EFFECTS OF ENVIRONMENTAL ACCOUNTING PRACTICES AND SUSTAINABLE DEVELOPMENT ON THE PERFORMANCE OF NIGERIAN LISTED MANUFACTURING COMPANIES

O. Florence OSEMENE, K. David KOLAWOLE, and Oluwagbenga OYELAKUN

ABSTRACT

This study provides an insight into the effect of accounting for the environment and companies' attitudes towards the sustainability of the environment. The objective of this study is to examine the relevance of environmental accounting practices to sustainable development and performance of listed manufacturing companies in Nigeria. Data was collected from annual reports and accounts of thirty-six randomly selected quoted companies in Nigeria. The data were analyzed using panel data regression analysis. Results revealed that there is significant positive relationship between sustainable development and return on equity (ROE) and return on assets (ROA); a significant positive relationship between environmental accounting and return on equity (ROE). Based on this, the study recommends that quoted manufacturing companies should account for, and report the effects of their economic activities on the environment to stakeholders in order to enjoy an improved and robust net profit and earnings per share.

Keywords: Environmental Accounting, Performance, Environmental Cost, Environmental Liabilities, Sustainable Development

INTRODUCTION

The earth is a rich heritage which harbors human beings, animals and plants of all sorts. The quest for civilization and industrialization is leading to hazardous wastes generation and pollution on quite a high scale. Hence, achieving sustainable development is a global concern in virtually all nations of the world. The magnitude of pollution of the environment is alarming in many parts of the world (Abdul, Nikhil and Bhangban, 2007). Tragedies such as the mercury (chemical) poisoning in Mima mate (Japan), massive oil spill by Terry Canyon accident caused serious pollution to air, land, and other natural resources. The chemical poisoning havoc caused by a pesticide factory in Bhopal (India) on December 1984 killed several, blinded many and affected over 150,000 people in total (Abdul et al., 2007). Humanity is generally faced by sustainable development challenges. Therefore, there is need for firms to seek for ways in reducing the dual challenges of sustainable development.

According to Kasum and Osemene (2010), there are two challenges of sustainability facing all firms which are internal sustainability and external or global sustainability. Internal sustainability is the going concern sustainability and can also be called the internal economic sustainable development. These incidences have led to the increased awareness in recent times about the interaction between firms and the environment in which they function (Adediran and Atu, 2010). Consequently, there has been increasing awareness about the interaction between firms and the environment in which they function. The awareness is as a result of the concern about factors such as resources scarcity, resources depletion, environmental degradation and the effect of the operation of firms which has led to the imbalances in the environmental system (Adediran and Atu, 2010).

Asaolu and Osemene (2009) added that poverty and population pressure are some of the causes of natural resources depletion leading to serious havoc in the environment. However the poverty level in Nigeria is aggravated not only by population increase, but more by corruption in high places. A large number of Nigerians suffer from inadequate access to health facilities, food supplies, housing, education and power supply necessary for a relatively good life. Concerns for minimum comfort have led to the global concern for sustainable development and also for firms to be environmentally sensitive. Therefore, it became a necessity to account, measure and evaluate environmental impacts and sustainable development on investments in organizations. These goals should enable users of accounting information to make decisions that are economically sound.

A sound and systematic approach of accounting system for sustainable development and environmental issues must be integrated with other management system to be implemented so as to ensure that environmental issues are properly taken care of. However, accounting for sustainability and environment is more than determining the cost of production in a conventional way but it includes considering the environmental implication of production in determining the total cost of production. The interrelationship between accounting for the environment, management information; decision making and accountability is being examined (Environmental Protection Agency, 1995).

Accounting for sustainability and environment in Nigeria is an existing concept that studies the impact of production activities of companies on the physical environment (Adediran and Alade, 2013). Organizations whose activities impact the environment such as the telecommunication industry, oil, gas and chemical companies and manufacturing companies should

as a matter of urgency imbibe the culture of environmental reporting and accounting. Arun (2010) opined that the improved emphases on sustainable development, firms are encumbered with more responsibility of considering the sustainability impact of their decisions.

Willsher (2004) as cited by Osemene, Kasum and Yahaya (2012) also noted that profit of organisations can be grossly affected if the environment is neglected or inadequately taken care of. Ordinarily, any rational being or entity cannot afford to spoil or be carefree with a profitable or potentially profitable venture and expect huge returns. In order words, organisations ought to naturally account for the pollution, emissions and degradations arising as a result of their economic activities in to the environment. Profit should never be the only report shareholders would be eager to applaud. Reports of damages to the environment, pollution of various forms, emissions into the air, land and sea, etc must be accounted for, rectification procedures, compensations where necessary and preventative measures to put in place are some of the items that should feature in annual reports of organisations.

The reporting of sustainability and environmental accounting information as one of the key elements in financial reporting enables those parties utilizing the information to have an understanding of the company's stance on environmental conservation and how it specifically deals with environmental issues.

This paper therefore, contributes from an African country's perspective to the global literature on sustainability and environmental accounting in annual reports. It also provides a basis for corporate decision making as well as determining the effect of accounting for sustainability and the environment on the performance of quoted companies in Nigeria. However, should companies continue with environmental accounting in a challenging business environment such as Nigeria when there might be an unfavorable economic return? This is why it is of importance to examine the relevance of environmental accounting practices to sustainability and performance of companies. The products or services of a company do not only determine its success or failure but also, the intricacy of its environment. The questions raised in this study are:

     i.   What is the relevance of sustainable development and environmental accounting on return on assets?

     ii.   To what extent do sustainability and environmental accounting affect return on equity?

The study hypothesized that:

    H_{01}:   Sustainable development and environmental accounting do not significantly affect return on assets.

    H_{02}:   There is no significant relationship between sustainable development and environmental accounting and return on equity.

The remaining part of this study is divided into three sections. The next reviews literatures. The third section describes the research methods while the last section was used to analyse data and present the results.

REVIEW OF RELATED LITERATURE

 Conceptual Framework

 Environmental accounting is defined as the collection, analysis and assessment of environmental and financial performance data obtained from business management information systems, environmental management and financial accounting systems. The taking of corrective management action to reduce environmental impacts and costs plus, where appropriate, the external reporting of the environmental and financial benefits in verified corporate environmental reports or published annual reports and accounts (Environmental Agency, 2010). It is a growing field in Accounting which identifies resource use, measures and communicates costs of an organization or national economy actual or potential impact on the environment (Osemene, 2010).

Environmental accounting is an inclusive field of accounting which provides information for both internal use, that is, providing environmental information relevant for management use in area of pricing, regulating expenditure and budgeting; and external use which involves disclosing environmental information of public interest to the public and to the financial community (Yakhou and Dorweiler, 2004). The authors noted that with the increasing focus on the environment, Accounting fills an expectation role in the measurement of environmental performance.

Environmental Protection Agency (1995), defined environmental accounting as "the identification and measurement of the costs of environmental materials and activities and using this information for environmental management decisions". The purpose is to recognize and seek to mitigate the negative environmental effects of activities and systems. Howes (2002) defined environmental accounting as: 'the generation, analysis and use of monetarized environmentally related information in order to improve corporate environmental and economic performance'. To Howes (2002), environmental accounting does not only focus on internal and external environmental accounting but makes the link between environmental and financial performance more visible. It assists in getting environmental sustainability integrated within an organization's culture and operations.

Concept of Sustainable Development

The importance of sustainable development cannot be overemphasized because sustainability is involved with every aspect of business environment, including the economic, social and utilization of resources by the organizations (Adams, Thornton and Sepehri, 2009). Although sustainability has many faces, the main idea is that resources should be used in ways that will not reduce them. Resources such as wildlife should be conserved in a way that future generations will enjoy their lifestyles at least as happy and healthy as the present generations or perhaps better.

According to Ekanem, Nwachukwu and Etuk (2014), the primary aim of sustainable development is on human capital development, economic empowerment, basic services, healthy living as well as to leverage the resources organizations can give and empower the societies in taking the lead on issues for their development. Brundtland report of United Nations, opined that sustainable development is the 'development that enables the needs of the present generation without hindering the future generation in meeting their needs' (Mitchel, 2002).

One of the major important questions in environmental studies is how we can ensure the improvements in human welfare within the limits of the earth natural resources. A probable solution is sustainable development, a term popularized in 1987

World Commission on Environment and Development Report as Our Common Future. Sustainable development implies limits, though not total limits but limitations imposed by the current state of social organization on environmental resources as well as the ability of the earth to absorb the effect of human activities. Sustainable development are policies and programmes of institutions that are aimed at assisting the poor as well as the vulnerable people in managing risk and overcoming deprivation, through direct cash or in-kind transfers. According to Arun (2010), factors responsible for companies to embark on sustainable development are social responsibility, government regulations increase, customer consciousness and international standards. The impacts of industrial activities are keenly felt on the environment in relation to the production and consumption of goods manufactured (Luken and Castellanos-Silveria, 2011).

Sustainable Development and Performance of Manufacturing Companies

Sustainable development has become the main issue in environmental studies and human development. Sustainability is the type of development that aimed at environmental protection, economic development, as well as poverty reduction. The aim of shareholders on the impact of sustainable development on financial performance of organizations are revenue enhancement, cost reduction, supplier ties, competitive edge, reduction of liabilities, more productive work force, quality improvements, efficiency and reducing business risk (Senge, 2002; Hart 2005). However, the relationship between financial performance and sustainable development and environmental accounting is arguably one of the most debated issues yet to be resolved (Choi, 1998).

It was argued that there are additional costs which accompany sustainability and environmental accounting thereby profitability of the affected company is depressed. Roberts (1992) found a positive impact between profitability of a company and sustainable development. Cortez and Cudia (2011) also opined that sustainable development positively impact on sales, and firm size over the long-run.

Applications of Environmental Accounting

Environmental accounting is a flexible tool that can cover a variety of frameworks. Chen (2009) noted that when manufacturers decide to determine the type, quantity and prices of their products to factors such as market conditions and customer retention; the long-term growth of the industry is considered the most important factor in product costing. In most cases, different products are produced in the different manufacturing processes and each process has its own environmental costs of production.

Environmental accounting is also used for investment analysis. The investors can more accurately assess the potential profitability of an investment when they are armed with environmental accounting reports. Keeping the environment in terms of understanding the long-term operating costs of each business unit is important. Range of environmental accounting through the analysis of the life cycle costs and environmental impacts of the company's inputs and outputs can be specified. It is important to be aware of the costs of environmental impacts and identify the past and future values of an organization's activities.

Organizations' systems are based on accounting data to provide information for various uses as well as for environmental managers to enable them to better understand the impacts of their decisions and to coordinate and improve environmental performance and strategic decisions

Approaches to Environmental Accounting

According to Environmental Protection Agency (1995), the approaches to environmental accounting are monetary approach and physical approach.

Physical Approach: In order to assess cost correctly, an organization must collect not only monetary data, but also non-monetary data on materials use, personnel hours, and other cost drivers. It places particular emphasis on the material-related cost drivers, because material purchase costs are a major cost driver in many organizations. The use of energy, water and materials, as well as the generation of wastes and chemical emission are directly related to many of the environmental impacts of organizations. In contrast to monetary approach, it focuses on company's impacts on its environment and is expressed in terms of physical units such as tons.

Monetary Approach: This approach addresses the environmental aspects of corporate activities expressed in the monetary units. It generates monetary information for management use such as payment of fines for breaking environmental laws and investment in capital projects. This approach does not only provides the basis for most management decision but also addresses the issues of how to identify, track and treat costs incurred as a result of the corporation's impact on the environment. Monetary approach contributes to strategic and operational planning, acts as a control and accountability device and provides the main systematic source of information for decisions about how to achieve desired corporate goals. However, those costs are often hidden by poor material tracking data and inaccurate overhead allocation.

Importance of Accounting for Environmental Effects

According to Ranayamatian and Dirz (1996), 'environmental accounting shows the necessity of measuring the environmental performance costs and analyzing it objectively, so that it can lead to the rationalization of administrative decisions. The mere measurement of environmental costs is considered useless unless it results in better decision making'.

Osemene and Olaoye (2009) observed that industrial pollution, oil spillage, deforestation and other related economic activities might have been responsible for reduction in the quality and usefulness of lives. The natural resources and environment account systems assist competent authorities of the country in preparing the plan for long-term usage of their natural resources that is explored for future development. The provision of accounting data for the operations and environmental activities can make a country to determine the funds needed to achieve optimal management of the environment (Akabom, 2012).

More so, environmental accounting when well handled and implemented can bring great benefit to individuals and companies. Enahoro (2009) noted that turnover of companies can be increased due enhanced image; company's shares could appear more attractive to investors due to enhanced product image and environmental risk rating. It would also probably bring about a better access and terms from lending institutions due to favourable environmental risk incidents.

Institutions Involved in Identifying Environmental Problems in Nigeria

Nigeria's national development plans have components which address sustainable consumption and production patterns (Osemene, 2010). Some of the policies addressing the concerns are the National Policy on the Environment, Vision 2010,

National Agenda 21, National Industrial Policy, National Policy on Agriculture, National Trade and Tourism Policy, Cultural Policy and the National Energy Policy

The institutional mechanisms involved in identifying environmental problems according to the National Agenda 21 are:

- Federal Ministry of Environment with the institutional arrangement of overall coordination of environmental management in Nigeria;

- Niger Delta Development Commission with the mandate to, interalia, monitor environmental sustainability of products for export;

- Federal Produce Inspection service;

- National Committee on the Implementation of Nigeria's National Agenda 21;

- Standards Organizations of Nigeria (they establish and monitor industrial quality standard); and

- National Agency for Food and Drug Administration and Control (they regulate health standards of food and drugs).

Environmental regulation in Nigeria existed as window dressing before 1998. This is because the major preoccupation of government was the provision of infrastructural facilities. Industrial pollution control and hazardous waste management was secondary while industrialization and economic development were of primary priority. However, the scenario changed as a result of an attempt in 1988 to dump toxic waste by Italy on a small port town (Koko) in the Niger Delta region of Nigeria (Adegoroye, 1997). This event shocked the Federal Government of Nigeria and highlighted the porosity of environmental regulation in the country. This gave rise to the promulgation of Decree No. 42 of 1988 by the then Federal Military Government of Nigeria. This Decree made it a criminal offence for anyone to carry or dump any harmful waste within the entire land mass and waters of the Federal Republic of Nigeria.

The episode described above gave rise to the establishment of an agency to oversee environmental protection. Hence, Decree No. 58 of 1988 gave birth to the Federal Environmental Protection Agency (FEPA). The Decree was later amended in 1992 by Decree No. 59 of 1992, granting FEPA the responsibility for protection of the environment, biological diversity, conservation and environmental technology and research. It was this Decree that created the first standards of environmental regulation in Nigeria.

The standards include water quality, effluent limitation, air quality, atmospheric protection, ozone layer protection, noise levels and the control of hazardous substances. These represent the efforts made by successive administrations to ameliorate the environmental problems of the country. However, on May 29, 1999 the civilian government under President Olusegun Obasanjo, added an impetus to the struggle against environmental menaces by making the environment a greater priority. To this effect, the government created, for the first time in the history of Nigeria, the Ministry of Environment in June 1999. The former regulatory agency, FEPA, was absorbed by the Ministry of Environment which took over all its function.

Some Major Efforts towards Achieving Sustainable Development

The Federal Government of Nigeria is fully committed to the objectives, policies and mechanisms for achieving sustainable development as is stated in Agenda 21, Nigeria (2000). The Government mounted effective machinery to enhance

environmental awareness through public enlightenment and environmental education; created a fora for building consensus and exchange of information and ideas among all stakeholders; had Manufacturer Association of Nigeria's (MAN) representative in FEPA ministerial governing council; involvement of workers and unions in promoting occupational safety, safe working environment through improved factory conditions, protection of workers and consumers' interests; promotion of environmental friendly production processes; among others.

In the efforts to control pollution in Nigeria, Osemene (2010) observed that organized groups, big organisations and associations such as MAN are easier to deal and communicate with. However, Adelegan (2003) reiterated that industrial pollution control guidelines and standards are neither sound nor correctly enforced in Nigeria. Adelegan (2004) noted that incentives for the adoption of pollution abatement measures are lacking and when the environment is polluted, there are little or no disincentives.

Theoretical Framework

Resource dependence theory concerns itself with the strategy organizations adopt in drawing resources from the environment. This is because organizations are mutually dependent on their environment (Uwuigbe, 2011). This theory states that companies derive their raw materials from their environment or from nature, therefore, it will be necessary for companies to protect the raw materials at all cost so as to make them available at all times. This can be done through giving consideration to the environment which they are being derived from. Any results from the use of resources consequently affect the environment and in turn affect the company (Uwuigbe, 2011).

ElKington (1997) reiterated via his triple bottom line approach theory that capitalism must satisfy legitimate demands for economic performance. With this, ElKington (1997) echoes Adam Smith's theory of the firm - that the firm has one and only one goal – to satisfy the desires of shareholders by making profits. However, profit may not be attainable if the environment in which the business operates is neglected. A corporation which accommodates the triple bottom line approach (social, economical and environmental performance) is contributing to sustainable development. Hart (1997) added that the achievement of sustainability would require a blending of product design and pollution prevention.

The Ecocentric theory stresses the importance of companies to produce a balanced report that contains the impact of its activities on the environment (home.sandiego.edu/kaufmann/hns379/ecocentrism_SAGEpdf). Ecocentrism is focused on protecting the environment, aimed at protecting holistic natural entities such as species, ecosystems and landscapes.

A balanced financial report should contain how the business has related with its environment. However, many businesses lack the proper approach to environmental management. The need for environmentally friendly products and environmental protection production process can never be over-emphasized.

Empirical Evidence

The International Federation of Accountants (IFAC) observed that environmental pressure is forcing many organizations to look for new, creative and cost-efficient ways to manage and minimize environmental impacts. Organizations have come to recognize the potential monetary rewards of improved environmental performance. They discovered that enhancing efficiency in the use of environmental resources brings not only environmental improvements but also significant monetary savings as waste treatment decreases.

In the study conducted by Osemene, Kasum and Asaolu (2012) on the impact of SMEs activities on human health and the environment in Oyo state, Nigeria, they discovered that environmental problems lead to inhalation of harmful smokes, emissions, noise pollution, etc. They added that the quest for rapid industrialization (not yet visible) and development pushed environmental management to the background. Meanwhile, El Serafy and Lutz (1996) noted earlier that consumers willingly pay more for products of companies that are environmentally friendly. In other words, people would pay higher prices for products of companies that preserve and clean the environment.

Cortez and Cudia (2011) conducted research on the impact of sustainability on firm performance. Using electronics companies listed in the Tokyo Stock Exchange and with aid of panel regression analyses, the study revealed that sustainable developments have significant impact on the firm performance because it enhances revenue generation. Hamid (2002) conducted a research on the measurement, evaluation and disclosure of environmental performance in financial statements or in its attachments. The author observed that measuring environmental performance depends on accounting systems but also needs more data other than the conventional accounting data. Monetarizing 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.

Several studies investigated the association between environmental expenditure and firms' performance. Various authors, accounting associations and researchers have addressed the environmental expenditure issues and concluded (based on different objectives) that environmental expenditure accounting and disclosures are important to both internal and external users (International Federation of Accountants, 2005; Enahoro, 2009).

A number of studies have been undertaken in different countries to examine corporate environmental performance from different perspectives. Owolabi (2007) investigated the extent of incorporation of environmental costs into oil and gas accounting in Nigeria. Based on response from stakeholders, his study revealed a high level of awareness of environmental issues and a positive attitude towards environmental cost and liability. He added that long term costs can be reduced as more efficient environmental practices are implemented while cost reductions can be achieved in the usage of resources as more efficient disposal and removal of waste production are established. Adediran and Alade (2013) investigated 14 different companies across different sectors that are listed on the Nigerian Stock Exchange as at 2010. They used multiple regressions analysis to analyse the data obtained from the annual reports and accounts. Their study revealed a significant negative relationship between environmental accounting and return on capital employed and earnings per share while it revealed a significant positive relationship for net profit margin and dividend per share.

Robbins (1991) pointed out the environmental issues and problems within industrial companies' strategies in the European countries and in the USA, where the disclosure of the environmental information was expanded. He sought to know whether such disclosure is as a result of environmental damage and their expected financial impact, or environmental events and its impact on the financial position and future business outcomes. The study concludes that environmental impacts affect the business and assets values. He opined companies' lack of commitment to environmental laws and the disposal of industrial waste properly and others as reasons for environmental pollution.

METHODOLOGY

The target population for this study consists of 36 purposive randomly selected quoted manufacturing companies whose activities have impact on the Nigerian environment. The research design used is the descriptive survey method which is in line with Olayiwola (2007) who asserted that descriptive research is concerned with the collection and analysis of data for the purpose of describing, evaluating or comparing current or prevailing practices, events or occurrences. This assertion is in agreement with the position earlier taken by Bello and Ajayi (2000) who asserted that descriptive survey research focuses on collection and analysis of data on prevailing circumstances. Survey research design fits into the current study; it involves the use of a representative sample from the population, because the study population is too large to collect data from each and every element. Furthermore, this study has to do with a prevailing current trend in the society and hence data obtained could be deemed to be a representative of the study population.

Secondary data obtained from the annual reports and accounts of the selected quoted companies from 2003 to 2013 were used for the study. Three operational variables were identified from the literature and examined. These are sustainable development, environmental accounting and performance variables. In order to measure the performance of quoted companies, accounting ratios such as return on equity and return on assets were used in formulating the specified models with respect to sustainable development and environmental accounting indices as presented below.

Model Specifications

The regression models are as stated below:

Model 1

$$ROE_{it} = \beta_0 + \beta_1 EA_{it} + \beta_2 SD_{it} + \varepsilon_{it} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots(i)$$

Model 2

$$ROA_{it} = \alpha_0 + \alpha_1 EA_{it} + \beta_2 SD_{it} + \mu_{it} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots(ii)$$

Where:

ROE = Return on Equity

ROA = Return on Assets

EA = Environmental Accounting

SD= Sustainable Development

$\beta, \alpha, \lambda, \psi$ = Co-efficient of Regressors

$\varepsilon, \mu, \sigma, \delta$ = Error Term

RESULT OF DATA ANALYSIS

Hypothesis Testing

In order to test for the impact of sustainable development and environmental accounting on performance of listed manufacturing companies in Nigeria, the formulated hypotheses are as follows:

H_{01}: Sustainable development and environmental accounting does not significantly affect return on capital employed.

Table 1: Random effect result (Model 1)

```
. xtreg ROE Sustainabledevelopment Environmentalaccounting, re robust

Random-effects GLS regression              Number of obs      =        19
Group variable: Company                    Number of groups   =         6

R-sq:  within  = 0.6002                    Obs per group: min =         1
       between = 0.8542                                    avg =       3.2
       overall = 0.7679                                    max =         6

                                           Wald chi2(1)       =         .
corr(u_i, X)   = 0 (assumed)               Prob > chi2        =         .

                             (Std. Err. adjusted for 6 clusters in Company)

                             Robust
          ROE      Coef.    Std. Err.      z     P>|z|     [95% Conf. Interval]

Sustainable~t   7.51e-08    6.40e-09    11.72    0.000     6.25e-08    8.76e-08
Environment~g   2.86e-10    1.26e-10     2.27    0.023     3.95e-11    5.32e-10
       _cons    .038442    .0524511     0.73    0.464    -.0643603    .1412444

      sigma_u   .07117732
      sigma_e   .14145897
          rho   .20202739    (fraction of variance due to u_i)
```

Source: Authors' Computation, (2016)

From the above result, it is observed that sustainable development and environmental accounting significantly affect ROE positively. The result indicates that on average, a unit increase in sustainable development across time and across companies increases ROE. This is shown by the coefficient of sustainable development of (7.51) with p-Value (0.000).

Also the result shows that on average, a unit increase in environmental accounting across time and across companies, increases ROE by 2.86 units, this is in line with economic theory and the result is statistically significant. This result is statistically significant as the p-Value is 0.023.

Table 2: Hausman Test Result

```
. hausman fixed random

                    ─── Coefficients ───
                     (b)          (B)          (b-B)        sqrt(diag(V_b-V_B))
                    fixed        random       Difference         S.E.

Sustainabl~t       5.60e-08      7.51e-08      -1.90e-08         1.09e-08
Environmen~g       3.61e-10      2.86e-10       7.49e-11         1.86e-10

                        b = consistent under Ho and Ha; obtained from xtreg
               B = inconsistent under Ha, efficient under Ho; obtained from xtreg

     Test:  Ho:  difference in coefficients not systematic

              chi2(2) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                      =        3.54
           Prob>chi2 =        0.1707

.
```

Source: Authors' Computation, (2016)

The null hypothesis for Hausman test is that the model has a random effect. From the result above, we fail to reject the null hypothesis of no random effect because the probability value is above 0.05 and we therefore adopt the random effect estimator, controlled for heteroscedasticity by adding a robust standard error.

H_{02}:   There are no significant relationship between sustainable development and environmental accounting and return on equity.

Table 3: Random Effect Result (Model 2)

```
Random-effects GLS regression              Number of obs      =         19
Group variable: Company                    Number of groups   =          6

R-sq:   within  = 0.4482                    Obs per group: min =          1
        between = 0.8817                                   avg =        3.2
        overall = 0.6913                                   max =          6

                                           Wald chi2(1)       =          .
corr(u_i, X)     = 0 (assumed)             Prob > chi2        =          .
```

ROA	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
Sustainable~t	6.59e-08	1.16e-08	5.69	0.000	4.32e-08	8.86e-08
Environment~g	7.42e-11	2.61e-10	0.28	0.776	-4.38e-10	5.87e-10
_cons	.0016622	.0721383	0.02	0.982	-.1397263	.1430506
sigma_u	0					
sigma_e	.16671461					
rho	0	(fraction of variance due to u_i)				

.

Source: Author's Computation, (2016)

From the result in the table above, it can be viewed that sustainable development significantly affect ROA while environmental accounting is not significant and therefore does not have any appreciable effect on ROA. That on average, a unit increase in sustainable development across time and across companies' increase ROA by about 6.59 units. This is statistically significant with p-Value of 0.000. A unit increase in environmental accounting on average, across time and companies increase ROA by about 7.43 units. However, this is not significant statistically as the p-Value is .776.

Table 4: Hausman Test Result

	—— Coefficients —— (b) fe	(B) re	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
Sustainabl~t	5.43e-08	6.59e-08	-1.16e-08	1.68e-08
Environmen~g	8.26e-11	7.42e-11	8.38e-12	3.03e-10

```
                        b = consistent under Ho and Ha; obtained from xtreg
          B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

           chi2(2) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                   =         0.59
         Prob>chi2 =         0.7438
```

.

Source: Authors' Computation, (2016)

The null hypothesis for Hausman test is that the model has a random effect. From the result of the Hausman test above, we fail to reject the null hypothesis of no random effect because the probability value is above 0.05 and we therefore, adopt the random effect estimator, controlled for heteroscedasticity by adding a robust standard error.

CONCLUSION AND RECOMMENDATIONS

The results obtained from the analysis revealed that sustainable development is significant in explaining the variations in ROE and ROA of manufacturing companies in Nigeria. On the other hand, environmental accounting has significant impact on ROE but has no significant impact on ROA. This implies that sustainable development positively affects ROA. The study thus concluded that sustainable development has significant effect on performance of manufacturing companies in Nigeria. The study also reveals that environmental accounting does not significantly affect return on assets but significantly affect return on equity. Consequently, the study recommends that quoted manufacturing companies should account for, and report the effects of their economic activities on the environment to stakeholders in order to enjoy an improved and robust net profit and earnings per share.

Furthermore, the incorporation of environmental reports detailing effects of every material activity into the annual financial statements of all manufacturing companies listed on the Nigerian stock exchange should be encouraged. Finally, government

policies should be enacted that will ensure firms engage in sustainable development activities so as to enhance their revenue generations.

REFERENCES

Abdul, K. P., Nikhil, C. S., & Bhagban, D. A., (2007). Environmental Accounting and Reporting with special reference to India. *Indian Journal of Accounting*, 2(3), 45   –66. Retrieved on October, March 24, 2014 from http://mpra.ub.uni-muenchen.de/7712/.pdf

Adams, M. Thornton, B. &Sepehri, M. (2009).The Impact of the Pursuit of Sustainability on the Financial Performance of the Firm.*Journal of Sustainability and Green Business.*Vol. 1(1): 1-14.

Adediran, S. A. & Alade, P. O. (2013). The Impact of Environmental Accounting on Corporate Performance in Nigeria. *European Journal of Business and Management*,5(23), 55 – 67. Retrieved on November 27, 2014 from http://www.iitse.org/journals/index.php/RJFA/article/download/2633/2648

Adediran, S. O., & Atu, O. A., (2010). Corporate Environmental Responsibility as a Means of Alleviating Niger Delta Crises. Academic Scholarship Journal, 2(1), 75 – 90. Retrieved on November 27, 2013 from http://www.iitse.org/journals/index.php/RJFA/download/35735/86495ience.

Adegoroye, A. (1997). The Challenges of Environmental Enforcement in Africa: The Nigerian Experience: A paper delivered at the Third International Conference on Environmental Enforcement.

Adelegan, J. A. (2003) Environmental Compliance, Policy Reform and Industrial Pollution in sub-Saharan Africa: Lessons from Nigeria.

Adelegan, J.A. (2004) The History of Environmental Policy and Pollution of Water Sources in Nigeria: The Way Forward. http.www.fuberlin.de/ffuakumwelt/bc2004.

Akabom, I. A. (2012). Environmental Friendly Policies and their Financial Effects on Corporate Performance of Selected Oil and Gas Companies in Niger Delta Region   of Nigeria. American International Journal of Contemporary Research, 2(1), 168   – 173.

Arun, N. N. (2010). Challenges in Sustainable Manufacturing.Proceedings of the 2010 International Conference on Industrial Engineering and OperationsManagement, Dhaka, Bangladesh.

Asaolu, T.O. & Osemene, O.F. (2009). An Assessment of Environmental Financial Accounting Issues in the operation of Oil and Gas Industry in Nigeria. *Lapai International Journal of Management and Social Sciences*. 2(2); pp 256-271, published by the Faculty of Management and Social Sciences, Ibrahim Badamasi Babangida University, Lapai, Niger State.

Bello, R. & Ajayi, O. S. (2000). Research Methods and Statistical Analyses. Haytee Press and Publishing Company Limited, Ilorin.

Chen. J. C. (2009). The Accuracy of Financial Report Projections of Future Environmental   Capital expenditures. American Accounting Association Conference. New York

Choi, C. H. (1998). Sustainable Indicators for Managing Community Tourism. Available at www.cirano.qc.ca/pdf/publication/2011s-60.pdf.Retrieved on 7/5/2016.

Cortez, M. A. & Cudia, C. P. (2011).Sustainability and Firm Performance: A Case Study of Japanese Electronics Companies. Ritsumeikan International Affairs Vol.10.321-340.

Dorwayiler, Y. (2002) "Dimensionality of Environmental Accounting". *Journal of Accounting and Research* 9(4)

Ekanem, J. T., Nwachukwu, I and Etuk, U. R. (2014). Impact of Shell's Sustainable Community Development Approach on the Livelihood Activities of Community Beneficiaries in the Niger Delta, Nigeria.*Journal of Sustainable Society.* Vol. 3(2): 7-14.

Elkington, J. (1997). Cannibals with Forks: Triple Bottom Line of 21st Century Business, London, Capstone Publishing Ltd.

El Serafy, S. & Lutz, E. (1996). Environmental and Resource Accounting: An Overview in Ahmed, Y.J., El Serafy and E. Lutz (eds). Environmental Accounting for Sustainable Development, a World Bank Symposium

Environmental Agency (2010)/ What is Environmental Accounting? www.environment-agency.gov.uk/business

Environmental Protection Agency (1995). An Introduction to Environmental Accounting as a Business Management Too;:Key concepts and terms. United States Environmental Protection Agency.

Enahoro, J.A (2009). Design and Bases of Environmental Accounting in Oil & Gas and Manufacturing Sectors in Nigeria; Covenant University, Ota, Nigeria; Ph.D. Thesis in Accounting.

Gary, R. H., & Bebbinton, J. K., (2001). Accounting for the Environment, London: Sage Publications.

Hamid, M. A. (2002). Theoretical Framework for Environmental Accounting – Application on Egyptian Petroleum Sector. A paper presented at the Nine Annual Conference of the Economic Research Forum (ERF). American University in Shaja, UAE.

Hart, S. L. (1997). Beyond Greening: Strategies for a Sustainable World. Harvard Business Review, 75(1), 66-76.

Hart.S. (2005). Capitalism at the crossroads.Aligning business, earth and humanity.Wharton School Publishing.

Hasel, L. N., (2005). The Relevance of Environmental Performance. European Accounting Review, 4(2), 345 – 367.

Holm, C., & Rikhardsson, P. (2008). Experienced and Novice Investors: Does Environmental Information Influence Investment Allocation Decisions? European Accounting Review, 17(3), 537-557.

Howes, R. (2002). Environmental Cost Accounting: An Introduction and Practical Guide, London, The Chartered Institute of Management Accountants

International Federation of Accountants (2005). International Guideline Document: Environment Management Accounting. New York.

Kasum, A. S. & Osemene, O. F. (2010).Sustainable Development and Financial Performance of Nigerian Quoted Companies.Available at *iiste.org/Journals/index.php/JEDS/article/download/339/228.Retrieved on 11/5/2016.*

Mitchel, G. (2002). Problems and Fundamentals of Sustainable Development Indicators.Available at *onlinelibrary.wiley.com Sustainable Development.Retrieved on 13/5/2016*

Olayiwola, A. O. (2007). Procedures in Educational Research. Hanijam Publications, Kaduna.

Osemene, O.F.(2010). Environmental Accounting in the Management of Small and Medium Scale Enterprises in Oyo State, Nigeria. An unpublished PhD thesis submitted to University of Ilorin, Nigeria.

Osemene, O.F., Kasum, A.S. & Yahaya, K.A. (2012). Environmental Audit Practices in Small and Medium Scale Enterprises in Nigeria. *Annals of Management Sciences*. International Centre for Business and Management Excellence, 1(1), 10-40.

Osemene, O.F., Kasum, A.S. & Asaolu, T.O. (2012). A Study of the Impact of SMEs Activities on Human Health and the Rnvironment in Oyo State, Nigeria. *Advances in Management* .Published by Department of Business Administration, University of Ilorin, Nigeria. Pp 127-143.

Osemene, O.F. & Olaoye, J.A. (2009). An Evaluation of the Effects of Environmental Accounting Factors on the Life of the Inhabitants of the Oil Producing Communities in Nigeria. *Lapai International Journal of Management and Social Sciences*. 2(1); pp 59-70, published by the Faculty of Management and Social Sciences, Ibrahim Badamasi Babangida University, Lapai, Niger State.

Owolabi, A.A. (2007). Incorporating Environmental Costs into Nigeria Oil and Gas Accounting, A thesis submitted to the Department of Management and Accounting, Faculty of Administration, Obafemi Awolowo University; Ile-Ife, Nigeria.

Ralph, L. & Castellanos-Silveria, F. (2011). Industrial Transformation and susutainable Development in Developing Countries. Sustainable development, 19(3); 167-175. Wileyonlibrary.com/journal/sd

Ranayamatian, J. & Dirz D. (1996). Environmental Accounting - A Tool for Better Management. Management Accounting,74(2)

Robbins, N. (1991). Environmental Auditing-a tool whose time has come. Multinational Business, 2, 20-21

Senge, P. (2002). The necessary revolution.Working together to create a Sustainable World.Nicholas Brealey Publishing.

Starkey, R. (1998). Environmental Management Tools for SMEs: A Handbook. Edited for the European Environment Agency (EEA). The centre for corporate environmental management (CCEM).

United States Environmental Protection Agency (1995). An Introduction to Environmental Accounting as a Business Management Tool: Key Concepts and Terms. Washington.

Uwuigbe, U. A., (2011). Corporate and Environmental Disclosure in Nigeria: A Comparative Study of the Building Material and Brewery Industry. International Journal ofBusiness and Management, 6(2), 258 – 264.

Yakhou, M. & Dorweiler, V.P. (2004). Environmental Accounting: An Essential Component of Business Strategy. Business Strategy and the Environment. www.interscience.wiley.com

ABOUT THE AUTHORS:

Dr. Osemene, O.F. is a Senior Lecturer and currently the head of Department of Accounting, University of Ilorin, Nigeria.

Mr. K. D. Kolawole is a Research Assistant at the Department of Accounting, University of Ilorin, Ilorin.

Mr. Oyelakun, O. O. is an Accountant with Prometheus Maritime Ltd in Lagos Nigeria

APPENDIX

```
. xtreg ROA Sustainabledevelopment Environmentalaccounting, fe
```

```
Fixed-effects (within) regression              Number of obs      =        19
Group variable: Company                        Number of groups   =         6

R-sq:   within  = 0.4484                        Obs per group: min =         1
        between = 0.8789                                       avg =       3.2
        overall = 0.6911                                       max =         6

                                                F(2,11)            =      4.47
corr(u_i, Xb)  = 0.5159                          Prob > F           =    0.0379
```

ROA	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
Sustainable~t	5.43e-08	2.04e-08	2.67	0.022	9.46e-09	9.91e-08
Environment~g	8.26e-11	4.00e-10	0.21	0.840	-7.98e-10	9.64e-10
_cons	.0368412	.0992818	0.37	0.718	-.1816765	.2553589
sigma_u	.06566159					
sigma_e	.16671461					
rho	.13429112	(fraction of variance due to u_i)				

```
F test that all u_i=0:      F(5, 11) =      0.49              Prob > F = 0.7806
```

```
. est sto fe
```

```
. xtreg ROA Sustainabledevelopment Environmentalaccounting, re
```

```
Random-effects GLS regression                  Number of obs      =        19
Group variable: Company                        Number of groups   =         6

R-sq:   within  = 0.4482                        Obs per group: min =         1
        between = 0.8817                                       avg =       3.2
        overall = 0.6913                                       max =         6

                                                Wald chi2(1)       =         .
corr(u_i, X)   = 0 (assumed)                     Prob > chi2        =         .
```

ROA	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
Sustainable~t	6.59e-08	1.16e-08	5.69	0.000	4.32e-08	8.86e-08
Environment~g	7.42e-11	2.61e-10	0.28	0.776	-4.38e-10	5.87e-10
_cons	.0016622	.0721383	0.02	0.982	-.1397263	.1430506
sigma_u	0					
sigma_e	.16671461					
rho	0	(fraction of variance due to u_i)				

```
.
```