

Effect of Effluent and Waste Treatment Cost Disclosure on Economic Value Added of Quoted Oil and Gas Firms in Nigeria

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Abstract: This study analyzed the effect of carbon emission disclosure on economic value added of oil and gas firm in Nigeria stock exchange between the periods of 2018-2019. Panel Least Squared (PLS) method of data analysis was used. Secondary sources of data were employed; the interested variables were sourced from the annual report of the quoted oil and gas firms. The following variables were employed: Economic value added, effluent and waste treatment cost disclosure, Revenue growth of firm and Firm size. The study employs Causality Test, Hausman Test, fixed effect as well as random effect to analyses the included variables. From the analysis result the study found that effluent and waste treatment cost disclosure, has significant effect on economic value added, revenue growth of firm has positive significant effect on economic value added. Firm size has positive insignificant negative effect on economic value added. The study recommend that Government should enact regulatory laws that will ensure that companies carry out the corporate social responsibility. Extant laws should be properly enforced.

Keywords: Carbon emission disclosure, Economic value added, Revenue growth, Firm size

INTRODUCTION

Effluent is wastewater - treated or untreated - that flows out of a treatment plant, sewer, or industrial outfall. Generally refers to wastes discharged into surface waters (Naddeo & Liu, 2020). Effluent only refers to liquid discharge (Choi, 2019). Effluent refers to wastes discharged into surface waters (Canencia, Dalugdug, Emano, Mendoza & Walag, 2016). An effluent cost a fee or tax to be paid on discharges into the environment, based on the quantity and/or quality of discharged pollutants. Waste is unwanted or unusable materials. Waste is any substance which is discarded after primary use, or is worthless, defective and of no use. A by-product by contrast is a joint product of relatively minor

economic value. A waste product may become a by-product, joint product or resource through an invention that raises a waste product's value above zero. Examples include municipal solid waste (household trash/refuse), hazardous waste, wastewater (such as sewage, which contains bodily wastes (feces and urine) and surface runoff), radioactive waste, and others (Muck & Brass, 2015). Wastes are substance or objects, which are disposed of or are intended to be disposed of or are required to be disposed of by the provisions of national law (Diaz, 2016).

The UNSD Glossary of Environment Statistics (2001) describes waste as materials that are not prime products (that is, products produced for the market) for which the generator has no further use in terms of his/her own purposes of production, transformation or consumption, and of which he/she wants to dispose. Wastes may be generated during the extraction of raw materials, the processing of raw materials into intermediate and final products, the consumption of final products, and other human activities. Residuals recycled or reused at the place of generation are excluded. Under the Waste Framework Directive (2008), the European Union defines waste as an object the holder discards, intends to discard or is required to discard. Inappropriately managed waste can attract rodents and insects, which can harbour gastrointestinal parasites, yellow fever, worms, the plague and other conditions for humans, and exposure to hazardous wastes, particularly when they are burned, can cause various other diseases including cancers. Toxic waste materials can contaminate surface water, groundwater, soil, and air which causes more problems for humans, other species, and ecosystems (Wolsink, 2014). Waste treatment and disposal produces significant green house gas (GHG) emissions, notably methane, which are contributing significantly to global warming (Moran, 2014). The economic costs of managing waste are high, and are often paid for by governments. Money can often be saved with more efficiently designed collection routes, modifying vehicles, and with public education. Environmental policies such as pay as you throw can reduce the cost of management and reduce waste quantities (Wilson, Velis & Cheeseman, 2016). Waste recovery (that is, recycling, reuse) can curb economic costs because it avoids extracting raw materials and often cuts transportation costs (Ray, 2018). The location of waste treatment and disposal facilities often reduces property values due to noise, dust, pollution, unsightliness, and negative stigma. The informal waste sector consists mostly of waste pickers who scavenge for metals, glass, plastic, textiles, and other materials and then trade them for a profit. This sector can significantly alter or reduce waste in a particular system, but other negative economic effects come with the disease, poverty, exploitation, and abuse of its workers (United Nations Environment Programme, 2019).

Waste is part of the economy; it is a by-product of economic activity, by businesses, government and households. Waste is also an input to economic activity, whether through material or energy recovery. The management of waste has economic implications for productivity, government expenditure, and, of course, the environment (Yao-Jen & Min-Der, 2013). Firms' decisions over how to manage waste impact on their profitability. Where the benefits outweigh the costs, firms can reduce their overall costs and improve productivity by reducing the use of expensive raw materials, whether metal in industry, or paper in commerce. Equally, costs can be reduced by optimising the management of waste which arises (Thorneloe, Weitz, & Jambeck, 2017).

Economic Value Added (EVA) means a financial metric that investors use to tell how their capital is performing in one company as compared with other investments (stewart, 2013). Economic value added (EVA) is a financial measurement of the return earned by a firm that is in excess of the amount that the company needs to earn to appease shareholders. In other words, it is a measure of an organization's economic profit that takes into account the opportunity cost of invested capital and ultimately measures whether organizational value was created or lost (Stern & Shiely, 2013). Economic value added (EVA) is a measure of a company's financial performance based on the residual wealth calculated by deducting its cost of capital from its operating profit, adjusted for taxes on a cash basis. EVA can also be referred to as economic profit, as it attempts to capture the true economic profit of a company. This measure was devised by management consulting firm Stern Value Management, originally incorporated as Stern Stewart & Co (James, 2019). Economic Value Added (EVA) or economic profit is a measure based on the residual income technique that serves as an indicator of the profitability of projects undertaken. Its underlying premise consists of the idea that real profitability occurs when additional wealth is created for shareholders and that projects should create returns above their cost of capital (James, 2019).

EVA compares the rate of return on invested capital with the opportunity cost of investing elsewhere. This is important for businesses to keep track of, particularly those businesses that are capital intensive. When calculating economic value added, a positive outcome means that the company is creating value with its capital investments. Conversely, a negative outcome would mean that the company is destroying value with its capital investments and the capital would be better spent elsewhere. Businesses can use economic value added to assess managerial performance as it serves as a measure of value creation for shareholders (Izhar, Alam & Yameen, 2019). The real key to create shareholders' wealth is that a business enterprise has to earn economic returns to its owners for its economic survival and Economic Value Added (EVA) is one measure that can realistically assess the economic contribution of a company, shorn of accounting anomalies. EVA generated or destroyed by a company during a period can be measured by comparing profits with the total cost of capital used to produce them, thus aiding managers to withdraw value-destructive activities and invest in projects that are critical to shareholder's wealth. Over the long-term, it is improvement in EVA and not in accounting profits that drives wealth creation (Saurav-Panda, 2015; Gurleen, Sidana & Panda, 2019).

REVIEW OF RELATED LITERATURE

2.1 Conceptual Review

2.1.1 Waste Management Cost Disclosure

Waste Management Cost Disclosure Waste (or wastes) is unwanted or unusable materials. Waste is any substance which is discarded after primary use, or is worthless, defective and of no use. Examples includes municipal solid waste (household trash/refuse), hazardous waste, wastewater (such as sewage, which contains bodily wastes (feces and urine) and surface runoff), radioactive

waste, and others. Wastes are substance or objects, which are disposed of or are intended to be disposed of or are required to be disposed of by the provisions of national law (UNSD Glossary of Environment Statistics, 2013). Waste collection and transport can generate up to 70% of the total costs of the system. Separated collection of recyclables implies additional costs for which the sale of recycled waste often does not compensate, but there is increased pressure to reach the long-term recycling objectives set by law. The proper estimation and monitoring of waste collection costs are essential to define the most cost-effective waste collection system (Dijkgraaf & Gradus, 2017).

2.2 Theoretical Framework

2.2.1 Legitimacy Theory

The earliest documentation on legitimacy theory can be traced to the study of Sethi (1975) who states that corporate social responsibility is that corporate behaviour that aligns with prevailing social norms, values and expectations. The concept of social contract holds that the activities of business organizations should comply with social expectations. In the absence of this compliance society will withdraw the organizations' right to continue its operations. Business organizations operate within the boundary set by rules, regulations and societal norms. Where there is any perceived threat to the business as a result of violation of any rule and societal norm, sustainability disclosures are released by the companies. This implies that businesses that are prone to legitimacy problems tend to disclose more information in order to satisfy the public about their sustainability performance (Scaltrito, 2015). Legitimacy theory posits that business organizations disclose their sustainability initiatives to legitimize their operations. The businesses that are prone to sustainability issues also report more information to minimize criticism from the host community, address stakeholder expectations, build reputation and ultimately attract capital. Sethi (1975) also indicates that the need for corporate social responsibility is linked to organizational quest for legitimacy in the presence or absence of legitimacy threats. Scaltrito (2015) on legitimacy theory identify a number of threats to legitimacy namely negative events and media exposure. According to Raucci and Tarquinio (2015), business organizations seek 'legitimacy' from important stakeholders by ensuring that their value system is in alignment with the values of the society that hosts the operations of the business. Sethi (1975) also discloses that legitimization is characterized by changes in the internal decision-making, changes in the perception of the external environment, and accountability mechanisms of the business organization. With respect to the notion of legitimacy, corporate disclosures (mandatory/voluntary) are ways through which businesses can show that they support certain societal expectations.

2.2.2 Anchored Theory

This study is anchored on Stakeholder theory because stakeholders are instrumental in ensuring that an organization acts in the public interest. Again, the business case for environmental reporting is often premised on the need for a business to prepare environmental cost disclosure reports for the purpose of financial stakeholders. On the other hand, environmental reporting as an accountability mechanism implies organizations' readiness to report true and fair information on environmental performance. Also, an accountability approach to environmental reporting implies that an organization identifies the stakeholders in its internal and external business environment

who are all pivotal to its success and continuity. Such awareness could foster greater co-operation and engagement between company managers and stakeholders, thereby, resulting in feedback from corporate stakeholders.

2.3 Theoretical Exposition

Effluent and Waste Treatment Cost Disclosure and Economic Value Added

Maintaining good levels of waste management efficiency is an essential requirement for building sustainable development. This is valid not only from an environmental and social perspective but also from an economic point of view (Schönborn, Berlin, Pinzone, Hanisch & Lanz, 2019). Environmental issues are also components of corporate social responsibility (CSR) aspects covering environmental implications of a company's operations, products and facilities, such as: eliminating waste and emissions; maximizing efficiency and productivity of resources; and minimizing practices that might adversely affect the enjoyment of a country's resources by future generations (Masud, Bae & Kim, 2017). The rapid industry development, the depletion of natural resources, and the rise in environmental awareness have led corporate companies to shift their attentions from short-term profits to long-term strategies to achieve sustainable management and smooth progress into a new era (Mahmood, Furqan & Bagais, 2019). The World Commission on Environment and Development established sustainable development policies for future environmental and economic development, defining sustainability as a development model that meets the needs of contemporary people and protects the environment without comprising future development (Energy Research Centre of the Netherlands. 2018). Sustainability indicators are a suitable means for assessing the development of production technologies and integration of business decisions. Achieving an acceptable environmental performance has become a universal commitment for all organizations to maintain competitiveness (Kokubu & Kitada, 2015).

Environmental accounting (or green accounting) is an environmental analytical tool that measures and communicates the costs and benefits of the overall economic effects (International Organization for Standardization, 2011). It is a process that involves collecting material-volume and cost information to identify the costs incurred by corporate companies in the pollution emission, waste treatment, and environmental protection (Christ & Burritt, 2016). Adopting sustainable development while also retaining business competitiveness is a common goal in corporate communities. Because of this trend, a goal-oriented innovative management method is necessary for economic optimization and the reduction of material-related environmental pollution. Stotz and Bey (2018) explained that material flow management, which contributes to full utilization of the potential sustainable management of a company, provides a new framework for economic research and initiates standardization processes for sustainable management, because material flow and its effects are direct causes of ecological problems, material flow management can be used to directly address the root of a problem and facilitate the reduction in the environmental pollution, which also leads to cost reduction.

Environmental protection is critical for sustainability. Continuous investments in energy consumption and natural resource consumption, as well as manufacturing sectors and infrastructure, have had seriously harmful impacts on the environment Dominkovic

Bacekovic, Cosic, Krajacic, Pukšec, Duic, & Markovska, (2016). Environmental accounting creates accountability for business entities in terms of their efforts to protect the environment in their corporate decisions (Baek, 2017). Environmental accounting constitutes a tool for applying the sustainable development concept and now commands acceptance as a means of ensuring the preservation of the environment. Environmental accounting information includes financial, environmental performance, and policy aspects, which are scattered in many parts of annual reports and social responsibility reports. The quality of disclosures can be characterized from aspects of comprehensiveness, reliability, and compliance (Vastola, Russo & Vurro, 2017). In decision making, an organization considers different pressures from internal and external parties and attempts to legitimize the impact of its activities on the environment in the eyes of society and various pressure groups. Environmental accounting plays an active role in preparing, presenting, and analyzing environmental information for interested party holders, thus encouraging top management to improve environmental conditions (Martí-Ballester, 2017). Li, He, Liu and Su (2017); Nishitani, Jannah, Kaneko (2017); Abreu & Cavalcanti, (2019) documented a negative relationship between effluent and waste treatment cost disclosure and financial performance. Tan, Habibullah, Tan & Choon, (2017), Muller and Kolk (2019); Gugler & Shi (2019); Nguyen, Ta, Lai, Dao & Cao (2020) showed a positive relationship between effluent and waste treatment cost disclosure and financial performance.

2.4 Empirical Review

Sarumpaet (2020) examined the relationship between environmental performance and financial performance amongst Indonesian companies from 2012-2018. The environmental performance is measured by corporate environmental ratings provided by Bapedal/ the Ministry of Environment, through a program, called PROPER, while the financial performance was measured by return on assets (ROA). Some control variables were also included in the analysis, namely: total sales, industry sector, stock exchange listing, and ISO 14001 certification. The study revealed while financial performance is not significantly associated with environmental performance, company size, stock exchange listing and ISO 14001 are significantly associated with environmental performance. This finding also indicated that the government environmental rating is highly consistent with international environmental certification.

Le (2020) investigated the role of environmental management accounting on sustainable supply chain management and the link between sustainable supply chain management and efficiency including financial and environmental factors using questionnaire-based survey. The study designed and sent questionnaires to 600 construction material manufacturing enterprises in Vietnam and managed to collect 418 valid ones which were processed by SPSS 20.0 software. The results showed that environmental management accounting had a significantly positive impact on sustainable supply chain management. Therefore, if enterprises adopt environmental management accounting, they will more likely implement sustainable supply chain management more efficiently. On the other hand, the findings pointed out that sustainable supply chain management positively affect to both financial and environmental efficiency.

Nguyen, Ta, Lai, Dao and Cao (2020) assessed the impact of factors on the application of environmental accounting for sustainable development. The information of 80 companies used for the research were representatively selected from manufacturing, mining and processing industries, state ownership and non-state ownership, in export processing zones and outside export processing zones at all scales of number of employees, equity, revenue in Vietnam. Data were analyzed using multivariate linear regression. Research showed that factors such as managers' perceptions of costs and benefits, environmental changes, characteristics of the scale of production and business activities of enterprises, pressures to announce sustainable environmental information and reporting have significant influences on the development of environmental accounting for sustainable development.

Xiaopeng, Xueyao and Yongliang (2020) estimated the causality of environmental information disclosure (EID)'s impact on investment efficiency based on a quasi-experiment in 2007. The study found strong and robust evidence that there is a significant positive connection between environmental information disclosure (EID) and company investment efficiency in China. The study further determined that heterogeneity of EID's performance appeared in the different settings of industry and subdivision industries. The significance of several sub-industries disappeared while the others retained larger significant coefficients than the whole industry case. The probability that an enterprise issued an environmental annual report has a significant positive link with investment efficiency in heavy industry, while this relationship is weakened or even not obvious in non-heavy polluting industries. Finally, the study found that employee compensation served as a mediator from which EID has an indirect effect on investment efficiency. The results confirmed that EID plays a vital role in firm-level capital allocation efficiency.

Yongliang, Wen and Li (2020) utilised panel dataset composed of the listed manufacturing firms in China during 2006–2016. The study used the difference-in-differences (DID) model and the propensity score matching (PSM) method to investigate whether the Environmental Information Disclosure Measure (for Trial Implementation; EIDMT) affects the firm value. The results showed that EIDMT exerts a significant impact on the listed manufacturing firms' value. In consideration of the firm's ownership, EIDMT plays a more important role in the firm value of non-state-owned firms than state-owned firms. Furthermore, using a PSM–DID model for eastern, central, and western China, it was found that EIDMT significantly affected the firm value in eastern and western China but has little impact on central China.

Atang and Eyisi (2020) examined the determinants of environmental disclosures of listed manufacturing firms in Nigeria. The data for the study was gotten from a sample of 22 listed firms in the industrial sector. Ex post facto research design was adopted for the study and multiple regressions was used in analyzing the data. Descriptive and inferential statistics were used to generalize the results and conclude the findings. The result showed a beta value 0.018 for cost of sales. This mean an increase in the profitability of manufacturing firms will lead to a 1.8% increase in the environmental disclosure of the company. The result also revealed that board composition influenced about 13% of the variation in the environmental disclosure of manufacturing firms in Nigeria. While on the

other hand auditor type contributed only 5.6% of the changes in the environmental disclosure of the manufacturing firms in Nigeria. It was therefore concluded that profitability, auditor type, board composition and firm size jointly influenced the environmental disclosure of manufacturing firms in Nigeria. It was recommended that the regulatory bodies should initiate policies that will make the disclosure of environmental information compulsory in Nigeria. Also, the external auditors should also persuade their clients to disclose information relating to the environment as this has an impact on their reputation.

Depoers (2020) related the extent of disclosure in the annual reports of French listed companies to some economic determinants. The sample included the 2015 annual reports of 102 randomly selected industrial and commercial firms. The extent of disclosure was measured by an index based on financial and non-financial discretionary information. The model of hypothesis explaining voluntary disclosure was defined as the interplay of contradictory forces: inducements deriving principally from agency theory and limitations imposed by information costs. The results revealed that voluntary disclosure is significantly related to size, foreign activity and proprietary costs.

Khaled, Elnahass and Salama (2020) used the resource-based view of the firm as a theoretical framework and linking it to carbon disclosure through carbon disclosure project, the study conceptualised and empirically investigated the impact of adopting proactive carbon management policies and communicating them to stakeholders, focusing on the financial performance of the top FTSE350 companies between 2007 and 2015. By developing a comprehensive financial performance index and controlling for several firm characteristics, the study found strong evidence that voluntary carbon disclosure is positively associated with firm financial performance.

Mohamad, Rahayu, Kaujan and Irwandi (2020) examine the impact of various factors on the quality of environmental disclosure. The study focused on factors related to the strategy and vision of the firm (environmental audit, presence of an environmental committee), diversity of and within boards (independence of the board, gender diversity) and factors related to the environment (environmental performance, degree of pollution of the company). The study used a sample of French listed companies in SBF120 for the period 2009–2014. The study found that quality of disclosure remains relatively low. In addition, the findings indicated that a company's strategy and vision (environmental audit), diversity in boards (gender diversity) and environmental performance play significant roles in explaining variations in quality of environmental disclosure.

Mohamad, Rahayu, Kaujan and Irwandi (2020) examined the effect of environmental performance on firm value with environmental disclosure as a mediation variable. Sample of research is non-financial companies at the Indonesia Stock Exchange that have followed the Environmental Performance Assessment Program (PROPER) held by the Ministry of Life Environment and Forestry. The data analysis method was Structural Equation Modeling-Partial Least Square (SEM-PLS), and the analysis operation was facilitated by the software of WarpPLS 6.0. The result of analysis showed that environmental performance has a positive effect on firm value and environmental disclosure; environmental disclosure

does not affect firm value and does not mediate the effect of environmental performance on firm value.

Ojiakor, Ezuwore and Ozioko (2018) examined the responsiveness of organizational performance to environmental cost disclosure in the financial statements of motor vehicle manufacturing organizations in South East, Nigeria from 2006-2017. Specifically, the study was aimed at ascertaining the degree of relationship between environmental cost disclosure and profitability of the sampled firms. The survey design was used to carry out this research. Data were collected using questionnaires distributed to the respondents from the visible and viable motor vehicle manufacturing firms in South East, Nigeria. Personal interviews were conducted to check consistency in response. Data were analyzed using percentage frequency, while the Pearson's Product Moment Correlation Coefficient (PPMCC) statistic was used to test the hypothesis. The results of the analysis revealed that the degree of environmental cost disclosure in the financial statements of motor vehicle manufacturing firms in the South East, Nigeria is dependent on firm profitability. The more successful firms tend to disclose their environmental costs than the retrogressive firms. The study therefore, recommended that the motor vehicle manufacturing firms in the industry should of necessity be encouraged to disclose their environmental costs in their financial statements.

METHODOLOGY

3.1 Research Design

The research design employed in this study was *ex-post facto* research design. This was utilized in order to establish the meaningful relationship between environmental cost disclosure and economic value added and the effect thereof. This study was also treated as *ex-post facto* research since it basically relied on historical data (Kothari & Garg, 2014).

3.2 Population of the Study

The population of this study consisted of all the twelve (12) oil and gas companies listed on the Nigerian Stock Exchange as at 31st December, 2020. They include: 11 Plc (formerly Mobil Oil Plc); Anino International Plc; Capital Oil Plc; Conoil Plc; Eterna Plc; Ardova Plc (formerly Forte Oil Plc); Japaul Oil & Maritime Services; MRS Oil Nigeria Plc; Oando Plc; Rak Unity Petroleum Company Plc; Seplat Petroleum Development Company Plc; Total Nigeria Plc.

3.3 Sample Size and Sampling Technique

The sample size of this study comprised of eleven (11) listed oil and gas firms in the Nigeria Stock Exchange (NSE) from 2008 to 2020. Purposive sampling technique was adopted to select oil and gas companies that consistently filed their annual reports with the Nigerian Stock Exchange for the study period (2008-2020), these are: 11 Plc (formerly Mobil Oil Plc); Anino International Plc; Capital Oil Plc; Conoil Plc; Eterna Plc; Japaul Oil & Maritime Services; MRS Oil Nigeria Plc; Oando Plc; Rak Unity Petroleum Company Plc; Seplat Petroleum Development Company Plc; Total Nigeria Plc.

3.4 Model Specification

In an attempt to determine the effect of effluent and waste treatment cost disclosure has no significant effect on economic value added of quoted oil and gas firms in Nigeria. we develop an empirical model to ascertain the relationship that exists between the dependent and independent variables. Generally, specification of account model is based on accounting theory and on the available data relating to the effluent and waste treatment cost disclosure being studied. The model of accounting analysis in this study will therefore follow the conventional method, and this, is in reference to the variables of interest in the model above. Obara, Ohaka, Nangih, Odinakachukwu, (2017). The effect of accounting for waste management expenditure on the profitability of oil and gas companies in Nigeria. *International Journal of Economics, Commerce and Management United Kingdom* 5 (3), 68-79.

The following model were adopted by him

$$Y = \alpha + \beta_1 WME + e$$

where

Y = Firm Value

WME = Waste management expenditure

F= Functional notion

The present study will modify the model to enable the researcher to look at the topic from different perspective. Algebraically, therefore. The model to be regressed in this study is presented in a relational form as follows

$$EVA = F(EWTCD, RVG, FSZ)$$

Where

EVA= Economic value added

EWTCD= Effluent and waste treatment cost disclosure

RVG= Revenue growth of firm

FSZ= Firm size

With the linear expression of the model being

$$EVA = b_0 + b_1 EWTCD + b_2 RGF + b_3 FZ + u$$

Where

β_0 = Autonomous or Intercept

β_1 = Coefficient of Parameter EWTCD

β_2 = Coefficient parameter RGF

β_3 = Coefficient of parameter FZ

3.5 Decision Rule

The test of hypothesis and the decision on whether to accept or reject each hypothesis was based on the result of the T-Test/T-Stat in the multiple regression analysis. The t-statistics was used to test the significant contribution from each predictor to the regression models. Hypothesis were tested at 5% (0.05) level of significance. The Null Hypothesis was accepted if the Probability 'Value P-value of T Stat is greater than the stated 5% level of significance otherwise reject. $P < 0.05$, Accept H_0 . $P < 0.05$, Reject H_0

DATA ANALYSIS, INTERPRETATION AND DISCUSSIONS

Table 4.1.1: Panel Least Square Regression Analysis testing the effect of Effluent and Waste Treatment Cost Disclosure on Economic Value Added

Dependent Variable: EVA
Method: Panel Least Squares
Date: 12/12/21 Time: 12:41
Sample: 2008 2019
Periods included: 12
Cross-sections included: 16
Total panel (balanced) observations: 192

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.679746	3.923705	5.937824	0.0000
EWTCDD	1.539293	1.054267	7.460060	0.0000
RVG	0.069637	0.551890	5.126179	0.0000
FSZ	0.082004	0.401561	0.204213	0.8384
R-squared	0.711574	Mean dependent var		4.905846
Adjusted R-squared	0.684199	S.D. dependent var		2.809879
S.E. of regression	2.815772	Akaike info criterion		4.928963
Sum squared resid	1490.572	Schwarz criterion		4.996828
Log likelihood	-469.1805	Hannan-Quinn criter.		4.956449
F-statistic	29.33768	Durbin-Watson stat		1.908725
Prob(F-statistic)	0.000000			

Source: E-Views 10.0, Regression Output 2021

Interpretation of Regression Result

$$EVA = 3.679746 + 1.539293EWTCDD + 0.069637RVG + 0.082004FSZ + \mu$$

The above model tested the effect of EWTCDD on economic value added. The result showed that EWTCDD and RVG have a significant positive effect on EVA, while FSZ has a non-significant positive effect on EVA. This can be seen from the coefficients and probability of t-statistics in table 4.23; $\beta_1 = 1.539293$, Prob = 0.0000 < 0.05; $\beta_2 = 0.069637$, Prob = 0.0000 < 0.05; $\beta_3 = 0.082004$, Prob = 0.8384 > 0.05. Furthermore, the Adjusted R-squared which is the coefficient of determination shows the magnitude of variations caused on EVA by the explanatory variables (EWTCDD, RVG and FSZ) to be 0.684. This indicates that about 68.48% variation in EVA is attributed to the influence of the explanatory variables (EWTCDD, RVG

and FSZ) while the remaining 31.6% is caused by other explanatory factors outside this model and this is captured by the error term.

Decision:

From Table 4.23, at the adopted level of significance at 0.05, the overall significance of the model with the Prob(F-statistic) = 0.000000, which is less than 0.05. Therefore, we reject the null hypothesis and accept the alternative, which upholds that Effluent and Waste Treatment Cost Disclosure has significant positive effect on Economic Value Added of quoted Oil and Gas firms in Nigeria at 5% significant level.

Table 4.1.2: Pairwise Granger Causality Test showing the Causal Link between EWTCD and EVA

Pairwise Granger Causality Tests

Date: 12/12/21 Time: 12:42

Sample: 2008 2019

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
EWTCD does not Granger Cause EVA	160	3.50982	0.0323
EVA does not Granger Cause EWTCD		0.81708	0.4436

Source: E-Views 10.0 Causality Output File, 2021

Interpretation of Diagnostic Test

Table 4.24 shows that a unilateral causality runs from effluent and waste treatment cost disclosure to economic value added at a P-value of 0.0323 which is statistically significant at 5% level, thereby establishing a causal relationship between EWTCD and EVA. Consequently, giving credence to the alternative hypothesis that upholds that effluent and waste treatment cost disclosure has a significant effect on economic value added of quoted oil and gas firms in Nigeria at 5% level of significance.

Table 4.1.3: Fixed Effect Estimation between Effluent and Waste Treatment Cost Disclosure and EVA

Dependent Variable: EVA

Method: Panel Least Squares

Date: 12/12/21 Time: 12:44

Sample: 2008 2019

Periods included: 12

Cross-sections included: 16

Total panel (balanced) observations: 192

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.241595	4.042794	5.801820	0.0000
EWTCD	1.470854	1.100363	7.336699	0.0000
RVG	0.172336	0.572536	5.301004	0.0000
FSZ	0.125473	0.413299	0.303588	0.7618

Effects Specification

Period fixed (dummy variables)

R-squared	0.744676	Mean dependent var	4.905846
Adjusted R-squared	0.630887	S.D. dependent var	2.809879
S.E. of regression	2.852943	Akaike info criterion	5.009484
Sum squared resid	1440.653	Schwarz criterion	5.263975
Log likelihood	-465.9104	Hannan-Quinn criter.	5.112555
F-statistic	20.91241	Durbin-Watson stat	1.767010
Prob(F-statistic)	0.000000		

Source: E-Views 10.0, Regression Output 2021

Table 4.1.4 Random Effect Model (FEM) Analysis between EWTCD and EVA

Dependent Variable: EVA

Method: Panel EGLS (Period random effects)

Date: 12/12/21 Time: 12:48

Sample: 2008 2019

Periods included: 12

Cross-sections included: 16

Total panel (balanced) observations: 192

Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.679746	3.975502	4.925606	0.0000
EWTCD	1.539293	1.068185	6.441037	0.0000
RVG	0.069637	0.559175	5.124535	0.0000
FSZ	0.082004	0.406862	0.201552	0.8405

Effects Specification

	S.D.	Rho
Period random	0.000000	0.0000
Idiosyncratic random	2.852943	1.0000

Weighted Statistics

R-squared	0.711574	Mean dependent var	4.905846
Adjusted R-squared	0.604199	S.D. dependent var	2.809879
S.E. of regression	2.815772	Sum squared resid	1490.572
F-statistic	17.73768	Durbin-Watson stat	1.508725
Prob(F-statistic)	0.000000		

Unweighted Statistics

R-squared	0.611574	Mean dependent var	4.905846
Sum squared resid	1490.572	Durbin-Watson stat	1.508725

Source: E-Views 10.0, Regression Output 2020

Table 4.1.5 Hausman Test Comparing FEM and REM on EWTCD and EVA

Correlated Random Effects - Hausman Test

Equation: Untitled

Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	13.224222	3	0.0087

Source: E-Views 10.0 Hausman Output, 2020

Interpretation of Hausman Test

On comparison of the results between the fixed effect model (FEM) and random effect model (REM), the Hausman specification test showed that the chi-square probability is significant at 5% ($0.0087 < 0.05$). The result suggests that the fixed effect regression model is more appropriate for the sampled data. Thus, this result corroborates the regression result in table 4.23 which upholds that EWTCD has a significant relationship with EVA of quoted oil and gas firms in Nigeria at 5% level of significance.

4.2 Discussion of Findings

The estimated models were be discussed vis-a-vis stated a priori theoretical expectations about the sign of the numerical values of model coefficients. This provides insight into the nature of the relationship between environmental cost disclosure on economic value added of quoted oil and gas firms in Nigeria and the effect thereof. Variables that entered the model were Emissions Cost Disclosure, Pollution Control Equipment Cost Disclosure, Compliance Cost Disclosure, Research and Development Cost Disclosure, Effluent and Waste Treatment Cost Disclosure as independent variables, while economic value added served as the dependent variable. Estimation of the model is via the Correlation analysis, Panel Least Square (PLS) Regression analysis, Granger Causality Test and Hausman Test by the application of the software for empirical econometric analysis, E-Views 10.0.

The adjusted R^2 of 60.6% for hypothesis I did not constitute a problem to the study because the F- statistics value of 18.52637 with an associated $\text{Prob.} > F = 0.000000$ indicates that the model is fit to explain the relationship expressed in the study model and further suggests that the explanatory variables are properly selected, combined and used. The value of adjusted R^2 of 60.6% also shows that 39.4% of the variation in the dependent variable is explained by other factors not captured in the study model. This suggests that apart from ECD, RVG and FSZ there are other factors that mitigate EVA of quoted Oil and Gas in Nigeria. The results in table 4.3 illustrated that ECD has a positive and significant relationship with EVA measured with a beta coefficient (β_1) = 2.980494 and t- value of 4.996923 respectively and p- value of 0.0000 which is statistically significant at 5%. The result of this study is in consistent with Atang and Eyisi (2020); Yongliang, Wen and Li (2020); Muturi (2019); Azhar and Meiryani (2019) but contradicts the findings of Mohamad, Rahayu, Kaujan and Irwandi (2020); Iheduru and Chukwuma (2019); Aliyu, Adejola and Nguavese (2018).

The regression coefficient for hypothesis II revealed that one unit increase in PCECD would exert 90.73% increase on EVA. Overall, the combined and the overall effect of the regressors - PCECD, RVG and FSZ of quoted oil and gas firms in Nigeria, is shown on the model probability summary of the regression results. The F-statistic of 4.145136 with an associated Prob(F-statistic) of 0.002697 is statistically significant at 5%, which reveals that the model is well fitted, while the coefficient of determination; adjusted R^2 of 0.313610, explains the individual variation of the dependent variable (EVA) as a result of the changes in the independent variables (PCECD, RVG and FSZ). It can be said that PCECD, RVG and FSZ have combined predictive power of 31.36% in affecting EVA of quoted oil and gas firms in Nigeria. The result of this study corroborates the results of Khaled, Elnahass and Salama (2020); Emeka-Nwokeji and Osisioma (2019); Okegbe and Ofurum (2019); Lyndon and Sunday (2018) but inconsistent with the results of Xiaopeng, Xueyao and Yongliang (2020); Putri and Wahyudi (2019).

From the findings in hypothesis III, the value of adjusted R squared was 0.815388, an indication that there was variation of 81.5% on EVA due to changes in CCD, RVG and FSZ. This implies that only 81.5% changes in EVA of oil and gas companies could be accounted for by CCD, RVG and FSZ, while 18.5% was explained by unknown variables that were not included in the model. The probability of the slope coefficients indicate that; $P(x_1 = 0.0000 < 0.05; x_2 = 0.0008 < 0.05; 0.0000 < 0.05)$. The co-efficient value of; $\beta_1 = -0.467415$ for CCD implies that EVA is statistically significant however, negatively related to CCD at 5% level of significance; $\beta_2 = 0.115136$ implies that RVG has a significant positive relationship with EVA, while $\beta_3 = 0.003525$ implies that FSZ has a significant positive relationship with EVA. The findings of this study supports the works of Mohamad, Rahayu, Kaujan and Irwandi (2020); Lastri and Hasyir (2019); Oyedokun, Egberioyinemi and Tonademukaila (2019); Olaoye & Adekanmbi (2018) but failed to corroborates with results of Abdullah, Mahmuda, Malik, Pratiwi, Rais, Dja'wa, Abdullah, Lampe and Tjilen (2019).

The value of the Adjusted R-squared in hypothesis IV showed that 45.4% of the total variation in dependent variable (EVA) is explained by independent variables (RDCE) and control variables (RVG and FSZ) to the determination of EVA while the remaining 54.6% is caused by other explanatory factors outside this model and this is captured by the error term. The coefficient result shows that RDCE ($\beta_1 = 0.565339$); RVG ($\beta_2 = 0.139865$); FSZ ($\beta_3 = 0.067412$) are positively related with EVA. The probability value of the slope coefficients indicate that ($x_1 = 0.0000 < 0.05; x_2 = 0.0037 < 0.05; x_3 = 0.8692 > 0.05$). This implies that EVA has a significant positive relationship with RDCE and RVG; a non-significant positive relationship with FSZ. The Durbin-Watson figure of 1.669360 indicates the absence of autocorrelation in the regression model. The overall performance of the model is satisfactory as shown by Prob(F-statistics) = 0.000068. The results of this study supports the findings of Depoers (2020); Nguyen, Ta, Lai, Dao and Cao (2020); Baalouch, Ayadi and Hussainey (2019), Dike and Leyira (2018) but not consistent with the findings of Eichholtz, Holtermans, Nils and Erkan (2019); Marco, Favino & Netti (2019).

The results of hypothesis V showed that EWTC and RVG have a significant positive effect on EVA, while FSZ has a non-significant positive effect on EVA. This can be seen from the coefficients and probability of t-statistics in table 4.23; $\beta_1 = 1.539293$, Prob = $0.0000 < 0.05$;

$\beta_2 = 0.069637$, Prob = $0.0000 < 0.05$; $\beta_3 = 0.082004$, Prob = $0.8384 > 0.05$. Furthermore, the Adjusted R-squared which is the coefficient of determination shows the magnitude of variations caused on EVA by the explanatory variables (EWTCD, RVG and FSZ) to be 0.684. This indicates that about 68.48% variation in EVA is attributed to the influence of the explanatory variables (EWTCD, RVG and FSZ) while the remaining 31.6% is caused by other explanatory factors outside this model and this is captured by the error term. This study is consistent with the works of Le (2020); Falope, Ofori and Ofurum (2019); Salehi, Tarighi & Rezanezhad (2019); Agboola and Oroge (2019); Thi, Thi and Thi (2019); Ojiakor, Ezuwore and Ozioko (2018) but negates the findings of Sarumpaet (2020); Nuzula (2019); Shariful, Rahman and Wan-Nazihah (2018).

CONCLUSION AND RECOMMENDATION

Investments in production equipment might be made in order to reduce environmentally hazardous emissions. Such investments are considered environmental costs. Most investments however are not made solely for environmental purposes but also to increase the utilization capacity. These investments are not considered as entirely environmental but also as regular investments. In these cases the environmental costs only consist of the part of the investment considered an environmental investment. Waste produced by a process often has to be processed before being released to the environment. Some of the waste can be handled by the company itself, other waste is better handled by external waste treating companies. Handling of the waste causes environmental costs either way. The cost of waste transportation is also considered an environmental cost to include depletion of natural resources, noise and aesthetic impacts. Residual air and water emissions, long-term waste disposal. Thus, accounting became concerned with achieving new goals such as measuring and evaluating potential or actual environmental impacts of projects on organizations' performance. These new goals are of great importance as they enable many users to take different development decisions that are economically and environmentally sound (Bala and Yusuf, 2003). Ali (2002) identified the main reasons of accounting interest in the environment to include; environmental costs which can be significantly reduced and eliminated as a result of business decisions, ranging from operational and housekeeping changes to investment in cleaner production, to redesign of processes/products. Also environmental cost (and, thus potential cost savings) may be obscured in overhead accounts or otherwise overlooked. For the above reasons, it is believed that accounting should be responsible for measuring, evaluating and disclosure of environmental performance in financial statements or in its attachments. No doubt that measuring environmental performance depends on accounting systems but needs data, other than the conventional accounting data, such as pollution ratios. Monetizing environmental issues may not be totally accurate but, economists and accountants have to give best estimates, according to the current level of knowledge, and techniques used (U.S. Environmental Protection Agency (EPA), 1995 and Hamid, 2002). Based on the findings of the study, the following recommendations were made: Companies should carry out operational impact evaluation. This is in order to evaluate the effect of their operation on the community, the environment and the people. This will be able to audit and control their CSR practices. It will help them check unwholesome practices. Host communities and other stakeholders should hold the companies accountable for the performance of their corporate social responsibility. They should

demand for proper operational impact evaluation and such evaluation should be reported to them timely Government should enact regulatory laws that will ensure that companies carry out the corporate social responsibility. Extant laws should be properly enforced.

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