assets is placed on a table (Barbu et al., 2018). The case of high production costs in German corporations has greatly impacted corporations' ability to generate enough value creation and economic value for the satisfaction of what could be termed legitimate shareholders demand for adequate stock returns (Bartolacci et al., 2018; Lu & Li, 2020).

It is difficult to meet different social and legal issues, due to the absence of lasting relationships and the absence of shareholders' engagement in environmental disclosure. Poor information feedback mechanism is a fundamental issue in Nigeria among manufacturing companies. The concern of deficient bi-directional communication models between the shareholders and the board of directors and the management of the corporate organization is hugely creating monumental problems (Emeka et al., 2019). Studies have shown that the problem of return on assets could be attempted using effective environmental disclosure (Fan et al., 2020; Kaya & Erkut, 2018). Kurawa et al. (2022) submitted that adequate environmental disclosure is closely related to effective and sustainable corporate performance, effective assets utilization and competency as the managers are motivated to transparency and accountability of corporate activities. The pressure for the manufacturing company to demonstrate environmental responsiveness has been sustained, significantly impacting corporate stock returns in Germany, France UK firms (Babu et al., 2018).

The problem of environmental disclosure in Nigeria had never been a lack of environmental agencies, but the high level of incompetence and weak environmental control and control management (Emeka-Nwokeji & Okeke, 2019; Igbekoyi et al., 2021). According to Hassan and Lahyani (2020), the challenges of environmental pollution, the inability to instil adequate control

of emission reduction, energy conservation, and environmental policies have been attributed to the compromising attitude and disposition of regulatory agencies in Nigeria. Nigeria's environmental regulation and compliance profile have remained invisibly and unimpressively impactful to keep Nigeria environmentally sensitive to emission reduction and pollution control. Efforts have been geared by the government to have established some pockets of environmentally related regulatory institutions, to ensure effective environmental protection and adequate disclosure.

Given the various demands of many shareholders and stakeholders, the issue of manufacturing businesses' return on assets is multifaceted (Standberg &Grahame, 2020). The issue of return on assets has been thoroughly examined in prior studies, and it has ranged from inadequate stock returns to insufficient stock price-earnings ratio as a result of a lack of transparency at the capital markets, as well as perceived manipulative share market prices leading to false share market values of the participating companies from a variety of perspectives based on the different categories of shareholders' divergent expectations (Acar & Temiz, 2020; Cosmulese et al., 2019; Venturelli et al., 2018).

Environmental disclosure has been considered as one of the motivation factors that could influence effective return on assets among the manufacturing companies in Nigeria. To the extent corporate firms exercise transparency in pollution control and management, the policies about environmental management being implemented in manufacturing companies have a strong relationship with financial performance and effective return on assets. Akther and Xu (2020) posited that environmental disclosure significantly affects assets. Almaqtari et al. (2020) reported that companies that are sensitive to their environment tend to optimize their assets for the benefit of the stakeholders. Hassan and Lahyani (2020) noted that companies that enjoy customer and general public legitimacy are likely to have improved performance and robust returns on assets. Igbokoyi et al. (2021) reported that environmental disclosure had a significant effect on Return on assets as an adequate recognition of the importance of a clean environment and effective waste management among companies sensitive to pollution are critical to the growth and survival of the firms. Iliemena, (2020) stated that disclosure regarding a company's environmental impact greatly aids in stakeholder engagement, including customers, workers, and communities, as well as demonstrating a commitment to responsible business practices. More so, Moutinho et al. (2020) documented that environmental transparency can motivate firms to innovate and create innovative ways to lessen their environmental effect. This can lead to the creation of more sustainable and efficient technologies, processes, and products. Companies may be forced to publish information regarding their environmental impacts, such as emissions statistics and energy consumption, by legislation or industry standards.

The importance of environmental preservation, clean air and environment are the some of the major factors that motivated the study. Besides, while there are a good number of studies in Nigeria that have considered the significance of the environment, only a few of them have provided sufficient empirical evidence of the effect of environmental disclosure on the return on assets of manufacturing companies listed in Nigeria. This current study bridges the gap and provides insight into the impact of environmental disclosure on the performance, return on assets stakeholders' legitimacy of the operations of the companies. The objective of this study is to contribute to the existing studies about environmental disclosure and return on assets of

manufacturing companies listed in Nigeria. In pursuance of the objective of the study, the following research hypothesis was formulated:

Research Hypothesis: *Environmental disclosure does not significantly affect the return on assets of manufacturing companies listed in Nigeria.*

The remainder of the research was approached in the following manner: The study included a literature overview and theoretical framework in section 2. Section 3 addressed technique, whereas Section 4 addressed data analysis, outcomes, and commentary. The study's results and recommendations were provided in section 5.

2. Literature Review/Theoretical Framework

2.1 Conceptual Review

Return on Assets: The return on assets in this study represented one of the performance indicators to assess the effect of environmental disclosure on sustainable stock returns of manufacturing companies. According to Awadzie et al. (2022), return on assets is defined as one of the performance financial ratios that measure the profitability and viability of corporate investments and organizations comprehensively from the profitability perspective performance of companies accruing from the optimal use of corporate assets. Return on assets according to Agbiogwu et al. (2016), measures the profitability of an organization in relation to the use of assets owned and available to the organization. Efficient and competence of managers are adjudged by the extent of return on assets in generating earnings and profit for the companies (Aguguon & Salawu, 2018).

Environmental Disclosure: Environmental disclosure and sustainability reporting is a systematic process for environmental disclosure indices measuring and assessment. Tzouvanas et al. (2020) submitted that effective environmental disclosure can effectively regulate and enhance corporate pollution management and ecological environmental policies system, already applied by many nations around the globe as energy conservation and emission reduction. The stakeholders expect that environmentally sensitive organizations portend great danger to pollution and the environment, and this necessitates the environmental regulatory standards to mandate companies to comply with environmental preservation and protection, by ensuring adequate environmental waste management as well as pollution control, and emission reduction, and green environment (Wang et al., 2019; Tang et al., 2020).

Environmental Policies: The environmental policies regulate the companies to adequate implementation of ecosystem protection, effective waste disposal control, and implementation of such policies in line with environmental disclosures and international best practices as efforts geared to address the challenges of global warming, climate change, and ensure greenhouses gasses (Mathuva & Kiweu, 2016). The essence of these environmental policies has been to regulate the influence of human activities and prevent undesirable actions deliberate or otherwise to endanger the environment. McGuire (2014) stated that environmental policies may comprise two major issues, environmental and policies.

Environmental Management: Wijsman et al. (2019) stated that environmental management is all about decision-making and efforts put in place to enhance procedures in making effective decisions to protect and preserve the environment, in relation to the natural resources, disposal of waste materials, modification of the environmental ecosystem and other environmental changes. Sun et al. (2019) noted that environmental management reflects economic and political undertakings, legal and regulations joint structure to appeal, regulate as well as mandate environmental protection and compliances. Tadros and Magnan (2019) documented that environmental management is all about managing the environment for the inclusive benefits of the earthly inhabitants, human beings, animals, and aquatic inhabitants (Agugom & Olanipekun, 2021)..

Companies with track records of energy conservation, tend to minimize wastages and losses, rather the measure increases productivity by reducing energy consumption and associated higher energy bills, cost of maintenance, and reduction in overheads Hassan and Lahyani (2020). In a bit to improve energy conservation, companies had been advised to adopt mechanisms to improve energy conservation by engaging in an energy audit and green accounting and/or environmental accounting. Some electric bulbs are now being produced to reduce the radiation and emission of energy and reduce climate and global warming by devising measures for the number of services used. Ironlwe and Promise (2016) revealed that energy conservation is connected with the ecosystem as companies regulate their energy consumption.

2.2 Theoretical Framework

Resource Dependence Theory: The resource dependence theory was developed and presented to the literature by Pfeffer and Salacik in the year 1978 (D'Amico et al., 2016). The resource dependence theory postulates that there the survival of companies was in great jeopardy, when the resources and the activities were controlled by the external powers, as a result, corporate organizations and those running the company should have a relationship with those external powers. A total discarding or rusty relationship with the external powers could negatively affect the survival and sustainability of the company. Hu and Karbhari (2015) noted that the resource dependence theory philosophy was that the managers of the corporate organization should manage their resource dependencies with a variety of wisdom and planned strategies, such as the co-optation of resources of constraint, to obtain greater autonomy and also reduce uncertainties in the flow of needed resources from the external powers and from the environment (Patten, 2002); Turner et al., 2000).

Some of the assumptions of resourced dependence theory according to Macagnan and Fontana (2013) was that while it was not ideal denigrating the importance of synergies with external third parties for organizations to improve their autonomy and pursuance interests, it was significant to emphasize the power a company has over another company based on the resources it controls which were not available to that other company somewhere else. The assumption further posits that resource concentration was synonymous with power concentration, as a result, since an entity cannot own all the resources it requires to require, it was amative that it depends on another company that controls that resource in the exchange-based power dependence, making entities interdependent on eaefore, the level of power external influence has over a firm depends

on the level of existence it exerts over certain resources (Mathuva & Kiweu, 2016; Malafrontem et al., 2016).

2.3 Empirical Review

Igbekoyi et al. (2021) examined the possible effect of environmental reporting on return on assets and corporate financial performance of selected manufacturing companies in Nigeria. The study employed an *expo facto* research design, using a selected manufacturing company listed in Nigeria for a period of 11 years spanning from 2008 to 2018. The study population consisted of 67 manufacturing companies while 23 of the companies were selected for the study. The study measured environmental reporting with three-point disclosure indices based on GRI guidelines. The study found that environmental reporting had a negative insignificant effect on environmental sustainability reporting and financial performance. In addition, the study had a positive but insignificant relationship between earnings per share (EPS) and return on assets (ROA).

Igbekoyi et al (2021)'s result from their study showed results that agree with the result derived from Pedron et al. (2021) who opined that environmental disclosure had a positive effect on stock returns and market values of the sampled companies listed in Brazil. On the other hand, Ndukwe and Nwakanma (2018) had results that revealed that there was a negative and insignificant association between environmental disclosures and the return on assets of the selected companies investigated.

Emeka et al. (2020) studied the implications and possible effect of environmental disclosure on return on assets and sustainability reporting of some selected companies in the non-financial sector quoted in Nigeria for a period of 8 years covering 2011 to 2018. The study used data obtained from the financial statements of the companies and panel regression analysis was carried out. The result of the regression analysis revealed that environmental disclosure measured using economic, social and governance (ESG) revealed a positive significant effect on return on assets and corporate sustainability reporting of the selected and sampled companies in Nigeria. Emeka et al. (2020) had a result that is in concordance with the result obtained by (Wara et al., 2020). The study concluded that environmental disclosure had a positive influence on the corporate profitability of the companies sampled. In opposition to the result of Emeka et al. (2020): Qiu et al. (2014) found that there was a negative significant relationship between environmental disclosure and profitability.

Wara et al. (2020) examined the effect of environmental disclosure on the corporate performance of firms quoted on the floor of the Nairobi Stock Exchange. The study took an *expo facto* as the technique for the study, while the secondary data was employed for a period of 14 years covering from 2007 to 2015. The financial statement for the period was extracted for the study. Control variables of firm size and financial leverage were introduced to the study. The result of the study revealed that corporate performance measured using Tobin's Q and return on assets (ROA) was positively and significantly affected by environmental disclosure indices. Wara et al. (2020)'s result is not different from the result derived from (Nguyen & Tran, 2019). The regression analysis revealed that environmental accounting disclosure had a positive significant association with financial performance for the period under consideration in the study. Contradictorily, the result of the study done by Wara et al. (2020) is different from the result obtained by Chukwu

and Timah (2019) who found that environmental accounting had a negative effect price-earnings ratio of the sampled insurance companies.

Shuaibu et al. (2019) examined the effect of environmental information disclosure on the corporate governance performance of selected listed companies in the cement manufacturing companies in Nigeria. The study employed secondary data extracted from the financial statements of the cement companies for the study. The regression analysis carried out revealed that environmental information disclosure in the sector were poorly reported and inadequate disclosure. The study also found that environmental information disclosure had a positive effect on the return on assets (ROA) performance of the companies. Shuaibu et al. (2019) had a study that is in concordance with the study of Nasir et al. (2014)'s study. The regression analysis carried out revealed that sustainability reporting had a positive effect on the firm performance of the companies selected and tested. Conversely, the result derived from Shuaibu et al. (2019)'s study does not concur with the report obtained by (Moses et al., 2020). The study revealed that sustainability reporting had a negative significant effect on the corporate performance of the companies sampled in the study.

Yahaya (2019) investigated the effect of environmental disclosure practices on the financial results of environmentally sensitive companies listed in Nigeria. The study employed return on assets (ROA) as a proxy to measure financial results, while the green reporting index was used to proxy environmental disclosure practices. The results of the regression revealed that environmental disclosure practices had a positive significant effect on return on assets. Based on the study done by Yahaya (2019) there is a similarity when compared to the result obtained by Oyedokun et al. (2019). The study found that environmental disclosure practices had an effect on the assets of the firm in the area tested. On the other hand, Yahaya (2019)'s result is not similar to the result derived from Obida et al. (2019)'s study. The study reported that environmental disclosure had a negative significant effect on market returns, and this has negative implications on investors' investment decisions.

Obida et al. (2019) investigated the impact of environmental disclosure practices on return on assets (ROA) and stock market returns in Nigeria. The study focused on the effect of environmental disclosure practices on the volatility of returns among the selected companies. The study found that environmental disclosure practices had a positive significant effect on the volatility of stock returns and return on assets of the manufacturing companies listed in Nigeria. Furthermore, the study also reported that environmental disclosure had a negative significant effect on market returns, and this has negative implications on investors' investment decisions. Obida et al. (2019)'s result is in tandem with the result obtained by Akee et al., 2016). The result showed a negative relationship between environmental disclosure information and the firm performance of the listed companies in Vietnam. Contrary to this report, Adegbe et al. (2020)' result revealed that environmental accounting practices had a positive significant effect on share value.

Oti and Mbu-Ogar (2018) examined the effect of environmental and social disclosure on the return on assets performance of some selected quoted oil and gas companies in Nigeria. The

study sourced time series data from the Central Bank of Nigeria for the study, covering a period of 50 years. Ordinary least square regression technique was used where the theoretical framework was underpinned by stakeholder and legitimacy theories explaining the relationship between corporations and the societal strata's need for environmental disclosure and oil and gas performance. The result of the study revealed that disclosure on employee health, safety and community development had no significant effect on oil and gas performance and disclosure of waste management had a positive significant effect on firms' oil and gas performance. The study recommended that oil and gas companies sampled in this study should regularly review their waste management strategy and employee bespoke technology in waste management in order to alleviate the effect on the environment. The study of Oti and Mbu-Ogar (2018) is consistent with the report obtained by Ufere et al. (2017) that showed that corporate environmental disclosures had a positive significant effect on industrial performance among the real estate companies sampled in Malaysia. Whereas Oti and Mbu-Ogar (2018)'s study is not consistent with Gatimbu and Wabwire (2016)'s study whose results revealed that firm size and leverage had a negative significant effect on environmental disclosure.

Barbu et al. (2018) investigated the possible effect of mandatory environmental disclosure and firm size on firm performance consequences to IAS AMD IFRS adoptions. The study employed an *expo facto* research design, using secondary data sourced from the sampled companies listed in France, Germany and Uk. The study employed pooled regression analysis of environmental disclosure indices based on the GRI checklist. The study found that mandatory environmental disclosure and firm size had a positive significant effect on firm performance among the listed and sampled companies in France, Germany and the UK. The result of the study by Barbu et al. (2018) is similar when compared to the result obtained by Adegbe et al. (2020) who revealed that environmental accounting practices had a positive significant effect on share value. On the other hand, the study of Barbu et al. (2018) is not similar to that of Basten et al. (2016) who reported that environmental disclosure had a negative and insignificant effect on stock returns of the companies.

Bartolacci et al. (2018) studied the impact of financial sustainability reporting and firm size on firm performance from a water management disclosure point of view. An *expo facto* research design was adopted for eth study, while secondary data obtained from the financial statements of the companies were extracted for the study. Pooled regression analysis was carried out and the result of the regression analysis revealed that financial sustainability reporting and firm size had a positive significant effect on the financial performance of the companies selected and sampled in the study. Bartolacci et al. (2018)'s result of their study showed a result that is in concordance with the result obtained by (Bellucci et al., 2019). The result of the analysis revealed that environmental accounting reporting had a positive effect on equity holders' stock returns for the period under investigation. Whereas the result from Bartolacci et al. (2018)'s study is not in concordance with the result derived from (Carballo et al., 2017). The result showed environmental policies and pollution collectively control had a negative effect the on return on assets of the companies tested in the study.

2. Methodology

In addressing the effect of environmental disclosure on the return on assets of manufacturing companies listed in Nigeria, an *ex-post facto* research design was used in the study. The study's population consisted of the 66 listed manufacturing businesses on the Nigerian Exchange Group as of December 31, 2021. Purposive sampling was used to choose 29 manufacturing businesses. The reliability and validation of data were premised on the certification of annual published financial statements by the statutory auditors of the selected manufacturing enterprises for a 16-year period (2006-2021). The required audit of the financial accounts was used to ensure the data's veracity. At a 5% significance level, descriptive and inferential (multiple regression) statistics were utilized to assess the data.

Model Specifications

$$Y_{it} = \beta_0 + \beta X_{it} + \mu_{it}$$

$$ROA_{it} = \beta_0 + \beta_1 ENPOL_{it} + \beta_2 ENMGT_{it} + \beta_3 ENGC_{it} + \beta_4 EMR_{it} + \beta_5 PLCTR_{it} + \mu_{it}$$

Where

Return on Assets = ROA, Environmental Policies = ENPOL, Environmental Management = ENMGT, Energy Conservation = ENGC, Emission Reduction = EMR, Pollution Control = PLCTR.

4. Data Analysis, Result and Discussions

This second regression result focused on the impact of Environmental Disclosure on the Return on Assets of listed manufacturing companies in Nigeria. A multiple panel regression approach is used, where Return on Assets (ROA) is considered as the dependent variable and Environmental Policies (ENPOL), Environmental Management (ENMGT), Energy Conservation (ENGC), Emission Reduction (EMR), Pollution Control (PLCTR) are considered as independent variables.

Table 1: Environmental Disclosure and Return on Assets

Estimation Techniques	Fixed Effect Model with Robust			
Dependent Variable: ROA	Coeff.	Std. Err	T-Stat	Prob
Constant	5.95	0.99	6.00	0.00
ENPOL	-7.07	1.47	-4.81	0.00
ENMGT	1.31	1.37	0.96	0.34
ENGC	-4.02	2.23	-1.81	0.07
EMR	5.70	1.65	3.44	0.00
PLCTR	7.31	4.56	1.60	0.11
Adjusted R ²	0.017			
F-Stat	F _(5,458) = 7.01 (0.00)			
	Chi ² ₍₄₎ = 56.47 (0.00)			
Hausman Test	Chi ² ₍₁₎ = 7.95 (0.00)			
Heteroskedasticity Test	F _(1,29) = 3.565 (0.078)			
Serial Correlation Test				

Source: Researcher's Work (2023), Note: ROA = Return on Assets, ENPOL = Environmental Policies, ENMGT = Environmental Management, ENGC = Energy Conservation, EMR = Emission Reduction and PLCTR = Pollution Control @Chosen Significant level of 5%

Interpretation of Diagnostic Test for the Model

The hypothesis was used to assess the effect of environmental disclosure on the return on assets of the selected listed manufacturing companies in Nigeria. The Fixed Effect and Random Effect models were estimated alongside the Hausman test to access which of the model is appropriate. From the Hausman test as shown in Table 1, the value is 56.47 with a probability value of 1 per cent. This suggests that the fixed effect is more appropriate because of the significance of the Hausman test.

The model was tested for heteroskedasticity, and serial correlation to examine the robustness of the model. The heteroskedasticity test helps to examine whether the variations in the residuals of the model are constant over time or not; the null hypothesis states that the residuals are constant over time, with the alternative as the non-constancy of the residuals. This test was carried out using the Breusch-Pagan/Cook-Weisberg test and the null hypothesis assumption homoscedastic residuals could not be rejected because the test statistic of 7.95 is statistically significant at 1 per cent level, thus, the alternative hypothesis that the residuals are heteroscedastic could not be rejected.

Also, a serial correlation test is carried out to determine the existence of autocorrelated residuals of the estimated model. According to Baltagi, (2021), the autocorrelation problem causes the standard errors of the coefficients to be smaller than their actual value and the coefficient of determination (R-squared) to be higher than normal. The null hypothesis of the test states that there is no serial correlation, against the alternative hypothesis of serial correlation. The test is carried out using the Wooldridge test and the result of the serial correlation test statistic of 3.565 with a probability value of 8 per cent is statistically insignificant at 5 per cent level. Therefore, the study concluded that the estimated model is free from autocorrelated residuals.

Conclusively, to correct heteroscedasticity the fixed effect model regression with robust standard error estimates was used to estimate the effect of environmental disclosure on the return on assets of selected manufacturing companies listed in Nigeria.

Regression Equation Results for Model II

$$ROA_{it} = \beta_0 + \beta_1 ENPOL_{it} + \beta_2 ENMGT_{it} + \beta_3 ENGC_{it} + \beta_4 EMR_{it} + \beta_5 PLCTR_{it} + \mu_{it}$$

$$ROA_{it} = 5.95 - 7.07 ENPOL_{it} + 1.31 ENMGT_{it} - 4.02 ENGC_{it} + 5.70 EMR_{it} + 7.31 PLCTR_{it}$$

From the results for the model in Table 1, which examined the effect of environmental disclosure on return on assets of selected listed manufacturing companies in Nigeria, the results showed evidence that environmental management, emission reduction, and pollution control have a positive relationship with return on assets of the selected manufacturing companies listed in Nigeria. This implies that increases in environmental management, emission reduction, and pollution control will lead to an increase in return on assets. Conversely, environmental policies and energy conservation have a negative relationship with the return on assets of the selected

manufacturing companies listed in Nigeria. This implies that increases in environmental policies and energy conservation will lead to a decrease in return on assets.

Concerning the magnitudes of the estimated parameters a percentage change in environmental management, emission reduction, and pollution control will lead to 1.31, 5.70, and 7.31 increases in the return on assets of the selected listed manufacturing companies in Nigeria respectively, while a percentage change in environmental policies and energy conservation will lead to 7.07 and 4.02 decrease in the return on assets of the selected listed manufacturing companies in Nigeria respectively.

In addition, there is evidence that environmental policies and emission reduction have a significant relationship with the return on assets of the selected listed manufacturing companies in Nigeria (ENPOL = -7.07 t-test = -4.81, $p < 0.05$ and EMR = 5.70, t-test = 3.44, $p < 0.05$) respectively. This implies that environmental policies and emission reduction were significant factors influencing changes in the return on assets of the selected listed manufacturing companies in Nigeria. Conversely, there is evidence that environmental management, energy conservation and pollution control have no significant relationship with the return on assets of the selected listed manufacturing companies in Nigeria (ENMGT = 1.31, t-test = 0.96, $p > 0.05$; ENGC = -4.02, t-test = -1.81, $p > 0.05$; and PLCTR = 7.31, t-test = 1.60, $p > 0.05$) respectively. This implies that environmental management, energy conservation and pollution control were not significant factors influencing changes in the return on assets of the selected listed manufacturing companies in Nigeria. Furthermore, in consideration of the magnitude of each parameter of the estimated coefficients of the regression of each variable in the model, this suggested that a percentage change in environmental policy, energy and conservation, would lead to a decrease of 7.07 and 4.02 in the price earning and that a percentage change in environmental management, emission reduction and pollution control would lead to an increase by 1.31, 5.70, 7.31, and 5.95 respectively in return on asset of selected manufacturing companies in Nigeria.

The Adjusted R^2 which measures the proportion of the changes in the return on assets as a result of changes in environmental policies, environmental management, energy conservation, emission reduction, and pollution control explains about 2 per cent changes in the return on assets of the selected listed manufacturing companies in Nigeria, while the remaining 98 per cent were other factors explaining changes in the return on assets of the selected listed manufacturing companies in Nigeria but where not captured in the model. The Adjusted R^2 result appeared low with only 2 per cent, this was found consistent with some Nigeria studies using similar Nigerian data (Ogunode & Adegbe, 2022; Emeke et al., 2021). For instance, the study by Ogunode and Adegbe (2022) revealed that 22% and 11% were reported as the Adj. R^2 figures in the regression analyses in their study. Similarly, Emeke et al. (2021) reported 11% and 6% as reported Adj. R^2 respectively. There is a likelihood of high environmental disclosure non-compliance among manufacturing companies in Nigeria and the possible non-mandatory and weak environmental disclosure enforcement posture in Nigeria.

The model's overall fit is indicated by the F -test statistic, which tests the null hypothesis that all coefficients in the model are zero. In this case, the F -test is significant at the 1% level, indicating that the model as a whole is a good fit for the data. Alternatively, the F -test statistic of 7.01 with

a probability value of 0.000 implies that environmental policies, environmental management, energy conservation, emission reduction, and pollution control are joint significant factors influencing changes in return on assets of the selected listed manufacturing companies in Nigeria. The *F*-test Statistic of 7.01 with a probability value of 0.000 and the degree of freedom $F_{(5, 458)}$ is significant at a 5 per cent level, this implies that the null that there is no significant effect of environmental disclosure on return on assets of selected listed manufacturing companies in Nigeria was rejected and the alternative hypothesis that there is a significant effect of environmental disclosure on return on assets of the selected listed manufacturing companies in Nigeria was accepted.

Discussion of Findings

The Model of the study examined the effect of environmental disclosure on the return on assets of selected manufacturing companies listed in Nigeria. The study regression has mixed results, however, the joint result showed that environmental disclosure has a significant effect on the return on assets of selected manufacturing companies listed in Nigeria. The report is consistent with the results of some previous studies by (Adegbe et al., 2020; Reiner, 2020; Burritt et al., 2019; Polycarb, 2019; Cosmulesca et al., 2019; Elmagrhi et al., 2018; Basten et al., 2016; Osemene et al., 2016; Eze et al., 2016; Ezejiofor et al., 2016; Chaklader et al., 2016; Solikhah & Winarsih, 2016). For instance, the study by Adegbe et al. (2020) studied the impact of environmental accounting practices on the share market value of food and beverages manufacturing companies listed in Nigeria and the study result revealed that environmental accounting practices had a positive significant effect on share value. In addition, the study equally found that environmental accounting practice with the controlling variable of firm size had a positive impact on the share market value of food and beverage manufacturing. However, the results were not in tandem with the results obtained by some other prior studies (Igbekoyi et al., 2021; Obida et al., 2019; Chukwu & Timah, 2019; Emeka-Nwokeji & Okeke, 2019; Sukhdev-Singh, 2017; Gatimbu & Wabwire, 2016; Ezeagba et al., 2017; Andrikopoulos & Kirilani, 2013; Fatimah et al., 2015; Wakaisuka-Isingomal et al., 2016). For instance, Igbekoyi et al. (2021) examined the possible effect of environmental reporting on return on assets and corporate financial performance of selected manufacturing companies in Nigeria and the study revealed that environmental reporting had a negative insignificant effect on environmental sustainability reporting and financial performance.

5. Conclusion and Recommendations

The importance of environmental disclosure in influencing corporate performance has been emphasized in the literature. The extent of financial performance and recognition of the corporate performance have been associated with the attitude of such companies towards environmental protection and policies in that regard being disclosed in their annual financial statements among pollution-sensitive companies especially the manufacturing companies in Nigeria. In addressing the problem of return on assets, this study examined the effect of environmental disclosure on financial performance from the perspective of return on assets. The random-effect generalized ordinary least regression analysis conclusively showed that environmental disclosure affects the return on assets of manufacturing companies listed in Nigeria. Consequent to the findings, the study made the following recommendations:

- i. The study recommends that investors should be critically concerned to have an underlying credible report of the companies' operational environmental policies and the strategic importance the management attached to a clean environment in managing the waste resulting from their factories.
- ii. Investors should demand from the management annual environmental audits, and external assurance, and adequate budgeting and investment in pollution control, consistent and robust environmental disclosure as it could affect the return on assets from the return on assets perspective.
- iii. The management team of the manufacturing companies should ensure adequate environmental policies and compliance with a clean environment as a priority. In addition, the managers of the manufacturing companies should ensure that there are workable and attainable impactful policies and lasting managerial and strategic decisions towards environmental protection capable of impact on the stock market capitalization of the companies as market participants tend to be attracted to buy a share from such companies with good track records of effective environmental disclosure policies and blueprint.
- iv. Hence the management should ensure that the level of environmental compliance should be revealed and reported consistently. The management should ensure that there are strong commitments and adequate disclosure of all environmental protection policies, and efforts towards full compliance should be the priority of the managers since there are likely penalties capable of denting the image and reputation of the companies which market participants will react to accordingly.

6. Contribution to future research

This study provided novelty research through the findings in this study, the significance of environmental disclosure in deepening effective corporate performance and return on assets of the manufacturing companies considering the importance of environmental protection and the need for manufacturing companies to displace honesty, transparency and accountability in efforts and policies in place towards preservation and protection of the environment for the future.

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