Environment Accounting and Host Community Agitation in Nigeria: The Petroleum Industry Experience

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This paper analyzes the effects of community agitations over environmental damage due to petroleum exploration and production activities in Nigeria. The host communities in petroleum producing areas strongly believe that petroleum companies show high levels of neglect to environmental damages caused by their operations. Thus environmental costs are not necessarily significant to their operations. The estimates of the variables in the model reveal that in Nigeria, petroleum companies' activities have serious impacts on the levels of environmental degradation in these areas and this has lead to continuous agitations by those inhabiting the immediate community where they carry out their explorative activities. Insights from this analysis will assist environmental analyst to justify the use of an innovative environmental accounting technique which will take seriously the environmental components of production costs.

JEL Code: C3, D6, L5, N5, Q3, Q5.

1. Introduction

Environmental accounting (EA) emphasize the need for a close monitoring of natural resource by accounting for the impact of its associated activities on the environment, health and well being of the inhabitants of the location where such natural resources are resident in particular and how efficient the processes of such resources can be used to sustain development in the nation in general. Shil and Iqbal (2005) stated that EA is a tool to supplement environmental management. They claim that the disclosure of EA data is important for developing an appropriate environmental report that will enable government agencies, other companies and interested individuals get a clear understanding of the company's stance on environmental conservation issues. Further they expressed the fact that it is focused on providing the management of an organization with standard information on the actual private environmental cost already being incurred by the firm. They suggested that it should reflect the external reporting of environmental expenditure, and estimating the external environmental costs not recognized by the firm.

The main objective of this paper is to analyze the effects of community agitations over environmental damage due to petroleum exploration and production activities in Nigeria. This work also takes into consideration the levels of environmental damage in the community and if government intervention has made any difference. From the results obtained the researcher will propose policies necessary to secure effective development

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with respect to natural resource and the environment in accordance with an efficient environmental accounting system. These views make this study unique from previous studies which basically related underlining theories, analyzed trends and discuss the similarities across country policy issues.

The second section of the study covers the literature review. Section three is focused on model specification, while section four exposes the results obtained in the analysis. The fifth section dwells on policy recommendations and conclusions.

2. Literatures Review

The world commission on environment and development (WCED, 1987) establish the need for countries heavily dependent on natural resource, to generate sustainable development indicators which should be guided by polices in order to strictly protect such resources and ensure that they are judiciously utilized. Further, the United Nation, European Commission, International Monetary Fund, Organization for Economic Cooperation and Development and World Bank (2003) emphasize the need for a comprehensive evaluation of natural resources and environmental accounting in order to establish indicators of political and economic relevance which will aid sustainable development.

It is necessary to note that the World Bank advanced indicators that enable countries build prospects around their net national product, such that adjustments can be made for the use of non renewable natural resources and the depletion of the environment and environmental sustainability (Hamilton, 2000 and World Economic Forum, 2002). This measure is intended to ensure that a number of factors related to environmental and social conditions are strongly accounted for in order to enforce the sustainability of future long-term development and increase confidence in government policies.

The history of commercial petroleum exploration activities in Nigeria began in 1956. This was intensified in 1971 when more multinational corporations where given license to operate in Nigeria. This led to the exploration of offshore oil and gas operations and the granting of deep water acreages to the oil producing companies, with implications for stated operation and regulatory guide lines and serious consequences on the economic life of the host communities.

Indigenous people in these host communities are plagued by low-income, poor health and their means of livelihood; fishing and farming are heavily disturbed by the increasing rates of pollution due to increased oil and gas exploration activities. In the early 1990s, the Ogoni people of the Niger Delta region in Nigeria began a series of protests against Shell Petroleum Company and the Nigerian National Petroleum Corporation. "The environmental impact of Shell's operations in Nigeria, and the minimal economic benefits to the indigenous people around those operations, prompted large-scale protests at Shell facilities, which temporarily halted oil extraction in the Ogoni land 1993" (Davis, Whiteman and Zald 2006). The brutal response of the then Nigerian military government resulted in the destruction of over three dozen villages and the arrest and execution of nine Ogoni protest leaders. Global social movements joined

in support of the Ogoni, launching an international boycott of Shell and a shareholder campaign among some of Shell's institutional investors (Van Alstyne, 2005). Due to these forms of actions, Wolf (2004) claimed that such host communities over re-acted and affirmed that most of the communities where multinationals carry out their business operations were "rootless cosmopolitans". This is because firms traditionally orient their corporate social responsibilities towards the local communities, but host communities hold these corporations liable for actions beyond the firm boundaries and beyond their local communities.

Luna, Ayerbe and Torres (2006) illustrate that there are internal and external sets of difficulties confronting firms when adopting a proactive attitude towards environmental degradation. They suggested that the external factors can be easily managed but that the internal barriers inflict stronger negative influence on environmental sustainable strategies. Therefore, sustainable schemes should be designed to curtail these internal factors in order to develop a proactive environmental strategy. Therefore it is essential for Federal Government to put in place codified strategies directed more explicitly towards the social responsibilities of the corporation. It is also necessary for government to put forth directives to permit academicians and consultants to increasingly promote social audits which will represent an institutionalized attempt to measure and effectively monitor social performance (Davis, Whiteman and Zald 2006).

3. The Methodology

The research follows a structural estimation process in order to get the most from the array of data set available. These data were collected from the Organisation of Petroleum Exporting Countries (OPEC) annual statistical bulletin 1999, 2001, 2009, the international financial statistics (IFS) 2000 and the Central Bank of Nigeria (CBN) statistical bulletin 2007. Basically, the researcher's objective is to generate a parsimonious theoretical framework that allows the pertinent issues to be illustrated while maintaining simplicity.

Communities in petroleum producing areas in Nigeria are assumed to maximize functional returns on expected petroleum investment utility by choosing the sets of options made available by the petroleum companies after relative environmental pressures. These may face some levels of time constraint considering the nature of option's process and related activities at every point in time. The host community choices of the stated options are aided by their experiences and a perception that may be influenced by the activities of the petroleum companies over environmental issues. The host community maximizes an additively-separable, functional environmental benefit, with expected utility function where the within-period environmental damage anticipation function is assumed to be concave and takes the form:

$$EAC_{a(t)} = (PCS_a, PEO_{a(t)}, PED_{\alpha(t)}, EVD_{a(t)}, GOV_{a(t)}, CAG_{a(t)}) \qquad - \qquad - \qquad \text{equ. 3.1}$$

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Where

a= 1, 2 indexes No. of firms.

t= 1…N indexes time periods.

EAC = Environmental Accounting

$EVD_{a(t)}$= Environmental Damage

PCS_A= Petroleum companies level of satisfaction with petroleum Companies' exploration regulation

PEO= Petroleum company output

PED= Petroleum company environmental damage

GOV= Government Intervention

$CAG_{a(t)}$= Community agitation

t= Time-lag; total numbers of periods spent on the resolution of exploration damages by the inhabitants of the host community in period t.

The main idea is to captured the host community decision on whether to take the stated option or refrain in period 't'. If the final term on the left-hand-side of the equation is zero, then the host community decision in increasing petroleum companies' performance on environmental issues after exploration damage exceeds all other forms of cost and the host community records decreasing satisfaction. The host community will devote time to evaluate the performance of the petroleum companies if the costs of the environmental damage in terms of the foregone loss as a result of the exploration, $-PCS_{a(t)}UFL_{e(t,a)}$ and the anticipated loss of such environmental damage $-PCS_{a(t)}UAL_{e(t,a)}$ do not exceed the future benefit of the host community usage of such properties/assets (i.e. farm lands, fish waters etc.), $+FB_{a(t)}PCS_{e(t,a)}$.

The empirical approach is to estimate a reduced form model of host communities satisfaction balance as a result of environmental problems caused by oil exploration activities, is being derived from equation three. Hence, we focus on the behavior decision of the individuals' and their willingness to accommodate such problems in order to improve their relationship with the oil producing companies in their communities.

The following reduced form model is employed in the estimation:

$$EAC_{a(t)} = \beta_0 + \sum_{j=1}^{n} \beta_1 \log PEO_{at} + \sum_{j=1}^{n} \beta_2 \log PED_{at} + \sum_{j=1}^{n} \beta_3 \log PCS_{at} + \sum_{j=1}^{n} \beta_4 \log EVD_{at}$$
$$+ \sum_{j=1}^{n} \beta_5 \log GOV_{at} + \sum_{j=1}^{n} \beta_6 \log CAG_{ja} + \varepsilon_{at} \quad - \quad - \quad - \quad - \quad - \quad \text{equ. 3.2}$$

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Where;

EAC is a dummy representing the total volume of gas flare by Petroleum Companies' during their exploration activities where gas flare is above regulated volume since 1970 to 2008.

EVD this variable is represented by the total volume of gas flare during the Petroleum exploration process.

$PCS_{(t)}$ the variable is measured by the change in the total output of the Petroleum firms during the observation.

PEO is the outcome of the total output of the petroleum companies in the Niger Delta region of Nigeria.

PED is the total volume of gas flared by petroleum companies' during exploration activities.

GOV is a dummy variable used to capture government intervention during the petroleum crisis period in the Niger Delta.

CAG is a dummy variable designed to express the level of host community agitation over the ways petroleum companies handle cases of environmental damages as a result of petroleum production activities in the region.

ε_{at} is the disturbance term

It is expected that the extent to which these communities can transform their experiences into workable solutions without the help of the petroleum companies will correlate with their perceived possibilities in order to improve their benefits and reduce their losses. In most cases, this will involve a lot of finance and toil and communities with low or no financial backings are likely to have difficulties transforming the stated solutions into their desired prospective benefits. Therefore, the possibility for the host community to have a high tendency to consistently obtain a benefit and lead normal lives in all periods represents personal-specific differences in preferences in attitudes towards environmental damages caused by oil and gas exploration.

The estimation of the logit model will be in different modules since the illustrations in the theoretical framework and model state discrete choice problems (Green, 1997; Cameron and Trivedi, 2006). This is because most of the variables in the model vary with time and the specified model shows that the researcher will have to recover the residuals from the modules specified so as to explore the relationships between the host communities in the petroleum producing region and oil producing companies carrying out exploration activities in their communities.

4. The Findings

In the previous section the researcher systematically attempt to outline a model depicting the effect of the extent of damage done by oil exploration activities in the host community where they carry out their operations. The first order conditions of the petroleum companies' performance and best practice on environmental issues and their effect on the socio-economic life of inhabitants in the host community were generated and then used to guide the researcher's choice of estimation and the interpretation of the results.

In this section of the study, the outcomes of the results will be interpreted to reflect the empirical findings associated with the satisfaction, perception and best practice of the petroleum companies' exploration practices in petroleum producing areas in Nigeria. It is necessary to noted that each module is estimated over the same observation in order to obtain new results while the changes are interpreted adequately.

4.1 Summary statistics and Correlation Results

Table 1: Distributive Statistics of the Variables in the Model

Variables	EAC	PCO	PCS	PED	EVD	CAG	GOV
Mean	0.625000	30716.24	379.4250	-0.007698	21708.90	0.550000	0.250000
Median	1.000000	27394.50	762.0000	0.028152	22060.00	1.000000	0.000000
Maximum	1.000000	101976.0	44446.00	0.435848	75772.70	1.000000	1.000000
Minimum	0.000000	8029.000	-48597.00	-1.043754	7957.000	0.000000	0.000000
Std. Dev.	0.490290	17645.33	12733.84	0.294826	10311.26	0.503831	0.438529
Skewness	-0.516398	2.046993	-0.703283	-1.862461	3.555347	-0.201008	1.154701
Kurtosis	1.266667	8.214154	10.48464	6.976624	20.10128	1.040404	2.333333
Jarque-Bera	6.785185	73.24687	96.66376	49.48097	571.6926	6.669387	9.629630
Probability	0.033621	0.000000	0.000000	0.000000	0.000000	0.035625	0.008109
Observation	40	40	40	40	40	40	40

Source: Author's estimation, using STATA 11.

Considering the distributive statistics in table 1, the mean of the distribution shows that PCS has the highest mean which is approximately 379. 43. The PED variable has the lowest mean with approximately -0.0077. The EAC, CAG and GOV dummy variables mean range from an estimated 0.63 to 0.25. The standard deviation results reveal that the PCO, PCS and EAC dispersion in their series are positive and high while the spread of the PED, GOV, CAG and EAC series spread are positive and low. The estimated values of the kurtosis specifically indicates that EVD, PCS, PCO and PED series distributions are highly peaked relative to the normal while EAC and CAG series have flat relative normal distributions but the GOV series is relatively near a normal distribution. Therefore, we reject the null hypothesis of a normal distribution at the one percent level of statistical significance for the PCO, PCS, PED, EVD and GOV variables while the CAG and EAC variable null hypothesis for a normal distribution is rejected at the five percent statistical significance level.

Table 2: Spearman Correlation Estimates

Variables	EAC	PCO	PCS	PED	EVD	CAG	GOV
EAC	1.0000						
PCO	0.0380	1.0000					
PCS	0.8388*	0.1745	1.0000				
PED	0.8388*	0.0992	0.9777*	1.0000			
EVD	0.1521	0.8536*	0.3268*	0.2428	1.000		
CAG	-0.1816	0.7226*	-0.1350	-0.2133	0.5094*	1.0000	
GOV	-0.0298	0.5702*	0.0400	0.0000	0.2351	0.5222*	1.0000

Source: Author's estimation, using STATA 11.

A close look at the correlation results in table 2, revealed that the environmental account stated by petroleum companies in the Niger Delta region in Nigeria highlights the fact that petroleum companies keep to exploration regulations in accordance with the level of damage incurred as a result of their activities. Inversely, correlation result of PED and PCS suggest has the highest positive outcome in the table, it shows that the level of petroleum environmental damage in this region is largely due to petroleum companies' exploration activities and inadequacies in the stated regulations. Also, EVD is positively correlated with PCO and PCS which may suggest that environmental damage in this region is due to increase in petroleum companies output and ill regulations guiding exploration activities.

Further, CAG and GOV are negatively associated with EAC; this implies that community agitations and government intervention have relative levels of bias with the levels of environmental assessments accounted for by petroleum companies in the Niger Delta religion in Nigeria. This suggests that the environmental accounting statements of these companies are not relatively associated with such agitations and government interventions. With insights from the correlation result of CAG, PCO and EVD reveal that host community agitation is basically due to continuous petroleum companies' expiration activities which have lead to subsequent increase in output and subsequent increase in environmental degradation as a result of such increase in production outputs. Also, it is noticed that government only intervenes to stop the rage of the agitations in this region in order to keep petroleum production output consistent and interrupted.

4.2 Module One: Empirical Outcome of Environmental Accounting

In this part of the disclosure of findings, there are three models; the first module has three sets of equations. These equations were considered in separate Logit regressions before considering the difference in their effects in the same Logit regression as some variables were removed and others added intermittently. The last column reports the Logit regression chi square result, its probability value, the log likelihood ratio, and the Pearson chi square goodness-of-fit test result with its associated probability chi square value. The standard error results from the Logit regression are reported in (parentheses), z test results are reported in [block parentheses] while the probability values are reported in {brackets} in all the modules specified.

The first set of logit regression result did comprehensive coverage of the impact of petroleum companies' total output, environmental damage, host community agitation and government intervention on environmental accounting issues in the Niger Delta region in Nigeria. Such records cover petroleum production activities, and highlight government interventions but it does not necessarily report community agitations and it does not sufficiently cover environmental damages. Therefore, since these variables were not statistically significant at the one or five percent levels, it was necessary to carry out further sets of test to investigate and justify the validity of the results.

Table 3: Logit Result of Environmental Accounting

EAC	Modules 1					
Variables	Const	POC	EVD	CAG	GOV	Chi^2
POC, EVD, CAG and GOV	18.337 (13.15) [1.41] {0.16}	1.022 (2.25) [0.45] {0.65}	-2.948 (2.57) [-1.15] {0.25}	-1.48 (1.00) [-1.48] {0.14}	0.692 (1.23) [0.56] {0.57}	LR=4.63 {0.3276} LL=-24.148 PC=40.29 {0.2478}
EVD, CAG and GOV	19.193 (12.68) [1.51] {0.13}		-1.946 (1.26) [-1.54] {0.12}	-1.629 (0.95) [-1.72] {0.09}	0.319 (0.89) [0.36] {0.72}	LR=4.42 {0.2194} LL=-24.25 PC=37.84 {0.3409}
EVD and GOV	9.733 (10.01) [0.97] {0.33}		-1.004 (0.99) [-1.01] {0.31}		-0.411 (0.80) [-0.51] {0.61}	LR=1.12 {0.5713} LL=--25.90 PC=37.81 {0.3868}

Source: Author's estimation, SATA 11.

Consequently, the author investigates the effect of the levels of environmental damage, host community agitations and government intervention on environmental accounting issues. The results presented in table 3 reveal that the level of environmental damages has a negative association with environmental accounting reports. This result is similar to the outcomes of host community agitation and environmental accounting; the impact was also negative, suggesting that the intensity of environmental damages are not reflected in environmental accounts. It discloses that the changes in these variables are not properly captured by the environmental accounting reports of petroleum firms' operation in Nigeria. The government intervention variable shows a very low positive impact which is not statistically significant at the one or five percent level. A closer look at this issue empirically, made the researcher consider only the environmental damage and government intervention variable in a separate model on environmental accounting. The result shows that change in environmental damage are not properly covered by environmental reports and government interventions are not effective enough to control the problems associated with environmental damage and have not preformed a standard environmental accounting framework.

4.3 Module Two: Empirical Outcomes of Community Agitation

This set of logit regression analysis presented in table 4 took into consideration the impact of environmental damages due to petroleum exploration activities and the total

estimated petroleum companies output on host community agitation. The author noticed that environmental degradation due to petroleum production activities greatly influences host community agitation. Also, it was noticed that this outcome has strong negative consequences on total petroleum production output. To justify the validity of this view, it is necessary to note that these variables were statistically significant at the one and five percent levels.

Table 4: Logit Result of Host Community Agitation

CAG	Modules 2			
Variables	Const	POC	EVD	Chi^2
EVD, POC and GOV	55.918 (22.06) [2.53] {0.01}	-16.971 (6.452) [-2.63] {0.00}	11.703 (5.87) [1.99] {0.05}	LR=20.49 {0.0000} LL=--9.945 PC=26.42 {0.4956}
EVD and GOV	39.124 (17.11) [2.29] {0.02}		-3.914 (1.71) [-2.28] {0.02}	LR=7.36 {0.006} LL=--16.51 PC=37.81 {0.3868}

Source: Author's estimation, SATA 11.

In order to ascertain this fact, the author further addressed the possibility that environmental depletion is key to host community agitation by carrying out a separate test, on both variables. It was detected that increase in community agitation and violence is strongly associated with environmental damage as a result of oil and gas exploration activities in this region. However, it is necessary to note that the environmental damage variable has a negative sign which suggest that there are other factors associated with host community continuous agitation which this model did not capture. Subsequently, this variable was statistically significant at the five percent level.

4.4 Module Three: Empirical Outcomes of Government Intervention

The third set of logit regression outcomes consider the effect of environmental accounting and environmental damage and the effect of total petroleum production output and environmental damage on government interventions. These facts were established in two separate regression analysis and it was found that, government interventions have not been intensive enough to control petroleum companies' account of environmental damages as a result of their activities. Also, policies put in place as guide, and regulations of environmental depletion are inefficient. To ascertain the validity of these facts, it is important to note that these variables were statistically significant at the ten and five percent levels.

Table 5: Logit Result of Government Intervention

GOV	Modules 3				
Variables	Const	EAC	EVD	PCO	Chi^2
EAC and EVD	27.042 (14.29) [1.89] {0.05}	-0.4684 (0.805) [-0.58] {0.56}	-2.583 (1.421) [-1.82] {0.06}		LR=4.90 {0.0862} LL=--20.042 PC=37.75 {0.4350}
EVD and GOV	28.052 (20.32) [1.38] {0.17}		13.808 (6.67) [2.07] {0.03}	-15.965 (7.272) [-2.20] {0.02}	LR=16.11 {0.000} LL=---7.11 PC=18.88 {0.4642}

Source: Author's estimation, SATA 11.

5. Summary and Conclusions

This study empirically analyzed environmental accounting and host community agitation in petroleum producing region in Nigeria. The author applied the logit regression technique to investigate if petroleum companies' environmental accounting practices effectively cover petroleum production output, environmental damage, issues that lead to host community agitations and government intervention strategies. A second set of logit regression analysis seek to justify the impact of environmental damage, petroleum companies total output on host community agitation while the third module considered the efficiency of government intervention strategies on petroleum companies exploration activities, environmental damage and environmental accounting.

In order to sufficiently test the impact of petroleum exploration activities, environmental damage on host community agitation, the researcher developed a theoretical framework with an informed statistical underpinning in other to propose reliable policies. The analysis of the results reveals that environmental accounting records basically consider petroleum production activities and highlights government interventions. They do not necessarily cover issues leading to host community agitations. The intensity of environmental damage is not reflected in environmental accounts. Government interventions strategies are not effective enough to control petroleum companies' environmental depletion and its policies have not proffered a standard environmental accounting framework that will effectively capture petroleum companies' account of environmental damages. Environmental degradation arising from petroleum production activities greatly influence host community agitation and associated violence. This suggests that policies put in place to guide environmental depletion are inefficient.

From the outcomes of the results, it is necessary for policy makers to focus on clearly stated account for the energy sector in Nigeria. It is suggested that government should develop an energy account, which will provide stated statistics of emission inventories, its financial implications on the livelihood of the inhabitants of the host community and associated environmental damage. This account should make available the outcomes of petroleum, gas and crude oil spillage scenarios. It should also take into strict consideration the levels of economic damages on forest, fish and farm lands with regard to associated changes in host community environment and acidification due to the

inappropriate use and disposal of hazardous substances. This account will enable the government to easily assess the degree of damage petroleum activities inflict on the host communities and proffer efficient solutions to resolve such issues. It will also make it easier for politicians and government agencies to get the necessary information in order to secure reasonable levels of control in the exploration of natural resources and put in place policies to intensively curtail environmental degradation. It will ensure that regulations put in place curtail air pollution from emissions as a result of petroleum companies' exploration activities in host communities in Nigeria. It is also important that all quoted companies in the Nigerian stock market disclose environmental information in their annual reports.

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