

Environmental Cost Accounting: Effect of Pollution on Economic Growth in Nigeria

Araoye, Felix Ebum

Internal Audit,
Bells University of Technology,
Ota, Ogun State,
Nigeria,
araoyefelix@yahoo.co.uk

Ajayi, Emmanuel Olusuyi

Department of Economics,
Accounting and Finance,
Bells University of Technology,
Ota, Ogun State,
Nigeria,
olusuyiajayi@yahoo.co.uk

Olatunji, Toyin Emmanuel, & Aruwaji, Akinola Michael

Department of Management and Accounting,
Ladoke Akintola University of Technology,
Ogbomosho, Oyo State,
Nigeria,

olatunjitoyin@gmail.com, maaruwaji@lautech.edu.ng

Abstract

This study examined the effect of environmental pollution on economic growth in Nigeria. It specifically examined the trend of economic growth and the effect of environmental cost of pollution on economic growth for the period 2000 to 2014. This study made use of secondary time series data which were obtained from Central Bank of Nigeria statistical bulletin. The data was analyzed using ordinary least square (OLS). Descriptive Statistics was used for the Trend Analysis. The findings of the study showed insignificant impact of pollution cost on economic growth in Nigeria. The study recommended that fine and penalty for oil spillage and gas flaring should be increased to an amount that out rightly discourages oil companies from gas flaring.

Key Words: *Environmental Cost Accounting, Pollution, Economic Growth, Central Bank, Nigeria*

1.0 Introduction

The problem of land degradation failures globally has brought about problems of environmental Accounting in the measurement of pollution in Nigeria. The interest in social and environmental accounting has existed for the past three decades in western countries. However, Nigeria is suffering from lack of intensive research dealing with environmental and social issues (Enahoro, 2009). Environmental accounting has no definite definition as it relates to economic and environmental information. It identifies resource use measures, communication cost and economic impact on the environment. It is a subset of accounting

and its target has been the incorporation of both economic and environmental information. The word pollution has various meanings. However, under Nigeria law, section 41 of the Federal Environmental Protection Agency Act Cap. F10 Laws of the Federation 2002, defines 'pollution' as a Man-made or man aided alteration of chemical, physical or biological quality of the environment to the extent that it is detrimental to that environmental or beyond acceptable limits. Nigeria is a developing country and must continue to advance economically and this requires increased exploitation of natural resources. Evidently, there exist a polarity between Nigeria's GDP and energy consumption as they are highly correlated. But the exposure here is that most of the natural resources consumed are non-renewable and are under threat of depletion and a persistent consumption of our most valued natural resources in the present day, would compromise the ability of future generations to meet their own needs. Nigeria is Africa's most populous nation with 140 million peoples as announced in 2006 and how it was 166.2 million announced in 2012 as provided by the National Bureau of statistics. Examples of non-renewable resources are coal, oil and gas, water, etc.

Environmental pollution is so acute that the issue is making environmental accounting a strong branch of accounting but the style of environmental accounting is not a generalized one but social responsibilities and commitment on the of entities that serve a strong agents for pollution have disclosure on environmental accounting which is helped, strong agents like international chamber of commerce, (FASB) financial accounting standard board emerging issues task force, chemical manufacture association, inter-governmental working group, experts on international standards of accounting and reporting.

Pollution affects various sectors of the economy in Nigeria, most importantly the agriculture and petroleum sectors of the economy. All sectors of the economy have an effect on the economic growth of Nigeria. Pollution in Nigeria has caused a huge loss in agricultural sector which has reduced the economic growth. The control of pollution has helped increase the economic growth but once an area has been polluted it is very hard to control and return the area to its previous state. According to the World Bank Record the sector still accounts for over 26.8 percent of GDP and two thirds of employments. Nigerian is no longer a major exporter of cocoa, cotton, groundnuts, rubber and palm oil. The continuous decline in the agricultural sector despite huge investments in the sector, which among other include the establishment of River basins and Rural Development Authorities, the Agricultural Development programmes, ADP, (funded jointly by the World Bank and the Federating Units in Nigeria), and more than 20 Agricultural Research Institutes.

1.1 Statement of Problem

Attempt has been made by individuals, government, non-governmental organizations, and world institutions like UNO, World Bank, most especially by scholars to address the lingering environmental pollution associated with oil spills and flaring of gas in the Niger Delta. Scholars like Kobboun, (2008), Manby, (2003), Teresa, (2006), Hull & Rothenberg (2005), Ngakwe (2009), Emogan, (2008), Sarumpaet, (2005), in their research works has attempted to address the perennial problems associated with the environmental degradation of oil spillage and pollution. Some international institutions like the World Bank and the World Health Organization, have equally reported facts on what constitute the causes and effects of oil and gas industries on a particular environment like the Niger Delta region.

Developing countries like Nigeria are faced with issues of poor infrastructure, lack of technological knowhow, illiteracy, and high dependence on foreign goods. Some Nigerian

authors such as Asaolu and Osemene (2009), Enahoro, (2009), Bassey, Usang, and Godwin (2010) have devised various methods in environmental accounting and its relation with pollution in Nigeria. They evaluated pollution but didn't identify the cost of environmental protection. According to Hecht (1991), it is cited that money spent to put pollution control devices smokestacks will increase GDP even though the expenditure is not economically productive. It was also cited that the cost controlling pollution cannot be determined due to various reasons, for example, the polluted areas cannot return to its original state. Pollution brings about Economic losses to the company, government and society, for example economic loss in relation to the economic engaging in more expenses, trying to control pollution. Since the pollution cost will reduce the profit of the company, the tax that would be paid to the government would also reduce which is an economic loss to the government. The society which is polluted suffers from illness depending on the type of pollution. The gap above is what this study is going to fill.

This study focuses on Nigeria Oil and Gas and manufacturing sectors which are recognized as the cause of pollution in the environment. For emphasis, the problem is that the Nigeria business environment is yet to recognize and design environmental accounting or environmental information and issues of raw materials, energy consumption and use of natural resources which have systematically depleted the environment. This study is going to help the management accountant of oil companies to determine the economic loss and also show its impact on the output of oil companies and Economic growth of Nigeria.

1.2 Research Question

1. What has been the trend of Economic Growth and cost of Pollution in Nigeria
2. How does Pollution affect economic growth in Nigeria

1.3 Objectives of Study

The broad objective of this study is to examine the impact of environmental accounting in terms of pollution of Oil and Gas on economic growth in Nigeria. The specific objectives are:

1. To examine the trend of economic growth and cost of pollution
2. To determine the effect of environmental pollution on economic growth.

2.0 Literature Review

2.0.1 Theoretical Review

2.0.2 Environmental Cost Reduction Theory

This theory was developed by freeman (1984). It suggests that the lowest environmental costs will be attained at the point of zero-damage to the environment. It is considered that before environmental costs information can be provided, environmental costs must be defined. Environmental quality model is the ideal state of zero-damage to the environment, which is analogous to environmental quality management (EQM), a zero-defect state of total quality management. This is certainly compatible with the concept of eco-efficiency. Environmental costs incurred are costs arising because poor environmental quality exists or may exist and these have to prevented, reduced and remedied.

2.0.3 Social and Environmental Accounting Theory

Gray, Owen and Maunders (1987) defined social accounting as the process of communicating the social and environmental effects of organization's economic actions to particular interest groups within society and to society in general. This theory also known as social contract or corporate social responsibility (CSR) which implies that corporations have an implicit obligation to give back to society (Wikipedia 2009). Deegan (1998), relates the social

contract expectation with the legitimacy theory where ‘there is social contract between the organization and those affected by the organization’s operations’. This concept has been well acknowledged in many past studies. Gray et al. (1987) and Owolabi (2007) agree that social contract theory is responsible for corporate social responsibility.

2.0.4 Eco-Efficiency Theory

An ecosystem is largely determined by the natural environment as opposed to the activities of man. There is a dynamic interrelationship between the natural environment and man. Environmental Right Action (ERA) (1998) contribution to the issue of environmental sustainability emphasizes man’s critical responsibility to face the challenge of depletion of the environment. Eco-efficiency suggests that organizations can produce more useful products while simultaneously reducing negative environmental impacts, resource consumption and costs. Eco-efficiency further suggests that rather than focus on the consequences of negative environmental impact, attentions should on attacking the causes. In the opinion of Aert, Cornier & Magnum (2006) this concept suggests at least three important messages, firstly, improving ecological and economic performance which should be seen as complimentary. Secondly, that improving environmental performance should not be viewed as charity and goodwill but a matter of competitive necessity. This is in contrast to Deegan (1998) view where he had opined that social costs (i.e environmental costs) which are not matched with related revenue are incurred not for the good of the individual company but for the society. A third suggestion is that eco-efficiency should be seen as supportive of sustainable development.

2.0.5 Quality of Life Theory

This theory was used by Enahoro (2009) in his study of Environmental design. Quality of life (QOL) of CSR is defined by Hass (1999) cited in Owolabi (2007) as a multidimensional evaluation of an individual’s current life circumstances in the context of the culture in which they live and the values they hold. QOL is primarily a subjective sense of well-being encompassing physical, psychological, social and spiritual dimensions. In some circumstances, objectives indicators may supplement or, in the case of individuals unable to subjectively perceive, serve as a proxy assessment of QOL. According to Dierkes (1979) and cited in Owolabi (2007), the theory asserts that unrestrained industrial production for economic development has not only resulted in increase of social costs in heavy proportions, but also evident in environmental pollution and social ills. The adverse effect has triggered of society’s negative attitude toward industrialization. Business organizations are therefore regarded as villains since they are responsible for degradation of the environment and all the social ills.

2.0.6 Framework of Physical Accounting for Environmental Pollution

This theory was used by Nagle (1994). Physical accounting of environmental pollution includes physical accounting of pollution discharge, treatment and generation by industry and by region. It includes seven specific components – four physical accounts by region, i.e of water pollution, of air pollution, of industrial wastes and of urban household wastes; and three physical accounts by industrial/sectors i.e of water pollution, of air pollution, and of industrial wastes, which are presented in seven matrices. Territorial accounting scopes include 31 provinces, municipalities and autonomous regions and three regions of different economic level of Eastern, Middle and Western. Industrial accounting scopes include three industries of Primary, Secondary and Tertiary, there in the Primary industry are focused on farming, large-scale living stocks and rural households, while in tertiary industry consist of public service sectors and urban households.

2.0.7 Framework of Monetary Accounting for Environmental Pollution

The monetary accounting theory of environmental pollution involves two parts. One part is to measure monetary flow of environmental pollution in current economic accounting, mainly accounting environmental protection expenditure. The other part is to evaluate environmental degradation cost based on physical accounts and economic cost of pollution accidents. According to accounting methods, environmental degradation cost can be divided into maintenance cost and pollution cost, and the latter is known as environmental degradation cost in the report.

2.1.0 Empirical Review

2.1.1 Empirical Evidence on Mortality Effects of Particulate Air Pollution

Six decades ago, two devastating AP episodes sparked public awareness of the health impairing effects of outdoor particulate pollution, especially in highly polluted cities of the world. These were the toxic fogs in Donora, Pennsylvania (USA) between 25th and 31st October, 1948 and that of London between 5th and 8th December, 1952 that claimed 20 and 4000 lives respectively. In spite of the fact that historical accounts of AP exposures in cities and work places prior to the 1990s were rarely accompanied by quantitative pollution data, an increasing number of deaths and sicknesses during these two major pollution episodes made obvious the fact that an association between (particulate) pollution and mortality, these pollution incidents launched a plethora of time series studies that observed changes in daily deaths counts link with short term changes in particulate pollution. Daily time series studies evaluate effects of short term exposure to pollution by analyzing associations between changes in daily mortality counts with day-to-day changes in ambient pollution concentrations. Further, these studies relate mortality to several days of abnormally high concentrations of AP. This is undeniably a logical argument as long as an association between exposure to particulate pollution and mortality exist, the mortality risks of short-term exposure should be less than those of the long-term.

2.1.2 Empirical Studies on Environmental Cost Management Accounting

The study of Nagle (1994), on environmental accounting reveals that corporate managers are placing high priority on environmental accounting. Environmental accounting as a prevalent subject in the international community is not yet a priority in Nigeria. Epstein (2011) explains pertinent aspect of environmental degradation and cost as those including emissions into the air, water and land. It also include aspects of untreated domestic waster outflows into river and costal oceans and quantities of solid water that must then be disposed of perhaps through land spreading or incineration. Pollution include airborne SO₂ emissions from power plants by stack – gas scrubbing which leaves a highly concentrated sludge and degradation which incorporated midnight dumping, illegal dumping along the sides of roads or in remote areas. Field (2011) has done tremendous work on the economies of natural resources and in this instance explored the approach of benefit-cost analysis through discounting of future based input and output values of environmental projects and activities.

2.2.0 Importance of environmental management accounting

At all times it is important in decision making to provide accurate costs information. The consciousness and need to protect the environment will make for environmental costs to be identified, accurately measured and reported conventionally along with companies' overheads before allocation to products or processes. Sometimes they have been totally left out of financial reporting because they constitute externality social costs which did not form part of bottom-line financial reporting. Adverse effect on the society known as environmental social costs, or externality costs is a critical issue for consideration. This is considered an

issue of responsibility for environmental accountability. Externality costs are therefore internalized as part of environmental cost accounting. The term environmental cost does not only refer to costs paid to comply with regulatory standards, costs which have been incurred in order to reduce or eliminate releases of hazardous substances but all other costs associated with corporate processes which reduce adverse effect on the environment. Several definitions have proffered for environmental accounting. Hansen and Mowen (2000) have defined environmental costs as cost associated with the creation, detection, remediation and prevention of environmental degradation'. EPA (1995), defined Green Accounting or Environmental Accounting as: 'identifying and measuring the costs of environmental materials and activities and using this information for environmental management decisions'. Significance of EMA are identified as not only involving information provision, management planning and control, but an adaptation from the German Environment Ministry 28 (2003) identifies three broad benefits of EMA supports environmental protects through cost efficient compliance with environmental regulations and self-imposed environmental policies. Examples are in planning and implementing pollution control investments or projects. It involves also, investigating and purchasing cost efficient substitutes for toxic materials and the reporting of environmental wastes and emissions to regulatory agencies.

2.3.0 Impact of Pollution and Land Degradation on Economic Growth

Pollution has been defined in Wikipedia (2009) as the release of chemical, physical, biological or radioactive contaminants to the environment'. Pojman (1999) says pollution is unwanted substances as contaminants', also citing the National Academy of Sciences definition as 'undesirable change in the physical, chemical, or biological characteristics of the air, water or land that can harmfully affect health, survival, or activities of human or other living organisms'. Water pollution affects oceans and inland bodies of water. These may include organic and inorganic chemicals, heavy metals, petrochemicals, chloroform and bacteria. Water pollution may also occur in the form of thermal pollution and the depletion of dissolved oxygen.

Land degradation according to Wikipedia (2009) is a human induced of natural process which negatively affects the capacity of land to function effectively within an ecosystem by accepting, storing and recycling water, energy, and nutrients'. The causes of land degradation are identified as anthropogenic and mainly agricultural related. They include; Land clearing and deforestation, agricultural depletion of soil nutrients, urban conversion, irrigation and pollution. Further description and impact on land resulting from degradation according to Wikipedia (2009) state as follows; Sever land degradation affects a significant portion of the earth's arable lands, decreasing the wealth and economic development of nations. Land degradation cancels out gains advanced by improved crop yield and reduced population growth. As the land resource base becomes less productive, food security is comprised and competition for dwindling resources increases, the seeds of potential conflict are sown. Thus a downward eco-social spiral is created when marginal lands and nutrients are depleted by unsustainable land management practices resulting in lost soil stability leading to permanent damage. We often assume that land degradation only affects soil productivity. However, the effects of land degradation often have more significant impacts on receiving water courses (rivers, wetlands and lakes) since soil, along with nutrients and contaminants associated with soil, are delivered in large quantities to environments that respond detrimentally to their input. Land degradation therefore, has potentially disastrous impacts on lakes and reservoirs that are designed to alleviate flooding provide irrigation and generate hydro-power.

3.0 Research Methodology

This chapter entails the method through which the various objectives of the study are achieved. It contains the methodology used in examining environmental cost of Pollution in Nigeria. This chapter is sub-divided into 5 sections. It includes introduction, model specifications, apriori expectations, measurement of variables, and technique of data analysis and sources of data.

3.1.0 Population of Study

The population of study includes all legally registered Oil companies listed on the Nigerian Stock Exchange Market (2014) which totalled 352 companies.

3.1.1 Data Collection Instrument and Procedure

Data and information for this study were gotten from Central Bank of Nigeria statistical bulletin. Information required are Gas production, Gas utilization and GDP.

3.1.2 Model Specification

The statistical technique that will be adopted is multiple regression analytical technique because more than one independent variables are to be used.

In achievement the first objective we adopt the model formulated by Asaolu and Osemene (2009). The explicit stated.

$$GDP = f(QGF, QOS, K, L) \dots\dots\dots (1)$$

Transforming the explicit model above into an implicit model, we have

$$GDP = \beta_0 + \beta_1 QGF_t + \beta_2 QOS_t + \beta_3 K_t + \beta_4 L_t + \mu_t \dots\dots\dots (2)$$

To present and show the long-run relationship between the variables, we log linear equation (2) above

$$LogGDP_t = \beta_0 + Log\beta_1 QGF_t + Log\beta_2 QOS_t + Log\beta_3 K_t + Log\beta_4 L_t + \mu_t \dots\dots\dots (3)$$

Where

β_0 = The intercept for the whole regression model

β_1 = The slope of QGF

β_2 = The slope of QOS

β_3 = The slope of K

β_4 = The slope of L

GDP = Gross Domestic Product (Dependent Variable)

QGF = Quantity of Gas Flared (Independent Variable)

QOS = Quantity of oil spilled (Independent Variable)

K = Capital (Independent Variable)

L = Labour (Independent Variable)

μ_t = Disturbance/Error term

K,L = Control Variables

A Priori Expectation

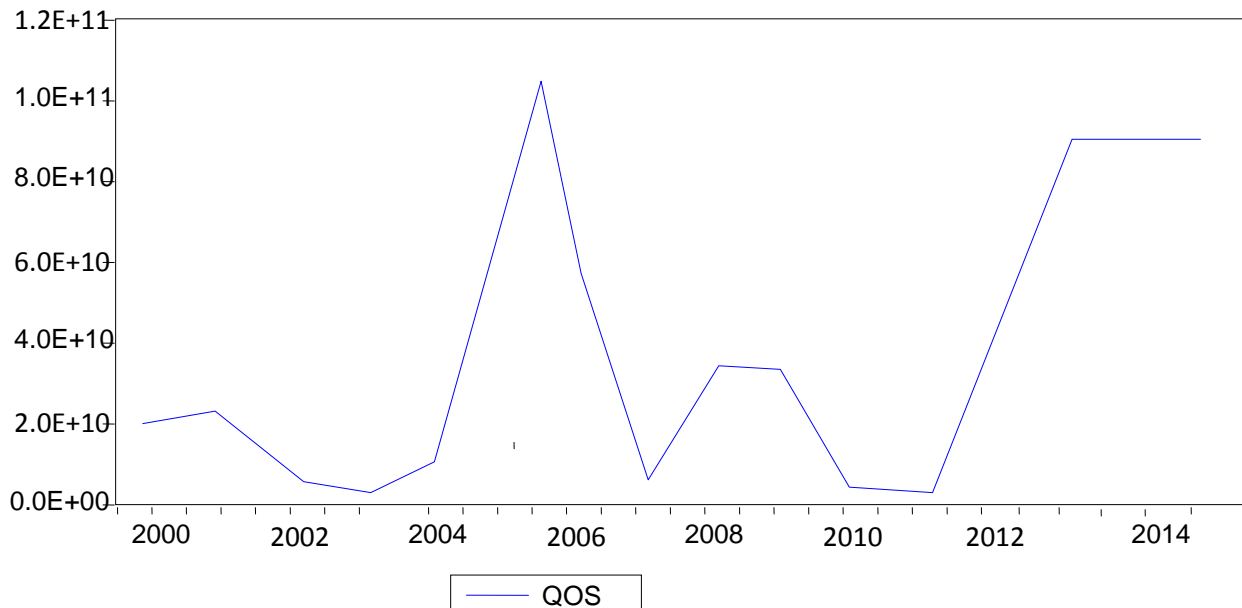
In achieving the first objective, the pollution cost and Economic loss is expected to have a positive relationship

$$\beta_1 > 0, \beta_2 > 0$$

4.0 Data Presentation, Analysis and Interpretation

This chapter gives an insight into the relationship between Pollution and Economic growth in Nigeria and also deals with the trend of Pollution and Economic growth in Nigeria from 2000 to 2014.

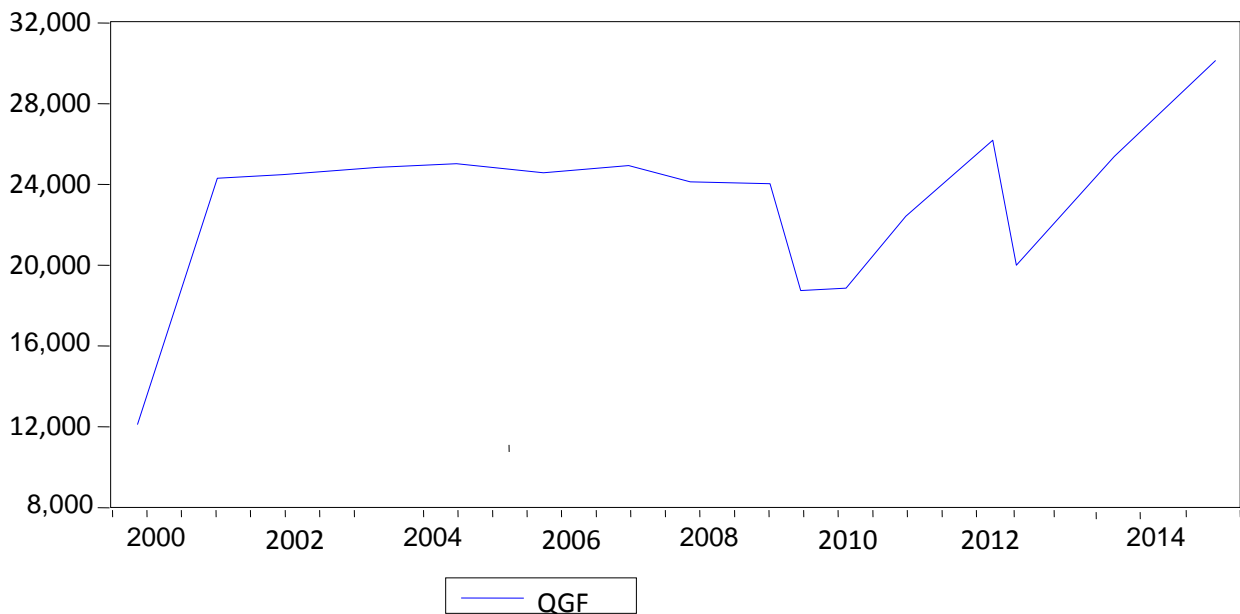
Fig. 4.1 Trend analysis on Quantity of oil spilled (in millions)



The quantity of oil spilled is the amount of oil spilled that is not recovered which causes pollution to the environment. From the analysis above, the quantity of oil spilled shows an increase from year 2000 to 2001 and then a decline in 2002 and 2003, this might be due to the standards set up in 2002 to reduce and control pollution. For example environmental guidelines and standards for the petroleum industry in Nigeria (EGASPIN) introduced in 2002 helped tremendously in this respect. It increases in 2004 and then in 2005 increases speedily, this increase might be due to the sabotage and theft in February 2005. This is in line with Shell Petroleum claim that most of the oil spills were as a result of oil theft and sabotage. By 2007 it starts to decline and increase 2008. In 2009 it increases and declines in 2010 and increases in 2011 to 2012, this increase might be due to the vandalization and theft by militants by Shell Petroleum in conjunction with the Federal Government of Nigeria.

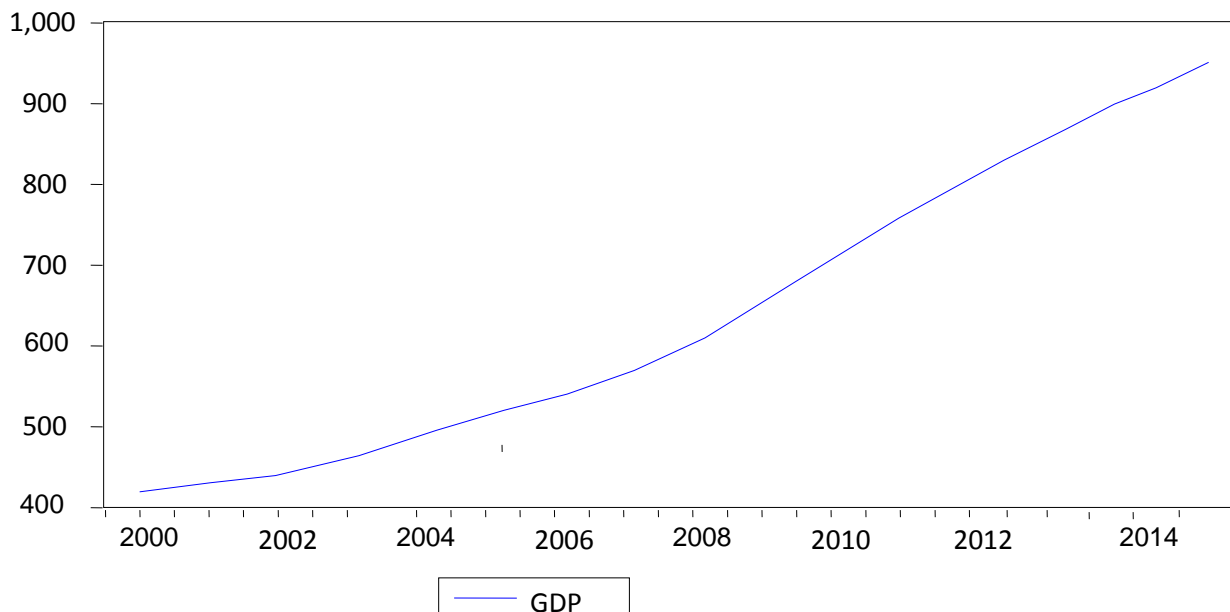
Fig. 4.2 Trend analysis on Gas flared in Nigeria (in millions)

Quantity Flared



The quantity of Gas flared is the amount of gas combustion undertaken so as to prevent the chemicals from contaminating the environment. From the analysis above, there is an increase in quantity of gas flared from 2000 to 2002. This might be as a result of the continuous flaring by oil companies even when the government declared gas flaring as illegal. The oil companies preferred to pay fine and penalty than clean up the society. There is a steady rate from 2003 to 2008 which then declines in 2009 and increases in 2010 to 2011. This might be as a result of not attending to the gas flared when the oil rig belonging to Chevron caught fire. It later decreases in 2012 and then increases in 2013.

Fig. 4.3 Trend analysis on economic growth (in billions) GDP



Economic Growth is the growth in the Gross Domestic Product (GDP) in Nigeria. The GDP in Nigeria from 2000 to 2014 shows a gradual increase each year to the next year as seen above. These are factors that determine economic growth in Nigeria, Economic factors like Natural resources, Capital accumulation, organization, technological process, division of labour and scale of production, structural changes. In 2000 Niger Delta Development Commission (NNDC) was created to coordinate economic and social development in the oil producing region.

Table 4.1 Regression Estimate

Dependent Variable: LGDP				
Method: Least Squares				
Date: 06/01/15 Time:23:53				
Sample: 2000 2013				
Included observation: 14				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-46.49831	9.535424	-4.876375	0.0009
LCAPITAL	-0.096148	0.068247	-1.408817	0.1925
LLABOUR	-3.503994	0.613102	5.715189	0.0003
LQOS	-0.009385	0.010916	-0.859711	0.4123
LQGF	-0.044079	0.040801	-1.080333	0.3081
R-squared	0.991533	Mean dependent var		13.33385
Adjusted R-squared	0.987770	S.D. dependent var		0.272416
S.E. of regression	0.030126	Akaike info criterion		-3.894417
Sum Squared resid	0.008168	Schwarz criterion		-3.666182
Log likelihood	32.26092	Hannan-Quinn criter		-3.915544

F-Statistic	263.4996	Durbin-Watson stat	1.671898
Prob(F-Statistic)	0.000000		

Source: Author's Computation from E-views

From table 4.1 above, the R^2 of 0.99 indicates that the independent variables jointly explained the variation in the dependent variable by 99%. This is very high. The above fact was further buttressed by the adjusted R^2 of 0.987770 which equally confirms the fitness of the model. The prob F-statistic of 0.000000 is statistically significant at 5% level of significance. This shows that the independent variables jointly and significantly influence the economic growth. The Durbin Watson statistics of 1.671898 shows no autocorrelation in the sample since the value is close to 2. The coefficient of K is negative (-0.096148) and statistically not significant at 5% level (-1.408817). The coefficient of L is positive (3.503994) and statistically significant at 5% level (5.715189). The coefficient of QOS is negative (-0.009385) and statistically not significant at 5% level (-0.859711). The coefficient of QGF is negative (-0.044079) and statistically not significant at 5% level (-1.080333).

The study therefore concluded that capital, quantity of oil spilled and gas flared have insignificant impact on economic growth proxy by the Gross Domestic Product. However, labour revealed a significant relationship with GDP. In conclusion this study found out that only labour affects GDP.

5.0 Summary, Conclusion and Recommendation

This study examined the impact of environmental accounting and economic growth in Nigeria over the period 2000 to 2014. The study examined the trend of pollution and GDP and also examined the impact of environmental accounting on economic growth.

The study used secondary data from CBN statistical bulletin 2013 edition. The study employed regression analysis and a descriptive statistics inform of line and graph to examine the trend.

From the findings of the analysis, it was observed that capital, quantity of oil spilled and gas flared are insignificant to GDP but labour is significant to GDP.

5.1 Conclusion

This study investigated the impact of environmental cost on the output of oil and gas companies in Nigeria. The key variables used to proxy pollution were quantity of gas flared and quantity of gas spilled. Therefore the study concluded that capital, quantity of oil spilled and gas flared are insignificant to GDP but labour is significant to GDP. In conclusion this study found out that only labour affects GDP.

Policy Recommendation

Previous studies on environmental accounting have only considered the impact of environmental accounting on output of oil companies but this study considered the impact of environmental accounting on the government, companies and the society as whole.

Based on the regression estimate, the following recommendations are given to the government, oil and gas industries and to the general public.

1. The fine and penalty for oil spillage and gas flaring should be increased to an amount that out rightly discourages oil companies from flaring gas.
2. Government should establish polices and agencies that make sure oil and gas companies clean up after pollution.
3. Companies should account for each oil spillage caused and strictly adhere to the rules and regulation governing them.

4. Embargo should be placed to reduce oil exploration by multinational companies to as to reduce pollution.

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