



The Implication of NESREA Act and Financial Performance on Environmental Disclosure in Nigeria

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

Article Information

DOI: 10.9734/AJEBA/2021/v21i1030436

Editor(s):

(1) Dr. Fang Xiang, University of International and Business Economics, China.

Reviewers:

(1) Muhammad Tariq Mahmood, Federal Urdu University of Arts, Science & Technology, Pakistan.

(2) Sathyanarayana, Davanagere University, India.

Complete Peer review History: <https://www.sdiarticle4.com/review-history/71418>

Original Research Article

Received 20 May 2021
Accepted 25 July 2021
Published 07 August 2021

ABSTRACT

The study assesses the implication of compliance and enforcement of the NESREA Act, profitability, and Growth on environmental disclosure of cement companies in Nigeria. Secondary data comprising financial and non-financial information were source from annual accounts and reports of the sample companies, spanning a period of five years (2015 – 2019). Panel regression models were considered in assessing the implication of the variables under study. The findings reveal that NDI has a significant P-value which signifies that compliance with NESREA Act increases environmental disclosure by 2.9%. ROA also exerts a significant impact on environmental disclosure. This implies that a 1% increase in the profitability of the sample companies will increase environmental disclosure by 1.4%. Firm Size is also positive and exerts significant impact, by implication, the result suggested that an increase in the total revenue will lead to about 9% increase in environmental disclosure. Hence the study recommends among others that measuring, treatment, disclosure, and reporting of environmental activities need to be standardized and mandated to give a true and fair view of environmental management practices. These will not only protect the environment but will also enhance the firm's competitiveness and subsequently lead to high corporate performance.

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Keywords: NESREA Act; IFRSB; enforcement; compliance.

1. INTRODUCTION

The need for environmental protection and development-induced the executive, the legislative, and the judicial parastatals in Nigeria to pass the bill on the establishment of the National Environmental Standards and Regulations Enforcement Agencies (NESREA) Act 2007, presently known as Cap N164 LFN, 2010. The Act was further amended in 2018. The agency requires Nigerian companies to carry out their organizational activities in line and conformity with the requirements of the United Nation Sustainable Development Goals (NESREA, Sec.8). The agency, by its mandate, had the objective to protect and manage the environment (NESREA, Sec. 2). Though, the environmental impact of oil firms is controlled by NOSDRA (National Oil Spill Detection and Response Agency) Act, 2006. The establishment of NESREA by the Nigerian government is one of the biggest changes in the management of natural resources, aquatic and terrestrial animals [1]. Globally, environmental pollution, erosion, and degradation are much greater in magnitude than in previous decades as a result of the high rate of population growth, urbanization, industrialization, and modernization of agriculture and mining activities.

NESREA is essentially focused on a strategy that propels sustainable development. That is a system that doesn't jeopardize the planet's resources needed for future generation's life and development on earth. According to Lyndon and Sunday [2], the environment could not be defended only by strictly economic results but with the integration of domestic and international laws and regulations. United Nations (UN) country members and other relevant non-governmental organizations are in the process of developing series of SDGs (Sustainable Development Goals). Nigeria, as a member, is in dire need to adopt and implement these goals. More especially, goals 9, 11, and 13 (industry, innovation, infrastructure, sustainable cities & communities, and climate action).

Regrettably, a reasonable number of emerging economies including Nigeria are yet to achieve to the fullest the objectives of Millennium Development Goals (MDGs). This may be associated with inadequate environmental laws and regulations, poor implementation and enforcement of the available laws and regulations, and the inability of the governments

to stimulate sustainable development practices [3]. In this regard, Nigeria launches National Environmental Institution to manage its environment, the first country in Africa. While South Africa is the only African country that mandated sustainability reporting. It is worthy to note that, the established institutions (in Nigeria) deeply put roots into public law, which contains rules and regulations, and have an object the protection of the entire environment. The common features of these institutions are laced with panel provisions and hence they prohibit such activities that will have a serious negative effect on the environment. The provision of most of these statutes attracts criminal sanctions like monetary fines, imprisonment, or both. In other words, if an individual or corporate body violates any of the provisions of such statutes, he/she is liable to a criminal charge. Thus, there is a pressing need for managers, investors, regulators, institutions, and other relevant stakeholders that has a direct link in the implementation and enforcement of regulations, guidelines, and objectives, to consider the environmental implications as a competitive strategy that need to be integrated with other goals and objectives [4].

Organizations monitored by NESREA are encouraged to show consideration in decision-making regarding environmental protection and pollution prevention. Environmentalists opined that it could be more cost-efficient and beneficial to implement pollution prevention mechanisms and acquire clean technology than those of pollution cleanup. The new environmental laws priorities pollution prevention alternatives over pollution cleaning approaches [5]. It follows therefore that determining the appropriate pollution prevention approach will require appropriate, comprehensive, and timely plans and decisions taken by relevant stakeholders. This is particularly enforceable for the cement companies since their activities are largely associated with environmental degradation.

Therefore, one of the distinctions of this study is its focus on the implication of the NESREA Act, profitability, and growth of cement companies on environmental disclosure in Nigeria. There are none or few studies if any in this area.

1.1 Statement of Problem

Nigeria is currently facing increasing environmental challenges in terms of natural and

human-induced calamities such as drought, floods, and erosion. Environmental challenges such as deforestation resulting from unethical and unsuitable mining of mineral resources are a major driver of land degradation in Nigeria. Indiscriminate, inappropriate, unlawful mining activities and other similar issues have left North-Western, South-South, and other Nigerian regions bare and unproductive [6,7,8]. To encourage environmental protection and development, Nigerian Stock Exchange (NSE) in its latest (2020) report encourages listed companies to practice sustainability activities in different dimensions. These dimensions include the economic group of indicators (employees support: health safety, job security, etc.). The social group of indicators (community support: education, housing, and philanthropic activities). And

Environmental group of indicators (environmental support: sustaining the eco-friendly environment, producing environmentally friendly products, waste management, recycling, etc.) [9]. This study, therefore, focuses on the environmental group of indicators (dimension). The justification for this is that the Nigerian government, as well as Industries, give much more priority to preventing and reversing desertification, managing forest, wildlife, and natural resources, gas spillage, air pollution, soil and water contamination, and combating floods and erosion (Environmental Protection and Development) than any other element of sustainable development. Such as economic and social indicators of sustainability practices [10,11,6,7].

Notably, cement companies have many features in common with other extractive companies and at the same time have peculiar nature of the soil, water, and air pollution during extraction, production, transportation, and marketing activities. By comparison with other sectors such as chemicals, oil, and gas, and mining companies, cement companies have a significantly higher direct environmental impact. Environmental protection and development are subject to varied definitions, it may mean to prevent the production of contaminants and wastes that could cause damages to the natural resources. To prevent the unnecessary discharge of harmful substances to the environment, Sec. 7(h) empowered NESREA to enforce and monitor compliance on matters related to environmental regulations and standards on noise, air, land, seas, oceans, and other bodies (NESREA, Sec. 7). This paper

examines the implementation and enforcement of NESREA standards. Specifically, to assess the implication of the NESREA Act, profitability, and growth on environmental disclosure by cement companies in Nigeria.

This study contributed to the literature by documenting early evidence of the National Environmental Agencies and its implications. Prior researches reported the impact of environmental cost disclosure [12,10,4,2,13,1]. Similarly, Bassey et al., [8]; Mohammed et al., [14]; Etale and Sawyerr, [15] among others studied environmental accounting practices and sustainable development in Nigeria. There are also studies on the review and assessment of the NESREA Act [16,17,18,19,20] in Nigeria. Whereas, little or no evidence is reported of studies on the implication of NESREA standards on environmental disclosure in Nigeria.

The remainder of the paper is organized as follows: Section 2 provides and discusses related concepts on environmental accounting, NESREA, and the usefulness of NESREA in the development of natural resources. A review of prior literature was also considered. Section three of this paper deals with the methodology. Section 4 summarizes the empirical findings of the study and Section 5 concludes and recommends based on the key findings of the study.

1.2 Conceptualization

This section defined relevant and related concepts on National Environmental Standards and Regulations Enforcement Agencies, environmental cost disclosure, the theoretical context of the study amongst others.

1.3 Establishment of NESREA Act

Environmental Laws and regulations in Nigeria have witnessed significant development. Evolving from a humble beginning to more rigorous laws with legislative backing. Remarkably, before the Nigerian independence in 1960, protection and development of the environment do not warrant state intervention. Environmental laws were handled in a rudimentary manner. The few available laws at that time were the Public Health Act of 1917 and the Criminal Code Act of 1961. However, in response to a high population and industrial growth in the 1970s, largely associated with the oil boom left Nigeria with no other choice but to

strengthen the laws regulating environmental challenges [20,21,22].

The establishment and enactment of the most drastic and systematic environmental laws were witnessed in the late 1980s and early 1990s. This was owing to Nigerian's compliance to various international conventions during the periods (UN Convention to Combat Desertification, 1994; Conventions on Biological Diversity 1992; International Trade in Endangered Species of Wild Fauna and Flora, 1973; Conservation of Migratory species of wild animals, 1980; Protection of the Ozone Layer, Vienna 1987; Persistent Organic Pollutants, Stockholm 2001, and other similar conventions). The arsenal of these conventions served as the basis of environmental laws and regulations in Nigeria. The breach of which attracts criminal or civil liabilities or both. Civil liabilities involve the payment of damages or costs because of the abuse of environmental protection laws in Nigeria.

Laws, regulations, and standards that safeguard the environment was derived from the Nigerian constitution, statutory enactments, customary laws, common laws, international environmental agreements, and pronouncements of the Nigerian courts. Additionally, the national and state assemblies were given concurrent power to legislate on the environmental matter in Nigeria. In pursuant to its environmental objectives (as contained in sec. 20 of the 1999 Constitution), the executive and Nigerian legislative, in 2007 enacted the NESREA (Establishment) Act 2007 [16,17,19,11,20,6]. Development of environmental technology and the Protection of biodiversity (Environment) are among the key objectives of the agency (NESREA, Sec. 2). Section two of the establishment Act vests upon the agency, responsibility for the coordination and liaison of multifarious stakeholders on relevant issues related to environmental laws, policies, and guidelines within and outside the country [23]. NESREA as an agency has the moral right to sue defaulting person or organization. The agency shall also be sued before the court of competent jurisdiction in its corporate name (NESREA, Sec. 1(2c).

Deliberate and/or accidental discharge of any hazardous substance will attract criminal penalty and any other costs associated with the removal, restoration, and replacement of natural resources suffered as a result of the discharge (NESREA,

Sec. 47). The cost of third parties in the form of reparation, restoration, restitution, or compensation as a result of environmental degradation, may be determined by the agency from time to time or when the need arises [23]. The agency is also responsible for the development of environmental technology, enforcement of relevant laws, and compliance to all international agreements, protocols, conventions, and treaties on environmental and other related matters (NESREA, Sec. 8) [23]. The Agency has developed and gazette 33 regulations that cover various sectors of the environment, ranging from Sanitation to Energy Sectors as contained in Table 1.

Table 1 shows regulations and standards that were formulated to protect and enhance the quality of Nigeria's resources, promote public health and welfare, development of natural resources, and propelling the productive capacity of nations' human, animal, marine, and plant life. The environmental issues that being accord the highest priority are sustainable production, preventing desertification, and preserving the forest, wildlife, floods, erosion, and natural resources.

1.4 Environmental Disclosure

Disclosure source of environmental, economic, and social issues include voluntary disclosure, external non-firm sources of disclosure, and mandatory disclosure. Disclosure entails the release of a set of information relating to a company's past, current, and future environmental management activities, performance, and financial implications [10]. It further covers issues resulting from corporate environmental management decisions and actions. These may include issues such as expenditures or operating costs for pollution control equipment and facilities, site restoration costs, litigation cost, among others [24,25,14]. Quoted companies are engaging more actively in environmental disclosure in their annual financial statements. Table 2 shows the list of items required to be disclosed by companies.

Table 2 itemized environmental indicators to be disclosed on standalone (sustainability) report and/or integrated report, and other environmental indicators that are usually found in the annex report.

Table 1. List of NESREA standards

S/N	Regulations	Description	Standards
1.	National Environmental	Wetlands, River Banks & Lake Shore	S. I. No. 26
2.	National Environmental	Watershed, Mountainous, Hilly & Catchments Areas	S. I. No. 27
3.	National Environmental	Sanitation & Wastes Control	S. I. No. 28
4.	National Environmental	Permitting & Licensing System	S.I. No. 29
5.	National Environmental	Access to Genetic Resources & Benefit Sharing	S. I. No. 30
6.	National Environmental	Mining & Processing of Coal, Ores, and Industrial Minerals.	S. I. No. 31
7.	National Environmental	Ozone Layer Protection	S. I. No. 32
8.	National Environmental	Food, Beverages, & Tobacco Sector	S. I. No. 33
9.	National Environmental	Textile, wearing Apparel, Leather & Footwears Industry	S. I. No. 34
10.	National Environmental	Noise Standards & Control	S. I. No. 35
11.	National Environmental	Chemicals, Pharmaceuticals Soap & Detergent Manuf. Industries	S. I. No. 36
12.	National Environmental	Standards for Telecommunications/Broadcasting Facilities	S. I. No. 11
13.	National Environmental	Soil Erosion & Flood Control	S. I. No. 12
14.	National Environmental	Desertification Control & Drought Mitigation	S. I. No. 13
15.	National Environmental	Base Metals, Iron & Steel Manufacturing/ Recycling Industries	S. I. No. 14
16.	National Environmental	Control of Bush/Forest Fire & Open Burning	S. I. No. 15
17.	National Environmental	Protections of Endangered Species in International Trade.	S. I. No. 16
18.	National Environmental	Domestic & Industrial plastic, Rubber and Foam Sector.	S. I. No. 17
19.	National Environmental	Coastal & Marine Area Protection	S. I. No. 18
20.	National Environmental	Construction Sector	S. I. No. 19
21.	National Environmental	Control of Vehicular Emission from Petrol and Diesel Engines	S. I. No. 20
22.	National Environmental	Non-Metallic Minerals Manufacturing Industries Sector.	S. I. No. 21
23.	National Environmental	Surface and Groundwater Quality Control	S. I. No. 22
24.	National Environmental	Electrical/electronic Sector	S. I. No. 23
25.	National Environmental	Quarrying & Blasting Operations	S. I. No. 33
26.	National Environmental	Control of Alien & Invasive Species	S. I. No. 32
27.	National Environmental	Pulp & Paper, Wood & Wood Products.	S. I. No. 34
28.	National Environmental	Motor Vehicle & Miscellaneous Assembly	S. I. No. 35
29.	National Environmental	Air Quality Control	S. I. No. 64
30.	National Environmental	Control of Charcoal production & Export.	S. I. No. 62
31.	National Environmental	Dams & Reservoirs	S. I. No. 66
32.	National Environmental	Hazardous Chemicals & pesticides	S. I. No. 65
33.	National Environmental	Energy Sector	S. I. No. 63

Source: NESREA Web. (2019).

Table 2. Items of environmental disclosure

Annual Report	Annex
1. Environmental Programmes & Policies	Measurement criteria related to the environment
2. Preventing measures/environmental protection	Environmental incentives
3. Compliance with environmental regulations	Environmental expenditure allocated to results (operating cost)
4. Reference to certification	Environmental capitalized expenditures (investment)

Annual Report	Annex
5. Past and current environmental investment	Environmental liabilities
6. Environmental performance/risk and impact on the environment (quantitative information)	Environmental contingent liabilities
7. Environmental indicators	Environmental provisions
8. Environmental management system	Fees and penalties relating to environmental issues
9. External environmental audit	Heading: information on environmental issues
10. Future environmental investment and expenditure	Heading: CO2 licenses
11. Awards & recognition related to the environment	

Source: Adapted from Babangida, (2019).

1.5 Environmental Costs

The term environmental cost covers the costs of complying with regulatory standards; costs incurred to reduce the unnecessary discharge of any hazardous substances and all other costs associated with corporate processes that reduce the adverse effect on the environment. In the view of Abdulsalam and Babangida, [10] environmental costs are that costs that have to do with the creation, detection, remediation, and prevention of environmental degradation. While Ioannou and Serafeim, [26] defined Environmental Accounting as a systematic process of identifying and measuring costs associated with environmental activities and any other related cost. The primary objective of environmental accounting is the recognition and mitigation of environmental issues. Additionally, environmental accounting links environmental and financial performance more visibly [7,27] and assist in getting environmental sustainability embedded within an organization's culture and operations. The primary aim is to provide decision-makers with the information that will curtail operational costs and business risks [15,28].

1.6 Review of Empirical Studies

Sophisticated environmental laws and regulations emerged as a new trend in corporate reporting, essentially focused on a system that doesn't jeopardize the planet's resources needed for future generation's life and development on earth. At the moment, there is a strong argument by scholars and environmentalists that companies received more than proportionate benefits from embedding environmental management policies in the company mission

and vision statements. In this regard, several studies on the impact of industrialization on sustainable development were conducted. A recent study conducted by Akinsulore and Akinsulore, [29] examined the relationship between sustainable development and the exploitation of bitumen in Nigeria: Assessing the environmental laws faultiness. The study specifically examines the Environmental Impact Assessment (EIA) Act and the National Environmental Standards and Regulation Enforcement Agency (NESREA) Act. The study aims to establish whether the provisions of the agencies are quite adequate to take care of bitumen's processing requirements before and during development. The study finds that laws regulating bitumen development have serious lacuna that could endanger the attainment of sustainable development in the Nigerian bitumen sector.

Similarly, Olusola [30], carried out a comparative study on the legal framework governing gas flaring in Nigeria, Canada, the United Kingdom, Saudi Arabia, and Norway. The study finds that weak enforcement of laws is a critical factor responsible for the menace. It recommends the use of modern technologies, a sophisticated mixture of regulations, and non-regulatory incentives such as fiscal policies and gas market restructuring.

In the same vein, Ifesinachi [31], studies the effects of oil pollution on the marine environment in the Gulf of Guinea (Bonga Oil Field example). The study focuses on the effect of oil spillages on the marine environment. Using the Bonga Oil Field spillage as an example, the study exposes, from a policy perspective, the shortcomings of existing environmental regulations and their implementation in Nigeria weaken efforts for a sustainable marine environment and, by

extension, threatens food security of coastal communities.

Another study by Adeoluwa [16], focused on the appraisal of the operationalization of National Environmental Regulations in Nigeria. The study argues that weak and inadequate awareness and enforcement of regulations on the part of NESREA are the backbones of environmental degradation in Nigeria. The paper concludes that NESREA, being the appropriate authority, should strengthen its enforcement mechanism and embark on serious environmental awareness creation especially among the rural dwellers who are closer to the natural environment.

While Mahmood, Shahab, and Hafeez [32], used Time-series data to conducted an empirical analysis on energy capacity, industrial production, and the environment. The aims are to investigate whether there are significant relationships between energy, environment, and industrial production in Pakistan. For robustness, the study statistically tests the contradicting hypotheses to find the possible shape of an environmental Kuznets curve. The study reveals the presence of robust long-run relationships between energy, environment, and industrial production for Pakistan. The scale economy is also assumed. The study further found that the capital and labor elasticities of income show increasing returns in the presence of energy and emission variables. It finds evidence of EKC in a quadratic-restricted model but not in a cubic function. This analysis implies that the authorities and other relevant bodies should encourage and propel the development of environment-friendly energy resources. Thus, the study further recommends that, society and other relevant stakeholders has to take serious measures to tackle the issues of environmental degradation.

Correspondingly, Hafeez et al., [33] Assessed the relationship between agriculture, energy demand, finance and environmental degradation. The study aims to evaluate the impact of agriculture and forest on environmental degradation in One Belt and One Road (OBOR) economies, spanning from 1980 to 2017. The cross-sectional dependence and order of integration are checked by cross-sectional dependence and second-generation panel unit roots tests respectively. The study further introduced the Wester-Lund co-integration test, the statistical results infer the presence of co-integration between under-considered variables for the study. Furthermore, the empirical results

from Fully Modified Ordinary Least Square (FMOLS) and Dynamic Ordinary Least Square (DOLS) suggest that agriculture and energy demand upsurge environmental degradation. Whereas the forest improves the environment quality. The study, therefore, recommends the authorities to consider efficient energy utilization and eco-friendly techniques to overcome the deteriorating effects of energy usage and agricultural activities on the environment. The heterogeneous panel causality test infers a bidirectional causality between environmental degradation, finance, agriculture, and energy demand respectively.

Mahmood and Shahab [34], Investigated the nexus between Energy, Emissions and the Economy in the Pakistani economy. ARDL approach was employed to statistically examined the long run nexus between the variables under study. The statistical results suggested that the demand elasticity of energy is positive and greater than unity, but the negative externality is produced due to the use of energy. The elasticities of capital and Labor show that due to negative by-products of energy use, the production function exhibits decreasing returns to scale. Whereas the EKC test (in the presence of energy demand) finds no such evidence. This implies that energy use has a positive impact on the economy. Therefore, the study recommends the need to explore more sources of energy that can help meet the increasing energy demand. The fuel substitution from costly to cheaper should be monitored by the government. Carbon Tax should be imposed on the industries that produce more pollutants.

The literature reviewed testified the inconsistencies in the findings. The inconclusiveness of the findings in the literature, theoretical gap and the methodological weaknesses of the previous literature trigger this study. Therefore, this study is the first of its kind to assess the implication of the National Environmental Standards and Regulations Enforcement Agencies (NESREA) Act on environmental disclosure in Nigeria.

1.7 The Theoretical Context of the Study

The institutional theory stated that an organization succeeds if everyone agrees it is an organization; it fails if no one believes that it is an organization. Organizations are established within socio-cultural contexts, which affect organizational behavior and impose expectations

and demands. Previous Studies have used institutional theory to explain environmental disclosures [10,35]. The theory contends that the institution is at the heart of the social structure. Institutional norms are durable, transferable, and are the basis of social behaviors and interactions.

However, ethical firms operate within a nexus of economic, legal, and cultural institutions. Simply put, organizations are encouraged to integrate their goals and objectives with the concepts, principles, and acceptable standards (sustainable development goals) within the environment, which in return propel organizational legitimacy. The theory encourages firms to adopt a new method of production, design, and implement strategies that safeguard the environment from any form of pollution as a result of their activities. As a matter of certainty, organizations that comply with sustainability activities (economic, social, and environmental issues), in return received legitimacy and prove worthy of resources by society [10]. Accordingly, the theory provides viable methods by which structures, including schemes, rules, norms, and routines can be integrated with established guidelines for social behavior.

Consequently, we premised this study on institutional theory on the conjecture that differences in the institutional framework,

specifically the legal and cultural dimensions of the institution, could provide salient explanations for the difference in firms' environmental reporting behaviors and outcomes.

2. METHODOLOGY

An ex-post facto research design was adopted because the study relied solemnly on secondary data (environmental disclosure items, profitability, and growth indicators). Panel regression techniques are considered in analyzing the variables under study. Panel regression techniques are the best unbiased and efficient estimator, and they minimized the error term. The population of the study consists of the entire (eleven) quoted cement companies on the floor of the Nigerian Stock Exchange (NSE) within the study period. Census sampling method was used to sample the listed companies. The list of the sample companies is depicted in Table 3.

Table 3 shows the list of quoted cement companies in Nigeria under three different groups. Lafarge group of companies have four listed cement companies in Nigeria and BUA group of companies equally have four listed cement companies. Additionally, there are three quoted cement companies under the corporate name of Dangote group.

Table 3. List of quoted cement companies in Nigeria

S/N	Group Name	Company Name	Facility Name	City
1.	BUA Cement	Cement Coy. of Northern Nig. (CCNN)	Sokoto	Sokoto
2.	BUA Cement	Edo Cement Coy. Ltd.	Edo Okpella	Okpella
3.	BUA Cement	Kalambaina Cement	Kalambaina	kalambaina
4.	BUA Cement	BUA Cement	Obu I & II	Okpella
5.	Dangote Group	Dangote Cement Plc. (Dangcem)	Benue	Gboko
6.	Dangote Group	Dangote Cement Plc. (Dangcem)	Ibese	Ibese
7.	Dangote Group	Dangote Cement Plc. (Dangcem)	Obajana	Obajana
8.	Lafarge Holcim LTD.	Ashaka Cement Plc.	Ashaka	Gombe
9.	Lafarge Holcim LTD.	Lafarge Africa Plc. (WAPCO)	Ewekoro I & II	Ewekoro
10.	Lafarge Holcim LTD.	Lafarge Africa Plc. (WAPCO)	Sagamu	Sagamu
11.	Lafarge Holcim LTD.	United Cement Coy. Of Nig. Ltd (UNICEM)	Mfamosin	

Source: Nigerian Stock Exchange, (2021).

Table 4. Data collection form

Company Name:		Date:						
Period		2015	2016	2017	2018	2019	2020	Total
NESREA Indicators								
Air Quality and Atmosphere Protection	N1:							
Ozone Protection	N2:							
Noise	N3:							
Water Quality	N4:							
Effluent Limitations	N5:							
Environmental Sanitation	N6:							
Land Resources and Watershed Quality	N7:							
Environmental Indicators								
Climate change and energy	E1:							
Energy use	E2:							
Alternative energy sources	E3:							
Flared gas	E4:							
Biodiversity and ecosystem.	E5:							
Freshwater.	E6:							
Local environment impact.	E7:							
Other air emissions	E8:							
Spills to the environment	E9:							
Waste	E10:							
Decommissioning	E11:							

Source: author's computation, (2021).

A dichotomous method of content analysis technique of sourcing data from non-financial information is specified in codifying qualitative information into categories to derive qualitative values. OLS, Fixed Effects (FE), and Random Effects (RE) models were the forms of regression carried out. It deems necessary to identify the panel regression model with the highest explanatory power. To achieve this objective, a Hausman specification test was introduced to statistically choose the most appropriate between FE and RE models. This is in line with the studies of Ioannou and Serafeim [26] and Nwaiwu and Oluka [35]. The robustness of the affirmation tests provides an empirical platform for generalization in this study. The independent (explanatory) variable consists of NESREA Disclosure Index, Profitability, and Growth Ratios. The NESREA Disclosure Index, which is a dummy variable, is measure by a value "1" if the company disclosed environmental information in line and conformity with NESREA Act or category "0" if the company does not disclose the information. The dependent variable, which is Environmental Disclosure is equally a dummy variable and proxied by Environmental Disclosure Index in line with the current Global Reporting Initiative Standard (GRI-G4) disclosure

index. The data collection form is depicted in Table 4.

Table 4 shows the method of collecting non-financial (environmental) information of the variables under study. NESREA Disclosure Index is grouped under seven (7) solid indicators. Environmental Disclosure Index is grouped into eleven groups of indicators inline and in accordance with the GRI-G4 group of indicators.

2.1 The Model for the Study is Specified Below

$$EDI = f(NESREA, Profitability, and Growth)$$

$$EDI_{it} = \beta_0 + \beta_1 NDI_{1it} + \beta_2 ROA_{2it} + \beta_3 FZ_{3it} + \epsilon_{it}$$

Where:

NDI_{it} = NESREA Disclosure Index of firm i at time t.

EDI_{1it} = Environmental Disclosure Indicators of firm i at time t.

ROA_{2it} = Return on Asset of firm i at time t

FZ_{3it} = Firm Size proxy by log. of the total revenue of firm i at time t.

ϵ_{it} = Error term in firm i at time t.

β_0 = constant interest.

$\beta_1 - \beta_3$ = coefficient of the parameters

2.2 Variables Measurement

NESREA Disclosure Indicators can procreate a value "1" if the company disclosed the information or category "0" for the non-disclosure. The disclosure requirements are compliance issues related to Water, Biodiversity, Emissions, Effluents, Waste, Materials, and Energy. EDI = Environmental Disclosure

Indicators. The indicator is "0" if the company does not disclose such information or "1" if the company reports or communicate these indicators. The financial performance indicators are profitability proxied by Return on Asset (ROA) and Growth proxied by Firm Size. The list of variables and their measurement is revealed in Table 5.

Table 5. List of variables and their measurement

IV	Proxy	Measurement
NFDI	Air Quality & Atmosphere Protection	Sec. 20 (1a-f, 2, 3 & 4) of the agency encourages the report and provision of the most appropriate means to prevent and combat various atmospheric pollution. Minimum essential air quality standards for human, animal, marine, or plant health. Any firm that violates the regulations commits an offense and be liable to a fine not exceeding ₦2,000,000 and an additional ₦50,000 for every day the offense subsists.
	Ozone Protection	Sec. 21 (1-3) of the agency mandated corporate entity report and embark on programs for the control of any substance, practice, process, or activity which may reasonably be anticipated to affects the stratosphere, especially ozone in the stratosphere, when such effect may endanger public health or welfare. Violation of this provision attracts a fine not exceeding ₦2,000,000 and an additional ₦50,000 for every day the offense subsists.
	Noise	Sec. 22 (1a-b, 2 & 3) provides that firms must identify and report major noise sources, noise criteria, and noise control technology and comply with the regulations on noise, emission, control, abatement, as may be necessary to preserve and maintain public health and welfare. Any firm that violates the regulations commits an offense and be liable to a fine not exceeding ₦500,000 and an additional ₦10,000 for every day the offense subsists.
	Water Quality	Sec. 23 (1-4). An organization should report the use and value of public water supplies, propagation of marine and wildlife, recreational purposes, agricultural, industrial, and other legitimate use. Any firm that violates the regulations commits an offense and be liable to a fine not exceeding ₦500,000 and an additional ₦10,000 for every day the offense subsists.
	Effluent Limitations	Sec. 24 Organizations should report and comply with regulations on effluent limitations, on existing and new point sources, for the protection of human, animal, marine, and plant life. Violation of such may attract a fine not exceeding ₦1,000,000 and an additional ₦50,000 for every day the offense subsists.
	Environmental Sanitation	Sec. 25 (1 & 2) encourages companies to report their efforts on sound environmental sanitation.
	Land Resources and Watershed Quality	Sec. 26 (1-4) encourage companies to disclose their activities towards the protection and enhancement of the quality of land resources, natural watershed, coastal zone, dams, and reservoirs including prevention of flood and erosion.
Profitability	ROA	$\frac{Net\ Income}{Total\ Asset}$
Growth	Firm Size	Natural Log of Revenue

Dependent Variable		
EDI	Green House Emission	Report quantity of GHG emissions, including carbon dioxide and methane, from combustion and other processes.
	Energy Use	Energy use is an indicator of resource use and is typically associated with the generation of GHGs and other air emissions.
	Alternative Energy Use	This indicator facilitates reporting of company activities in research, development, supply, and/or use of non-fossil fuel energy, particularly alternative and renewable energy resources.
	Biodiversity & Ecosystem Service	Report on how the company addresses biodiversity and ecosystem services (BES)
	Fresh Water	Report on actions taken to manage identified risks associated with freshwater use.
	Air Emission	Report quantities of emissions to the atmosphere.
	Decommissioning	Describe the company's approach to planning and execution of decommissioning activities (includes abatement, demolition, remediation, and reclamation).

Source: Author's computation, (2021).

2.3 Presentation and Interpretation of Results

The measures of Environmental Disclosure Indicators, NESREA Disclosure Indicators, Profitability, and Firm's growth, in terms of mean, median, standard deviation, variance, skewness, and kurtosis, maximum and minimum values are presented in Table 6.

Based on the descriptive values in Table 6, it is clear that the distribution can be considered as normal and the data set satisfies the requirement for normal distribution. That the sample was drawn from a population that is normally distributed. This is because the values of the Kurtosis are greater than 0.30. Another reason is the dependent variable "EDI" has Mean and Median values of 0.514600 and 0.160377. The deviation from the mean value is 0.110567. This suggested that the variables are normally distributed since there is no wide gap between the mean and standard deviation. EDI has a maximum value of 1.000000 and a minimum value of 0.000000. This is because of the dummy nature of the variable.

NDI has a mean of 0.541622, which means that cement companies have an average mean disclosed in the NESREA disclosure index to the extent of 0.541622. The median is 0.092557, while the maximum and minimum values stood at 1.000000 and 0.000000. This is because the NDI is measured by dummy variables "1" and "0". The deviation from the average mean is 0.014081, which means that the data were normally distributed since there is no wide gap between

the mean and the deviation from the average mean. ROA and F-Z have a mean average of 1.463270 and 6.439533. The deviation from the mean is 1.051067 and 5.014678, which is closely netted. This signified that a single shock to environmental disclosure produces a positive impact on the profitability and growth of the targeted companies.

2.4 Inferential Analysis

This section deals with the summary of inferential statistics estimation of the variables under study. It shows the results of the Pool OLS Model, Fixed Effect Model, Random Effect Model, and other Post estimation tests.

Table 7 presents results of Ordinary Least Square, Fixed Effect, and Random Effect Models. Hausman Specification test, Autocorrelation test, and Group Wise Heteroskedasticity favor Random Effect Model with a Robust Error Term (RET). Therefore, this study will interpret the results of the RE model with a Robust Error Term. Table 8 Present the result of the Heteroskedasticity test.

Table 8 shows the statistical result of the modified Wald Test for GroupWise Heteroskedasticity in the FE Regression Model. It assumes to be the most robust test to non-normality. The result shows a positive and statistically significant result of F-value 49.65 and P-value 0.0000 at a 1% level of significance, which signified the rejection of the null hypothesis and concludes Heteroskedasticity.

Table 6. Summary of descriptive statistics

Variables	Mean	Median	Max.	Mini.	Std. Dev.	Skewness	Kurtosis	Obs.
EDI	0.5146	0.1604	1.0000	0.0000	0.1106	1.0522	1.0214	15
NDI	0.5416	0.0926	1.0000	0.0000	0.0141	0.3123	1.1239	15
ROA	1.4632	1.6377	6.5510	0.2081	1.0511	0.0258	0.5257	15
F-Z	6.4395	1.1566	5.0700	0.0415	5.0147	0.3991	0.4593	15

Source: Author's Computation, (2021).

Table 7. Estimation results

IV	Dependent Variable: EDI			
	Pooled OLS	Fixed Effects	Random Effects	RE (Robust Error Term)
Constant	7.54148	8.47996	7.39491	7.38891
NDI:				
Coefficient	.0501121**	.0502139**	.0329616	.0291289**
t-value	2.64	2.60	1.45	1.74
p-value	0.044	0.050	0.325	0.085
ROA:				
Coefficient	.0321868	.0301262	.0471158**	.0452958**
t-value	0.99	0.99	2.46	2.06
p-value	0.426	0.326	0.019	0.014
F-Size				
Coefficient	.8466596***	.8375916***	.9107934**	.8991956**
t-value	3.17	3.20	2.46	1.70
p-value	0.000	0.000	0.014	0.043
No. of Obs.	15	15	15	15
R ²	0.7977	0.3146	0.3073	0.3073
Adj-R ²	0.7968	0.2639	0.2920	0.2920
F-Statistics	3118.64	9.18		
Probability	0.0000	0.0000	0.0000	0.0000
Rot MSE	0.45732			
Sigma_u		9.5366072	9.5668072	9.5636072
Sigma_e		0.445731701	0.55411701	0.45731701
Rho		0.89671057	0.9977057	0.9087057
Wald Chi ²			20.18	19.48
P-Value (X ²)			0.0005	0.0005
Hausman Chi-Square Test			1.02 (0.9074)	
Autocorrelation Test			0.650 (0.4569)	

Source: Author's Computation from STATA Version 15 Output (*=10% level of significance, **= 5% level of significance, ***= 1% level of significance).

Table 8. Wald test for groupwise heteroskedasticity

Heteroskedasticity Test	F-Value	P-Value
	49.65***	0.0000

Source: Author's Computation from STATA Version 15 Output (*=10% level of significance, **= 5% level of significance, ***= 1% level of significance).

3. RESULTS

The results of the Pooled Ordinary Least Square (OLS), Fixed Effects, Random Effects estimation models, and Random Effects with a robust error term model for variables influencing

environmental disclosure of the sample companies during the period under study were captured in Table 7. A total of 15 observations were included in the analysis. The R-Squared value stood at 0.7977, showing that the pool OLS model accounts for 80% of the variables under

study. The appropriateness of the result of the Pool OLS model with specific firm effects was tested by the Poolability test. The significant P-value (0.0000 @ 1%) of the poolability test suggested the rejection of Pool OLS and prefers a Fixed-Effects model or Random-Effects model.

The Hausman specification test was used to choose between FE and RE models. The statistical result suggested the Random Effects model. The lagrangian multiplier test was also introduced to test the appropriateness of the Random Effects model. The significant p-value of 0.0000 at 1% favors the Random Effects model. The study, therefore, interpreted the results of the Random Effect Model with a robust error term that controls the presence of Heteroskedasticity.

H₀₁: NESREA Disclosure Index has no significant impact on the environmental disclosure of quoted cement companies in Nigeria.

Holding all other variables constant, enforcement and compliance to NESREA Act have a positive and significant impact on the environmental disclosure of cement companies in Nigeria. The NDI shows a P-value of 0.085, with a coefficient value of 0.0291289. This signifies that compliance with the NESREA Act increases environmental disclosure by 2.9%. The result rejected the null hypothesis in favor of the alternate hypothesis, which states that the NESREA Disclosure Index has a significant impact on the environmental disclosure of quoted cement companies in Nigeria.

H₀₂: ROA has no significant impact on the environmental disclosure of quoted cement companies in Nigeria.

ROA also exerts a significant impact on the environmental disclosure of quoted cement companies in Nigeria. This implies that a 1% increase in the profitability of the sample companies will increase environmental disclosure by 1.4%. The result, therefore, favors the alternate hypothesis, which stated that ROA has a positive impact on the environmental disclosure of the sample companies.

H₀₃: Firm Size has no significant impact on environmental disclosure of quoted cement companies in Nigeria.

Firm Size indicated a P-value of 0.043 and a coefficient value of 0.8991956. By implication,

the result suggested that an increase in the total revenue will lead to about 9% increase in environmental disclosure. Therefore, the null hypothesis is rejected in favor of the alternate hypothesis, which stated that Firm Size has a significant impact on environmental disclosure of quoted cement companies in Nigeria.

4. DISCUSSION OF FINDINGS

The regression results indicated that ROA, Firm Size, and compliance to NESREA Act exert a significant impact on the environmental disclosure of cement companies in Nigeria. Thus, hypotheses 1,2&3 hold that companies that complied with the standards and guidelines of NESREA disclosed better environmental issues and achieved the best results in terms of profitability and growth. These findings validated institutional theory, which suggested that an ethical organization stands a chance of achieving its stated aims and objectives. Furthermore, in a real situation, businesses operate within social structures, rules, and norms that are capable of influencing their decision-making. This is consistent with the findings of Abdulrahaman, Babangida and Ibrahim, [12]; Babangida [3]; Nwaiwu and Oluka [35]; Charles et al., [5]; Mohammad et al., [13]; Basseyy et al., [8]; and Aggarwal [24]. The study findings are equally in line with the findings of Abdulrahaman, Babangida and Ibrahim, [12] which revealed that big size firms attract more considerable attention from media, policymakers, and other stakeholders; as such, they would be pressurized to contribute much to environmental development. This finding is also consistent with that of Tang and Chan (2010) but contradicted Uwuigbe (2011), who argued that there is no relationship between the size of the firm and social and environmental reporting. The study further finds that there are variations in environmental disclosure and reporting by quoted cement companies in Nigeria. These findings are also plausible because there are no commonly acceptable indices for measuring, treatment, disclosure, and reporting environmental activities in Nigeria.

5. CONCLUSIONS

Based on the empirical evidence, the study, therefore, concluded that the higher the compliance to NESREA standards by Nigerian listed firms the greater the reporting and disclosure of environmental issues (as encouraged by Nigerian Stock Exchange).

Furthermore, the greater the environmental disclosure and reporting, the higher the Return on Asset and Firms Size. This is consistent with the extant literature on environmental accounting and sustainability reporting.

6. RECOMMENDATIONS

Based on the findings of this study, the following recommendations were made. Hence the study recommends among others that measuring, treatment, disclosure, and reporting of environmental activities need to be standardized by relevant bodies such as government, regulatory agencies, non-governmental organizations, IFAS, IFRC, and IFRSB. Relevant government agencies should ensure effective compliance with NESREA Act and its regulations. This will not only protect the environment but will also enhance the firm's competitiveness and subsequently lead to high corporate performance. The study further recommends mandating environmental disclosures and reporting to give a true and fair view of environmental management practices.

7. POLICY IMPLICATION

The policy implication of these findings is that environmental disclosure to be mandatory with legislative backing in Nigeria. The fine and penalties for the violation of the requirements of the NESREA Act need to be increased to a reasonable amount. For example, destruction of the Atmosphere by an organization attracts a fine not exceeding ₦2,000,000 and an additional ₦50,000 for every day the offense subsists. This amount is insignificant compare to the consequences of environmental degradation (destruction of the atmosphere).

8. SUGGESTION FOR FURTHER STUDIES

Future researchers should extend the study period to observe whether significant impact might occur over time. There is a need to critically examine the level of compliance and enforcement to NESREA Act regulation. Furthermore, researchers should use other financial performance variables such as market ratios and risk ratios to measure financial performance.

DISCLAIMER

The products used for this research are commonly and predominantly use products in our

area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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Peer-review history:

*The peer review history for this paper can be accessed here:
<https://www.sdiarticle4.com/review-history/71418>*