



## **Environmental Liability Estimates and Equity Value of Oil Firms in Nigeria**

**Gospel J. Chukwu<sup>1\*</sup>, Hwerien Rosemary Idamoyibo<sup>2</sup>  
and Monday M. Akunna<sup>3</sup>**

<sup>1</sup>*Department of Accounting, Federal University, Otuoke, Bayelsa State, Nigeria.*

<sup>2</sup>*Department of Accounting, Ignatius Ajuru University of Education, Port Harcourt, Nigeria.*

<sup>3</sup>*Department of Accounting, Captain Elechi Amadi Polytechnic, Port Harcourt, Nigeria.*

### **Authors' contributions**

*The three authors collaborated in conducting this study. Author GJC designed the study, performed the statistical analysis and wrote the initial draft of the manuscript. Author HRI managed the conceptual review and empirical review. Author MMA wrote the philosophy and theoretical framework of the study. All authors read and approved the final manuscript.*

### **Article Information**

DOI: 10.9734/JEMT/2020/v26i330235

#### Editor(s):

(1) Dr. Kamarulzaman Ab. Aziz, Multimedia University, Malaysia.

#### Reviewers:

(1) Emmanuel Dodzi. Kutor Havi, Methodist University College Ghana, Ghana.

(2) Batrancea Larissa, Babes-Bolyai University, Romania.

Complete Peer review History: <http://www.sdiarticle4.com/review-history/57541>

**Original Research Article**

**Received 18 March 2020**

**Accepted 23 May 2020**

**Published 30 May 2020**

### **ABSTRACT**

The purpose of this study is to examine whether decommissioning and environmental restoration estimates affect equity valuation of oil firms in Nigeria. The study also examined whether changes in these environmental liability estimates are value relevant in Nigeria. The study analysed data from four listed oil firms that estimated and reported decommissioning liabilities in their annual reports from 2012 to 2018, using regression analysis technique. Findings indicate that investors in Nigeria's oil and gas firms negatively value environmental liability estimates. This finding is possibly because Nigerian investors view these estimates as representing the extent to which the firm will damage the environment. Given the adverse effect of environmental degradation in Nigeria, investors are wary of any indication of environmental violation. However, changes in decommissioning and restoration estimates are not associated with variations in the market value of oil firms in Nigeria, probably due to lack of investors' sophistication in appreciating the basis for these changes. Further, some listed oil firms did not provide for environmental liability in their annual reports for the seven years examined, possibly because there is no legal obligation to restore the environment. These findings should motivate environmental regulators in Nigeria to

\*Corresponding author: E-mail: [gospeljchukwu@gmail.com](mailto:gospeljchukwu@gmail.com);

consider laws that will expressly mandate environmental restoration for polluting firms in the country. With such legal requirement, accounting regulators could ensure that oil firms (with facilities that affect the environment) recognise provision for environmental liabilities in their financial statements.

*Keywords: Decommissioning costs; environmental behaviour; environmental liabilities; environmental restoration; provisions; value relevance.*

## 1. INTRODUCTION

The economic prosperity of Nigeria depends on the revenue realised from the sale of crude oil and gas. This source of revenue gives the country over ninety per cent of its export earnings. The global drop in oil prices in the first quarter of 2020, arising from the coronavirus pandemic and oil price war between two major producers, sharply degraded the exchange value of the Nigerian Naira, depleted the country's foreign reserve, crashed the budgeted revenue for 2020, forced the Federal government to borrow from dedicated funds, collapsed businesses and heightened unemployment [1,2].

The process of producing oil and gas in Nigeria entails grievous violations of the environment. This is especially observed in the Niger Delta region where gas and crude oil deposits are available in massive quantities for commercial production. The biodiversity habitats of some communities in this region have been badly degraded by the activities of extractive firms operating in the zone [3,4]. The firms extracting oil and gas in the region have exposed the area to the hazards of waste dumping and gas flaring leading to damage in the quality of the air, water and soil in the area, and imposing profound health challenges and misery on the communities in the region [5]. Also, massive oil spills from network of pipes, terminals, oil platforms and pumping stations have led to environmental disasters in the Niger Delta. Vidal [4] reports that there are more oil spills in the Niger Delta every year, than what is experienced in many other parts of the world. This situation necessitates government intervention to ensure that oil firms are made to care for their business environment.

Environmental pollution of the Niger Delta ecosystem is increasingly manifesting in divers dangerous forms. For instance, Port Harcourt, a major city in the region, has been taken over by dense black particles (black soots) hanging in the atmosphere and leaving poisonous residue on surfaces everywhere in the city. The level of air pollution resulting from the black soots portends

great future danger as residents inhale the poisonous substance which has lingered for months in the city. The black soot is partly blamed on gas flaring activities taking place in the area [6]. It is possible that the stock of these black soots may have dissolved underground and this may further affect the quality of mineral soil in the area.

In response to cases of environmental violation, the government of Nigeria enacted the Federal Environmental Protection Act as well as the Harmful Waste Act. But compliance with these environmental legislations is poor [7], due possibly to weak enforcement by regulatory agencies [5]. Thus, sites of oil spills may not be attended to for a long time by oil firms [8] and degraded sites of oil production may be abandoned without clean up and restoration [9].

Oil firms install long term assets (sometimes) underground, to enable them carry out their operations. Such installations significantly affect the landscape on which they are erected, and sometimes hurt the communities that host the facility. An environmentally responsible company will take actions to restore the environment and protect the host community so that hazardous substances will not escape from abandoned facilities into the community when the assets are no longer in use. ERA [9] reports that abandoned oil facilities are not decommissioned by oil firms in the Niger Delta, and this further degrades the environment.

Accounting standards (IAS 37 and IFRIC 1) require that firms engaged in operations that adversely impact the environment should estimate and recognise its liabilities relating to decommissioning and restoration cost, and should account for changes in environmental liability estimates. With the implementation of international standards in financial reporting in Nigeria since 2012, it is expected that listed oil firms will report estimates for decommissioning and environmental restoration in their financial statements. In prior studies based on advanced economies, there is mixed evidence on how these estimates are valued by the market

[10,11]. Moreover, these studies did not consider how changes in environmental liability estimates affect market value.

Studies based on Nigerian data concentrated on how environmental cost or disclosure is associated with firm performance [12], and how disclosure of social and environmental activities affects market value [13]. No known Nigerian study has examined how environmental liability estimates affect the market value of listed firms in Nigeria. By examining how the equity market in Nigeria values environmental liability estimates, and how changes in these estimates are related to market value of listed oil firms in Nigeria, the current study fills gap in literature.

## 2. LITERATURE REVIEW

### 2.1 Conceptual Review

An entity may be required to dismantle or remove its facilities at the end of the useful life of the asset and to restore the site on which it had carried out its operations. In the absence of legal requirement, an environmentally responsible entity will plan to dismantle installations and restore the environment when the asset is no longer in use. Accounting standards (IAS 37 and IFRIC 1) require that the entity should estimate the amount required for dismantling and restoration, and recognise the amount in the financial statement. This amount represents environmental liability provisions necessary to remove expired installations and restore the environment.

Under IFRIC 1, *Changes in Existing Decommissioning and Similar Liabilities*, the cost incurred by the entity to dismantle and restore the environment is called decommissioning and restoration cost. In IFRIC 5, *Rights to Interests arising from Decommissioning, Restoration and Environmental Rehabilitation Funds*, the word "decommissioning" is used to include the cost incurred in decommissioning plant, environmental rehabilitation, and restoration of polluted environment; therefore, the word "decommission" covers both removal of installations and restoration of the environment. IAS 37, *Provisions, Contingent Liabilities and Contingent Assets*, requires the reporting entity to estimate and recognize liability on decommissioning cost as soon as the obligation is established, and this will usually be at the time the activity which gives rise to the obligation begins. When an entity constructs or installs an asset which will cause environmental damage,

the obligating event which gives rise to future environmental liability occurs the moment the asset is put to use [14].

For environmental liability to be recognised there should be a legal obligation or a constructive obligation on the part of the reporting entity. A legal obligation arises from terms of contract or legislation that requires the entity to decommission and restore the environment; while a constructive obligation arises from the established practice or published policies of an entity which indicates that the entity will rehabilitate a damaged environment. IAS 37 provides a number of examples on constructive and legal obligation using issues such as contaminated land, warranties, fitting smoke filters and offshore oilfields of oil and gas companies. The standard also requires an entity to recognize provision for decommissioning cost based on the best estimate of the cost to be incurred. A discount rate is applied to the estimated amount to obtain the present value which is regarded as the initial estimate of the decommissioning cost. IAS 16, *Property, Plant and Equipment*, requires that an amount equal to this initial estimate is recognized as part of the cost of the related asset. IFRIC 1 allows an entity to change the estimate of the restoration and decommissioning cost using either the cost model or the revaluation model.

A few firms in the oil and gas industry in Nigeria provide for decommissioning liability in their annual reports. These firms are Seplat Petroleum, Oando Plc, Conoil Plc and Eterna Oil Plc. Seplat Petroleum Plc recognises liabilities for decommissioning costs to fulfil constructive obligation arising from past practice of firms in the oil and gas industry. Estimates of decommissioning costs are determined based on latest assumptions concerning the scope and mode of abandonment. The Seplat group makes full provision for decommissioning oil production facilities and the associated restoration cost, on a discounted basis as production commences [15,16]. Eterna Plc provides for future cost required to decommission storage tanks, and noted that the provision for decommissioning cost commenced with the adoption of IFRS in Nigeria in 2012. Conoil also provides for decommissioning obligation related to dismantling and removal of signages and pumps from service stations of dealers, while Oando Plc recognises provisions to decommission underground tanks and restore oil and gas assets.

A firm may rely on internal estimates or engage a consultant to determine estimates of decommissioning liabilities. For instance, Oando Plc used internal experience in developing the assumptions that inform the estimates of restoration and decommissioning cost, while Seplat deployed the services of a third party to develop the required estimates [16,17,18,19]. The assumptions that underlie the estimates of environmental liabilities vary among firms. Seplat Plc used a discount rate in the range of 12% to 15%, and an asset retirement period of approximately 20 years [16], while Oando's discount rate is in the range of 15% to 20% with an estimated asset life of less than 40 years. Eterna Plc expects that its assets will be decommissioned in 30 to 50 years, but Conoil did not disclose its assumptions and none of the firms disclosed assumption of market risk in determining the estimates of environmental liabilities [17,18]. The differences in assumptions may confuse investors, and make it difficult for them to appreciate changes in estimates of environmental liabilities.

## 2.2 Empirical Review

The need to protect the environment and account for its resources has increasingly gained ascendancy in national policies, global discourses and academic research. Accordingly, there is a growing number of accounting studies on environmental disclosures, environmental performance and environmental protection, and how these affect the performance or market value of reporting entities.

Many studies observe that firms which disclose their environmental activities provide useful information that assist investors in decision making and present the reporting entity as socially responsible. Disclosures that indicate that a firm's activities are environmentally friendly usually increase the reputation of the reporting firm [20], attract investors' favourable response [21] and lead to better market valuation of the firm [22]. Social disclosures are sometimes examined along with environmental disclosures, and both forms of disclosures affect the market value of the reporting firm [13]. When the two forms of disclosures are examined separately and compared, there is a disparity in the extent to which they individually affect market value. Gutche et al. [22] found that environmental disclosures provide information that is more value relevant than social disclosures. On the other hand, disclosures that indicate negative

environmental outcome could attract negative investors' response, except where such disclosures are viewed as evidence of responsible environmental behaviour [23].

Investors react positively to environmentally friendly behaviour, while poor environmental performance (e.g. pollution) leads to negative market reaction. This suggests that the market rewards good environmental performance and disciplines negative environmental behaviour [24, 25,26,27,28]. How the market reacts to a negative environmental event (such as pollution) sometimes depends on whether or not the event is sanctioned by current regulatory guidelines. Wang et al. [28] observed that the market penalises environmental events that attract regulatory sanctions more than negative environmental events that are not legally sanctioned.

The environmental performance of firms can be assessed by green scores and green rankings assigned to corporate entities. These scores and rankings are based on actions taken by firms to reduce hazards and pollution in their business activities. Though the green scores and green rankings assigned to firms are based on self-constructed guidelines of the ranking entity; the scores and rankings generally utilise common dimensions [29]. Studies on how these scores relate to market value provide mixed evidence on how the market responds to green rankings attributed to environmental performance. For instance, Yadav, Han and Rho [30] observed that green rankings affect investors' perception and constitute an important factor in firm valuation, while Prober, Meric and Meric [31] reported that variations in green scores do not explain variations in stock returns among firms with environmental rankings.

Environmentally responsible firms usually invest in resources and activities that reduce pollution and enhance green management. Such investments are beneficial to the host communities, the state, environmental agencies, and other stakeholders. Investors also favourably value such investments as the firms concerned receive the benefits of legitimacy in their operating environment. Koner and Cohen [32] found that reduction in chemical emissions by 10% resulted in an increase in market value of USD 34 million, indicating that the market compensates firms that care for their environment.

As with environmental rankings and green scores, the announcement of environmental investments designed to improve a firm's environmental performance may be viewed favourably by the investing public, leading to higher market value for the investing firm [33]. On the other hand, the announcement of such capital projects may attract investors' negative response and eventually downgrade the market price of the investing firms [34]. The weight of literature on how the market reacts to environmental performance indicates that negative events such as pollution engender negative investors' reaction, while positive events such as reduction of emissions lead to positive reaction from the market [28,32,35].

The stock market also values estimates of environmental liabilities associated with clean-up sites of firms in polluting industries. Barth and Nichols [10] examined whether environmental liability estimates are associated with the share prices of polluting firms in the US, using seven proxies of environmental liabilities. Results of the study indicate that all the proxies are negatively associated with share price, indicating that the market negatively valued environmental liability estimates. Comier and Maanan [11] noted that environmental liabilities implicit in pollution costs are negatively valued by the market. The literature on the value relevance of estimates of restoration costs is scanty. Generally, however, there is mixed evidence on how the market values environmental disclosures, environmental performance, environmental investments and estimates of environmental liabilities [10,11, 28,35]. As stated earlier, oil firms use different assumptions in determining decommissioning estimates, and some of the assumptions are not fully stated in their annual reports. These differences in assumptions may confuse investors and make it difficult for them to appreciate environmental liability estimates and the changes in the estimates.

Prior studies have examined how environmental liability is associated with market value [10,11], but no study based on Nigerian data has examined this relationship. Also, no known study has examined how changes in environmental liability estimates affect equity value. Given the empirical review above, this study proposes the following hypotheses in order to fill the identified gap in literature:

H1: Decommissioning and restoration estimates do not affect the market value of oil firms in Nigeria.

H2: Changes in environmental liability estimates do not affect the equity values of firms in the oil industry in Nigeria.

### **2.3 Philosophy and Theoretical Framework for the Study**

The environmental philosophy that underlies this study is social contract philosophy, which assumes that firms and other reporting entities exist because the society allows them to. Hence, these entities should care for the society and respond to its needs. There should be government regulations to reduce environmental damage and these regulations should be enforced in order to save human society [36].

Studies on environmental accounting may rely on a number of theories such as agency theory, stakeholders' theory, legitimacy theory and institutional theory. IAS 37 requires reporting entities to provide for decommissioning liabilities if there is a legal or constructive obligation for the entity to do so. Although listed oil firms in Nigeria are required to apply IFRS, financial reporting regulators in Nigeria have not sanctioned any oil firm for not making such provisions. Oil firms that estimate and report restoration costs may be doing so to conform to reasonable expectation of the society in which they operate. Indeed, Seplat Petroleum Plc observed in its 2017 annual reports that the provision for decommissioning liabilities was made as a result of constructive obligation based on practices accepted in the oil industry. Environmental disclosures may be used to satisfy the self-interest of managers and leave the public with the impression that a firm is ethically responsible [37]. Under the agency theory, self-interest motivates a manager to choose the disclosures to make, especially when such disclosures are not compelled by extant laws. These disclosures may not be consistent with the underlying economic conditions of the firm, and investors may not rely on such information in equity valuation decisions.

### **3. METHODOLOGY**

This study uses the *ex post facto* design as it matches variables on environmental restoration with variables on market value obtained from the oil and gas sector in Nigeria. Nine firms in this sector are listed in the Nigerian Stock Exchange (NSE). A number of oil and gas firms (most of which are multinationals) are not listed on the NSE. The unlisted oil firms include Addax petroleum, Baker Hedges, Hallibuton, Slumberger, Shell, and Total Petroleum Nig. Ltd.

Of the nine listed companies only four firms provide for decommissioning cost and environmental restoration cost. These firms are Conoil Plc, Eterna Plc, Oando Plc and Seplat Plc; accordingly, these firms constitute the sample for this study.

As noted by Eterna [17], the measurement and recognition of decommissioning liability by some Nigerian firms commenced from 2012 when the country adopted IFRS. Accordingly, data on estimated environmental restoration costs were drawn from annual reports of the firms in our sample from 2012 to 2018. One of the companies, Seplat Plc, was listed on the stock exchange in 2013. Therefore, relevant accounting data were accumulated on this company from 2013 to 2018. A summary of the firm years in the study is stated in Table 1.

To eliminate the effect of scale, estimates of decommissioning liabilities were deflated by total assets. In the period studied, the shares of Seplat Plc traded at a relatively high price (as high as N695 per share in some days), while that of Eterna oil was sometimes lower than N30 per share. Similarly, earnings per share and net asset per share of the companies were also in different magnitudes. To address this, the study used the natural logarithm of accounting variables in the model. The study adopted the Ohlson [38] valuation model in examining how the market values restoration estimates of oil firms in Nigeria.

The models for the study are as follows:

$$MP_{it} = \beta_0 + \beta_1 DRE_{it} + \beta_2 EPS_{it} + \beta_3 NAPR_{it} + \varepsilon_{it} \quad (1)$$

$$MP_{it} = \beta_0 + \beta_1 CDRE_{it} + \beta_2 EPS_{it} + \beta_3 NAPR_{it} + \varepsilon_{it} \quad (2)$$

Where:

- MP = Market price per share.
- DRE = Decommissioning and restoration estimates (provision for decommissioning cost).
- CDRE = Change in decommissioning and restoration estimates.

- EPS = Earnings per share.
- NAPS = Net asset per share.

Earnings per share (EPS) and net asset per share (NAPS) are independent variables in the Ohlson model. Since the Ohlson model is adopted in this study, the variables, EPS and NAPS, were included in the model for the study. The Ohlson model allows for other information, therefore including DRE and CDRE is consistent with the model.

#### 4. RESULTS

Results from analysis of data on environmental restoration estimates and market value, using STATA version 12, are presented in Tables 2, 3 and 4. Table 2 contains the descriptive statistics of the study. Table 3 presents a summary of the regression models used in the study, while Table 4 contains the coefficients and t statistic of the independent variables.

The descriptive statistics presented in Table 2 shows that market price (MP) of oil firms in the sample of the study range from N2 to N695 per share, with a mean value of N124. These values compares favourably with the market price of firms in other sectors of the Nigerian economy. Decommissioning and restoration estimates (DRE) range from N23.5m to N56bn, indicating that decommissioning and restoration costs involve huge outlay of corporate funds. Changes in decommissioning and restoration estimates (CDRE) vary from a negative value of N1.2bn to N30bn, indicating that oil firms adjust estimates of DRE upwards and downwards over time, and some changes in these estimates are substantial.

Table 2 further shows that earnings per share (EPS) vary from a negative amount of N79 to N143, with a mean value of approximately N10 per share. Net assets per share (NAPS) range from N4 to N859 per share, with a mean value of N150 per share. The mean value of NAPS is not very far from the value assigned to the firms by the market, since the average market price per share is N124.

**Table 1. Sample period**

| Name of firm               | Period of data | Number of firm years observations |
|----------------------------|----------------|-----------------------------------|
| Conoil                     | 2012 – 2018    | 7 years                           |
| Eternal                    | 2012 – 2018    | 7 years                           |
| Oando                      | 2012 – 2018    | 7 years                           |
| Seplat                     | 2013 – 2018    | 6 years                           |
| Total number of firm years |                | 27                                |

Table 3 presents a summary of the results of data analysis for model 1 and model 2. The summary of model 1 shows that the adjusted R<sup>2</sup> is 88 per cent, suggesting that the independent variables explain more than eighty per cent of the variations in the dependent variables. The F value of 64.9, with a significance of .000, indicates that the model fits the data. The adjusted R<sup>2</sup> and level of significance of model 2 are similar to those of model 1, indicating that model 2 also fits the data. The variance inflation factor of the two models ranges between 1 and 1.6, indicating that the issue of collinearity is not

a problem in this study. The Durbin Watson score of 1,214 for model 1 and 1.374 for model 2 indicate that in both cases, the assumption of independence is violated. To remedy this deficiency, the study used robust standard errors, which also takes care of the problem of heteroscedasticity. Thus, in Table 4, the regression results are presented in two panels, A and B, with panel B using results based on robust standard errors to ensure that the standard errors estimated for the models are consistent.

**Table 2. Descriptive statistics**

| Variables | Minimum    | Maximum    | Mean       | Std. Deviation |
|-----------|------------|------------|------------|----------------|
| MP        | 2          | 695        | 124.26     | 215.979        |
| DRE       | 23,548     | 56,955,150 | 10,696,466 | 18719332.56    |
| CDRE      | -1,222,000 | 30,613,000 | 3,358,227  | 8380948.74     |
| EPS       | -7,900     | 14,398     | 953.56     | 3829.26        |
| NAPS      | 422        | 85,922     | 15,032     | 26995.876      |

**Table 3. Model summary**

|                                  | Model 1 | Model 2 |
|----------------------------------|---------|---------|
| R Square                         | 0.894   | 0.863   |
| Adj R Sq                         | 0.881   | 0.845   |
| Std err of the estimate          | 0.643   | 0.734   |
| Regression Sum of Sq             | 80.57   | 77.693  |
| Residual sum of sq               | 9.506   | 12.383  |
| F Stat                           | 64.982  | 48.104  |
| Significance                     | .000    | .000    |
| <b>Variance inflation factor</b> |         |         |
|                                  | DRE     | 1.026   |
|                                  | CDRE    | 1.074   |
|                                  | NAPS    | 1.452   |
|                                  | EPS     | 1.459   |
| Durbin Watson                    | 1.214   | 1.374   |

Source: Results from model summary and ANOVA

**Table 4. Results of regression analysis**

| Panel A |        |           |       |      | Panel B |                 |       |      |
|---------|--------|-----------|-------|------|---------|-----------------|-------|------|
| Model 1 |        |           |       |      | Model 1 |                 |       |      |
|         | Coef.  | Std. Err. | t     | Sig  | Coef.   | Robust Std. Err | t     | Sig  |
| DRE     | -1.253 | 0.474     | -2.64 | .015 | -1.252  | 0.274           | -4.56 | .000 |
| EPS     | -0.112 | 0.064     | -1.74 | .094 | -0.111  | 0.093           | -1.19 | .247 |
| NAPS    | 1.064  | 0.089     | 11.99 | .000 | 1.063   | 0.119           | 8.93  | .000 |
| Model 2 |        |           |       |      | Model 2 |                 |       |      |
|         | Coef.  | Std. Err. | t     | Sig  | Coef.   | Robust Std. Err | t     | Sig  |
| CDRE    | 0.003  | 0.026     | 0.11  | .909 | 0.003   | 0.023           | 0.13  | .901 |
| EPS     | -0.097 | 0.073     | -1.33 | .195 | -0.097  | 0.080           | -1.20 | .241 |
| NAPS    | 1.081  | 0.105     | 10.33 | .000 | 1.080   | 0.097           | 11.08 | .000 |

Results of ordinary least square presented in panel A (model 1) indicate that provision for decommissioning cost (DRE) is negative and significant (see Table 4). The same variable is negative and significant at the 1 per cent level in panel B, suggesting that investors negatively value the estimates of future decommissioning cost reported in the annual financial statements of oil firms in Nigeria. Therefore, hypothesis 1, which proposes that decommissioning and restoration estimates do not affect the market value of oil firms in Nigeria, is not supported.

The coefficient of changes in decommissioning and restoration estimates (CDRE) reported in model 2 is not significant in both panel A and panel B, supporting the hypothesis which states that changes in environmental liability estimates do not affect the equity values of firms in the oil industry in Nigeria

The coefficient of net asset per share (NAPS) in models 1 and 2, and in panels A and B, is positive and significant at the 1 per cent level, indicating that the market positively values NAPS reported by oil firms in Nigeria. However, the coefficient of earnings per share (EPS) is not significant for decommissioning estimates, as well as for changes in restoration estimates.

## 5. DISCUSSION OF RESULTS

The regression results reported in Table 4 show that decommissioning and restoration estimates are negatively related to the market price of oil and gas firms in Nigeria. The result is consistent even with the use of robust standard errors to correct for autocorrelation and possible heteroscedasticity. What this suggests is that investors negatively value the amount reported for future decommissioning and restoration costs. The higher the amount of this estimate, the more negatively investors value the oil firm, relative to other firms in the industry. The result of this study is consistent with Barth and Nichols [10] who also found a negative relation between environmental liability proxies and market value. Given the high level of devastation of the Niger Delta ecosystem by oil firms in Nigeria, it is possible that investors view the amount of decommissioning provisions as an indication of the level of probable damage the firm will unleash on its environment. Thus, the higher the estimate of environmental liability, the higher the probable environmental damage expected of the firm; and consequently, the more adversely the firm is valued. This is consistent with the

literature which suggests that negative environmental activity, or perception of negative environmental performance, adversely affects stock market valuation of firms in polluting industries [26,28,39]. On the other hand, distrust in the environmental responsibility of oil firms in Nigeria, arising from negligence of these firms in remediating for environmental damages, could lead investors to believe that environmental provisions for decommissioning liability is merely to serve the interest of the managers of the firms who are conveying information that the firm is responsive to environmental needs and comply with accounting standards in recognizing future environmental remediation costs. Agency theory suggests that social and environmental disclosures can be used to satisfy managerial welfare [40].

The regression results also show that changes in decommissioning estimates are not valued by the market. This may be due to the use of assumptions that are not fully disclosed in the annual reports to enable a more informed evaluation of the basis of change in estimates. For instance, Conoil Plc was scanty in disclosing the basis for estimates of decommissioning liabilities in its 2017 annual reports. Estimates such as the discount rate used in determining provision for environmental liability may assist an entity in achieving strategic goals [41]. Therefore, to better inform the market, firms should more fully disclose the assumptions that gave rise to changes in decommissioning provisions reported in the financial statements.

## 6. CONCLUSION

This study examined how environmental liability estimates, and changes in the estimates, are associated with the market value of listed oil firms in Nigeria. Data on decommissioning liabilities and market value of oil firms that recognised decommissioning liabilities in their annual reports from 2012 to 2018, were analysed using OLS. Results of the study indicate that investors in Nigeria's oil and gas firms negatively value environmental liability estimates. However, changes in decommissioning estimates are not associated with market value. Given the results of the study, it is reasonable to conclude that investors in Nigeria's oil and gas firms negatively value the amount estimated as provision for decommissioning costs, possibly because investors view these estimates as representing the extent to which the firm will damage the environment. Consequently, the higher the



estimates of restoration cost, the more negatively the market values the firm. Changes in estimates of decommissioning liability are not valued by the stock market, possibly because of inadequate disclosures of assumptions that support the changes and lack of sophistication of market participants in Nigeria. An important limitation of this research is that the data analysed were drawn from only the few listed oil firms that estimate and recognise future environmental liabilities. Further studies may consider including a survey approach to elicit information from investors in order to enrich discussions on how the market values the estimates of decommissioning and restoration costs reported by oil firms in Nigeria.

### COMPETING INTERESTS

Authors have declared that no competing interests exist.

### REFERENCES

1. Agabi C, Adaramola Z, Olaniyi M, Iloani FA, Ogwu SA. Nigeria: Oil price quakes send jitters to Nigerian economy. Daily Trust. 2020;15. [Accessed 29 April 2020] Available:<http://www.allafrica.com/stories/202003150028.html>
2. Akanni LO, Gabriel SC. The implication of COVID 19 on the Nigerian economy. [Accessed 28 April 2020] Available:<http://www.cseaafrica.org>
3. Onwuka EC. Oil extraction, environmental degradation and poverty in the Niger Delta Region of Nigeria: A viewpoint. International Journal of Environmental Studies. 2006;62(6):655-62. DOI:<http://doi.org/10.1080/0020723050040823>
4. Vidal J. Nigeria's agony dwarfs the gulf oil spill: The Us and Europe ignore it. The Guardian. 2010;30. [Accessed 22 April 2020] Available: <http://www.theguardian.com>
5. Krause R. Oil spills keep devastating Niger Delta; 2015. [Accessed 26 April 2020] Available:[dw.com/en/oil-spills-keep-devastating-niger-delta/a-18327732](http://dw.com/en/oil-spills-keep-devastating-niger-delta/a-18327732)
6. Salami T. The strange black soots: The city of Port Harcourt and the hanging black cloud. 2018;19. [Accessed 24 April 2020] Available:[medium.com](http://medium.com)
7. Ogunba A. An appraisal of the evolution of environmental legislation in Nigeria. Vermont Law Review. 2016;40:672-74.
8. Bello M. Nigeria: Amnesty International accuses oil giants of 'negligence' in Niger Delta; 2018. [Accessed 22 April 2020] Available:<http://www.dw.com>
9. Environmental Rights Action. Shell's continuing oil spills from abandoned facilities in Ogoni; 1999. [Accessed 28 April 2020] Available: <http://www.waade.org>
10. Barth ME, McNichols MF. Estimation and market valuation of environmental liabilities relating to super fund sites. Journal of Accounting Research. 1994;32:211-19. DOI:<https://doi.org/10.2307/2491446>
11. Comier D, Megnan M. Investors assessment of implicit environmental liabilities: An empirical investigation. Journal of Accounting and Public Policy. 1997;18(2):215-41 DOI:[https://doi.org/10.1016/S0278-4254\(97\)00002-1](https://doi.org/10.1016/S0278-4254(97)00002-1)
12. Emeka-Nwokeji NA, Osisioma BC. Sustainability disclosures and market value of firms in emerging economy: Evidence from Nigeria. European Journal of Accounting, Auditing and Finance Research. 2019;7(3):1-19.
13. Okpala OP. Corporate social and environmental disclosures and market value of listed firms in Nigeria. Proceedings of 139<sup>th</sup> IASTEM International Conference, Boston, 16-21 September, 2018.
14. Beyersdorff M, Bonham M, Chan WL, Covic A, Curtis M, Danmola T, Davies M, Zellar M. International GAAP. West Sussex, United Kingdom: John Wiley & Sons Ltd; 2013.
15. Seplat Petroleum Development Company Plc. Annual Report and Accounts; 2017. [Accessed 22 April 2020] Available:<http://www.seplatpetroleum.com/newsroom/2017-annual-report-and-accounts/>
16. Seplat Petroleum Development Company Plc. Annual Report and Accounts; 2018. [Accessed 23 April 2020] Available:<http://www.seplatpetroleum.com/newsroom/2018-annual-report-and-accounts/>
17. Eterna Plc. Annual Report & Accounts 2018. [Accessed 27 April 2020]

- Available:[http:// www.eternapl.com](http://www.eternapl.com)>2018-annual-report-accounts
18. Conoil Plc. Financial Statements for the Year Ended 31 December; 2018. [Accessed 23 April 2020]  
Available:[http://www.nse.com/ng/Financial\\_NewsDocs/26602\\_CONOIL\\_PLC\\_FINANCIAL\\_STATEMENTS\\_JULY\\_2019\\_PDF](http://www.nse.com/ng/Financial_NewsDocs/26602_CONOIL_PLC_FINANCIAL_STATEMENTS_JULY_2019_PDF)
  19. Oando Plc. Annual Report and Accounts; 2018. [Accessed 23 April 2020]  
Available:<http://www.oandopl.com/wp-content/uploads/2019/05/Oando-PLC-Annual-Report-2018-1.pdf>
  20. Lorraine NHJ, Collison DJ, Power DM. An analysis of the stock market impact of environmental performance information, *Accounting Forum*. 2004;28(1):7-28  
<https://doi.org/10.1016/j.accfor.2004.04.002>.
  21. Martin PR, Moser DV. Managers green investment disclosures and investors' reaction. *Journal of Accounting & Economics*. 2015;61(1):239-54.  
DOI:<https://doi.org/10.1016/j.jacceco.2015.08.004>
  22. Gutsche R, Schulz J, Gratwohl M. Firm value effects of CSR disclosure and CSR performance. 2017 EFMA Annual meeting – Athens.  
Available:<https://www.alexandria.unisa.ch/publication/2519>
  23. Blacconiere WG, Patten DM. Environmental disclosures, regulatory costs, and changes in firm value. *Journal of Accounting and Economics*. 1994;18: 357-77.
  24. Flammmer C. Corporate social responsibility and shareholder reaction: The environmental awareness of investors. *Academy of Management Journal*. 2013; 56(3):758-81.  
DOI:<https://dx.doi.org/10.5465/amj.2011.0744>
  25. Kumar S, Shetty S. Does environmental performance improve market valuation of the firm: Evidence from Indian market. *Environmental Economics and Policy Studies*. 2018;20(2):241-60.
  26. Shane PB, Spicer BH. Market response to environmental information produced outside the firm. *Accounting Review*. 1982;58(3):521-38.
  27. Rao SM. The effect of published reports of environmental pollution on stock prices. *Journal of Financial and Strategic Decisions*. 1996;15(12):25-32.  
DOI:<https://doi.org/10.1.1.198.7051>
  28. Wang C, Zhang H, Lu L, Wang X, Song Z. Pollution and corporate valuation: Evidence from China. *Applied Economics*. 2019;51(32):3516-30.  
DOI:<https://doi.org/10.1080/00036846.2019.1581915>
  29. Semenova N, Hassel LG. On the validity of environmental performance metrics. *Journal of Business Ethics*. 2015;132:249-58.  
DOI:<https://doi.org/10.1007/s10551-014-2323-4>.
  30. Yadav PL, Han SH, Rho JJ. Impact of environmental performance on firm value for sustainable investment: Evidence from large US firms. *Business Strategy and the Environment*. 2015;15(2):89-99.
  31. Prober L, Meric I, Meric G. Does company green score affect stock price? *Review of Business and Finance Studies*. 2016; 6(3):11-19.
  32. Koner S, Cohen M. Does the market value environmental performance? *The Review of Economics and Statistics*. 2001;83(2): 281-289.
  33. Wirth C, Chi J, Young M. The economic impact of capital expenditures: Environmental regulatory delay as a source of competitive advantage. *Journal of Business Finance & Accounting*. 2013; 40(1&2):115-41.  
DOI:<https://doi.org/10.1111/jbfa.12009>
  34. Jacobs IW, Singhai VR, Subramanian R. An empirical investigation of environmental performance and the market value of the firm. *Journal of Operations Management*. 2010;28(5):430-41.  
DOI:<https://doi.org/10.1016/j.jom.2010.01.001>
  35. Endrikat J. Market reactions to corporate environmental related events: A meta-analytic consolidation of empirical evidence. *Journal of Business Ethics*. 2016;138:535-48.  
DOI:<https://doi.org/10.1007/s10551-015-2598-0>
  36. Buhr N, Reiter S. Ideology, environment and one world view.: A discourse and analysis of Noranda's environmental and sustainable development reports. *Advances in Environmental Accounting and Management*. 2006;3:1-48.

- DOI:[https://doi.org/10.1016/51479-3598\(06\)03001-9](https://doi.org/10.1016/51479-3598(06)03001-9)
37. Santoso EB. Corporate social responsibility, opportunistic or ethical behaviour. *Advances in Economics, Business and Management Research*. 2019;100:389-93.
38. Ohlson J. Earnings, book values and dividends in equity valuation. *Contemporary Accounting Research*. 1995;2(2):661-87.
39. Gupta S, Golder B. Do stock market penalise environment unfriendly behaviour: Evidence from India. *Ecological Economics*. 2005;52:81-92.
- DOI:<https://doi.org/10.1016/j.eco/econ-2004-06-011>
40. Ness KE, Mirza AM. Corporate social disclosure: A note on a test of agency theory. *The British Accounting Review*. 1991;21(3): 211-17.
41. Schneider T, Michelon G, Maier M. Environmental liabilities and diversity in practice under international financial reporting standards. *Accounting, Auditing and Accountability Journal*. 2017;30(2): 378-403.
- DOI:<https://doi.org/10.1108/AAAJ-01.2014-1585>

© 2020 Chukwu et al.; This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

*Peer-review history:*  
*The peer review history for this paper can be accessed here:*  
<http://www.sdiarticle4.com/review-history/57541>