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Mandatory environmental sustainability in Nigeria: A comparative study between environmentally sensitive and less environmentally sensitive sectors

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Abstract

This study compares and contrasts the quality and quality of environmental sustainability between Nigerian oil and gas and industrial goods companies. The study further investigated the economic consequences of environmental sustainability on performance of entities quoted in the Nigerian Stock Exchange. The study covers a period of 10 years, spanning from 2011 to 2020. An independent T-test was introduced to gauge the level of compliance and enforcement. The results reveal variations in the compliance level with oil and gas companies scoring the highest percentage. The findings also reveal that only 53% out of the total samples comply with NSCD, 33% comply with OLPD, 45% comply with SEFD, 42% comply with SGCD, only 23% of that number comply with CMDA, 29% comply with AQCD, 48% comply with SWCD, and only 36% out of the total number comply with DDCD. Drawing on institutional theory, the empirical results reveals a significant positive relationship between environmental sustainability and firms' financial performance. The study, recommends that government should introduce environmental tax as an incentive and strategy for motivating firms to disclose and comply with the requirements of sustainable development goals.

Keywords: Environmental sustainability, mandatory requirement, enforcement, compliance

Introduction

The establishment of regulatory, voluntary, incentive-based, informational, and cooperative instruments of policy that are directed at promoting environmental sustainability has been a primary focus of government activity for quite some time. (Abdullahi & Auwal, 2021) ^[1]. These policies trend has increase global awareness about environmental sustainability (ES) worldwide. Environmental sustainability is a strategy used by organizations to present their positive and/or negative impacts on the environment, personnel, economy and community as a whole. The disclosure of both positive and negative environmental issues enables relevant stakeholders to have an insight into the firm's stance on ES and how it specifically deals with sustainable development goals (Eurosif, 2018; Giannarakis, 2019) ^[25, 28]. Accordingly, environmental sustainability has become a major part of the strategic plan of most organizations, and generally seen as an extension of firms' efforts that foster sound and ethical business practices.

Traditional financial reporting practice has been complemented by environmental reporting in the early 80s, although it was not accorded great deal of significance until the outbreak of various environmental challenges. Such as "chemical leakages in Bhopal (India) in the year 1984. The 1989 USA (Alaska) oil spillage. The tainted milk incident involving the Japanese Snow Brand Dairy Company in 2000. The Chinese Sanlu melamine milk poisoning incident in the year 2008. Niger Delta oil spillage (Nigeria) in the year 2010. The 2010 Gulf of Mexico oil spillage and the Mayflower and Mississippi oil spillage in 2013 in the USA". As a result, United Nations, multilateral organizations, national governments, and non-governmental organizations have advocated and attempted to use environmental sustainability to address the negative effect of industrial activities (Abdulrahman, *et al.*, 2021) ^[2].

Stakeholders observes that protecting ecosystem (Air, water, land, and lives) is more crucial than reducing prices of the commodities. Green initiatives motivate consumers to spend more money on environmentally friendly goods (Christensen, *et al.*, 2021) ^[20].

Organizations are encouraged to embark on green production processes as many investors place a high value on social and environmental responsiveness.

The national governments are under pressure from capital holders, investors, regulatory bodies, and host communities to legislate and standardize environmental sustainability. Abdullahi and Auwal (2021) ^[1], discloses that government can play important role in the development and promotion of environmental sustainability. The national government can legalize and standardize environmental sustainability through the establishment of laws and regulations. Environmentalists and non-governmental groups had the view that mandating environmental sustainability will increase its relevance, reliability, transparency, quality and comparability.

To protect and develop ecosystem and guarantee that businesses are environmentally conscientious, rules and regulations have been formulated (Abdulsalam, *et al.*, 2020) ^[3]. Nigeria for example, has established “National Oil Spill Detection and Response Agency (NOSDRA)”. The agency that oversees the operations of oil and gas companies. Similarly, “National Environmental Standards and Regulations Enforcement Agency (NESREA)” the legal body with the responsibility of enacting and enforcing environmental standards in Nigeria.

Environmental protection and development can also be emerged as the result of the interaction of market forces and mechanisms (Voluntary). In Common law countries, for example, the accounting regulation is in the hands of professional bodies. The emphasis is to present a true and fair financial statement to shareholders and other stakeholders. Companies in common law countries tend to score higher disclosures levels and have greater incentives to report environmental damages promptly. Furthermore, in competing for capital, companies may disclose more than the required information, which will lead to mandating environmental sustainability (Ioannou & Serafeim, 2011) ^[31].

Evidence about the required disclosure of nonfinancial information is contentious at the moment. Previous experiences in various countries have left it unclear as to whether mandating nonfinancial disclosure enhances the quality and quantity of information revealed (Grewal, *et al.*, 2019; Ioannou & Serafeim, 2017) ^[29, 32]. The management, on the other hand, maintained that organisations can voluntarily engage in environmental protection and disclose above the benchmark. The interaction of market forces and mechanisms would propel organizations to complement vision, mission, goal and objective with sustainable

development goals (Cohen, *et al.*, 2015; Amel-Zadeh & Serafeim, 2018) ^[22, 11].

A problem arises when insufficient information is reported to aid stakeholder’s investments and other corporate decisions. One of the consequences of non or inadequate disclosures of information is the fluctuations of share prices and earnings per share (Babangida, 2019; Abdulrahman, *et al.*, 2021) ^[19, 2]. In addition to this, firms that do not adequately report sustainability initiatives may have difficulties in raising capital, and may even have to pay a higher cost (interest) of capital (Abdullahi and Auwal, 2021; Abdulsalam & Babangida, 2020; Mercedes-Rodriguez-Fernandez, 2015) ^[1, 3, 38].

Therefore, it is an impetus to statistically examine the disclosure levels, quality, compliance, and enforcement of environmental regulations in Nigeria. The study covers a period of ten years, spanning from 2011 – 2020. Data was sourced from annual accounts of the sampled oil and gas and industrial goods companies.

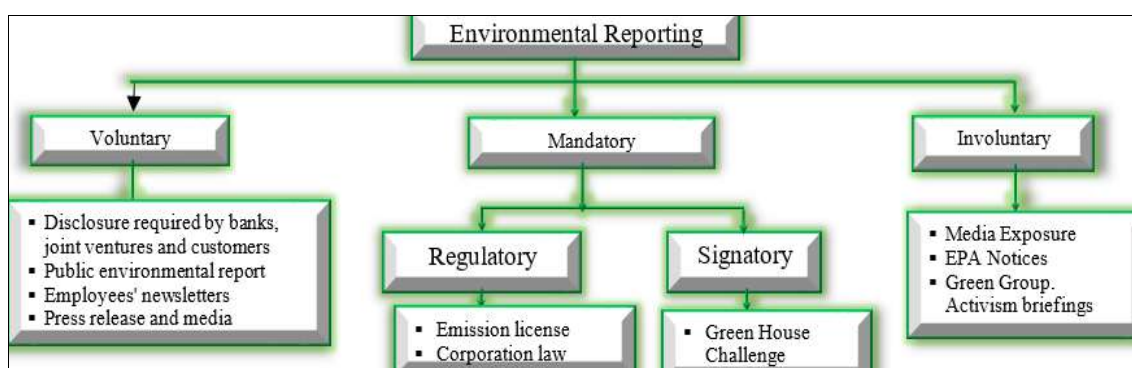
This research complements literatures by substantiating early evidence of Nigerian environmental protection regulations. Certainly, prior researches Waeli, *et al.* (2020) ^[9], Alawode and Festus (2020) ^[8], Onyali, *et al.* (2022) ^[49], reports the impact of environmental cost disclosure. Correspondingly, Bassey, *et al.* (2013) ^[16], Machmuddah, *et al.* (2020) ^[36], Abdulrahman, *et al.* (2021) ^[2], examines the practices of sustainability and environmental accounting in Nigeria. Correspondingly, Abdullahi and Auwal (2021) ^[1], Adeoluwa (2018) ^[6], and Maiké (2017) ^[37], investigates the impact of mandatory environmental practice in Nigeria. Whereas, little or no evidence is reported on the legal and economic consequences of mandatory environmental protection in Nigeria.

Conceptual Framework

This section reviews relevant concepts on mandatory environmental protection practices in Nigeria.

Environmental Reporting

Environmental reporting is generally grouped into voluntary reporting and mandatory environmental reporting. The quality of corporate disclosure can also influence by the qualities of “accounting professional body, Securities and Exchange Commission, financial reporting regulatory body, corporate laws, accounting standards, an independent auditing body, as well as the existence of education and training providers, culture and effectiveness of the judiciary system”. Figure 1.1 mirrors various types and components of environmental reporting.



Source: Adopted from Babangida, (2019)

Fig 1: Types of Environmental Reporting

Involuntary disclosure as shown in Figure 1.1 is a system of environmental reporting by organizations as a result of pressure from external stakeholders. Involuntary disclosure can be associated with pressures from media and non-governmental organizations. Voluntary reporting is depicted on the right-hand side of figure 1.1, it involves the disclosure of environmental sustainability enthusiastically. The reporting practice in most cases arises as a result of pressures from various groups that have a direct interest in firm's performance.

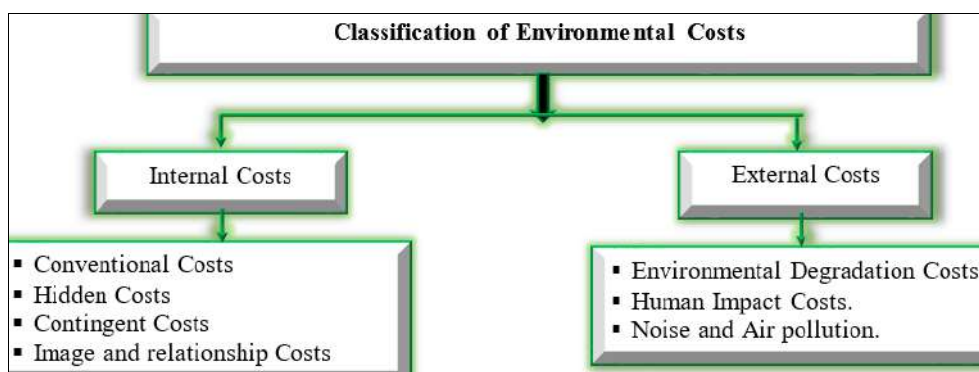
Voluntary environmental sustainability reporting is regarded to be the earliest form of contextual disclosure in the accounting discipline. It has been influenced and propelled by the "share value maximization model". The model concludes that the principal onus of management is to maximize firm's value (Abdulrahman, *et al.*, 2021) [2]. Studies reveals a positive link between environmental disclosure and firm's value (Abdulsalam & Babangida, 2020) [3]. Voluntary environmental disclosure allows companies to choose for themselves what to include and what not to include in the annual report. The proponents of the voluntary Act argued that organizations will disclose environmental information beyond legal requirements as a result of the interaction of market forces and mechanisms, and above all to remain legitimate.

Mandatory environmental sustainability is seen as the disclosure of environmental activities that are required by law. Mandatory environmental reporting focuses mainly on financial and non-financial environmental information, with complementary footnotes required by regulations and laws. Environmentalist argues that mandating environmental reporting would certainly add relevancy, reliability, and quality to corporate accounts and reports, as well, as propel social and environmental responsiveness (Abdullahi & Babangida, 2021; Abdulrahman, *et al.*, 2021) [1, 2].

Environmental Costs

The term environmental cost has traditionally been referred to as "the costs associated with cleaning up sites after production, or costs associated to waste management". It might also include "the environmental and social impacts cost" to other entities by the organizations, which are generally termed as societal costs. Societal costs are "costs imposed on individuals, society and the environment for which the organization is not directly held accountable". Most organizations emphasizes and focuses on private costs. It is a cost that entities are held accountable for and which in turn affect the firm's financial bottom line.

Environmental costs directly affect firm "internal costs", and costs to individuals, society and the environment for which the company is not accountable "external costs". The internal costs consist of "conventional costs, hidden costs, contingent costs, and image and relationship costs". Conventional costs cover "the costs of capital equipment, raw materials and supplies, while hidden costs refer to the results of assigning environmental costs to overhead pools or overlooking future and contingent costs. Several types of environmental costs that may be potentially hidden from managers are upfront environmental costs, regulatory cost, and voluntary environmental costs. The former are costs incurred before the operation of a process, system, or facility. These can include costs related to siting, design of environmentally preferable products or processes, qualifications of suppliers, and evaluation of alternative pollution control equipment. The latter (Regulatory and voluntary environmental cost) are costs incurred in operating a process, system, or facility. Companies traditionally treated these costs as overhead, it does not receive appropriate attention from managers and analysts responsible for day-to-day operations and business decisions". Figure 2.1 groups environmental costs into internal and external costs.



Source: Adapted from Beer & Friend, (2005)

Fig 2: Types of Environmental Costs

External environmental costs as identified in figure 2.1 includes Environmental Degradation Costs, Human Impact Costs, and Noise and Air pollution costs. External costs consist of "negative effects for which firms are not legally liable and Adverse impacts on human beings, their property and their welfare that cannot always be compensated for through legal systems". For example, waste-water discharge into dams, lakes, rivers, and seas, or to ecosystems as a result of solid waste and/or asthmatics caused by air pollution are all examples of external costs. To strike a balance between conflicting goals of environmental protection, profit, and wealth maximization, Organizations

must specify how they will reliably identify, measure, and report environmental information consistently and systematically.

Environmental Regulations in Nigeria

The focus of the Nigerian government towards environmental protection and development shifted to a more rigorous and comprehensive environmental regulation in 1988. In 1988, the government passed Decree No.42, making it illegal to dump hazardous materials anywhere in the country. The Decree has been complemented by Decree No. 59 of 1992 which gave birth to the "Federal

Environmental Protection Agency (FEPA)". This edict provided the impetus for the establishment of Nigeria's first set of environmental regulations. The standards include "water quality, effluent limitation, air quality, atmospheric protection, ozone layer protection, noise levels and the control of hazardous substances".

The "Nigerian Radiation Safety in the Management of Naturally-occurring Radioactive Materials (NORM) and Nigerian Radiation Safety in Nuclear Well-Logging Regulations" was established in 2008. The "National Oil Spill Detection and Response Agency (NOSDRA)" Act, 2006, aims to control environmental degradation by oil and gas firms. In 2007, Nigeria witnessed the establishment of the most stringent and rigorous environmental regulations. This is due to Nigerians' adherence to numerous international accords during the relevant eras. These conventions include "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 "National Environmental Standards and Regulations Enforcement Agencies (NESREA) Act 2007, presently known as Cap N164 LFN, 2010" was established in 2007, and amended in 2010 and 2018. The agency compels entities to carry out their actions in consistent with the UN SDGs (NESREA, Sec.8). One of the most significant improvements in the management of natural resources is the creation of NESREA by the Nigerian government.

Empirical Review and Hypotheses Development

The disclosures of mandatory environmental protection have risen both in size and in complexity on a worldwide scale. Remarkably, the study of Cerf (1961), serves as a reference point for empirical studies regarding environmental disclosure in annual reports. Since then, it has attracted the attention of academicians from both established and emerging nations. Summarizing the research on environmental reporting and disclosure, It is critical to notice that it spans numerous time periods and regions. Example, Abdullahi and Auwal (2021) ^[1], Abdulrahman, *et al.* (2021) ^[2], Abdulsalam and Babangida (2020) ^[3], Alawode and Festus (2020) ^[8], Onyali, *et al.* (2022) ^[49], Babangida (2019) ^[15], and Owolabi, *et al.* (2016) ^[50], study the Nigerian setting. The Iraq's environmental activities was examined by Al-waeli, *et al.* (2021 & 2020) ^[9-10]. In Zimbabwe, Olubukola, *et al.* (2021) ^[47], examines the level of environmental protection. Kaspersen (2013) ^[35], carried out his study in Denmark. Similar study was conducted in Indonesia by Machmuddah, *et al.* (2020) ^[36], the Asia-Pacific region by Amran, *et al.* (2014) ^[12], the United Kingdom by Bebbington, *et al.* (2009) ^[17], and Aburaya (2012) ^[5]. In United States, Eccles, *et al.* (2012), conducted similar research. The disclosure levels of environmental sustainability by the multinational companies was examine by Faisal, *et al.* (2018) ^[26], in China by Nguyen, *et al.* (2021) ^[43], but these studies revealed mix results.

Abdulrahman *et al.* (2021) ^[2] examine the impact of environmental cost on the profitability of multinational oil firms in Nigeria. The research spans fifteen years, from 2004 to 2018. The results mirror that environmental cost have positive and substantial influence on the profitability

of sample enterprises. This finding implies that organizations that invest in sustainability activities would have significant competitive advantages. The study, therefore, recommends oil and gas firms to invest heavily in environmental activities. In the same vein, Mion and Loza-Adaui (2019), study the consequences and qualities of mandatory (Directive 2014/95/EU) environmental protection of 132 Italian and German companies. The findings indicated that the quality of environmental disclosure increased after the establishment of mandatory environmental protection (Directive 2014/95/EU).

Machmuddah, *et al.* (2020) ^[36], reveals that environmental performance does not influence firm's value of listed Indonesian companies. Similarly, Iswati (2020) ^[33], discovers that environmental disclosure has no significant relationship with firm's value and profitability. Therefore, to empirically establish the economic effect of environmental laws and regulations on the Return on Capital Employ (ROCE) and Earnings per Share (EAPS) of listed firms in Nigeria, the study hypothesis that:

H₀₁: Mandatory environmental sustainability has no significant effects on the performance of listed firms in Nigeria.

A recent trend in corporate reporting has been the emergence of sophisticated environmental rules and regulations, which are primarily concerned with a system that doesn't endanger the ecosystem. Scholars and environmental activists currently present compelling arguments for environmental sustainability. Abdulsalam and Babangida (2020) ^[3], concludes that Companies benefited more than proportionately by incorporating environmental management practises. Compliance with environmental regulations determine firm's environmental responsiveness, and concludes that the dominant driver for environmental protection is government policies (Abdullahi & Auwal, 2021) ^[1].

Governments have a range of mechanisms and policies that can reduce the menace of environmental degradation and enhance environmental development. These may include "regulations, information programs, innovation policies, environmental subsidies, and environmental taxes". Therefore, regulations on mandatory environmental sustainability open new perspectives for research. The lively and growing debate among the proponents and opponents of mandatory environmental protection is whether mandating environmental sustainability enhance the disclosure, quality, and quantity of environmental information.

Helfaya and Whittington (2019) ^[30], statistically examines the quality of environmental sustainability disclosure in the UK FTSE100. The study investigated the quality and quantity of environmental sustainability based on the perception of 86 preparers and 177 users of companies' annual reports. The study provides empirical evidence on the design of metrics to assess the quality of disclosure. Doni *et al.* (2019) ^[23] look at how Italian companies respond to legal and institutional requirements. This gives us a look at the "ex-ante and ex-post adoption of the EU regulation" on protecting the environment. According to the findings, firms have significant difficulties complying with the criterion.

Similarly, Bergmann and Posch (2018) ^[18], examines environmental sustainability in Germany. Specifically, the

study examines how German firms evaluate mandatory national corporate responsibility law. The sample of the study consists of 151 Big and SMEs. Two-tailed t-tests and simple linear regression were used to empirically analyze the data. The study reveals varying results from SMEs to large firms as well as firms that are directly and indirectly affected. Similarly, firm's size exerts significant influence on evaluation of the law by directly affected firms, but it has no any effect on indirectly affected firms.

Abdullahi and Auwal (2021) ^[1], examines the implication of NESREA Act and firm's performance on environmental disclosure of cement companies in Nigeria. The study covers a period of 5 years spanning from 2015 – 2019. The regression result shows that compliance with environmental regulations increases environmental disclosure by 2.9%. The result further exerted that enforcement of NESREA regulations is quite low. Environmental disclosure is significantly impacted by ROA as well. This suggests that a rise in profitability would be accompanied by a corresponding increase in the disclosure of environmental sustainability. In order to provide a genuine and impartial picture of environmental management methods, the research advises, among other things, that measuring, treating, disclosing, and reporting of environmental activities ought to be standardised and regulated.

Therefore, to better understand how mandatory environmental protection may affect collective firm actions and societal attitudes in Nigeria, the paper hypothesized that:

H₀₂: There is no significant difference in the disclosure and compliance with mandatory environmental protection among the listed firms in Nigeria.

The Theoretical Context of the Study

This section reviews the theory that underpin this study. The study adopts institutional theory, this is best on the fact that the theory explains the relationship that exist between environmental sustainability, society, and firm's performance.

Institutional Theory

The institution, according to the theory, is at the centre of the social system. Institutional norms are long-lasting and transportable, serving as the foundation for social behaviours and interactions. However, moral businesses function inside a web of societal norms that span the legal, financial, and cultural spheres. Simply said, firms are urged to align their aims and objectives with the notions, values, and accepted norms (sustainable development goals) in the environment, since doing so will improve their reputation. According to the institutional theory, an organisation thrives if everyone agrees it is an organisation, and It fails if nobody considers it to be an organisation. Organizations are formed within socio-cultural environments, which influence organisational behaviour and impose expectations and demands. Previous research has employed institutional theory to understand environmental disclosures (Abdullahi & Auwal, 2021; Abdulsalam & Babangida, 2020; Nwaiwu & Oluwa, 2018) ^[1, 3, 14].

$$ROCE_{it} = \beta_0 + \beta_1 nscd_{it} + \beta_2 olpd_{it} + \beta_3 sefd_{it} + \beta_4 sgcd_{it} + \beta_5 cmda_{it} + \beta_6 aqcd_{it} + \beta_7 swcd_{it} + \beta_8 ddcd_{it} + \beta_9 eepd_{it} + \epsilon_i$$

(2)

The notion pushes enterprises to embrace innovative methods of production, design, and execute strategies that protect the environment from any sort of pollution caused by their operations. Organizations that adhere environmental standards, without a doubt, gain legitimacy and are deserving of societal resources (Abdullahi & Auwal, 2021). As a result, the theory offers realistic strategies for integrating structures such as schemes, rules, norms, and routines with established social behaviour principles. The study's foundation is institutional theory, which holds that variations in institutional framework, particularly those related to the legal and cultural aspects of the institution, may offer significant justifications for the variations in enterprises' environmental reporting behaviours and outcomes.

Summary of Research Methodology

The study focuses on the selected sample firms, consisting of eight (8) oil and gas and Ten (10) industrial goods companies listed in the Nigerian Exchange Group from 2011 – 2020. The most widespread technique of investigating the quality and quantity of environmental activities "Content Analysis" was employed. The method was well-known by Akbas (2016) ^[7], Fallan (2016) ^[27], and Nor, *et al.* (2016). Thirty-four (34) checklist indexes were used in measuring the quantity and quality of environmental reporting by the sample companies. The checklist index was grouped into nine (9) categories following Ofoegbu, Odoemelam and Okafor (2018) ^[46], Asmeri, *et al.* (2017) ^[14], and AbuRaya (2012) ^[5]. Unweighted index (Dichotomous Scores) was adopted, the unweighted method for measuring the quantity of environmental disclosure was familiar to Abdulsalam and Babangida (2020) ^[3].

Secondary data was used in eliciting the required information needed (ROCE & EAPS), t-test statistics is used to comparatively determines the level of corporate environmental disclosure between Nigerian industrial goods companies and oil and gas firms. In addition, multiple regression analysis is used to gauge the economic effects of mandatory environmental protection in Nigeria. Disclosure Index for each firm is computed with the aid of the following equation:

$$EDI = \sum_{i=1}^n \left(\frac{Qty_i}{Max.Qty} \right) \quad (1)$$

EDI = Environmental Disclosure Quantity Index.

Qty_i = 1 if item i is disclose; 0 for non disclosure

Max. Qty = Maximum applicable disclosure quantity score.

n = Number of items disclosed.

To test the hypotheses, the following regression models were adopted.

$$EAPS_{it} = \beta_0 + \beta_1 nscd_{it} + \beta_2 olpd_{it} + \beta_3 sefd_{it} + \beta_4 sgcd_{it} + \beta_5 cmda_{it} + \beta_6 aqcd_{it} + \beta_7 swcd_{it} + \beta_8 ddc d_{it} + \beta_9 eepd_{it} + \epsilon_i \quad (3)$$

Where:

ROCE_{it} = Return of Capital Employ of firm i at time t.

EAPS_{it} = Earnings Per Shares of firm i at time t.

β_0 is constant, β_1 -(9) = slope of the independent variables.

NSCD = noise standard and control disclosure.

OLPD = ozone layer protection disclosure.

SEFD = soil erosion & flood control disclosure.

SGCD = surface & groundwater quality control disclosure.

CMDA = coastal & marine area protection disclosure.

AQCD = air quality control disclosure.

SWCD = sanitation & waste control disclosure.

DDCD = desertification control and drought mitigation disclosure.

EEPD = enforcement to environmental protection laws & regulations.

Data Presentation and Discussion of Results

This section presents the results and interprets the economic effects of mandatory environmental sustainability in Nigeria.

Descriptive Statistics

This section presents the descriptive analyses of the dependent and independent variables. Thus, several pre and post-tests were conducted to check the conditions of the linearity. Table 1.1 depicted the mean, std. deviation, min., and max. values of the variables under investigation.

Table 1: Descriptive Analysis

Var.	Obs.	Mean	Std. Dev.	Min.	Max.
ROCE	180	25.86	65.64	-263.32	468.43
EAPS	180	3.66	6.87	-20.23	43.58
NSCD	180	0.53	0.50	0	1
OLPD	180	0.33	0.47	0	1
SEFD	180	0.45	0.50	0	1
SGCD	180	0.42	0.50	0	1
CMDA	180	0.23	0.42	0	1
AQCD	180	0.29	0.46	0	1
SWCD	180	0.48	0.50	0	1
DDCD	180	0.36	0.48	0	1
EEPD	180	0.21	0.41	0	1

Source: Authors Computation, (2021) Using STATA Version 14 Software.

Table 1.1 reveals 25.86 and 3.66 as the mean values of ROCE and EAPS, the minimum and maximum values ranges between -263.32 and -20.23 to 468.43 and 43.58. These results suggest that the disclosure and compliance with environmental laws and regulations can be associated with ₦25.86 and ₦3.66 increases in return on capital employed and earnings per share of the sampled companies.

The results further indicated that only 53% out of the total sampled firms disclosed and comply with NSCD, 33% comply with OLPD, 45% comply with SEFD, 42% comply with SGCD, only 23% of that number comply with CMDA, 29% comply with AQCD, 48% comply with SWCD, and 36% of the total sampled firms disclosed DDCCD. The result is consistent with the findings of Ofoegbu, Odoemelam and Okafor (2018) ^[46] and Umoren, *et al.* (2015) ^[51].

The low disclosure and compliance levels could be associated to the lack of specific format and method of environmental reporting, lack of commonly accepted standards, and weak legal and institutional factors in Nigeria (Abdullahi & Auwal, 2021) ^[1]. It could also be linked to the inadequate mechanisms for enforcement of environmental laws and regulations which stood at 0.21 (21%). This is in line with the studies of Abdullahi and Auwal (2021) ^[1], Olusola (2020) ^[48], Nwaiwu and Oluka (2018), and Ioannou and Serafeim (2011) ^[31]. To test the normality of the data, Shapiro-Wilk test was introduced. When the total number of observations is between 4 and 2,000, the test may be considered appropriate for use. The assumption that the variable follows a normal distribution if the p-value of the test is less than the significance level. Table 2.1 presents the result of the Shapiro-Wilk test for normality.

Table 2: Shapiro-wilk test for normality

Var.	Obs.	W	Z	Prob>Z
ROCE	180	0.59	9.18	0.000
EAPS	180	0.77	7.87	0.000
NSCD	180	1.00	-6.98	1.000
OLPD	180	0.99	0.58	0.028
SEFD	180	1.00	-3.48	1.000
SGCD	180	1.00	-2.23	1.000
CMDA	180	0.97	2.92	0.002
AQCD	180	1.00	1.51	0.066
SWCD	180	1.00	-5.02	1.000
DDCD	180	0.99	-0.17	0.067
EEPD	180	1.00	3.36	0.000

Source: Authors Computation, (2021) using STATA Version 14 Software.

As shown in Table 2.1, most of the p-values are significant, therefore, there is sufficient evidence to conclude that the variables are normally distributed.

Inferential Analyses

This section presents the results of independent sampled T-test and regression analyses on the quality and quantity of environmental disclosure and compliance with NOSDRA and NESREA requirements on environmental protection in Nigeria. Table 3.1 presents paired sample statistics of the variables under investigation.

Table 3: Paired Samples Statistics

	Var.	Mean	Std. Dev.	Std. Err. Mean
PAIR 1	ROCE 1	18.676	58.433	6.533
	ROCE 2	32.272	59.422	6.644
PAIR 2	EAPS 1	4.878	8.685	0.971
	EAPS 2	3.391	5.114	0.572
PAIR 3	NSCD 1	0.563	0.499	0.056
	NSCD 2	0.513	0.503	0.056

PAIR 4	OLPD 1	0.475	0.503	0.056
	OLPD 2	0.150	0.359	0.040
PAIR 5	SEFD 1	0.463	0.502	0.056
	SEFD 2	0.463	0.502	0.056
PAIR 6	SGCD 1	0.338	0.476	0.053
	SGCD 2	0.525	0.502	0.056
PAIR 7	CMDA 1	0.300	0.461	0.052
	CMDA 2	0.150	0.359	0.040
PAIR 8	AQCD 1	0.325	0.471	0.053
	AQCD 2	0.325	0.471	0.053
PAIR 9	SWCD 1	0.450	0.501	0.056
	SWCD 2	0.525	0.503	0.056
PAIR 10	DDCD 1	0.300	0.461	0.052
	DDCD 2	0.413	0.495	0.055
PAIR 11	EEPD 1	0.125	0.333	0.037
	EEPD 2	0.300	0.461	0.052

Source: Authors Computation, (2021) Using STATA Version 14 Software.

As shown in Table 3.1, the mean scores of the proxies of environmental development and compliance to mandatory environmental protection Nigerian industrial goods and oil firms are statistically different. Pair 3 "NSCD1=.563 & NSCD2=.513" exerts that oil firms disclosed and complies with the provisions and requirements of noise standard and control by 5% higher than the Industrial Goods companies. Similarly, the oil firms disclosed and complied with Ozone layer protection and coastal and marine area protection by 32.5% and 15% higher than the Industrial goods firms. These results are consistent with the findings of Jeroh (2020) ^[34], and plausible as the activities and operations of oil firms can largely be associated with air and water pollution.

However, The Industrial goods companies attached greater

importance to surface & groundwater quality control (SGCD1=0.338, SGCD2=0.525), sanitation and waste control (SWCD1=0.450, SWCD2=0.525), Desertification control and drought mitigation (DDCD1= 0.300, DDCCD2 = 0.413). Furthermore, the Industrial goods companies show higher compliance with the Nigerian Environmental Standards and Regulations, scoring 18% higher than the oil firms. This result is also plausible because most of the oil firms have foreign ownership and/or control by institutional investors and therefore attached greater importance to Global Reporting Initiative Standards (GRI). This is consistent with the findings of Abdulsalam and Babangida (2020) ^[3]. Table 4.1 presents paired sample differences between oil firms and Industrial goods companies listed on the Nigerian Stock Exchange.

Table 4: Paired Samples T-test (Paired Difference)

		Mean	Std. Dev.	T	df	Sig. (2-tailed)
PAIR 1	ROCE1 & ROCE2	-13.5959	69.8356	-1.741	79	0.086
PAIR 2	EAPS1 & EAPS2	1.4863	10.9089	1.219	79	0.227
PAIR 3	NSCD1 & NSCD2	0.5000	0.5489	0.815	79	0.418
PAIR 4	OLPD1 & OLPD2	0.3250	0.5223	5.566	79	0.000***
PAIR 5	SEFD1 & SEFD2	0.0000	0.5737	0.000	79	1.000
PAIR 6	SGCD1 & SGCD2	-0.1875	0.6182	-2.713	79	0.008***
PAIR 7	CMDA1 & CMDA2	0.1500	0.4800	2.795	79	0.007***
PAIR 8	AQCD1 & AQCD2	0.0000	0.6163	0.000	79	1.000
PAIR 9	SWCD1 & SWCD2	-0.0750	0.5460	-1.229	79	0.223
PAIR 10	DDCD1 & DDCCD2	-0.1125	0.5736	-1.754	79	0.083
PAIR 11	EEPD1 & EEPD2	-0.1750	0.5905	-2.651	79	0.010**

Source: Authors Computation, (2021) Using STATA Version 14 Software.

Table 4.1 show that there are statistically significant differences in the disclosure and compliance levels with environmental laws and regulations between oil firms and Industrial goods companies listed in the NSE ($t(180) = 5.566$, $p = 0.000$). This result indicated that on average, oil firms' scores on ozone layer protection were estimated at 0.325 (33%) higher than Industrial Goods company's scores. On whether there is a significant difference in the disclosure and compliance to surface and groundwater quality control, there is enough evidence ($t(180) = -0.188$, $p = 0.008$) to conclude that oil firms score 0.19 (19%) higher than industrial goods companies. Table 4.1 further presents differences in the disclosure and compliance with coastal and marine area protection ($t(180) = .150$, $p=0.007$). This indicated that on average, oil firms' score 0.15 (15%) higher than the Industrial goods companies.

There is enough evidence to rule out the null hypothesis and conclude that there are significant differences in the disclosure and compliance with environmental sustainability among the listed firms in Nigeria. This finding is in line and conformity with the findings of Babangida (2019) ^[15], Abdulsalam and Babangida (2020) ^[3], and Abdulrahman, Babangida and Ibrahim (2021) ^[2].

Effect of Environmental Sustainability on Return on Capital Employed (ROCE)

Table 5.1 presents the extent to which environmental sustainability affects ROCE of the sampled firms. Panel regression models were used to gauge the effects. To choose between RE or FE models the Hausman test was used. The results reveal P-value of 0.3427 which is significantly higher than 0.05 indicating that RE is the preferred model

for the analysis. The data were further subjected to Breusch-Pagan Lagrange Multiplier (LM) test, to choose between simple OLS or panel models. The P-value (0.0007) of the LM evinces significant differences across sampled entities, which further justified a RE model. The White's and VIF tests revealed the absence of multicollinearity and heteroskedasticity problems in the model. Ramsey RESET further revealed the absence of misspecification error in the model. Conclusively, the model is appropriate for prediction.

Table 5: Random Effect Result for ROCE

Dependent Variable: ROCE			
Independent Variables	Coef.	Std. Err.	Z-ratio
NSCD	-2.8608	14.9472	-0.19
OLPD	18.9105	3.1446	6.01***
SEFD	-23.4376	13.6336	-1.72*
SGCD	37.3392	16.7091	2.23**
CMDA	-31.4898	15.3638	-2.05**
AQCD	31.1167	14.6779	2.12**
SWCD	-24.5533	15.8223	-1.55
DDCD	13.544	1.5723	8.61***
EEPD	-15.9931	13.2199	-1.21
R ²	46%		
Wald chi ²	24.35***		
Hausman Test Result	10.10 (0.342)		
(LM) Breusch-pagan Test	10.30 (0.007)		
Diagnostic Tests			
Autocorrelation (Wooldridge Test)	(0.1177)		
Multicollinearity Test (VIF Mean)	(2.10)		
Heteroskedasticity (White's Test)	(0.1226)		
Ramsey RESET	(0.1167)		

Source: Author's computation (2021), STATA version 14 Software. ***, ** and * denotes level of significance at 1%, 5% and 10% respectively. Values in the parentheses are P-values.

Wald chi2 is statistical significance at 1% (24.35), indicating that the model is adequate and correctly specified. The coefficient of determination, R² is 0.46%, which signifies how well the proxies explain the quality, quantity, compliance, and enforcement of mandatory environmental protection. In other words, about 46% of the factors were explained in the model. Hence, 54% is explained by variables outside the model or captured by the error term. Although, Table 5.1 revealed that Noise Standard and Control Disclosure (NSCD), Sanitation and Waste Control Disclosure (SWCD) and Enforcement of Environmental Laws and Regulation Disclosure (EELRD) as proxies for mandatory environmental protection exert a negative and insignificant effect on ROCE.

The indication from Table 5.1 shows that the average value of OLPD is 18.91 with a standard deviation of 3.1446. The low std. dev. indicates a low level of dispersion of the respective firm from the mean. This indicated a significant and statistically positive effect on the ROCE of the sample companies at 1%. A unit change in the disclosure and compliance with ozone layer protection will bring about 19% increase in ROCE. SEFD exert -23.4376 as a coefficient value indicating a significant negative effect on ROCE at 10% level. SGCD exert a significant positive effect on ROCE at a 5% level. An increase in the disclosure and compliance with surface and groundwater quality control will lead to 37% increase in ROCE. CMDA coefficient value of -31.4898 revealed a significant negative effect on ROCE at 5%. This suggest that a unit change in

the disclosure and compliance to coastal and marine area protection brings about 31.5% decrease in ROCE and vice-versa.

AQCD exert a significant Coefficient value of 31.1167 which suggest a significant positive effect on ROCE at 5%. Increase in the disclosure and compliance with air quality control will brings about 31.12% increase in the ROCE of the sample firms. DDCD reveal a significant positive effect on ROCE. This signifies that a 1% increase in the disclosure and compliance with desertification control and drought mitigation will bring about 14% increase in the ROCE of the sampled firms.

Effect OF Environmental Sustainability on Earnings Per Share (EAPS)

Table 6.1 presents the extent to which mandatory environmental protection affects earnings per share of listed firms in the NSE. The results of the Hausman test revealed a P-value of 0.1427 which is higher than 0.05 indicating a preference for the RE model. The study further employed the Breusch-Pagan Lagrange multiplier (LM) to ascertain whether to adopt a simple OLS or panel model. The P-value (0.0000) evinces significant differences across the sampled firms which further justified a RE model. A significant test statistic below 5% from serial correlation indicates the presence of serial correlation. But the findings revealed otherwise, so we accept the null hypothesis of no first-order autocorrelation problem. White's and VIF tests revealed an absence of multicollinearity and heteroskedasticity problems in the model. Ramsey RESET test revealed the absence of misspecification error in the model.

Table 6: Random Effect Result for EAPS

Dependent Variable: Earnings Per Share (EAPS)			
Independent Variables	Coef.	Std. Err.	Z-ratio
NSCD	-1.0345	0.8261	-1.25
OLPD	11.1677	1.5273	7.31***
SEFD	2.0499	0.5107	4.01***
SGCD	11.1055	1.1157	9.95**
CMDA	0.7989	0.1062	7.52***
AQCD	0.7619	0.7106	1.07
SWCD	-0.7619	0.6897	-1.07
DDCD	-0.3045	0.0907	-3.14**
EEPD	1.7403	0.9477	1.84*
R ²	55%		
Wald chi ²	28.67***		
Hausman Test Result	19.14 (0.142)		
(LM) Breusch-pagan Test	24.59 (0.000)		
Diagnostic Tests			
Autocorrelation (Wooldridge Test)	(0.7117)		
Multicollinearity Test (VIF Mean)	(2.10)		
Heteroskedasticity (White's Test)	(0.1235)		
Ramsey RESET	(0.4770)		

Source: Author's computation using STATA version 14 Software. ***, ** and * denotes level of significance at 1%, 5% and 10% respectively. Values in the parentheses are P-values.

Wald chi2 (28.67) indicates that the model is adequate and correctly specified at 1% significant level. The coefficient value of the R² is 0.55, which revealed that 55% of the factors that explain the legal and economic effects of mandatory environmental protection in the Nigerian context were captured in the model. The remaining 45% were outside the scope of the study or captured by the error term. Table 6.1 revealed that NSCD, AQCD, and SWCD, as

proxies for mandatory environmental protection exert a negative and insignificant effect on the EAPS of the sample companies. OLPD shows a significant positive effect on EAPS at the 1% level. This implies that a unit change in the disclosure and compliance with ozone layer protection will bring about an 11.17% increase in the EAPS of the Nigerian samples. SEFD also exerts a significant positive effect on the EAPS at the 1% level. This shows that an increase in the disclosure and compliance with soil erosion and flood control will result in a 2.10% increase in the EAPS of listed firms in Nigeria.

SGCD show a positive effect on the EAPS of the sample firms at 1% level of significance. this indicates that a change in disclosure and compliance to environmental protection, proxied by SGCD will result in a 11.11% increase in the EAPS of the sample companies. CMDA also exert a significant positive effect on the EAPS of the companies under investigation at 1%. This result signifies that 1% increase in the disclosure and compliance to coastal and marine area protection brings about 0.80% increase in EAPS. As shown in Table 6.1, DDCD exerts significant negative effect on EAPS at 5%. This suggests that compliance with desertification control and drought mitigation brings about 0.30% decrease in EAPS. EELRD exert significant positive effect on EAPS at 10%. This result implies that enforcement of environmental laws and regulations in Nigeria will be associated with 1.74% increase in Earnings Per Share of listed companies. Therefore, the null hypothesis which stated that Mandatory environmental protection has no significant legal and economic effects on the performance of listed industrial goods companies and oil and gas firms in Nigeria is rejected and accepts the alternate hypothesis.

Discussion of Findings and Recommendations

Based on the descriptive analysis, the disclosure and compliance to mandatory environmental protection by the sample industrial goods companies and oil firms stood at 53% for NSCD, 33% for OLPD, 45% for SEFD, 42% for SGCD, 23% for CMDA, and 29%, 48%, 36% for AQCD, SWCD, and DDCD, respectively. The result is consistent with the findings of Ofoegbu, Odoemelam and Okafor (2018) ^[46], who finds that the disclosure levels of environmental sustainability was estimated at 10%. It also agrees with the findings of Umoren, *et al.* (2015) ^[51], who observes that compliance to environmental sustainability is estimated at 7%. These findings could be links to the lack of commonly accepted sustainability standards and weak legal and institutional factors in Nigeria (Abdullahi & Auwal, 2021) ^[1]. Thy study recommends NESREA, NOSDRA and other environmental agencies in Nigeria to strengthen the enforcement mechanism, which can ultimately increase and propel compliance with environmental protection and development.

The paired sample statistics documented that oil firms' scores on ozone layer protection (OLPD), surface and groundwater quality control (SGCD), and coastal and marine area protection (CMDA) are statistically higher than that of the industrial goods companies. This finding exerts that oil firms disclose and comply with pollution-related information. Clarkson, *et al.* (2011) ^[21], reveals that big and well-performing firms prioritized discretionary and verifiable information. Industrial goods companies, on the other hand, scored better disclosure percentage and

compliance with DDCD, SWCD, and NSCD. This is consistent with the findings of Cho, *et al.* (2012) ^[19], Aragon-Correa, *et al.* (2017) ^[13], and Ofoegbu, *et al.* (2018) ^[46], which stated that indigenous firms and environmentally sensitive sectors reported more extensively as they face greater threats and pressures from various stakeholders. The study, therefore, recommends government and other relevant institutions to prioritize and standardize environmental sustainability in Nigeria.

The study further finds that disclosure and compliance with mandatory environmental sustainability increases earnings per share and return on capital employed. This finding corroborates the conclusions of Moshud (2020) ^[41], Mohammed, Hassan and Bala (2020) ^[40], Abdulsalam and Babangida (2020) ^[3]. Owing to this, the paper suggests that government should introduce environmental tax as an incentive and strategy for motivating firms to disclose and comply with the requirements of sustainability initiatives.

Conclusion

Compliance with environmental sustainability by the Nigerian sampled companies is below the average benchmark, this may be associated with weak enforcement of environmental laws and regulations. Therefore, the enforcement mechanism and institution need to be strengthened. Fines and penalties for violating and polluting the environment and its surroundings need to be increased to a reasonable amount. For instance, an organisation that destroys the atmosphere is subject to a punishment of up to ₦2,000,000 and an extra ₦50,000 for each day the offence continues. When compared to the effects of environmental deterioration, this sum is negligible.

Policy Implication

This study contributes to the literature on environmental sustainability. In this regard, it is theoretically and practically relevant. Theoretically, despite the plurality of studies on environmental sustainability, this study is the first of its kind to statistically examine the legal and economic effects of mandatory environmental sustainability on firm's financial performance. Practically, the study allows relevant authorities and agencies to know the quantity, quality, compliance, and enforcement levels of the requirements of environmental protection and development, for subsequent strengthening of environmental laws and regulations.

Limitations and Suggestions for Further Studies

In subsequent research, the scope and time period should be broadened in order to determine whether or not a meaningful influence develops over time. It is imperative that the degree of enforcement of the NOSDRA and NESREA rules be subjected to an in-depth analysis. Researchers could also consider including other measures of performance to examine the economic effect of mandatory environmental sustainability.

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