

Accounting and Auditing

Environmental Cost Accounting Information and Strategic Business Decision in Nigeria

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Abstract: This study aimed at examining environmental cost accounting information and strategic business decision in Nigeria. The general assumption that conventional cost accounting does not have the ability to provide absolute information for evaluating the environmental behaviour of an organization and its economic consequences has motivated this study. Towards achieving this, secondary data was employed and a linear model was specified. Findings indicated that environmental cost accounting information as it relates to strategic business decision is value-relevant. It was on this note that we recommended firms to constantly reposition their accounting system in order to provide information on environmental costs so that the true costs in an organization can be ascertained and properly allocated. Also, due attention should be paid to waste management costs, employee health costs, investment financing costs, compliance and environmental costs and all environmental related costs by manufacturing concerns since they influence strategic decision. Our study is one of those that have explored the issue of environmental cost accounting relevance in strategic business decision in the Nigerian context.

Keywords: environmental cost accounting; strategic business decision; pricing decision

JEL Classification: M40

1. Introduction

The environment where a business is positioned is one aspect that needs priority attention if the business must survive and continue to operate in order to maximize shareholders wealth. A major challenge facing business firms today is the deterioration of natural assets due to economic activities. Pramanil Shiland Das (2007) opine that these deteriorations have reached an alarming level due to man's involvement in varied activities and in order to salvage business firms from this endemic situation, resources gradually flow out of the business and these resources

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(costs) are very relevant towards making strategic decisions. Thus, managers are under increased pressure not to only reduce such costs, but to also minimize environmental impacts on their operations (Abiola & Ashamu, 2012). These impacts are expressed by business firms in monetary terms (Horngren *et al.*, 2000), hence bringing to limelight the field of 'Environmental Cost Accounting'. Environmental cost accounting is the branch of accounting responsible for the identification of environmental impacts and recording of the cost of all such resources deployed to manage environmentally related threats. In this paper, we investigated the relevance of environmental cost accounting information in making strategic decisions in Nigeria. Towards this end, this paper is divided into four (4) sections: review of extant literature, methodology, results and discussion and conclusion and recommendations.

2. Review of Extant Literature

There is an apparent lack of awareness and understanding of the magnitude of environmental costs in business operations. The conventional management/cost accounting practices do not provide adequate information for environmental management purposes in a world where environmental concern as well as environmental related costs, revenues and benefits are on the increase (Abiola & Ashamu, 2012). Welford (1998) notes that the poor state of awareness or due care of the environment and the resultant damages are increasingly altering the opinions of stakeholders on the capability of firms, these on the long run can influence the survival and profitability of business firms. The importance of environmental cost accounting is on the increase not only for strategic business decision in the area of product pricing decision, outsourcing, but also for all routine management activities such as environmental reporting, cost allocation, control and performance evaluation (Burritt *et al.*, 2002).

The failure to include environmental costs in financial analysis has the effect of sending wrong signals to managers, shareholders and making process improvement, product mix, pricing, capital budgeting, and other routine decisions complicated. When environmental costs are not adequately allocated, cross-subsidization occurs between products (Graff *et al.*, 1998). Graff *et al.* (1998) view environmental cost accounting as accounting for the costs of impacts incurred by society, an organization, or an individual resulting from activities that affects environmental quality.

Over the years, substantial efforts and resources have been deployed to ensure that the natural environment is not treated as a free good. Accounting has become more concerned with achieving new goals such as measuring and evaluating potential or

actual environmental impacts on organizations (Tapamg *et al.*, 2012; Bassey *et al.*, 2013). The conventional accounting system does not provide absolute information for evaluating the environmental behaviour of an organization and its economic consequences. Environmental cost accounting information is of high relevance in making strategic business decisions. Environmental cost accounting aids managers in making strategic business decisions in the area of process and product pricing design, performance evaluation, capital investment decisions and costing determinations. (UNSD, 2001)

In this manner, potentially hidden environmental costs are identified and separated from the general costs; this enable the managers in determining the true cost of a particular product or process and the proportion that are actually environmentally driven costs (UNSD, 2001). Consequently, environmental accounting notifies corporate stakeholders of environmental costs, and creates a platform for key players to identify possible ways of reducing or avoiding those costs while at the same time improving environmental quality. All these are directed towards enhancing accurate assessment of costs and benefits of environmental preservation measures of firms and provide a framework for organizations to identify and account for past, present and future environmental costs to support managerial decision making, control and public disclosure (Schaltegger & Burritt, 2000; KPMG & UNEP, 2006). Ditz *et al.* (1995) opine that environmental costs can be substantial, ranging from five to twenty percents of the total cost of business. The view above supports the argument that environmental cost is very relevant in decision making since such a large percentage of business resources cannot be undermined in any strategic decisions.

According to Gale & Stokoe (2001), environmental accounting describes, measures and reports on the allocation of environmental resources, costs, expenditures and risks to various industry groups, to specific firms, or within firms to specific department, projects, activities or processes. They added that the traditional accounting system hides environmental costs in many ways and the broad approach to calculate full environmental costs is by distinguishing between internal costs (those borne by the organization) and external costs (those passed on to the society, e.g., environmental and health costs). They view internal environmental costs of business firms as a function of direct, indirect, and contingent costs, embedded with such things as remediation or restoration costs, waste management costs or other compliance and environmental management costs, these costs can be estimated and allocated using the management costing models that are available to the organization. External costs are costs of environmental damages external to an firm, these costs can be monetized by economic methods that determine the maximum amount that people will be willing to pay in order to avoid damage, or the minimum amount of compensation that they would accept to incur it, while

contingent or intangible environmental costs are cost that may arise in the future to impact on the operations of the organization, it falls into both internal and external cost categories and include changes in product quality as a result of regulatory changes that affects material inputs, methods of productions or allowable emissions, an unforeseen liability or remediation cost, employees health and satisfaction, customers perception and relationship costs; and investment financing costs or the ability to raise capital.

Effective business decisions depend strongly on relevant and true cost information. On this note, Gale & Stokoe (2001) stressed that activity-based costing as strategic cost management techniques can generate true cost. The Society of Management Accountants of Canada (1997), distinguishes between traditional cost accounting and activity-based costing (ABC), in their view, traditional cost accounting allocate cost based on the attributes of a single unit, allocation vary directly with the number of units produced while the ABC system focuses on the activities required for producing each product or providing each service. The Environmental Protection Agency, (1995) notes that activity-based costing is a means of creating a system that ultimately directs an organization's costs to the products and services that required these costs to be incurred, with ABC, overhead costs are traced to products and services by identifying the resources, activities, and their costs and quantity for producing output. ABC is the best costing technique for environmental cost accounting since environmental cost are based on individual activity and the true cost of each activity can be determine.

In addition, the quality of environmental cost information is enhanced by providing environmental cost data that is more relevant for strategic decision making. Environmental cost/management accounting information is relevant for decision making such that it performs essential roles in internal decision making in the area of product/process related decision making, investment projects decision making and correct product costing (Vasanth *et al*, 2012). Whilst acknowledging that there are scanty empirical literatures in this area of environmental cost accounting for strategic business decision, our study is among the first to investigate the relevance of environmental cost accounting information and strategic business decision in Nigeria.

3. Methodology

Eierle and Wolfgang (2013) stress that decision making and analysis of cause and effect relationship requires very specific models and sound accounting information. With this in mind, our empirical model institutes a linear relationship between environmental cost accounting information and strategic decision. The environmental cost accounting information are the remediation or restoration costs, waste management costs, compliance and environmental management costs, employees health and satisfaction costs, customers-perception and relationship costs and investment financing costs associated with business firms. Strategic decision is that which revolves around the many aspect of strategic decision such as process and product pricing design, performance evaluation amongst others. In line with the above, a linear model of environmental cost accounting information and strategic decision is given below:

$$y_t = a_0 + a_1\beta_1 + a_2\beta_2 + a_3\beta_3 + a_4\beta_4 + \dots U_t$$

Where y_t is the dependent variable (Strategic Decision proxied by Product Pricing Decision) and U_t the error term. $\beta_1, \beta_2, \beta_3, \beta_4, \dots$ are the regression coefficients with unknown values to be estimated; Environmental Cost Accounting Information (Waste Management Costs, Employee Health Costs, Investment Financing Costs and Compliance and Environmental Costs) are the independent variables. A-Priori Expectation is such that $\beta > 0$ ($i=1 - \dots n$). The data used covered the period 2008 through 2013 for 20 manufacturing firms in Nigeria. The model to be estimated in this paper is thus stated explicitly as below:

$$STRATDEC = b_0 + \beta_1 WMC + \beta_2 EHC + \beta_3 IFC + b_4 CEC + U_t$$

Where:

STRATDEC	= Strategic decision (proxied as product pricing decision)
WMC	= Waste Management Costs
EHC	= Employee Health Costs
IFC	= Investment Financing Costs
CEC	= Compliance and Environmental Costs

The analysis was done in order of precedence: correlation analysis: to measure the degree of linear association between the independent and dependent variables; analysis of variance tests; goodness of fit test through R^2 and test of statistical significance concludes this section.

4. Results & Discussion

The results and discussion are presented in order of precedence as below:

a. Correlation Analysis

Table 1. Correlation for Waste Management Costs & Strategic Decision

Pearson Correlation			Variance Inflator Factor (VIF)	Tolerance Level (TL)
Zero	Partial	Part		
.720	.810	.774	1.000	1.000

Source: SPSS Regression Output

Table 1 above revealed that there is a positive relationship between waste management costs and strategic decision with value (Zero:.720, Partial:.810 and Part:.774) correlations respectively. The VIF and TL values are 1.000 and 1.000 respectively suggesting that there is multicollinearity between waste management costs and strategic decision given that the VIF and TL values are closer to 1.

Table 2. Correlation for Employee Health Costs & Strategic Decision

Pearson Correlation			Variance Inflator Factor (VIF)	Tolerance Level (TL)
Zero	Partial	Part		
.814	.713	.810	1.065	1.071

Source: Output from OLS Regression

Table 2 above revealed that there is a positive relationship between employee health costs and strategic decision with value (Zero:.814, Partial:.713 and Part:.810) correlations respectively. The VIF and TL values are 1.065 and 1.071 respectively suggesting that there is multicollinearity between employee health costs and strategic decision given that the VIF and TL values are closer to 1.

Table 3. Correlation for Investment Financing Costs & Strategic Decision

Pearson Correlation			Variance Inflator Factor (VIF)	Tolerance Level (TL)
Zero	Partial	Part		
.714	.860	.765	1.014	1.023

Source: SPSS Regression Output

Table 3 above revealed that there is positive relationship between investment financing costs and strategic decision with value (Zero:.714, Partial:.860 and Part:.765) correlations respectively. The VIF and TL values are 1.014 and 1.023 respectively suggesting that there is multicollinearity between investment financing costs and strategic decision given that the VIF and TL values are closer to 1.

Table 4. Correlation for Compliance and Environmental Costs & Strategic Decision

Pearson Correlation			Variance Inflator Factor (VIF)	Tolerance Level (TL)
Zero	Partial	Part		
.912	.815	.732	1.099	1.055

Source: SPSS Regression Output

Table 4 above revealed that there is a positive relationship between compliance and environmental costs and strategic decision with value (Zero:.912, Partial:.815 and Part:.732) correlations respectively. The VIF and TL values are 1.099 and 1.055 respectively suggesting that there is multicollinearity between compliance and environmental costs and strategic decision given that the VIF and TL values are closer to 1.

b. Analysis of Variance Tests

This section provides the analysis of variance (ANOVA) results

Table 5. ANOVA Result (Goodness of Fit Statistic)

Model	Sum of Squares	Df	Mean Square	F.	Sig.
1 Regression	672169651.369	2	168042412.842	154.714	.000 ^b
Residual	79853535.263	18	3071289.818		
Total	752023186.632	20			

Source: SPSS Regression Output

- a. Predictors: (Constant), WMC, EHC, IFC, CEC
- b. Dependent Variable: STRATDEC

Table 5 summarizes the information about the variation of the dependent variable explained by the existing model and the residual that indicates the variation of the dependent variable that are not captured by the model. It can be observed that the independent variables give a significant effect on the dependent variable, where f-value is 154.714 with a p-value of less than 0.05 (i.e. $p < 0.000$) indicating that, overall, the model is significantly good enough in explaining the variation in the dependent variable. To ensure the statistical adequacy of the model, the goodness of fit can also be measured by the square of the correlation coefficient also called R^2 .

c. Goodness of fit test through R²

This section provides the goodness of fit test through the R²

Table 6. Goodness of fit through R Square

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.845 ^a	.794	.777	1752.5095771

Source: SPSS Regression Output

a. Predictors: (Constant), WMC, EHC, IFC, CEC

As shown in table 6 above, adjusted R² is .777, indicating that the independent variables in the model are explaining 78% variation on the dependent variables. Thus, we can understand that the model is providing a good fit to the data.

d. Test of Statistical Significance

This section reports the test of statistical significance of the variables used in the study

Table 7. Regression Results for Dependent and Independent Variables

Variables	Coefficients	t-statistic	Prob.
Constant	1154.858	.780	.433
WMC	.024	.375	.711
EHC	.563	2.204	.037
IFC	.563	2.147	.041
CEC	.939	9.911	.000

Durbin Watson: 1.027

Source: SPSS Regression Output

As shown in table 7 above, of the four variables tested, WMC (p-value = .0711), EHC (p-value = .037), IFC (p-value = .041) and CEC (p-value = .000) were statistically significant at 5 percent or lower. The result also showed that Waste Management Costs (WMC) has a coefficient of .024 and it is significant at 5% level. This implies that waste management costs have a positive relationship with strategic decision (proxied by product pricing decision). Employee Health Costs (EHC) has a coefficient of .563. The positive significance of the coefficient is a clear indication that employee health costs increases product pricing. Investment Financing Costs (IFC) significantly affects strategic decision at 5% level of accuracy. It is a major finding that investment financing costs affects strategic decision (product pricing). Another interesting finding is that Compliance and

Environmental Costs (CEC) has a positive relationship with strategic decision. The value of compliance and environmental costs has a coefficient of 0.563 and it is significant at 5% level. This implies that a unit increase in the compliance and environmental costs will result to 0.563 unit decreases in product pricing vice-versa. The Durbin Watson (Dw) test with value 1.027 shows support for the presence of first order serial correlation in the model since $d_l < DW < d_u$ 1.236 < 1.54.

5. Conclusion & Recommendations

This paper examined the relevance of environmental cost accounting information and strategic business decision in Nigeria using data from the manufacturing sector during the period 2008 through 2013. The outcome of the result suggests that waste management costs, employee health costs, investment financing costs and compliance and environmental costs have positive relationship with strategic decision. This implies that environmental costs accounting information is value relevant in making strategic business decision. Thus, it was recommended that firms should constantly reposition their accounting system in order to provide information on environmental costs so that the true costs in an organization can be ascertained and properly allocated. Also, due attention should be paid to waste management costs, employee health costs, investment financing costs, compliance and environmental costs and all environmental related costs by manufacturing concerns since they influence strategic decision.

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