ENVIRONMENTAL MANAGEMENT ACCOUNTING PRACTICE IN NIGERIA: NATIONAL PETROLEUM CORPORATION (NNPC)

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Abstract

There is an apparent lack of awareness and understanding of the magnitude of the environmental costs generated by organizations, and many opportunities for cost savings through good environmental management are thus lost. Conversely, conventional management accounting practices do not provide adequate information for environmental management purposes in a world where environmental concern as well as environment-related costs, revenues, and benefits are on the rise. *Using a case study of the Nigeria National Petroleum Corporation (NNPC) as an Environmental sensitive sector, this study conducts an assessment of NNPC's practice of environmental management accounting (EMA) by investigating how the NNPC manages, account for and report its environmental risk performance?* The study design will be mainly survey method, using questionnaires to collect data from managers in both the financial and environmental disciplines within the branches and strategic business units of the NNPC with specific case study of Abuja head office and branches in Port Harcourt and Lagos. The result of the study shows that NNPC managers are aware of environmental Accounting practices and that it is actively being used in practice. The findings of the study will further equip NNPC managers and similar policy makers to understand how it accounts for, manages, and reports environmental cost

information.

Keywords: Environmental Management Accounting, Physical Environmental Management Accounting, Monetary Environmental Management Accounting, Environmental Impacts, Nigeria National Petroleum Corporation, Environmental Reporting

Introduction:

Managers within organization are coming under increased pressure to not only reduce costs, but also to minimize the environmental impacts on their operations. Unfortunately a substantial impact on the environment has left Nigeria with an enormous economic, social, and environmental legacy. This pressure is coming from a broad group of stakeholders, including regulatory bodies, employees, customers, investors, non-government organization and finance provider. This paper therefore assesses how Nigerian National Petroleum Corporation can modify their existing accounting systems to make sure that environmental costing information is made available, for improved financial and environmental performance.

Various stakeholders, such as business customers, investors, local communities and government are applying pressure on organizations to improve and report environmental performance. Secondly, as a result of the stakeholders' pressure, environmental costs are not matching with its earning and benefits and becoming more important part of the organizational decision making. Finally, there is an increasing recognition that conventional management accounting practices often do not provide sufficient and accurate information for environmental management and environmental-related cost management. Consequently, many organizations significantly under-estimate both the cost and benefits of sound environmental management (Savage and Jasch, 2005; Gale 2006)

A Review of relevant Literature

Companies and organizations are increasingly concluding that maximizing profits at any cost is no longer the most beneficial way to operate their business or to maintain and improve their competitive advantage (Welford, 1998). Environmental litigation have been developed in some countries, and expectedly, a rising number and variety of stakeholders have been demanding

greater responsibility for the environment in business conduct (Schaltegger, Burritt and Petersen 2003).

Lack of awareness, or due care, of the environment and the resultant damage are increasingly altering stakeholders' opinions of companies and can lead to loss of business (Welford, 1998). However, companies who do proactively demonstrate environmental concern, and build environmental factors into their overall business strategy, can win favour with stakeholders and attain several other benefits, such as improved image and competitiveness, support from banks and insurance companies, new and strengthened business relationships and supply chain involvement (Schaltegger, Burritt and Peterson 2003).

Long term, costs can be reduced as more efficient energy practices are implemented, reductions are made in the use and waste of other resources and more efficient disposal and removal of waste production is established, as discussed by Laitner (2002). Babakri, Bennett, Raos and Franchetti (2004), provide further quantitative evidence of benefits of recycling practices following EMS implementation such as savings from recycling product materials or packaging.

Some companies complain that it can be a long time before such benefits are delivered and that in the short term there can be a substantial financial outlay in order for certain environmental improvements to be established (Hamschmidt and Dyllick, 2001). Others accept that the benefits far outweigh the costs (Babakri, Bennett, Raos and Franchetti 2004).

However, in several cases the balance of costs and benefits of undertaking environmental improvements remains undetermined because companies have not recorded or analyzed this information, and this can fuel the arguments of sceptics against spending on environmental improvement (Hamschmidt and Dyllick, 2001). According to Babakri, Bennett, Raos and Franchetti (2004), this can also be due to difficulties in being able to determine benefits, as environmental management systems may not have been in place for a sufficient amount of time in order to gather full sets of data. Therefore, it is not always readily possible to make a comparison.

Environmental management accounting is becoming increasingly important not only for environmental management decisions, but for all types of routing management activities, such as environmental reporting, cost allocation and control, performance evaluation (Burritt, 2004; Bennet, Richardsson and Schaltegger, 2003; Jasch, 2006). Environmental management accounting is broadly defined to be the identification, collection, analysis and the use of two types of information for internal decision making:

- Physical information on the use, flow and destinies of energy, water, and materials (including wastes) and;
- Monetary information on environmental-related cost, earning and savings (UNDESA/DSD, 2002; IFAC, 2005; Jasch 2006).

Physical environmental management accounting (PEMA)

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. Environmental management accounting places particular emphasis on the material-related cost drivers, because 1) material purchase costs are a major cost driver in many organizations (Strobel, 2001) and 2) the use of energy, water, and materials, as well as the generation of waste and emissions, is directly related to many of the environmental impacts of organizations.

Physical environmental management accounting is information for internal management decisions about corporate impacts. However, in contrast to monetary environmental management accounting, it is focused on company's impacts on the natural environment and is expressed on terms of physical units, such as tons of carbon dioxide emissions (Schaltegger and Burritt, 2000).

According to Jasch (2002) monetary environmental management accounting and physical environmental accounting, include external environmental reporting (both financial and non-financial) and application areas, such as environmental management systems, eco-design, cleaner production and supply chain management. Jasch's (2002) view on environmental management is based on the material flow approach, though she also refers to a more conventional management accounting framework when she says that the most important role of environment is to make sure that all relevant costs are considered when making business decisions, with "environmental" costs being a subset of the wider cost universe that corporate decision- makers should take into account. She then goes to argue that environmental management accounting should focus on material flows. "Which means that EMA is no longer meant to assess the total 'environmental' costs but to develop a different look at the production costs that takes an organization's environmental effects seriously"? Through this, EMA can be an attention-director to encourage managerial decision-makers to take a different look at familiar processes in order to reflect new priorities. As an internal environmental approach, PEMA has several functions (Schaltegger and Burritt, 2000):

- As a tool with a close and complementary fit to the set of tools being developed to help promote ecologically sustainable development
- As a decision-support technique concerned with highlight relative environmental quality
- As to a direct and indirect control of environmental consequences
- As an accountability tool providing a neutral and transparent base for internal and indirectly, external communication
- As a measure tool that is an integral parts of environmental measures such as eco-efficiency
- As a tool with a close and complementary fit to the set of tools being developed to help promote ecologically sustainable development
- As an analytical tool designed to detect ecological strengths and weaknesses

Monetary Environmental Accounting (MEMA)

Monetary environmental accounting (MEMA) addresses the environmental aspects of corporate activities expressed in the monetary units; it generates monetary information for internal management use such as payment of fines for breaking environmental laws and investment in capital projects that improve the environmental (Marinova, Annandale and Philmore, 2006). In terms of its method, MEMA is more of an extension or adaption of conventional management accounting to address the environmental aspects of corporate activities (Marinova, 2006).

This all-encompassing tool not only provides the basis for most internal management decision but also addresses the issues of how to identify, track and treat costs and revenue incurred as a result of the corporation's impact on the environment (Schaltegger and Burritt, 2000). Monetary environmental management accounting 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 (Schaltegger and Burritt, 2000).

Bierma, Waterstraat and Ostrosky (2000) address the issue of life-cycle costing with a particular emphasis on the supply and use of chemicals. They note that there are substantial environmental-related costs associated with this, e.g. wastage in process and cost disposal. However, those costs are often hidden by poor material tracking data and inaccurate overhead allocations, and/or are not allocated to the budgets of those responsible for causing them. One means of reducing costs is to replace a conventional hands-off supplier-customers relationship

with one in which the supplier renders a chemical management service. Bierma, Waterstraat and Ostrosky (2000) conclude that an important part of the success of the scheme was changes in accounting systems to give better data on chemical usage and wastage in facilities.

A comprehensive picture of flow cost accounting according to the materials flow approach above is provided by Strobel and Redmann (2002:67). The authors make it clear that material flow accounting involves a new way of looking at an organization. Flow cost accounting is a basic component of flow management which aims to combine economics benefits with environmental benefits. The other two components are the flow model which shows the material flow running through the organization and the flow organization that channels the flow. If the materials flow approaches takes precedence over other forms of institutionalization. Present organization structures will have to be changed on the basis of what could be called a flow-oriented version of process engineering. In flow cost accounting, materials flow distinguishes between the cost categories of materials, system and delivery and disposal. For these three cost categories, the paper describes a systematic treatment of how quantities and cost are recorded and used in order to manage the organization as a processor of materials flow.

Jasch (2006) gives a basic framework for assessing annual corporate environmental costs, as well as material flow (including energy and water) and the costs. Based on the experience gained from applying the UN DSD EMA framework in company workshops and case studies, mainly in Austria, Jasch (2006) describes how to check for data consistency in different information systems, such as the list of accounts, stock management, production planning and process engineering. Common hurdles in obtaining data from different information systems are described and solutions to improving consistency of data in an organization are suggested. She gives a detailed example of assessment for a brewery in the Excel tool developed to assist in the application of the United National Division for Sustainable Development (UN DSD) approach (Jasch, 2006).

Research reveal that many conventional cost accounting most often allocate environmental costs to general overhead accounts with the consequence that products and production managers have no incentive to reduce environmental costs and top management is often not aware of the extent of these costs (De beer and Friend, 2002; Gale, 2006b)

Perceived limitation of many existing management cost accounting systems

It is generally acknowledge that majority of management and cost accounting systems in place within organization pay little or no attention to attributing any form of environmental cost to an organization's operations and as a result, many environmentally incurred costs are accumulated in overhead accounts such as energy and water costs, waste treatment costs, stationery costs, insurance from holding hazardous substances, or regulatory costs associated with particular emissions or release (Deegan,2002).The capturing of these environmental costs in overhead accounts, results in concealed or distorted information relating to environmental costs (United Nation Division for Sustainable Development, 2001; Scavone, 2006; Gale, 2006b).

Research on environmental costs revealed that environmental costs are generally higher than considered because costs are hidden in other accounts (Gale, 2006b; Deegan, 2002). The total environmental costs were found to be at least twice as high according to EMA methodology as compared to conventional accounting (Gale, 2006b).

According IFAC (2005), the following challenges exist in most organizations management accounting systems:

- Inadequate links between accounting and other departments;
- Unintentional hiding of environmental-related costs information in overhead accounts;
- Inadequate tracking of information on material use, flows, and costs;
- Lack of some environmental-related information in the accounting records; and
- Investment decisions made on the basis of incomplete environmental-related information.

The largest part of environmental cost lies in the purchase value of non-product output (United Nations Division for Sustainable Development, 2001). According to Deegan, (2002) wrongly allocating costs in particular costing categories can also result in "hidden" costs in the costs in the accounting system.

Research Design and Data Analysis

Selected questions from the questionnaires were considered while, others used as a back-up in course of analyzing the findings, out of one hundred and fifteen "115" questionnaires administered one hundred "100" was returned. Three NNPC branches were selected, NNPC Abuja; NNPC Lagos.; and NNPC Port-Harcourt with 35, 45, and 35 questionnaires respectively.

While, questionnaires returned are 35, 37 and 28 from NNPC Abuja; NNPC Lagos and NNPC Port-Harcourt respectively.

Table 4.1. Summary of Questionnaires Distributed.

TABLE 4.1	QUESTIONNAIRES DISTRIBUTED TO VARIOUS COMPANIES		
COMPANIES	QUEST.ADMIN.	QUEST. RETUNED	PERCEN. RATE OF QUEST. RETUNED
NNPC Abuja	35	35	35
NNPC Lagos	45	37	37
NNPC Port-Harcourt	35	28	28
TOTAL	115	100	100

The above Table 4.1 shows the questionnaires distributed to from NNPC Abuja; NNPC Lagos and NNPC Port-Harcourt with 35, 45, and 35 questionnaires respectively while, questionnaires returned are 35, 37 and 28 from NNPC Abuja; NNPC Lagos and NNPC Port-Harcourt respectively. However, 100 questionnaires were collected out of 115 questionnaires distributed, this means, selected locations know the impact of Assessment of Environmental Management Accounting and the value of this research work.

Qualifications of Respondent

TABLE 4.6	RESPONDENTS' QUALIFICATIONS	
Qualifications	Respondents	Percentage
Postgraduate Degree (Ph.D./M.Sc.)	3	3
High Diploma/1st Degree (HND,B.Sc.)	42	42
National Diplomal (ND)	55	55
Total	100	100
SOURCE: From Questionnaires		

In Table 4.6 above, discloses the minimum qualification of the respondents is National Diploma that is; the respondents to these questionnaires are well educated. Therefore, the information sourced is reliable and relevant.

Longevity of Service of Respondents

TABLE 4.4	Longevity of Service of Respondents	
Year	Frequency	Percentage of Req.
<10	5	5
11<21	12	12
21<31	33	33
>31	50	50
Total	62	62
SOURCE:	From Questionnaires	

Table 4.4 above reveals the year of respondents in the company. Five respondents representing Five percent (5%) of the respondents who have stayed less than Ten years while, Ninety-Five (95) respondents representing Ninety-Five percent (95%) of the respondents have stayed more than Ten years. This category 95% has adequate knowledge of Assessing Environmental Management Accounting of NNPC. Therefore, the information sourced is reliable and relevant.

Position of Respondents

TABLE 4.5	RESPONDENTS'POSTIONS	
Positions	Frequency	Freq.Percentage
Environmental Mgr.	28	28
Fin./Mgt Accountants	59	59
Production Mgr	13	13
Total	100	100
SOURCE:	From Questionnaires	

From Table 4.5 above, it can be seen that, Twenty-Eight respondents (28) representing Twenty-Eight percent (28%) of the respondents are Environmental Managers, 59% of respondents are Financial/Management Accountants and 13% of the respondents are Production Managers. 100% respondents comprises of those who have working experience in the company such as, the Chief Executives Officers; the Chief Operating Officers; the Chief Financial Officers; Strategic Planning coordinators and the Board of Directors. It is group of those that are taking part in strategic management framework of the organization suchlike strategic vision, mission statements, corporate objectives, corporate targets, strategic planning process, strategy implementation and monitoring. Therefore, 100% of the respondents have sound knowledge of Environmental Accounting in NNPC and its impact on the operations, activities and performance. Thus, the information sourced is reliable and relevant.

Hypothesis testing

Statistical method employed in a research project among other functions is to estimate the validity and reliability of specific prediction or hypothesis. There are different statistical methods, but for the purpose of this study Chi-square method denoted by the

Greek letter X^2 is employed. It could be computed by using

$$X^2 = \sum \left[\frac{(O-E)^2}{E} \right]$$

Where 'O' is actual or observed frequency. 'E' is expected frequency X^2 is chi-square.

Hypothesis one

Q1 Ho::NNPC does not identify, collect and analyze physical information on the use, flows and destinies of energy, water, material (including waste) for internal decision-making

H_1: NNPC identifies, collects and analyzes physical information on the use, flows and destinies of energy, water, material (including waste) for internal

TABLE 4.4.1

	Observed N	Expected N	Residual
1	14	120.0	-106.0
2	43	120.0	-77.0
3	83	120.0	-37.0
4	311	120.0	191.0
5	149	120.0	29.0
Total	600		

Test Statistics

	Q1
Chi-Square(a)	465.467
df	4
Asymp. Sig	.050

a 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 120.0.

Decision: *In line with the decision rules stated earlier. The Null hypothesis (Ho) should be rejected as the calculated X^2 value is greater than the critical value. From the Table 4.4.1, the calculated value 465.467 is greater than critical value 9.488 at 5% level of significance with 4 degree of freedom. Thus, the Alternative Hypothesis,* **"**Nigeria National Petroleum Corporation (NNPC) identifies, collects and analyzes physical information on the use, flows and destinies of energy, water, material (including waste) for internal decision-making ***"is accepted.***

4.4.2 Hypothesis II (two)

Ho: NNPC does not identify, collect and analyze monetary information on environment-related costs, earning and savings for internal decision making.

H_1: NNPC identifies, collects and analyzes monetary information on environment-related costs, earning and savings for internal decision making.

Chi-Square Test

Frequencies

Q2

TABLE4.4.2.

	Observed N	Expected N	Residual
1	25	160.0	-135.0
2	47	160.0	-113.0
3	106	160.0	-54.0
4	324	160.0	164.0
5	298	160.0	138.0
Total	800		

Test Statistics

	Q2
Chi-Square(a)	499.063
df	4
Asymp. Sig	.050

a 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 160.0.

Decision:

In line with, the decision rules stated in section 4.1. The Null hypothesis (Ho) should be rejected because, from the above Table 4.4.2, the calculated x^2 value 499.063 is greater than the critical value 9.488 at 5% level of significance with 4 degree of

a) freedom (DF).Thus, the alternative hypothesis "NNPC identifies, collects and analyzes monetary information on environment-related costs, earning and savings for internal decision making is accepted.

Hypothesis iii (three)

H_O: NNPC does not report environmental risks and performance information to its internal and external stakeholders

H_1: NNPC reports environmental risks and performance information to its internal and external stakeholders

Q3

TABLE 4.4.3

	Observed N	Expected N	Residual
1	38	180.0	-142.0
2	63	180.0	-117.0
3	64	180.0	-116.0
4	371	180.0	191.0
5	364	180.0	184.0
Total	900		

Test Statistics

Chi-Square(a)	653.589
df	4
Asymp. Sig	.050

a 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 180.0.

Decision:

In line with the decision rules stated in section 4.1. The Null hypothesis (H_0) should be rejected because, from above Table 4.4.3,the calculated x^2 value 653.589 is greater than the critical x^2 value 9.488 at 5% level of significance with 4 degree of freedom (DF).

Thus, the alternative hypothesis "NNPC reports environmental risks and performance information to its internal and external stakeholders" is accepted.

Summary of Findings

The study supports the proposition that NNPC identifies, collects and analyzes physical information on the use, flows and destinies of energy, water, material (including waste) for internal decision-making. It also supports the fact that NNPC identifies, collects and analyzes monetary information on environment-related costs, earnings and savings for internal decision making.

Furthermore, the third alternative hypothesis that is NNPC reports environmental risks and performance information to its internal and external Stakeholders.

This result represents the opinion of NNPC managers as operator of EMA records. Their opinion may be bias to some extend as insiders. It is suggested that a further study involving the view of third party like NNPC's external auditors may be necessary for balanced result.

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