



IMPACT OF ENVIRONMENTAL COST ON THE PROFITABILITY OF QUOTED MANUFACTURING COMPANIES IN NIGERIA

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ABSTRACT

Corporate involvement in environmental initiatives and reporting is essential for increasing and sustaining performance in a dynamic and changing environment. However, this involvement in environmental activities is not without costs implication. Hence, business managers tend to sacrifice engaging and reporting environmental initiatives for economic benefits. This study examined the impact of environmental costs on the profitability of quoted manufacturing companies from 2007 to 2017. The study used the ex-post facto research design. Twenty mentioned manufacturing companies were purposively drawn from the population of sixty manufacturing companies listed on the floor of the Nigerian Stock Exchange. The study variables were sourced from the annual reports and accounts as well as the stand-alone environmental information of the selected companies over eleven years from 2007-2017. The cost incurred on environmental initiatives to the community and training of employees on environmental concerns were used as proxies for environmental cost. At the same time, the DuPont return on equity was proxy for profitability. The findings from the panel random-effect regression analysis showed that asset use efficiency ($F = 3.368$, $p = .01$) and equity multiplier ($F = 3.3301$, $p = .01$) were significantly influenced by environmental cost; while operating efficiency ($F = 0.5158$, $p = .72$) was not significantly impacted by environmental cost at 5% level of significance. As such, in this study, the asset use efficiency and equity multiplier are the main drivers of a significant increase in the return on equity of quoted manufacturing companies in Nigeria from 2007 to 2017. The study, therefore, concluded that environmental costs significantly affect the profitability of quoted manufacturing companies in Nigeria.



Keywords: DuPont return on equity; environmental cost; profitability; firm size; firm age

1. INTRODUCTION

Environmental costs are expenditures incurred by corporate organisations to eradicate, minimise, or recuperate negative consequences of the entity's activities on the environment (Ezeagba, John-Akamelu & Umeoduagu, 2017). Corporate involvement in environmental initiatives and reporting is essential for increasing and sustaining performance in a dynamic and changing environment (Albahussain, 2015).

The DuPont Model considers three components when analysing organisational profitability. These three components are operating efficiency; assets use efficiency, and equity multiplier (financial leverage). The DuPont model is a method of financial ratio analysis created to complement the traditional profitability measures in that; it points out the main drivers of the accounting measures of financial performance (Doorasamy, 2016).

The DuPont model overcomes the limitation of traditional financial performance ratios by identifying the underlying influencer of the individual estimate of financial performance.

Engaging in environmental activities is not without costs implication (Tsoutsoura, 2004). This explains why business managers tend to sacrifice engaging and reporting environmental initiatives for economic benefits, particularly given its voluntary nature in most economies. Therefore, whether manufacturing companies will disclose voluntary monetary, environmental information depends on the cost associated with such disclosure and the perceived benefit inherent in doing such.

There have been in-depth studies on environmental costs in developed countries, particularly in the areas of policy, regulatory provisions and the development of techniques for measuring environmental impact. Also, several studies in Nigeria evaluated organisational profitability by concentrating only on measures such as return on asset, return on equity, return on capital employed, earnings per share, dividend per share, firm value and net profit margin (Abogun, Fagbemi & Uwuigbe 2013; Jerry, Teru & Musa 2015; Ezeagba, John-Akamelu & Umeoduagu, 2017).

These profitability measures, though widely used, are limited in that they are not able to point out the exact component influencing an increase or decrease in their effects when put together. The DuPont model overcomes this limitation of traditional profitability ratios by identifying the underlying influencer of an individual estimate of profitability. It is on this



premise, that this study examined the impact of environmental costs on the profitability of quoted manufacturing companies in Nigeria, using DuPont return on equity.

2. LITERATURE REVIEW

2.1. Background

The DuPont model came into existence in the early 1900s. The model was introduced by F. Donaldson Brown when he was responsible for the cleaning up the finances in General Motors. In this method of performance measurement that was started by the DuPont Corporation in the 1900s, the emphasis is placed on pointing out the underlying driver of return on equity (ROE) among its three components. Doorasamy (2016) posits that the use of DuPont analysis was created to overcome the limitation of individual measure of performance because for instance; by simply measuring ROE, the underlying influencer for an increase or decrease in ROE is not easily determined.

The DuPont Model measures financial performance based on accounting income concept, a valid means for assessing profitability. The DuPont formula addresses the limitation of the simple ROE by breaking ROE into its components: operating efficiency, asset use efficiency and financial leverage; thus, allowing investors to identify the actual performance component driving ROE. Analysis from the DuPont formula allows for the determination of whether Management is generating value for shareholders effectively.

Return on equity assesses the ability of an organisation to efficiently generate income for shareholders on their investment in the organisation. In other words, it measures how well a company generated profits from every unit of equity capital and retained earnings. ROE can be calculated in different ways. In simple terms, the total equity capital found on the Statement of Financial Position at the end of the period can be used as the denominator.

In contrast, the value used can be the average equity capital, determined by taking the average of the equity capital for the beginning and the end of the financial period. Doorasamy (2016) posits that the use of average equity capital as the denominator is more accurate because the ratio compares an item on the income statement to an item on the Statement of Financial Position.

Return on equity (ROE) is a widely used performance ratio that measures how managers have effectively generated returns for equity holders (Abogun, Fagbemi & Uwuigbe, 2013). The three main influencers of ROE are operating efficiency, asset efficiency and higher leverage, each, capable of increasing ROE (Doorasamy, 2016). An increasing ROE shows that



the firm is generating more money from its net assets compared to previous years. Also, a firm creating a level of ROE above the normal industry average is more efficient at generating financial values for shareholders than its competitors. In general, a higher ROE is a positive sign.

Irrespective of the usefulness of return on equity in measuring performance, it does not tell specifically, the actual influencer of increase in the corporate performance. Also, simply looking at the ROE gives a complete picture neither does it give consideration to company's assets funded through debt; knowing well that a company's capital can be raised by issuing additional equity to existing and potential shareholders or by issuing additional debt through bonds.

Determining the kind of capital available for engaging in environmental initiatives is of paramount importance to managers and stockholders alike (Connors & Gao, 2011). The decision to use debt or equity goes a long way in affecting whether a firm would involve in the environmental initiative, the quantum of such involvement and the disclosure of such information. This is due to the associated cost of using either debt or equity capital to finance capital environmental projects as well as the consequences disclosing or not disclosing the environmental information (Yaseen & Al-Amarneh, 2015).

According to Connors and Gao (2011), corporate financial statements provide needed information to investors and lenders concerning the financial standing and ratings of companies, particularly those in pollution-prone sectors like manufacturing. When such firms fail to provide necessary environmental disclosure, they may be punished which could, in turn, affect their ability to access funds from lenders due to the risk of losing their funds owing to the negative consequences arising from failure to disclose environmental information (Connors & Gao, 2011). As opined by Ohidoah, Omokhudu, and Oserogho (2016), bankers and lenders will be interested in companies' communication about corporate environmental responsibility, as such, these companies will prefer to report environmental information if they have more debt than equity.

Connors and Gao (2011) analysed the effect of environmental performance and disclosure on the leverage of the United States of America firms in the electric utility industry. Their results suggest that firms with lower toxics emissions exhibit higher leverage and voluntary disclosure and that leverage is negatively associated with environmental disclosure.



Dibia and Onwuchekwa (2015) observed no significant association between environmental disclosure and leverage among selected oil and gas firm in Nigeria.

Ohidoah, Omokhudu and Oserogho (2016) also observed a nonsignificant relationship between leverage and environmental disclosure of manufacturing and financial companies listed on the Nigeria Stock Exchange. In a more recent study, Ahmad (2017) observed a nonsignificant negative relationship between leverage and environmental accounting disclosure of listed breweries companies in Nigeria.

2.2. The link between environmental costs and profitability

Conceptual propositions from previous studies, based on theories of environmental accounting, have provided mixed results on the relationship between environmental cost and profitability. As opined by Boaventura, Silva and Bandeira-De-Mello (2012), propositions based on stakeholders' theory provide evidence of a positive relationship between environmental cost and profitability. In that, companies engaged in environmental initiatives will incur lower explicit costs arising from their environmental responsibility as against those companies that are environmentally irresponsible (Vincent, 2012).

This implies that a good relationship with the relevant stakeholders' is critical to the survival of the company; owing to the positive signal such involvement will send to the external stakeholders', which will in turn yield positive returns to the reporting company in the long-run (Durnev, Li, & Magnan, 2015).

However, in line with Friedman (1970) as cited by Boaventura, Silva and Bandeira-De-Mello (2012) school of thought, a negative relationship tends to occur when business organisations get involved in environmental issues. This is due to the belief that few economic benefits arise from environmentally responsible behaviour with many costs associated with it; thus, resulting in a decline in the profitability of the company.

The status of the relationship between environmental cost and profitability is of interest, particularly to business managers in order to justify their involvement or non-involvement in environmental initiatives given its voluntary nature. As asserted by Arowoshegbe and Emmanuel (2011), that the direction and existence of a relationship are important to corporate managers because the reporting of certain environmentally responsible actions tend to correlate with the financial performance of firms negatively. In which case, managers may be advised to take caution; if otherwise, then Management might be encouraged to pursue such activities.

2.3. Theoretical perspective: stakeholder's theory



In a view to taking business objectives beyond the shareholders' theory, which posits that business organisations should focus on profit maximisation, Freeman propounded the stakeholder theory. According to Donaldson and Preston (1995), the stakeholder theory has its origin in the publication of Freeman's book, *Strategic Management: a stakeholder approach* in 1984.

Stakeholder theory communicates social information to any group or individual capable of being influenced or that have one influence or the other on the activities of the business. The stakeholder theory indicates that the objective of the company is to coordinate and satisfy the interests of the parties with a direct or indirect interest in the organisation (Boaventura, Silva & Bandeira-De-Mello, 2012).

According to Rahim, Jalaludin and Tajuddin (2011), there are primary stakeholders and secondary stakeholders. The primary stakeholders include the consumers, workforce, suppliers, equity owners, the government, or law enforcement agencies. The secondary stakeholders are indirectly involved in the economic activities of the company, and they affect it or are influenced by it.

The stakeholder theory posits that the meeting the needs of the various stakeholder groups is instrumental for organisational performance. This position is in line with Donaldson and Preston (1995) view on the instrumental approach to stakeholder theory; that organisations practising the stakeholder management will, other things being equal, be relatively successful in conventional performance terms.

However, the theory is critiqued on the ground that business organisations are in existence to maximise profit only. And that being morally responsible will distract managers from their purpose, deplete shareholders' returns, increasing product price, decreasing wages, and the fact that including all stakeholders would create a border-less scope for managers to cope with (Toukabri, Ben & Jilani, 2014).

The over simplicity nature of the stakeholder theory was also criticised (Fassin, 2008). Irrespective of the criticisms against the stakeholder theory, it is an approximation of reality (Fassin, 2008). It remains a theory giving support to social and environmental reporting in management researches (Harrison & Freeman 1999).

The specific objective of the study was to examine the impact of environmental costs measured by donations and medical aids to the community, and cost of training and education of employees on the profitability of quoted manufacturing companies in Nigeria. The choice



of environmental cost measures was supported by Dejan and Marina (2018), Basuki and Irwanda (2018).

- *H₀: Environmental cost does not significantly affect DuPont Return on Equity of quoted manufacturing companies in Nigeria.*

2.4. Conceptual framework

The conceptual framework in figure 1 depicts the perceived relationship between the dependent and independent variables.

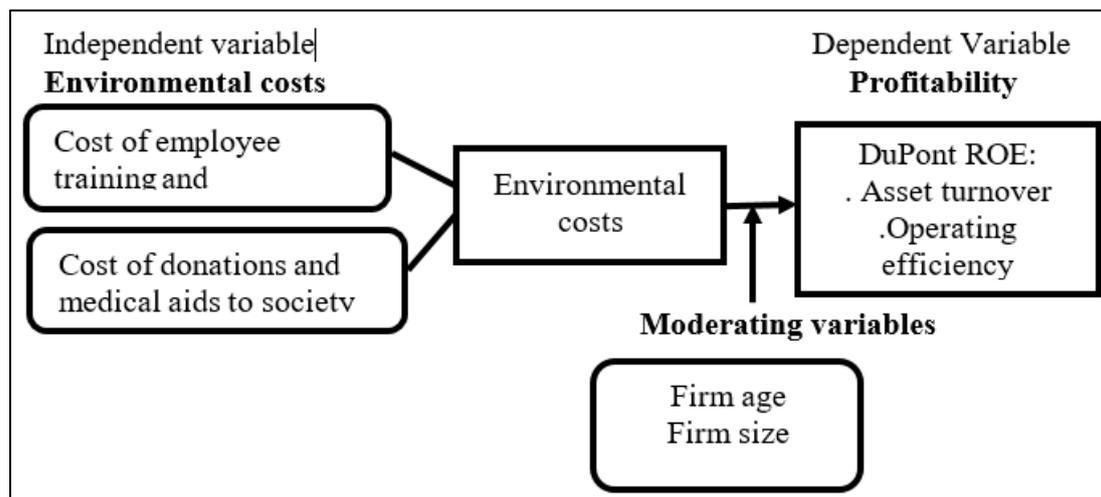


Figure 1: Conceptual framework
 Source: Author's Design (2019)

3. METHODOLOGY

3.1. Research design

The ex-post facto research design was used in the study. Ex-post facto research design is appropriate for studies focusing on events that have already occurred. It also aims at investigating a possible cause and effect relationship of data after the event has taken place.

- Moderating variables

All quoted manufacturing companies on the floor of the Nigerian Stock Exchange as at 31st December 2017 formed the study population. Based on the available statistics obtained from the Nigerian Stock Exchange as at 31st December 2017, there were sixty (60) quoted companies that fall into this category. The Nigerian manufacturing sector is selected because manufacturing companies are known to produce externalities arising from the nature of their operation (Abdullahi & Manini, 2017).

The study adopted the purposive sampling. The selected companies were drawn from

various industries under the manufacturing sector in Nigeria based on some predetermined criteria: selected quoted manufacturing companies were listed on the Nigerian Stock Exchange by 2007 and remained listed till 2017; selected companies were active in terms of environmental reporting within the period of focus evidenced with the inclusion of environmental disclosure in their annual financial report.

Based on the above-stated criteria, thirty-one quoted manufacturing companies classified as conglomerates, consumer goods, industrial goods, agriculture, and healthcare met the first selection criterion. Thereafter, the second and third criteria were applied to the thirty-one consistently listed over the years of coverage. Out of which only twenty (20) companies for eleven (11) years formed the sample for the study, having met the stated conditions. The sample was selected to obtain cross-sectional and longitudinal coverage necessary for testing hypotheses as to the potential influence of environmental cost on profitability.

The study employed the use of secondary data contained in the annual reports sourced from the corporate websites of the sampled companies. An eleven-year period from 2007 to 2017 was selected because the requirement of International Financial Reporting Standards (IFRS) on disclosure and treatment of environmental cost (IFRIC 6) became effective for financial periods from 1st December 2005.

3.2. Model specification

$$DROE = f(MEDON, TRAED, FS, FA) \tag{1}$$

Where:

DROE represents DuPont Return on Equity broken into the three components of ROE

DuPont ROE =

$$AT = f(MEDON, TRAED, FS, FA) \tag{2}$$

$$AT = \beta_0 + \beta_1 MEDON_{it} + \beta_2 TRAED_{it} + \beta_3 FS_{it} + \beta_4 FA_{it} + \varepsilon \tag{3}$$

$$NPM = f(MEDON, TRAED, FS, FA) \tag{4}$$

$$NPM_{it} = \beta_0 + \beta_1 MEDON_{it} + \beta_2 TRAED_{it} + \beta_3 FS_{it} + \beta_4 FA_{it} + \varepsilon \tag{5}$$

$$LEV = f(MEDON, TRAED, FS, FA) \tag{6}$$

$$LEV_{it} = \beta_0 + \beta_1 MEDON_{it} + \beta_2 TRAED_{it} + \beta_3 FS_{it} + \beta_4 FA_{it} + \varepsilon \tag{7}$$



Where:

Asset use efficiency (AT) measured by the ratio of total sales to total asset
Operating efficiency (NPM) measured by the ratio of profit after tax to sales
Equity multiplier (LEV) measured by the ratio of the total asset to total equity
MEDON represents Donations, and medical aids to host community
TRAED represents the cost of training and development of employees
FS represents Firm size measured by logarithm of total assets
FA represents Firm age measured by years of existence

For the subscript index it

i stands for the cross-sectional unit, $i = 1, \dots, 20$

t stands for the period, $t = 1, \dots, 11$

β_0 = Constant parameter/intercept

β_1 - β_2 = Regression coefficients of independent variables
 β_3 - β_4 = Regression coefficients of moderating variables

ε stands for the error term

A priori Expectation

Based on the stakeholder's theory, it is expected that environmental costs, moderated by firm-specific factors, will significantly impact the profitability of the selected quoted manufacturing companies in Nigeria. That is, $\beta_0, \beta_1, \beta_2, \beta_3, \beta_4 > 0$.

4. RESULTS AND DISCUSSIONS

The study also contributed to the existing studies on performance, particularly financial performance, using a more robust profitability measure (DuPont analysis).

4.1. Descriptive analysis

The total number of observations was two hundred and twenty (220) given time period of eleven (11) years and twenty (20) cross-sections. The measures of independent variables donations and medical aids to the society (MEDON) and training and employee development (TRAED) for the selected sample over the period 2007-2017, have average values of ₦43,722.45 and ₦1,341,686 respectively.

Their standard deviations were ₦131,550.30 and ₦2,058,487, respectively. It can be



inferred from their mean values that; the cost of training and employee development with a higher mean implies that environmental commitment is more on training and developing employees than engaging in other social initiatives.

This agrees with the findings of Tu and Huang (2015) that more cost is incurred on training and developing employees than engaging in social activities. The voluntary nature of environmental initiative could account for this.

Operating efficiency had an average value of 1.2961 with a standard deviation of 12.70. The result implies that for every unit of sales, an average of 29% profit is made by the sampled manufacturing companies. The outcome of average operating efficiency in this study presents a lower average compared with the findings of Fapohunda, Ogbeide and Igbinigie (2017) who observed 45-55% operating efficiency for quoted manufacturing companies in Nigeria.

Asset use efficiency ratio possessed an average of 1.0569 with a standard deviation of 0.889, higher than what was observed by Akinleye and Dadebo (2019). The ratio is good enough, given that it is above one, meaning the sampled manufacturing companies made judicious use of the asset in relation to the profits generated. This implies that for every naira spent on the asset, profit to the tune of 6% is made.

Equity multiplier had a mean score of 2.6694 with a standard deviation of 4.164, which implies that about 67% of the assets are financed by debts and values also higher than observed by Akinleye and Dadebo (2019). This could amount to increase in financial risk on the part of the companies.

The average firm size of the sample is 7.0020 with a standard deviation of 1.3045; average firm age is 47 years with a standard deviation of 19.479. The standard deviation values depict the extent to which the values of the variables can deviate from the mean values to both sides. Furthermore, all the variables are leptokurtic given that their kurtosis values were greater than three except the cost of donations and medical aids to the community which is platykurtic due to its kurtosis value of less than 3.

All the dependent variables except operating cost were positively skewed. This implies they are not fluctuating but increasing at a high rate with long tails while the entire independent and moderating variable were negatively skewed. This implies that they are fluctuating and increasing at a very slow rate and they have long left tails. The results of the Jarque Bera with probability values of <0.05 for all the variables implies the non-normality distribution of the study variables at a 5% level of significance.



Table 1: Descriptive Statistics of the environmental accounting and performance variables of sampled quoted manufacturing companies in Nigeria

Variables	Obs.	Mean	Std Dev.	Min.	Max.	Kurtosis	Skewness	Jarque Bera	Prob.
TRAED	220	4.77	2.23	0	7.07	3.48	-1.39	72.387	0.00
MEDON	220	2.62	2.13	0	6.11	1.37	-0.25	234.82	0.00
NPM	220	1.30	12.70	-1.69	185.81	204.19	14.06	378310	0.00
AT	220	1.06	0.89	0	9.58	40.00	4.31	13232.5	0.00
LEV	220	2.67	4.16	0.51	46.65	77.60	8.06	53397	0.00
FA	220	1.62	0.26	0.30	1.97	9.43	-2.26	566.59	0.00
FS	220	7.00	1.30	0	8.54	19.49	-3.62	2972.32	0.00

Source: Author's compilation (2019)

4.2. Panel ordinary least square analysis for environmental cost and DuPont ROE

The Hausman test was carried out to ascertain, which regression model would be appropriate to test the impact of the independent variables on dependent variable DuPont return on equity. Environmental cost and asset use efficiency measured by asset turnover showed a P-value of 0.09; environmental cost and equity multiplier (measured by leverage) had a P-value of 0.35 while environmental cost and operating efficiency (measured by net profit margin) presented a P-value of 0.12. Since the P-values were higher than 0.05, the random effect model was adopted for the three subcomponents of DuPont ROE.

The regression equations for the components of DuPont ROE based on the result of the Hausman tests can be rewritten as follows:

$$AT = 0.49 - 0.08MEDON + 0.05TRAED - 0.19FA + 0.12FS$$

$$NPM = 1.33 + 0.65MEDON - 0.06TRAED - 0.73FA - 0.04FS$$

$$LEV = -3.59 + 0.25MEDON - 0.09TRAED + 1.79FA + 0.45FS$$

4.2.1. Environmental cost and asset use efficiency

The results show that all variables except MEDON and FA were in line with the a priori expectation of the study. Cost of training and employee development (TRAED) and firm size (FS) had a positive effect on asset use efficiency (AT). However, the negative effects of the cost of donations and medical aids to the community (MEDON) and firm age, were observed on asset use efficiency for the period of study. From the coefficient of variation, it was observed that autonomous variable asset use efficiency is a positive 0.49 when all other variables are held constant.

Consequently, a unit change in the cost of donations and medical aids to the community will lead to a negative change of about 0.08 changes in the dependent variable asset use efficiency measured by sales to total asset ratio (AT) less the autonomous component with all

other variables being held constant. Also, a change in the predictor variable cost of training and employee development will lead to a positive change of about 0.05 in asset use efficiency less the autonomous component provided all other variables are held constant.

Furthermore, a unit change in the independent variable firm age will lead to a negative change of about 0.19 in asset use efficiency (AT), while a unit change in firm size will lead to a positive change of about 0.12 units in the dependent variable less the autonomous component provided all other variables are held constant.

Using the outcome of the t-statistic values, firm size (FS) ($t = 2.39$, $p = 0.02$) was statistically significant. The other variables were statistically nonsignificant because of their t-statistic values, both positive and negative, were below 2. The R-squared of 0.0589 for the regression coefficient indicates that about 5.89% of the variations in the dependent variable are explained by the changes in the independent and moderating variables while the remaining 99.94% is explained by factors not considered in this study. The Durbin Watson statistic of 1.92 indicates the non-presence of auto-correlation since the value is within the tolerable range of 1.5 to 2.5.

The F-statistic value of 3.37 indicates that the parameter estimates cannot be dismissed at 5% levels of significance owing to the fact that the probability of the F-statistic is ($p = .011$) is less than 0.05 which by implication indicates a statistical significance of the F-statistic. However, when considered individually, cost of training and employee development (TREAD) showed positive nonsignificant impact in line with the findings of Akinlo and Iredele (2014) and firm age (FA) nonsignificant negative impact implying that cost of training and employees development, though positive, does not positively impact on the asset use efficiency of the sampled companies and the fact that an organisation is old does not positively impact on their asset use efficiency.

Therefore, the results indicate that the independent variables are jointly significant at causing variation in the dependent variable asset use efficiency (AT). The null hypothesis is, therefore, not accepted, which implies that environmental cost moderated by firm age and firm size has a significant influence on asset turnover (AT), a component of DuPont ROE.

This significant positive impact of environmental accounting on asset use efficiency implies that manufacturing companies through the use of their assets in the area of environmental initiatives on training and employee development, and medical aids and donations to society efficiently generate profit for the companies.



This is in congruence with Setyorini and Ishak (2012), Abogun, Fagbemi and Uwuigbe (2013) and Odhiambo (2015) irrespective of the difference in measures of asset use efficiency. Also, asset use efficiency can be seen to contribute to the overall return on equity (ROE) due to its positive value, and financial performance of the sampled manufacturing companies owing to its being significant at 5% level of significance.

4.2.2. Environmental cost and operating efficiency

From the information in Table 2, only the cost of donations and medical aid to the society is in line with the a priori expectation of the study for operating efficiency. The result shows that operating efficiency (NPM) is positively influenced by the cost of donations and medical aids to the society (MEDON) while the independent variable TRAED, as well as the institutional variables firm age (FA) and firm size (FS), had a negative influence on operating efficiency (NPM) for the period of study. Also, it was observed from the coefficient of variation that autonomous variable operating efficiency is a positive 1.33 when all other variables are held constant.

Consequently, a unit change in the cost of donations and medical aids to the society (MEDON) will lead to a positive change of about 0.65 units in operating efficiency less the autonomous component with all other variables being held constant. Also, a unit change in TRAED will lead to a negative change of about 0.06 in operating efficiency (NPM) less the autonomous component provided all other variables are held constant.

Furthermore, a unit change in firm size will yield a negative change of about 0.04 units in operating efficiency, while a change in the moderating variable firm age (FA) will lead to a negative change of about 0.07 units in the dependent variable less the autonomous component provided all other variables are held constant.

The t-statistic values show that all the variables were statistically nonsignificant because the observed t-value were mostly negative: cost of donations and medical aids to the society ($t = 1.35$, $p = 0.18$), cost of employee training and development ($t = -0.14$, $p = 0.89$), firm size ($t = -0.04$, $p = 0.96$), firm age ($t = -0.18$, $p = 0.85$) and where positive, was far below 2. The regression coefficient indicates that 1% of the variations in the dependent variable are explained by the changes in the independent variables. The remaining 99% is explained by factors not considered in the study.

The F-statistic value of 0.52 and Probability (F-statistic) of 0.72 indicates that the parameter estimates cannot be established at 5% level of significance owing to the fact that the



probability value of the F-statistic is higher than the level of significance .05. Therefore, there is no statistically significant effect of environmental cost moderated by firm size and firm age on the operating efficiency.

The null hypothesis is therefore accepted, which means that environmental cost moderated by firm age and firm size has no significant effect on operating efficiency (NPM). The outcome could be due to the implication of the operating costs on the measure of performance because, with an increased operating cost from environmental commitments, the profit after tax is bound to reduce which then implies that the return from a unit of sales made will reduce.

The findings here are in line with that of Ezeagba, John-Akamelu and Umeoduagu (2017) who also observed a nonsignificant relationship between environmental cost and operating efficiency, a measure of financial performance. Going by the purpose of DuPont ROE, it is obvious that of the three components of ROE, operating efficiency does not significantly contribute to the overall return on equity (ROE) of the sampled firm due to its nonsignificant outcome.

4.2.3. Environmental cost and equity multiplier

All the independent variables except the cost of training and employee development were in line with the a priori expectation of the study for equity multiplier. The result shows that leverage is positively influenced by the independent variable cost of donations and medical aids to the community (MEDON), and the firm-specific variables, firm size (FS) and firm age (FA) for the period of study. However, a negative effect of the cost of training and employee development (TRAED) on LEV was observed. The coefficient of variation showed that autonomous variable Equity multiplier (LEV) is a negative 3.59 when all other variables are held constant.

Consequently, a positive change of about 0.26 in Equity multiplier is influenced by a unit change in the cost of donations and medical aids to the society (MEDON) less the autonomous component with all other variables being held constant. Also, a unit change in TRAED causes a negative change of about 0.09 in the dependent variable less the autonomous component provided all other variables are held constant.

Furthermore, a unit change in moderating variable firm age will lead to a change of about 1.79 units, and a unit change in firm size (FS) will cause a positive change of about 0.45 in equity multiplier (LEV) less the autonomous component provided all other variables are



held constant.

The t-statistic values showed that the variables are statistically nonsignificant because their t- statistic values, as shown in Table 2, both positive and negative, are far below the “rule of thumb of 2”. The R-squared of 0.058 indicates that about 5.8% of the variations in the dependent variable are explained by the changes in the independent variables of the study while the remaining 94.2% is explained by other factors not included in the study. The F-Value of 3.33 indicates that the parameter estimates cannot be dismissed at 5% level of significance owing to the fact that the probability of F-statistic is 0.01 which by implication indicates a statistical significance of the F-statistic.

Therefore, there exist a statistically significant effect of the independent variables and moderating variables all together on the dependent variable. However, when considered individually, the predictor variables and moderating variables do not have a significant effect on equity multiplier. Hence, the null hypothesis was not accepted for equity multiplier since the probability of F-statistic is less than .05. This means that equity multiplier, a component of DuPont ROE is significantly influenced by the variables used in measuring environmental cost.

This outcome suggests that engaging in environmental cost increases the financial risks of manufacturing companies which could arise from the high use of debt to finance environmental initiatives. This finding is supported by the study of Dibia and Onwuchekwa (2015) and Ohidoah, Omokhudu and Oserogho (2016) who also observed the positive influence of environmental cost on equity multiplier. However, the outcome of this present study failed to agree with those of Connors and Gao (2011) and Ahmad (2017) who on the contrary observed negative nonsignificant relationship between environmental cost and equity multiplier (financial leverage) a component of return on equity (ROE).

Table 2: Regression results for DuPont ROE

Variable		AT			NPM			LEV		
		Pooled	Fe	Re	Pooled	Fe	Re	Pooled	Fe	Re
TRAED	Coeff.	0.22	0.06	0.05	-0.2	0.32	-0.06	-0.1	-0.07	-0.09
	Prob.	0.46	0.06	0.12	0.65	0.55	0.89	0.5	0.67	0.51
	T	0.73	1.9	1.57	-0.45	0.6	-0.14	-0.67	-0.42	-0.66
	S.E	-0.03	-0.03	-0.03	-0.45	-0.53	-0.46	-0.14	-0.17	0.14
MEDON	Coeff.	-0.06	-0.07	-0.08	0.57	0.78	0.65	0.25	0.45	0.26
	Prob.	0.05	0.06	0.01*	0.22	0.2	0.18	0.09	0.02*	0.09
	T	-2.02	-1.92	-2.59	1.22	1.3	1.34	1.69	2.28	1.71
	S.E	-0.03	-0.04	-0.33	-0.47	-0.6	-0.49	-0.15	0.2	-0.15
FS	Coeff.	0.16	0.13	0.12	0.1	-0.29	-0.04	0.46	0.45	0.45
	Prob.	0.00*	0.02*	0.02*	0.9	0.76	0.97	0.07	0.14	0.07
	T	3.09	2.3	2.38	0.13	-0.31	-0.04	1.83	1.47	1.79
	S.E	-0.5	-0.05	-0.05	-0.78	-0.93	-0.8	-0.25	-0.3	0.25
FA	Coeff.	0.31	-2.09	-0.19	-0.94	6.42	-0.73	1.83	-6.75	1.79



	Prob.	0.19	0.02*	0.66	0.78	0.66	0.86	0.09	0.16	0.12
	T	1.32	-2.4	-0.44	-0.27	0.44	-0.18	1.68	-1.4	1.58
	S.E	0.23	0.87	0.44	3.41	14.74	4.01	1.09	4.82	1.13
Constant	Coeff.	-0.53	3.45	0.49	1.57	-10.64	1.33	-3.69	9.64	-3.59
	Prob.	0.29	0.01*	0.52	0.83	0.65	0.87	-	0.2	0.13
	T	-1.06	2.53	0.64	0.22	-0.46	0.16	-1.59	1.27	-1.15
	S.E	0.49	1.37	0.76	7.28	23.14	8.12	2.32	7.57	2.39
Hausman	Prob.			0.09			0.12			0.35
	R-squared			0.06			0.01			0.06
	F-stat			3.37			0.52			3.33
	prob. (F)			0.01*			0.72			0.01*
Durbin	Watson			1.92			0.94			1.40

*Denotes significant at 5% significance level

Source: Author's compilation (2019)

5. CONCLUSIONS AND RECOMMENDATION

The overall outcome of the various tests on the impact of environmental cost on the profitability of selected quoted manufacturing in Nigeria corroborates the findings of Boaventura, Silva and Bandeira-De-Mello (2012), Abogun, Fagbemi and Uwuigbe (2013), Odhiambo (2015) and Durnev, Li, and Mangan, (2015) who observed a significant effect of environmental cost on profitability.

However, the findings of this study contradict those of Fauzi. (2009) and Lin, Yang, and Liou (2009). Therefore, it can be inferred that environmental cost had a significant positive effect on asset use efficiency and equity multiplier, components of DuPont ROE, whereas a nonsignificant effect of environmental cost on operating efficiency existed. The study concluded that the joint influences of the measures of environmental cost on profitability are statistically significant. Thus, environmental costs have a significant effect on the profitability of quoted manufacturing companies in Nigeria.

The finding of the study supports the position of the stakeholder theory which posits that as corporate organisations look beyond profit maximisation by considering the wellbeing of other stakeholders, they send a positive signal to these stakeholders which in turn will yield benefits for the organisation. By incurring costs geared towards giving back to the environment and positively influencing the environment through training of their employees on environmental issues, they would save the business from consequences (product boycott, civil unrest, disruption to business activities among other) of not considering other stakeholders and in turn increase their profitability.

Based on the analysis of data and the findings, the study recommends that quoted



manufacturing companies should adopt environmental initiatives capable of being measured in financial terms in order to manage their influence on the business. Also, they should improve on their financial involvement in environmental concerns in order to improve on their profitability owing to the observed positive significant influence from this study.

The study is of importance to quoted manufacturing companies in Nigeria and other emerging economies in that they can apply the findings to draw value for and justify their need for involvement in environmental concerns given its attendant influence on their profitability.

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