Research Journal of Finance and Accounting
ISSN 2222-1697 (Paper) ISSN 2222-2847 (Online)
Vol.4, No.4, 2013

The Cost of Oil Spillage and Gas Flaring on The Socio-Economic Development of The Niger Delta Region of Nigeria

*Prof. J. O. Udoayang
Department Of Accounting; University Of Calabar; Nigeria.
Josephudoayang@Yahoo.Com
+2348034194911

Evang. U. E. Etowa
Department Of Accounting, Faculty Of Management Sciences, University Of Calabar
Yabiforum @Yahoo.Com
+2348032331057|

Abstract
The research examined the total loss revenue associated with the frequent oil spillage and gas flaring in the Niger Delta region of Nigeria and its effects on the socio-economic development of the region between 1979 and 2008. In carrying out the study, the survey research method was used while observation, interview, literature review and internet were employed as techniques of data collection. The findings of the study revealed that the total loss revenue of oil spillage and gas flaring was significantly influenced by the rate of oil spilled and gas flared, the quantity of oil spilled and gas flared. The study also revealed that the total loss revenue of oil spillage and gas flaring have no significant effect on the socio-economic development of the Niger Delta as measured by the rate of poverty in the region. The following recommendations were made. Government should, as a matter of urgency enact a law to control oil spillage and gas flaring which total lost revenue stood at US$175,795,811.00 equivalent to N20,671,321,766.00 and the establishment of oil spilled compensation fund to take care of the effects of oil spillage and gas flaring in the region.
Keywords: Total loss revenue, total oil spilled lost, total gas flared lost, average rate of poverty, the Niger Delta Region.

Introduction

Oil spillage and gas flaring, the twin bye products of petroleum operations have caused severe environmental pollution and lost of revenue by both the oil prospecting companies and the government. It is believed that the effect of the socio-economic well-being of the people has been less than desirable as a result of the negative effect of oil spillage and gas flaring in the communities of the Niger Delta and in the country, resulting in youth restiveness in many crude oil producing areas. The effect of these phenomena has in the last decade had negative impact on national economic development (Alao, 2008).

Others include the lack of legislature for the control of oil and gas pollution on the environment. The lack of legislature on compensation for health and environmental damages caused by oil spillage and gas flaring in the region, and the lack of policy implementation in line with globally accepted standard practices in the control of oil spillage and gas flaring (Grey, 1999).

Theoretical framework

This research seeks to review related literatures and theories which formed the basis of the study, in order to formulate an acceptable theory and model to be used in forecasting or estimating the costs of oil spillage and gas flaring in the Niger Delta.

Cost estimation theory

This theory is chosen for analysis based on its findings using "hindsight" approach on an analysis of cost data of over 8,600 oil spills covering 38 years as contained in the Oil Spill Intelligence Report (OSIR), International Oil Spill Data Base (Etkin, 1999). The theory reveals as follows:
That location, oil type, the quantity of oil spilled, the rate of spillage, and the clean up strategy used are the five major factors which significantly affect the costs of oil spillage per unit, apart from other minor associated factors.

Extending the theory to analyze average cost per tone, it reveals that, the cost on a tone basis decreases significantly with increasing amount of quantity of oil spilled. An analysis of a sample of 96 Non U.S.A. Oil

Spills in the OSIR, International Oil Spill Data base, shows that cost per tone is significantly negatively correlated.

{Spearman's rho (rs) = - 0.362, P< 0.01 and
Kendall's tau = - 0.245, P< 0.01}

Spearman's rho and Kendall's tau are non parametric statistical measures of ranked correlation.

Spearman's rho (r_s) = $1 - \{6\sum d^2/n(n^2-1\}]$

Where:

d = difference in ranking of cost in the different spill size categories;

n = No. of samples

Similarly:

Kendall's tau = 1-{Q/n (n-1)}

Where:

Q = Total of cost rank in different spill size categories;

n = No. of samples.

Oil spillage compensation theory

The international system of compensation provides a straight forward mechanism whereby the costs of clean up and pollution damages on both human and the environment can be recovered on a strict liability ("no fault") basis from the individual tanker owner and pollution insurer involved in an accident and from international funds maintained through levied imposed on oil cargo received in I0PC Fund member countries (ITOPF, 1998).

Oil spillage compensation theory analyses the number of oil spilled, the size or magnitude of oil spilled and the cost of the incidents in details and compared with the incidence of all tanker spills in Fund countries, using data from ITOPF'S oil spill data base.

Scope and methodology

The study covers forty (40) selected Local Government Areas across the nine (9) states of the Niger Delta. It seeks to know whether appropriate records of oil spillages and gas flaring have been kept by oil and gas prospecting companies, government own agencies and the oil and gas providing communities. The study shall involve examinations of data from N.N.P.C and the Central Bank of Nigeria (CBN) for confirmation of information gathered within the area .The nine states which make up the Niger Delta region of Nigeria are comprised of 183 Local

Government Areas, out of which 68 Local Government Areas are oil and gas producing areas.

Model specification

. The study developed a model called Descriptive and Stochastic Models (DSM). If DSM represents Y and the quantity of oil spilled and gas flared, the rate of oil spillage and gas flaring is represented by X.

Then:

$DS = F(X_i)$ where i = 1, 2, 3, 4 and

$Y = X_0 + b_1X_1 + b_2 X_2 + b_3 X 3 + b_4 X 4 + E$

Where b_1, b_2, b_3, b_4 are regression coefficients which measure the cost of oil spillage and gas flaring. While X_1, X_2, X_3, X_4 are the independent variables of the quantity and rate of oil spillage and gas flaring E_i is the components from the independent events considering the methods upon which data is collected.

Y is the total loss cost (loss revenue) associated with oil spillage and gas flaring within the period in view.

X_0 = alpha intercept at Y

X_1 = quantity of oil spilled

X_2 = quantity of gas flared

X_3 = the rate of oil spillage

X_4 = the rate of gas flaring

Table 1 Oil and gas units of measurements and conversions

S/n	Unit quantity	Equivalent quantity
1	1 Tonne of crude oil	1113.24 Barrels of crude oil
2	1 cubic meter (m^3) of crude oil	6.28982 Barrels of crude oil
3	1 Billion standard cubic feet (bscf) of gas	1000 Million thousand standard cubic feet (Mmscf) of gas
4	1 Million thousand standard cubic feet (Mmscf) of gas	1000 thousand standard cubic feet (mscf) of gas
5	1 Thousand standard cubic feet (mscf) of gas	28.31685 cubic meter (m^3) of gas
6	1 Cubic meter (m^3) of water	6.28979 Barrels of water
7	1 Million thousand British thermal unit (Mmbtu) of gas	1000 Thousand standard cubic feet (mscf) of gas

Source: Nigeria National Petroleum Corporation 1st Edition (2008).

Table 2 The total loss cost of oil spillage and gas flaring and the rate of poverty and life expectancy in the Niger Delta between 1979 and 2008

S/n	Year	Total loss cost (US$)	Poverty ave. %	Life expectancy
1	1979	19038939	12.2	42.00
2	1980	7761126	13	46.10
3	1981	1900504	13	46.10
4	1982	670324.2	13	46.10
5	1983	4642727	13	46.10
6	1984	2276147	13	46.10
7	1985	1539121	41.5	46.10
8	1986	184126.4	41.5	46.10
9	1987	590573.4	41.5	46.10
10	1988	139423.1	41.5	46.10
11	1989	143021	41.5	46.10
12	1990	359395	41.5	50.20
13	1991	2192679	41.5	50.20
14	1992	1025974	41.1	50.20
15	1993	162316.9	41.1	50.20
16	1994	489069	41.1	50.20
17	1995	1105774	41.1	50.20
18	1996	532888.9	57.5	50.20
19	1997	296721.8	57.5	50.20
20	1998	242478.1	57.5	50.20
21	1999	8554402	57.5	50.20
22	2000	9794349	57.5	52.50
23	2001	4465488	57.5	52.50
24	2002	6634048	57.5	52.50
25	2003	8226434	57.5	52.50
26	2004	9634293	34.1	52.50
27	2005	30932290	34.1	51.50
28	2006	26084801	34.1	51.50
29	2007	7714388	34.1	51.50
30	2008	18461990	34.1	51.50
Total	30	175,795,811	1,150	1,474

Source: Summary from analysis of researchers' field survey data (2010)

Table 3 Mean and standard deviation of the five variables

Variables	Mean	Std. deviation	N
Total loss cost	5859860	8019818	30
Qty. of gas (mscf)	3775163	11879920	30
Rate of gas flared	67.0950	18.7682	30
Qty. of oil spilled (bbls)	140693.4	157272.4	30
Rate of oil spilled	5.0210	6.5684	30

Source: Regression analysis of field survey data (2010)

The quantity of gas flared, rate of gas flaring and the regression constant are not significant predictors of total loss cost. The resulting prediction model is:

$$Y = 1159088 – 3.77E – 03X, - 3446.87\ X_2 + 35.173X_3 + 461219.3X_4$$

Where: Y = Total loss cost of oil spillage and gas flaring

X_1 = Qty of gas flared

X_2 = Rate of gas flaring

X_3 = Qty of oil spilled

X_4 = Rate of oil spilled

E = Standard error of the sample data

Data interpretation:

From table 2, it is revealed that a total of 4,220,803 barrels of crude oil was spilled at a total mean spillage frequency of 5.05%, resulting in a total loss cost of **U.S $ 175,141, 289** for the 30 years of the study in the Niger Delta, based on OPEC average yearly market price per barrel (OPEC, 2008 and 2009).

Table 3 above revealed the mean of the five predictors' variables for further research analysis.

Conclusion

Oil and gas accounting is a relatively new concept of accounting in Nigeria even though it has been in existence for many years in other developed countries of the world. This makes it interesting to embark on this study.

In the process of this study the researchers employed a survey method. All the hypotheses were tested at 0.0 5 level of significance.

The study revealed the following findings:

1. There is high rate of oil spillage and gas flaring in the Niger Delta leading to a loss of revenue by both the oil and gas prospecting Companies and the Government in the Niger Delta.
2. That a total loss cost of **US# 175, 795, 811** equivalent to **₦20,671,321,766.00** was derived from a combine total oil spilled of 4, 220, 803 barrels of crude oil and total gas flared of 112, 408, 693 million thousand standard cubic feet of gas over the past 30 years in the Niger Delta.

Recommendations :

1. Government should as a matter of urgency legislate on the control of oil spillage and gas flaring in the Niger Delta to reduce the total loss cost of oil spillage and gas flaring in the region.
2. The judgment against Shell Petroleum Development Company must be obeyed by both the oil company and the federal government, since it has not been voided till date by any other superior court in Nigeria (Nwokorie, 2005).
3. Government should initiate people oriented policies in governance to ensure micro economic empowerment and human capital development of the people of the Niger Delta aimed at reducing poverty in the region.

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