

## The Nigerian Oil and Gas Sector Environmental Health and Safety Constrains

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### Abstract

*Effective Environmental Health and Safety (EH&S) is a focal point to ensuring environmental sustainability. Hence, if this is lacking, the resultant consequences are major ecological footprint and concern that leads to environmental degradation. The Niger-Delta region of Nigeria is not far from these phenomena. However, this can be attributed to the activities of Nigerian oil and gas sector and the construction industries at large in, the quest for exploration to highness natural resources for energy production and industrial activities. Principally, the contributory factors to the bulk of Nigerian environmental pollution is as a result of oil and gas explorations processes, linked to unlawful dumping of industrial and chemical wastes, oil spillage and leakages, incessant gas flaring coupled with unwholesome EH&S management culture. These environments under pollution, are risk prompt, unsafe and unhealthy, with resultant consequences of losses in products and finances, which endangers the lives of humans, animals and the ecosystem at large. The application of qualitative and quantitative analysis were the indices used in the evaluation of this research results. However, to minimise the extents of these damage on the environment, proactive BPEO with sustainable EH&S practice should be inculcated with effective implementations in all ramification, in order to prevent as well as mitigate ecological and environmental pollutions and to create a sustainable environment for biodiversity to thrive.*

**Keywords:** *EH&S, Environmental pollution, Environmental sustainability, GHG, Oil spillage,*

### 1.0 Introduction

Oil and gas industrial sectors had witnessed a significant growth during the recent years of oil exploration, this has made the sector to undertake significant changes within the business arena. However, it's one of the largest sector within the globe, with drastic increasingly revenue generation as well as cost effective measures to providing at the present, the required energy source for its teaming customer satisfactions of their needs. Similarly, in general terms, oil and gas processes involves various activities in both the upstream and the downstream sectors these includes; explorations, drilling activities, extraction and refining of the raw materials, storage, transportation and distribution as well as selling of the products etc. Furthermore, the sequence of these activities, contains enormous risk and uncertainty in its domain. However, there are

significant efforts made by some companies to reducing the adverse effects of these menace on the physical environment as well as people (Authors industrial research).

## **2.0 Nigerian Petroleum Industry, an Overview**

Dated to the discoveries of bulk deposits of natural crude oil (petroleum) in Nigeria and within the Niger-Delta region in the year 1950s, this natural resource is the integral part of Nigerians economy and its political settings. The industrial oil sector in Nigeria is however vastly dominated by NNPC, which was founded in the year 1977. While the western MNOCs dominated general explorations and drilling processes, as well as shipping of the crude oil. In lieu of these exploration processes, the host communities have felt the severe negative impacts this exploration had caused their natural environments and its citizens. Similarly, this destruction is eminent even on the economic viability of agricultural produce (Omeje, 2006 and Ojakorotu, 2010a). Hence, this could be attributed to the failure of the FGN to enact and enforces sustainable environmental protection laws to govern the affairs of oil companies.

The inadequacy of this regulation in the affairs of multinational oil producing companies have made the host communities to compromising because of the adverse environmental degradation oil exploration had caused (Ibeanu, 2000b). It's evident that the local economy has been devastated, resulting from the socioeconomic as well as the environmental degradation caused by oil exploration, living a vast and majority of the biodiversity and the wildlife completely vulnerable to destructions, alongside contamination of the available fertile lands for agriculture, couple with adverse damage and loss of marine life (aquatic environments) (Ojakorotu and Okeke Uzodike, 2006).

These menaces of negative oil exploration processes have inflicted serious and complicated health problems on the teaming populace of dwelling communities as well as neighbourhood surrounding areas, whom has little or no knowledge of health and safety as well as BPEO. Among other contributory environmental degradation visible in this host communities, are the adverse pollutions resulting from gas flaring, oil spillage, leakages and the dumping of oil wastes on both land and in the waterbodies. The World Bank has reported that, about 75% of Nigerian gas productions are flared yearly. Positioning Nigeria as one of the largest gas flaring nation among other nations around the globe (Garner, Svensson, and Djumena, 2004). The resultant effect of gas flaring is that, it leads to unmeasurable ecological as well as physical damage to environmental resources (Air, Land, Vegetation cover and Water). Similarly, flared gas lives a soot deposits on roofs within surrounding settlements. Hence, the soot with a black ink natured is being washed down the roof when raining. This residual deposit is chemically formed, when combined with soils, it adversely alters the soil fertility. (Ibeanu, 2000a).

Oil spillage and the dumping of residual oil wastes into water-ways are a major cause of water poisoning to both man, animals, aquatic lives and vegetation within the surrounding communities of oil exploration regions. It has been reported by the UNDP that, the Niger-Deltas creeks and its terrains has received over 400,000 tonnes of spilled oil for the past 30yrs (Wilde-Ramsing, 2008). Similarly, according to (Adati A. K., 2012), (NNPC, 2013) and (US Legal, 2016), oil exploration and processing companies are contributors of the sporadically increase in ecological footprints in Nigeria as well as the rest of the world, and pollutions due

to pipe network leakages, explosion as a result of seismic survey works, blowouts, discharge from drilling fluid and refining effluents, unsustainable disturbance of the natural environments as a result of industrial and infrastructural constructions, with resultant effect of reducing the available soil nutrients and or increasing the toxicity content of soils for the requirement of plantation agricultural growth.

Furthermore, other contributory phenomenon includes; uncontrolled gas flaring in all Nigerian refineries, and are termed to be the largest gas flared country in the world for many decades. According to environmental groups, this menace has contributed to a large volume of GHG emission beyond any other source of emission within the African Sub-Sahara region. This phenomenon can reduce crop yields and retarded the growth of plants in surrounding farm lands. It also disrupts wildlife of host communities. Added with the indiscriminate and persistent dumping of refinery waste in nearby local communities by oil companies, as an avenue for cheap and effortless way to illuminate their waste compositions. Coupled with persistent oil spillage within the Nigerian environments are as a result of deliberate sabotage and damages inflicted onto oil pipelines, for crude oils theft by vandals. This activity is costing Nigerian billions of dollars (Amnesty International, 2011) and (NNPC, 2013).

### **3.0 Sturdy Aim and Objective**

To outline the major constraints in the Nigerian oil and gas exploration processes relative to EH&S. And to proffers effective recommendations as mitigation for sustainability management process.

### **4.0 Materials and Methodology:**

#### **4.1 Materials:**

This research had adopted the use of relevant scholarly materials, raw data from various sources, to include developmental questioner and interview with several workers from selected major oil and gas producing companies or industries in Nigeria.

#### **4.2 Method:**

Generally, several methodologies would have been visible to undertaking this research work. However, a conglomerate of both quantitative as well as qualitative approaches has been chosen. This is however to increase the probability and the likelihood of exploring effectively the various constraints of EH&S management within the Nigerian oil and gas sectors.

### **5.0 Research limitation**

The limitation to this research work is characterised by the followings:

1. Only seventeen (17) out of the thirty (30) Developmental Questioners administered were received and completed by the respondents whom are at junior staff cadres;
2. The condition to the acceptance of the Developmental Questioners is that, "only if the names of their company will not going to be mentioned in this research work" and
3. Both Senior and the Intermediate Staff of the companies declined the acceptance to be administered with the Developmental Questioner, nor to respond to oral interview

## 6.0 Results and Discursions

### 6.1 Results

Table 1: EH&S issues in Nigerian oil and gas sector.

Fields	Related issues
Environment	<ul style="list-style-type: none"> <li>• Sustainable management of both hazardous and non-hazardous wastes are lacking;</li> <li>• Prevalence of gas flaring which contribute greatly to GHGs;</li> <li>• Oil spillage is rampant, hence the environment is heavily polluted; and</li> <li>• Noncompliance to managing and monitoring of land, water and air quality;</li> </ul>
Health	<ul style="list-style-type: none"> <li>• Ineffective monitoring of constructions and industrial hygiene's</li> <li>• Persons Health &amp; Safety are not well taking care off;</li> <li>• Host community health are endangered, resulting from the use of hydrocarbon contaminated water, aquatic foods, vegetation, &amp; the inhalation of polluted air.</li> </ul>
Safety	<ul style="list-style-type: none"> <li>• Issues regarding energy and process control;</li> <li>• Workforce training issues (follow-up is lacking);</li> <li>• Accidents (human injuries and incidents) are visible and rampant;</li> <li>• Lack of the use of current effective and adequate safety material is prevalence.</li> </ul>

**Sources:**(Authors Industrial research, 2019)

Table 2: Peculiar Nigerian factors

Particulars	Descriptions
Nigerian direct human casualties	Throughout the Niger-Delta's peak eras of conflicts, an approximated figure of, up to 1000 individual's deaths are recoded yearly. These figures are related to both directly oil thefts as well as kidnapping related issues to oil thefts. While number of deaths issues related to pipeline vandalization and explosions are usually not known, because the corpses are usually burnt to ashes.
Nigerian environmental problems	Major oil spills cases in Nigeria, are attributed to deliberate and direct human activities such as sabotage (vandalization) of oil facilities (pipeline networks), for theft purposes. The resultant effect of this spillage is pronounced on the immediate environments (air, land plants & water), fuel stocks, to include devastating health effects on both human and animals.

**Sources:** (Authors Industrial research, 2019)

## **6.2 Nigerian environmental constrain (oil producing regions)**

The constrain with unsustainable environmental governance by the Nigerian oil and gas sectors has degraded and ravaged the large oil producing region in Nigeria (Niger-Delta) for so many decades. However, for this reason, fundamental environmental sustainability is partial and or completely lacking, leading to major sources of embroilment of crisis between the local communities for the quest of farm land and dominancy over pipe network, competitions between MNOCs, the case of government forces deployed in the cricks to halt rising militias groups sabotaging oil and gas facilities and installations, so also the taking of both foreign and local oil exploration and construction workers as hostages for ransoms. However, according to (Ojakorotu, 2000b and 2010), most of the crisis in Nigeria are because of environmental degradation, the rights of citizens, resource control and to couple with external manifestations of violent agitation as well as criminally induced activities by few sets of people/groups at the advantage of the deuterated situations, with the inability to have effective measures to addressing these challenges. Similarly, about 2% of the global oil requirements are produced in the Niger-Delta region, and accounts for more than 80% foreign Nigerian reserves.

## **7.0 Evaluation of Nigerian oil and gas sector problems**

The problems associated to Nigeria economical oil and gas exploration/industrial sector includes:

1. Lack of effective knowledge and awareness for sustainability in environmental, health and safety by the host communities and some of the industrial workers;
2. Local communities as stakeholders has little or no knowledge and the enabling laws to supporting them to accept or to reject certain projects and processes as it affects the physical environments;
3. A gross neglect for the implementation of sustainable environmental, health and safety by oil companies and their subsidiaries;
4. Lack of knowledge and or the utilization / implementation of EIA as well as BPEO by the host communities, industrial workers;
5. The lackadaisical attitude of the oil exploration companies as well as the Nigerian government to enforce the applicability and the effective compliance to EIA and BPEO in the oil exploration environments;
6. EH&S are not in compliance to international standards in Nigeria, as obtainable in most developed countries of the world;
7. Similarly, the oil and gas working environment has no maximum safety (virtually unsafe working conditions). With little or no supporting for R&D in EH&S management by industries, reliance is majorly from Nigerian PTDF;
8. Majority of the industrial worker are faced with difficulties of exercising their civic rights and duties, this exposes them to the prevalence of risks and uncertainty;
9. Oil and gas infrastructural facilities such as pipes and flow lines has little or no continuous and regular turnaround maintenances to minimise possible risk;
10. There is visible footprint of underdevelopments, and ravaging poverty despites the bulk of undelaying oil deposit and exploration processes in progress. Similarly, the host

communities are left with just a little or non-arable farmland left for farming, non-availability of fresh and palatable drinking water, loss of aquatic animals, social and health infrastructures are not adequate. All as a result of degradation/contamination/pollutions of the environments as well as the ecosystem, resulting from both deliberate and accidental human factors *table 1 and 2* above.

### 8.0 Environmental sustainability

Environmental Sustainability, it's an effective means of conserving and utilising the available environmental natural resources as well as the biodiversity, in the present and for the future needs of human generations. Environmental sustainability is dependent on indicators known to be, Environment, Society and Economy *figure 1*. Hence, if this target of Environmental Management is to be achieved and sustained, an effective and proactive environmental management, must define BPEO of human activities and practices within an ecological system.

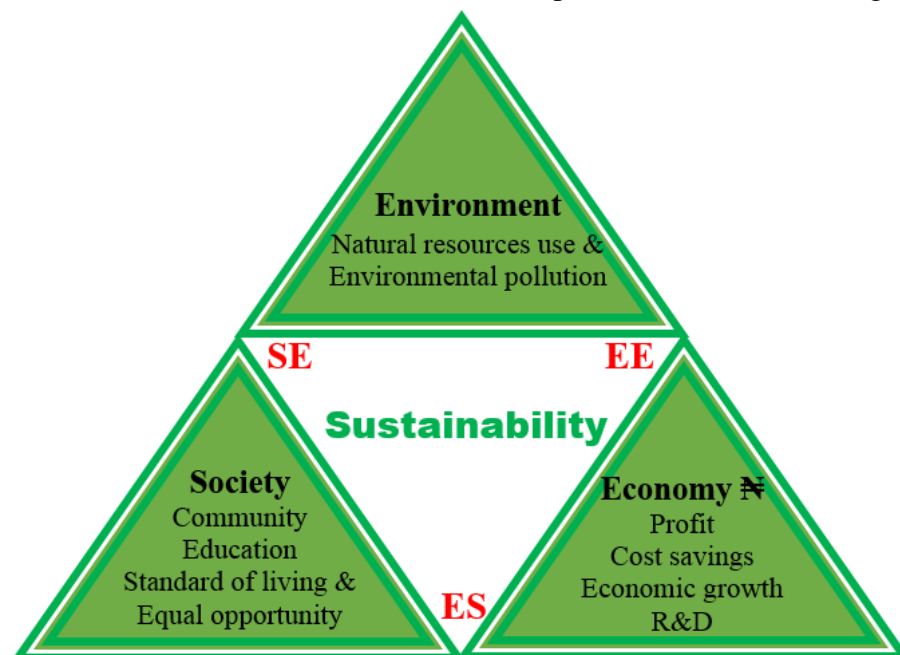


Figure 1: Sustainability iron triangle

**Sources:** (Authors Industrial research, 2019)

### 8.1 Conflicts of Sustainability indicators

According to EEA, indicators are certain parameters that supports effective evaluations of the impact of human activities within the natural environments. However, the main sustainability indicators are the Environment, Society as well as Economy, and are referred to as the sustainability golden triangle. Each of this fundamental indicator, has in its domain several other sub-indicators, which help in easy assessment and measures certain event(s). *figure 1*. (Pauline Thompson, 2008; US EPA, 2012; Sustainable measure, 2013 and Saleh M.A, 2015). The different forms of indicators provide easy identification within its domain, certain constraints and with possible mitigation measures, prior to the problem becoming unbearable to be effectively manage within the environment. Therefore, this implies indicators are matrix



or verdict of saying "how much" or "how many" or "to what extent" or "to what size" will an activity be of positive or negative impacts on to the environment.

For instance, a society of people cannot thrive without enhanced socio-economic activities, this is only obtainable and possible within the physical environment, for utilising the available environmental natural resources. This implies, only if these sustainability indicators are symbiotically harnessed with equal and or more replacements in its place of utilisation, otherwise environmental sustainability is jeopardised. Hence, conflicting issues of sustainability indicators becomes prompt and will endangers the environments, lives and the existence of the present and the future generation yet unborn (Saleh M.A, 2015).

### **9.0 Summary of major Nigerian oil & gas constraints**

This research has outlined the following major challenges as constraints affecting the Nigerian oil and gas exploration among which are:

1. Its eminent that there is inadequate training and retraining of staff on EH&S devices in the oil and gas operations by various companies;
2. Latest developmental plans as well as effective operational practices were not integrated within the existing process of EH&S management;
3. The host communities lack the provision to adequate and effective social service facilities, coupled with none sensitization to the need for EH&S practice. While pipeline vandalization and oil spillage is rampant;
4. Similarly, there are rampant cases of flow lines blowouts of oil and gas facilities in Nigeria, resulting from management neglect to promoting EH&S culture;
5. Industrial workers are grifted with fear to exercising certain leverage at work, as well as being involved in site accidents and or being kidnaped because of site insecurity;
6. The industrial oil and gas sectors has deliberately refuses to adapt the use of newer technologies and innovations. With the intention to reduce operational costs of their companies, so as to make more profit, with no emphasis on BPEO, related to EH&S;
7. There are no urgent as well as proactive mitigation measure for environmental degradation caused by the activities of oil exploration in Nigeria.

### **10.0 Conclusion:**

The contributory factors to the bulk of Niger-Delta environmental pollution is as a result of oil and gas explorations processes, linked to unlawful dumping of industrial and chemical wastes, oil spillage and leakages, incessant gas flaring coupled with unwholesome EH&S management culture. These environments under pollution, are risk prompt, unsafe and unhealthy, with resultant consequences of losses in products, finances, endangers the lives of humans, animals and the ecosystem at large. However, to minimise the extents of these damages on the environment, it's the duty of the Nigerian government and the oil industrial stakeholders to be committed in safeguarding the Nigerian environments to providing and ensuring a safe, healthy and accident free working environment. These can relatively be accomplished through, relevant R&D to design a comprehensive environmental sustainability risk based approach, which focuses on an overall safety management principles, in-line with proactive EH&S risk

assessments and management to guide all stakeholders in decision making, and to institutionalise effective mitigation measures for all risk and uncertainties, as well as to reduce and to eliminate the impact of human activities, by ensuring a strictest safety standards in the environments are followed during operations, constructions and processes.

### **11.0 Recommendations**

The problems associated to the oil and gas exploration sector in Nigeria, requires a prompt EH&S action plans. However, to addressing these phenomena, the below listed recommendation to the Nigerian government, stakeholders and oil industries, would provide an effective as well as adequate means of establishing sustainable EH&S culture in the oil and gas sector, namely:

1. There should be an effective enforced law with stringent penalties, on all forms of hydrocarbon and chemical contaminations/pollutions capable of causing environmental degradation, risks and uncertainty;
2. A mandatory compliance to a provision for enlightenment and awareness is to be made, in terms of EH&S practice, as responsibilities to be discharged by both the stakeholders and the employers in the oil industries, to their employees and their host communities;
3. The Nigerian government should enforce an effective system of the polluter pays principle (PPP), in cognisance with global BPEO;
4. The Nigerian government and the oil companies, should thoroughly demonstrate the understanding with maximum enforcement of effective EH&S principles, accident prevention mechanisms, as well as control and improvement strategies within the oil industrial sector;
5. There should be in place, a proactive and quick respond hydrocarbon pollution and contamination remediation process at the national level and in the oil producing region;
6. There should also be an effective input to R&D in EH&S management system by both oil producing companies and the stakeholders alike;
7. Similarly, there should be an in-depth understanding of risks, uncertainties and hazards and their causes as they affect or harm the employees and the environment (exposure to vibrations, noises, toxic gases, manual handling, hazardous substances, contaminations and pollution etc.);
8. The workforce of all the oil companies should have maximum understanding of the main importance of risk assessment and risk management process, as techniques for proactive accidents as well as ill health preventions mechanisms;
9. Finally, the oil industrial stakeholders and their workforce should have current in-depth understanding of how individual(s) responses or actions can minimise risks to H&S issues, and the benefits of adhering to systems, procedures as well as rules in EH&S.



## 9.0 Nomenclature

Acronyms	Descriptions
BPEO	Best Practice Environmental Options
EEA	European Environmental Agency
EH&S	Environmental, Health and Safety
EIA	Environmental Impact Assessment
FGN	Federal Government of Nigeria
GHG	Greenhouse gas
H&S	Health and Safety
MNOCs	Multinational Oil Company(s)
NGOs	Non-Governmental Organizations
NNPC	Nigerian National Petroleum Cooperation
PTDF	Petroleum Technology Development Fund

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