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Environmental Reporting and Operational Performance: A Study of Listed Manufacturing Firms in Nigeria

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Abstract

The study investigates how environmental reporting/disclosure by listed firms operating within the manufacturing sector in Nigeria affects their operational performance. The study employs the panel research design to ascertain how environmental reporting (surrogated by dummy variable) enhances firms' operational performance (surrogated by Return on total assets) in Nigeria. The study also employs the Hausman test to select the appropriate model (that is, the fixed-effect model). The study covers ten years (2009-2018) for both environmental disclosure and operational performance of firms in the manufacturing sector. Secondary data was obtained from the annual reports of the listed manufacturing firms in Nigeria. From the empirical results, the study concludes that there is a positive relationship between environmental disclosure and firms' operational performance. The study, therefore, recommends amongst others that as a matter of necessity, firms should engage more in sustainable environmental-related activities that are within the acceptable norms of the society, and embrace more innovative ways of business operations in order to save the biosphere and enhance operational performance. Also, such activities should be disclosed in line with the Global Reporting Initiative (GRI) G4 reporting guidelines or at best the GRI standards despite the permitted voluntary disclosure in Nigeria. Finally, the government should authorize the GRI framework as a mandatory guide, and also make it a listing requirement for firms who intend to go public.

Keywords: Environmental reporting, operational performance, firm size, firm age, GRI

Introduction

The business environment is a composition of both cultural, political, social, technological, economic, environmental, and regulatory factors that have the capability of affecting the stability, growth, and performance of the business climate, most notably their earnings ability. As businesses cannot operate in a vacuum, there is always a mutual relationship between a business and its environment. Since the emergence of the formal business model, following the industrial revolution, businesses have always exhibited dependency on the environment, with implications on the natural world (Uwuigbe et al., 2018). Nevertheless, the growing nexus between business and the environment; from how raw materials are extracted to the management of resources and a further level of waste generation and management, has long been neglected by most industrial firms. The environment where corporations enjoy most of its resources remains unprotected from degradation, mostly in climes where environmental laws and policies are either ineffective or non-existing and even in climes

like Nigeria with high environmental awareness and which have had a taste of economic and technological growth (Uwuigbe & Egbide, 2012).

Businesses organisations, including the industrial firms, have given much priority to their operational drive for growth, survival and maximisation of value for its shareholders, to the detriment of the environment as enshrined in their financial reports that mostly do not capture the effect of the firm operations on the environment (Uwuigbe et al., 2018). One cardinal hallmark of the industrial revolution was the massive exploitation of the non-renewable natural resources to the point of extinction. In the beginning, no consideration was given to nature, as industrial promoters exploited every means of satisfying all identified human cravings. The quest to conquer and subdue the natural world for economic returns was so overriding that it outweighed every thought of moderation in our quest for all sorts of products. The excitement of mass production and later customisation, with the help of the building technology, was so overwhelming that, there was no realisation that the natural resource-base was utterly depleted. The competition amongst industrialists and nation-states was so intense that addressing sustainability risks and exploring opportunities to manage natural resource utilisation, natural resource depletion, deforestation, pollution control, or any other aspect of the connectivity between the firm and the environment, was never considered.

To advance sustainable practice and reporting by companies, different global regulatory frameworks have been developed to support the activities of Environmental Protection Agencies (EPA). While, firms are not required or compelled to adopt this guidance, those firms that consider it necessary to voluntarily disclose sustainability issues may obtain some strategic and operational benefits from using an established framework. In support of these sustainability efforts, Sustainability Accounting Standards Board (SASB) in the US, the GRI, International Integrated Reporting Council (IIRC), the CDP (formerly the Carbon Disclosure Project), amongst others developed Sustainability Reporting Guidelines. These guidelines also include industry guidance which has been adopted by most organisations, and firms complying voluntarily by self-reporting their environmental information (PricewaterhouseCoopers [PWC], 2016). However, with the spread of voluntary reporting frameworks in different economies, efforts to achieve greater global harmonisation have emerged. One foremost instance is the Corporate Reporting Dialogue (CRD), an initiative of the IIRC. The CRD includes eight world-class organisations, including the SASB, GRI, and CDP, and which was formed with the intent or goal of establishing guidance for reporting to investors, creditors, and other stakeholders.

Coupled with current global financial dilemma, financial reporting has been criticised over the past decades for being too narrow, thus, not encapsulating multiple dimensions (Simnet, Vanstraelen & Chua, 2009; Utile, 2016). Evolving business practices are taking shape, and multi-dimensional reporting demand is increasing. The information requirements of stakeholders are also shifting. They are increasingly expecting greater transparency, about how companies are providing solutions to sustainability risks and opportunities. The various citizens led global campaigns, ignited by the environmental movements, are constraining governments to enact sustainability legislation and compelling firms to report the environmental impact of their operations. Some level of responses has

been recorded in the developed world about environmental impact reporting, though evidence of cheating abounds as in the instances of Volkswagen and Audit.

The ignited keen interest and development in the concept of corporate social responsibility/environmental reporting and what it requires, has stimulated ample research, particularly in the developed economies, though with conflicting results (Bednárová, Klimko & Rievajová, 2019). In contrast, responses from developing countries seem to be slow to the increasing concern about the issue of corporate social and environmental responsibility and disclosure. This presumably is owing to the dismal concern by regulatory bodies in these climes. Notwithstanding the magnitude of research, (Tsang, 1998; Guobadia, 2000; Orlitzky, Schmidt & Rynes, 2003; Amaeshi, Adi, Ogbechie and Amao, 2006; Ingram & Frazier, 2010; Uwuigbe & Egbide, 2012; Onyekwelu & Ugwu, 2017; Egbunike & Okerekeoti, 2017; Uwuigbe et al., 2018; Okpala, 2019), including mixed findings, studies in this area of environmental disclosure, specifically within the manufacturing sector (high and low impacts) in developing countries are still scarce.

Also, our motivation to look into only the environmental aspect of sustainability reporting by manufacturing firms is anchored on the notion that environmental issues are necessary to achieve some of the cardinal goals of the United Nations (UN). The environmental issues form an integral part of the sustainable development goals (SDGs) that is expected to be achieved in 2030 by member nations of the United Nations (United Nations, 2018). The SDGs have about 5 environmentally-related aspects from the 17 interconnected goals. The interconnected goals are cutting across environmental issues which include clean water and sanitation (Goal 6), renewable energy (Goal 7), responsible production and consumption (Goal 12), climate action (Goal 13) and life on land (Goal 15). Deteriorating the environmental landscape and its resources is counter-productive to the UN goal. Moreover, safeguarding the environment should be a top priority in all corporate undertaking owing to the unhealthy human consequences it has. From the above-identified challenges, and the need to create environmental awareness and regulation for both the industrial firms and the government of Nigeria, this study investigates how environmental reporting (disclosure) by listed firms, operating within the manufacturing sector in Nigeria, affects their operational performances.

Literature Review

Concept of Sustainability and Environmental Reporting

A sustainability report is a broader concept for the environmental report. An environmental report which is recognised to be a subset of the sustainability report is sometimes used interchangeably as sustainability report, corporate social and environmental disclosure, corporate environmental report, amongst others in researches. Irrespective of the divergent nomenclatures, a sustainability report is a published report by any organisation or company in relation to its economic, environmental and social effects or impacts produced by its routine or everyday actions (GRI, 2011). Similarly, Garg (2015) conceptualise sustainability reports as voluntary reports disclosed by corporations, who desire to offer further information and value to their concerned stakeholders, concerning how their activities and operations affect the society and environment. A sustainability report also shows how organisations demonstrate the linkage regarding its strategy and

commitments to uphold a sustainable world economy.

Similarly, Alok, Nikhil and Bhagaban (2008) define social and environmental reports or disclosures as an umbrella term that portrays the several means by which corporations disclose information related to their social and environmental activities, to those who have interest in their financial statements. According to Iredele and Akinlo (2015), it is the method by which information covering the degree of environmental activities of firms are communicated to different stakeholders including employees, shareholders, consumers, local communities, government and environmental groups or concerned NGOs. In this study, for clarity and emphasis, we confine the concept of an environmental report to mean part of sustainability reports that covers the environmental activities disclosure, relating to community involvement, human resources, the natural environment, energy, and product safety of companies and how it impacts on the environment and the firm.

Interestingly, the tenacious debate regarding environmental consciousness of companies and society birthed the sustainability agenda (sustainability reporting), cutting across accounting for human resource and social audits in the 1970s, triple bottom line (3BL) reporting and environmental reporting in the 1990s, corporate social responsibility (CSR) reporting and various forms of the Global Reporting Initiative (GRI) guidelines on reporting (Simnet et al., 2009). The demand for reliable sustainability information regarding the environmental performance of firms and products has risen astronomically in the last decade, given way to a global drive for environmental protection, thus, orchestrating the setting of EPA (Uwuigbe & Egbide, 2012). These agencies which include but not limited to the following; UN Environmental Program (UNEP), World Commission on Environment and Development (WCED), UN Conference on Environment and Development (UNCED), World Nature Organization (WNO), the Organisation for Economic Co-operation and Development (OECD Guidelines for Multinational Enterprises) United Nations Environment Programme (UNEP), Earth System Governance Project (ESGP), Intergovernmental Panel on Climate Change (IPCC), amongst others, are concerned on how businesses are conducted without destroying
the biosphere (Uwuigbe & Egbide, 2012; www.worldatlas.com).

Concept of Operational Performance

Operational performance of firms depicts how the stated objectives of firms can yield targeted results from their daily activities. Operational performance is measured by key metrics which are referred to as key performance indicators (KPI). These KPIs are dichotomised into (financial or non-financial index) metrics. The various dimensions are used to measure how well they are doing in meeting their set objectives. Some of these metrics commonly used by firms include customer satisfaction, employee satisfaction, revenue generation, productivity, and gross profit indices.

Furthermore, in the extant literature, the measurement of the financial performance of firms can be categorised to take the form of growth of firm size (total assets), firms profitability (Return on assets, return on equity, net profit margin, earnings per share, gross profit margin) and firms market-based proxies (market price per share). The use of financial performance in this study is birthed on extant studies that have recorded correlation regarding sustainability performance and firms performance (Turban & Greening 1997; Waddock & Graves as cited in Wissink, 2012).

Supporting Theories

Legitimacy Theory

According to Brown and Deegan (cited in Mousa & Hassan, 2015), legitimacy theory is an offshoot of a social contract, suggesting that a company survival is mostly a function of its operations within the stipulated bounds and norms of society. Based on the legitimacy theory, companies by their environmental report, project themselves to be perceived as "corporate good citizens" to legitimise their activities and prove that they conduct business in compliance with the norms, values, and expectations of society (Suchman, 1995). However, contradictory observations still exist regarding environmental reporting and actual environmental performance. Some authors argue that environmental disclosure is just a greenwashing strategy, a new standpoint of legitimacy theory (Hassan & Guo, 2017). Whereas, others identified a positive association between environmental reporting and actual effect (Nazari, Hrazdil & Mahmoudian, 2017). This has called for more investigation on environmental transparency and its actual impact on the operational performance of the firm and its environment. The expectation is that, due to the affirmative disclosure of information on environmental development, firms are likely to attract better-qualified employee, more legitimate acceptance from the community, more customer base and investors, hence better firm performance. This theory attempt to suggest that environmental reporting could have a better influence on firm performance and a positive nexus is expected from environmental reporting, being a determinant of firm operational performance.

Political Economy Theory

Political Economy Theory is another theory that has gained much relevance in accounting disclosure literature. According to Deegan and Unerman (2006), It has been adopted within the accounting domain to explain corporate and social environmental disclosure practices. In the view of Gray, Owen & Adams (1996) "political economy" is a framework that encompasses the social, political and economic fundamentals within which human life takes place. Corporate disclosures which accommodate economic activities have the capacity to communicate not only economic performances but also social and political performances in a way that the expectations of the multi-stakeholders are covered in the report (Aburaya, 2012). Political economy suggests that corporate environmental disclosure is a proactive reporting measure instituted by management to mediate, suppress and prevent social conflict among concerned stakeholders.

Gray, Khouy and Lavers (1995) maintain that political economy theory, is a theory that is not totally directed on the self-interest of firms and shareholders wealth, instead, it reflects on the political, social and institutional framework within which the organisation operates. This assertion by Gray *et al*. (1995a) can further be advanced from the views that the political environment has some indirect impact on the development of accounting practices in the form of government influences and national culture. This could mean that the political environment coerces firms indirectly to engage in environmental reporting, that show their level of accountability in environmental performance, which could also enhance their financial performance. In essence, it can be deposed that voluntary environmental disclosure is motivated by self-interest; to promote, sustain and enhance legitimate relationships by portraying an impression of being a "corporate good citizen" and to avoid government intervention.

Hypothesis Development

In the empirical literature, the challenge of social and environmental disclosure measurements has been reoccurring. Nevertheless, several measurement indices and metrics have been developed and adopted in various studies (Wiseman, 1982; Freedman & Stagliano, 1992; Patten, 1995; Gray *et al*. (1995b). These measurement indices have expanded the scope and quality of research findings in this area. By and large, our study drifts into how this level of environmental reporting or disclosures have currently been able to enhance the operational performance of firms within the manufacturing sector.

Environmental Reporting and Operational performance

Zamil and Hassan (2019) investigate how environmental reporting could influence financial performance, using firms listed in Fortune 500 firms in the US from 2013 to 2017. Data were analysed using descriptive statistics, correlation, and regression analysis. Findings from their study indicated that reduction in environmental performance indicators (explanatory variables) such as greenhouse gas emissions and water consumption had a positive and significant impact on the sampled financial performance. Whereas, in another variable, i.e., waste, had a negative and significant impact on financial performance. Due to the short period covered in the study, the findings may have been influenced by the period. Hence, an extended period needs to be covered in studies of this nature. From a joint significance, the level of environmental reporting could influence firm performance as depicted in the R^2 (71%)

Further, watching from conventional reasoning, it is not out of place to say that firms with better environmental performance will be motivated to disclose their environmental activities. In line with this wisdom, we reviewed the study by Orlitzky et al. (2003) who conducted a meta-analysis of 52 studies of corporate social performance. The association between corporate environmental performance and firm financial performance was examined using meta-analysis for 139 correlation coefficients. Their analysis revealed a positive correlation between the two.

Also, Kwaghfan (2015) investigated the impact of Sustainability Reporting on Corporate Performance using accounting-based (ROA) and market-based (EPS) proxies of Selected listed firms in the Nigeria Stock Exchange. Relying on *ex-post facto* research model, and on a sample of 64 companies selected from 76 non-financial companies, their findings show that Sustainability Reporting has a positive impact on the financial performance of companies. A similar significant and positive correlation between sustainability accounting and firm performance was also revealed in the study of Nnamani, Onyekwelu and Ugwu (2017), which examined firms in the brewery industry from 2010 to 2014. Also, the study by Okpala (2019) which examined only social and environmental disclosure need further empirical substantiation. This is because the study's finding reveals a slight improvement in social and environmental disclosure, without a corresponding correlation check on the firms' performance.

Additionally, a positive correlation has been observed in other studies (King & Lenox, 2001; Egbunike & Emudainohwo, 2017; Tsang, 1998; Guobadia, 2000; Amaeshi, Adi, Ogbechie & Amao, 2006; Uwuigbe & Egbide, 2012, amongst others). However, studies with negative and neutral findings also exist (see Elsayed & Paton, 2005; Egbunike & Okerekeoti, 2017; Ingram & Frazier, 2010). Also, a large number of firms concentrates mainly on the area of social works/community development, though with less percentage on the reported contents of social/community engagement, while giving

third class attention to environmental management (Owolabi, 2008; Appah, 2011). This is not encouraging with regards to GRI principle of defining reporting contents.

Furthermore, an industrial firm which was awarded Environmental Sustainability and Stakeholder Engagement in Social Enterprise Report Awards (SERAs) in 2015 was examined in the study by Owolabi, Taleatu, Adetula and Uwaigbe (2016). Through a content analysis, and without the examination of the firm's operational performance, their findings reveal a very poor sustainability engagement by the firm. Using the GRI guidelines as the basis of assessment, they found no disclosures on human right issues, 3% environmental disclosures, and 30% disclosure based on 169 GRI indicators. Could this be a creative reporting style by firms in high environmental impact sector in Nigeria? Attempt to answer this question and other identified gaps would require further studies in the manufacturing sector in Nigeria. Gaining a favourable position or gap from the divergent findings, which signposts less priority to environmental issues, this study investigates further how environmental disclosure impacts on the operational performance of firms in the manufacturing sector because of their high level of waste emission and exploitation of nature's input for their products. Thus, it is hypothesised that:

H_{O1}*: Environmental disclosure has no bearing on the performance of firms in the Nigerian Manufacturing sector.*

Methodology

This study employs a panel research design that allows for the study of the various entities in the manufacturing sector and the dynamics of change involving more than a cross-section within the specified time. With a population of 58 manufacturing companies (ESI-Environmental Sensitive Impact firms), the study employed a maximum variation (heterogenous) purposive sampling technique for 35 firms (cutting across the health sector, Agricultural, Consumer goods, natural resources, and conglomerates). We employed this technique due to the heterogeneous attributes of the firms with only available data for the period investigated (2009-2018). The data is secondary in nature, having been sourced from the annual report of firms listed on the floor of the Nigeria Stock Exchange. The study examined the impact of environmental reporting on the operational performance of firms using the following model;

$ROTA_{it} = (\beta_0 + \mu_i) + \beta_1 ENVD_{it} + \beta_2 FSIZ_{it} + \beta_3 FIRA_{it} + \varepsilon_{it}$

A priori expectation: $\beta_0 > 0$, $\beta 1 - \beta_3 > 0$,

Where:

ROTA = Return on Total Asset

ENVD = Environmental Disclosure

FSIZ = Firm Size

FIRA = Firm Age

$\beta_0 + \mu_i$ = Intercept with one-way error for the cross-section heterogeneity

β_1 = Beta coefficients

ε = Error term/disturbance

We follow a dichotomous technique known as the Kinder Lyndenberg Domin (KLD) environmental performance rating system, which embodies a dummy characteristic (Uwuigbe, 2012; Egbunike & Okerekeoti, 2017). A score of one (1) is assigned if a company indicates environmental disclosure theme in the annual reports; otherwise zero (0). To this effect, environmental reporting or disclosure in dummy (1,0) is measured as 1 for companies that have a section in the annual reports that have information on environmental policies, EIA or any related works on environmental protection and 0 otherwise. Although the GRI sustainability reporting guidelines for reporting environmental performance (24 items) is globally recognised, Nigeria is yet to make it a mandatory requirement for all firms both

quoted and unquoted on the NSE. This has created a loophole for firms to leverage the voluntary disclosure practice still.

For the error term, we applied the one-way non-stochastic error correction model for the cross-section. We assume that the unobserved heterogeneity incorporated in (ε_{it}) are time-invariant across the cross-sections or firms; hence, the two-ways error correction model was not necessary.

The study also made use of ROTA (Return on Total Asset), which is measured as profit after tax divided by the total asset to proxy for the operational performance of the sample firms. Similar study such as Kwaghfan (2015); Patten (1995) also proxied performance in such measures.

Control Variables

While the study examines how environmental disclosure/reporting influences the operational performance of firms in the manufacturing sector, other existing firm-level factors that can influence operational performance required to be controlled for in the estimations. Based on prior empirical studies, this study well-thought-out employs firm size and firm age as the control variables. In this study, the firm size was controlled because more prominent firms are more likely to pay more excellent concerned towards their corporate environmental reputation, given the fear of loss of reputation coupled with the associated cost. This is because larger firms are much visible to the government and external stakeholders who always demand improved environmental performance (Uwalomwa, 2011). The natural logarithm of total assets was the basis of measuring firm size (Turban & Greening 1997; Waddock & Graves as cited in Wissink, 2012; Uwuigbe, 2012; Soumadi & Hayajneh, 2012; Yahaya, 2017). Furthermore, it is anticipated that firms with existing extended operations from the date of incorporation are deemed to influence better innovative practices and leadership in doing business. Age, as measured by computing the true age of the firm from the date of incorporation, should give older firms competitive, strategic, and innovative leadership over younger firms, which should also enhance the associated business leadership benefits. As noted by Elshabasy (2017), age could drive efficient operations among firms. This is because, with time, firms realise how good their productivity and operational skills are and learn how to do things better. With age, firms specialise and find ways to standardise, coordinate and speed up their production processes, as well as reduce costs and improve quality without destroying the environment and their reputation. It is on this basis that studies have suggested that older firms report more extensively on environmental issues (Gray et al., 1995a). Firm age, which is also the firm Listing age in number, is the difference between current years minus year of listing in the NSE (Gray et al., 1995a; Elshabasy, 2017).

Table 1

Descriptive Statistics for ROTA, ENVD and other Control Variables

	No. of Obs	Minimum Statistic	Maximun Statistic	Mean Statistic	SD Statistic	Jarque-Bera Statistic	Probability
	350						
ROTA	350	-70.34000	53.96000	4.754600	12.32999	768.5314	0.000000
ENVD	350	0.000000	1.000000	0.300000	0.458914	66.79894	0.000000

FSIZ	350	5.090000	8.760000	7.157771	0.841845	11.76546	0.002787
FIRA	350	1.00000	54.000000	30.27143	12.14634	43.08060	0.000000

Source: EViews 10 output 2020

Analysis, Observation and Discussion of Findings

As indicated in Table 1, the total observation is 350 (made up of 35 firms multiplied by 10 years). The value for minimum and maximum statistic of ROTA is -70.34 and 53.96, mean is 4.75, and the standard deviation is 12.32, respectively. This explains that on average, firms can only get a return value of 4.75 on each investment on assets as also confirmed in the *Mean dependent var* in the regression result. This shows that due to poor environmental reporting patterns by manufacturing firms, there is also poor returns on the firms' total assets. Also, the result shows that a standard deviation of 12% for the sampled manufacturing firms. This implies that there is a large deviation from the sample mean in ROTA with respect to each of the variables, as the maximum statistic indicates 53% and a minimum of -70 %. This result is consistent with the findings of Utile (2016).

For ENVD, the value for minimum and maximum statistics remains 0.00 and 1.00 due to its dummy feature, and the mean value is 0.30, with a standard deviation of 0.45, respectively. This entails that on average, 30% of firms in the manufacturing sector give disclosure about its environmental-related activities. This may be the consequences of low ROTA, as observed above.

The standard deviation also shows about 0.45% variability from the mean value. As per the control variables, FSIZ has a minimum and maximum value of 5.09 and 8.76, while the mean and standard deviation is 7.157 and 0.841, respectively. FIRA has a minimum and maximum value of 1 and 54 from the period of listing on the NSE, while the average value and standard deviation is 30.27 and 12.14, respectively. The P-value of the J-B statistics for all the variables are within the significant level (<5%). They are highly statistically significant; hence we reject the null hypothesis of normal distribution.

Regression Result

Dependent Variable: ROTA
Method: Panel Least Squares
Date: 04/26/20 Time: 20:03
Sample: 2009 2018
Included observations: 350

Table 2

Variable.	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob**
C	-15.54553	6.062142	-2.564362	0.0108
ENVD	6.409029	1.605686	3.991458	0.0001
FSIZ	2.858186	0.826849	3.456719	0.0006
FIRA	-0.068739	0.054308	-1.265723	0.2065
R-squared	0.128442	Mean dependent var	4.754600	
Adjusted R-squared	0.120885	S.D. dependent var	12.32999	
F-statistic	16.99669	Durbin-Watson stat	0.921527	
Prob(F-statistic)	0.000000			

Correlated Random Effects - Hausman Test

Table 3:

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	22.646106	3	0.0000

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.609399	Mean dependent var	4.754600
Adjusted R-squared	0.563078	S.D. dependent var	12.32999
F-statistic	13.15594	Mean dependent var	4.754600
Prob(F-statistic)	0.000000	Durbin-Watson stat	1.714487

Source: EViews 10 output 2020

The regression output in table 2 above shows that all things being equal, an increase in environmental disclosure (ENVD) will cause the response variable which is the Return on total assets (ROTA) to increase, mostly when companies disclose their environmental impact. ENVD is observed to be significant with P-value (0001<5%). Similarly, the control variable (FSIZ) is having a positive coefficient of (2.8) with a significant P-value of (0.0006<5%), suggesting that ROTA will increase as the firm size increases. However, the firm age (FIRA) has a negative coefficient in relation to ROTA and statistically insignificant (0.20>5%) which is contrary to the study *apriori* expectation, suggesting that the older the firm, the less impact it has on its Return on total assets. This means that when a company fails to adopt environmentally friendly and innovative assets in operations (mostly in production and product), and they continue to use less green technology or assets for a number of years, their returns on such assets will decline.

From all indications, the joint significance of both the explanatory variable (ENVD) and the two control variables (FSIZ and FIRA) though significant (P-value of F-stat. 0.00000<5%) but could not strongly explain higher variation in the dependent variable (ROTA). With R-squared of about 12% (0.128), it means that the combined strength of the variables could only explain 12% variation in ROTA, which is very poor. This suggests that other factors (such as social and economic factors) can be brought in to explain better the variations in firm performance.

Furthermore, in order not to deny or undermine the individuality (heterogeneity) that may exist among the number of companies in the manufacturing sector, we have to further run the Fixed and Random effect model independent of the OLS (see Table 3 above). This helped us to know if the unobserved heterogeneity among the cross-section is strong enough to undermine the OLS result. Thus, the null hypothesis holds that the random effect model is appropriate (that is, the Constance/intercept does not correlate with the explanatory variables. The alternate hypothesis says the random effect is not true (Fixed effect assumption). Using the Hausman test to obtain the statistical significance, we identified a P-value of

(0.0000<5%) which permit us to reject the Null hypothesis and accept the fixed effect model as an appropriate model to control for the unobserved heterogeneity among the sampled firms. This shows that the intercept is time-invariant, hence the one-way error correction model. The fixed-effect model was more appropriate due to the macro panel data used, and the cross-section components were non-stochastic.

Covariance Analysis

Covariance Analysis: Spearman rank-order
Date: Date 04/24/20 Time: 20:15
Sample: 2009 2018
Included observations: 350

Correlation Probability	ROTA	ENVD	FSIZ	FIRA
ROTA	1.000000			

ENVD	0.273185	1.000000		
	0.0000	-----		
FSIZ	0.248567	0.453388	1.000000	
	0.0000	0.0000	-----	
FIRA	-0.022535	0.351917	0.162337	1.000000
	0.6744	0.0000	0.0023	-----

Source: EViews 10 output 2020

From the spearman rank-order covariance analysis, the null hypothesis states that there is no correlation between Return on total assets and Environmental disclosure and other control variables. However, from the output, the correlation between ROTA and ENVD (0.273185) tend towards (1) one, indicating a positive and robust relationship between the variables. Hence, the null hypothesis of no correlation was rejected. It also shows that the relationship is significant, having a Probability value of less than 5 per cent (0.000). Consistent with similar findings are Egbunike and Emudainohwo (2017), Tsang (1998), Amaeshi, Adi, Ogbechie and Amao (2006), Uwuigbe and Egbide (2012). However, it is contrary to the findings of (Egbunike & Okerekeoti, 2017; Ingram & Frazier, 2010; Elsayed & Paton, 2005).

Similar correlation also exists for FSIZ and ROTA with the same level of significance. However, FIRA is having a negative correlation with ROTA with an insignificant relationship having its P-value greater than the significant level (0.6744>0.05). Further analysis and observations entail that when firms within the manufacturing sector disclose their environmental activities, there is a higher tendency of reporting higher returns on total assets. More notably, when there is compliance with the GRI environmental reporting guidelines, firms stand to benefits from market opportunities, indirectly enhance their internal environmental performance, increase the confidence of investors and other financial institutions amongst other benefits.

Conclusion, Potential Implication and Recommendations

The study investigates how environmental reporting (disclosure) by listed firms, operating within the manufacturing sector in Nigeria, affects their operational performances. Moreover, we observed from extant literature that efforts in Nigeria and other developing economies within the African continent in promoting environmental consciousness of companies, mostly the industrial firms and the society have not been encouraging. This is given that safeguarding the environment should be a top priority in any corporate environmental efforts by many organisations, owing to the unhealthy human consequences it has and the resultant operational performance it yields.

From the descriptive statistic, the data analysis reveals poor environmental reporting patterns by manufacturing firms in the Nigerian industrial sphere, which may also have resulted in poor returns on the firms' total assets. The analytical output

shows that on average, 30% of firms in the manufacturing sector give disclosure about its environmental-related activities. This may be the consequences of low ROTA, as observed above.

From the variable coefficients, findings suggest that an increase in environmental disclosure and firm size (ENVD, FSIZ) will cause the response variable (ROTA) to increase, following disclosure of their environmental impact. ENVD is observed to have a positive and significant relationship with ROTA. The covariance result also shows a positive relationship between the variables. However, the firm age (FIRA) shows a negative coefficient concerning ROTA and statistically insignificant, suggesting that the older the firm, the less impact it has on its ROTA.

The study findings permit us to conclude that a positive nexus exists between environmental reporting and operational performance of firms in the manufacturing sector engaged in environmental protection-related activities and disclose it accordingly. Though the relationship is positive, it was not that strong because other factors such as social, economic and even governance factors which could have strong combined influence were not considered in the study. Nevertheless, the size of the firm is considered as a control variable that influences operational performance through environmental disclosure. Firm age which could be a better control variable to influence firms innovative and standardise activities was found to be insignificant and contrary to influence performance.

The significant contribution of the current study is projected in its practical implications and its helpfulness in providing data for more extensive research in environmental disclosure. The value relevance of environmental disclosure remains a severe subject to investors, standard-setters, corporate decision-makers, and researchers (Berthelot, Cormier, & Magnan, 2003). By policy implication, this research will offer the government of Nigeria the needed empirical backing as a matter of social, economic and environmental priority, to coerce firms to embrace the GRI standard as a compulsory reporting guide for firms listed on the NSE. The inadequate disclosure observed from the study findings may suggest that the firms may not be doing the right thing about the environment in which they operate. The possibility of the firm not doing the right thing about the environment may have possibly resulted in stakeholders pressure directly or indirectly with some consequences leading to a harsh business environment. With this idea, it will give the government a necessary clue to engage in environmentally-friendly policies in line with global best practices that will revamp most firms and promote the ease of doing business within the manufacturing industry. The issue of companies addressing environmental risk and opportunities will further receive more attention owing to the findings of this study.

This study, therefore, recommends that firms should engage more in sustainable environmental-related activities that are within the acceptable norms of the society, and embrace more innovative ways of doing business in order to save the biosphere. Such activities should be disclosed in line with the GRI G4 reporting guidelines or at best the GRI standard despite the permitted voluntary disclosure in Nigeria. This will help manufacturing firms in Nigeria and other firms, in general, to meet the global standard and enhance their environmental performance which potentially could enhance their operational performance. Firms should also be more concerned in economic and social accountability, transparency and disclosure in order to solidify their operational performances. This can be seen

from how poor the explanatory power of only environmental disclosure together with the control variable (firm size) could influence a variation in Return on total asset in our regression output. Finally, the government should authorise the GRI framework as a mandatory guide, and also make it a listing requirement for firms who wish to go public. For further studies, researchers could examine other sectors involvement in sustainability disclosure and environmental performance in relation to its operational performances. Content analysis on firm's annual report should be done to reveal the level of GRI standard adoption in Nigeria. Further studies could also ascertain the causal relationship among these variables as this study only analysed the covariance (correlation analysis), and the panel analysis using the fixed and random effect.

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