American Journal of Engineering Research (AJER)
e-ISSN: 2320-0847 p-ISSN: 2320-0936
Volume-14, Issue-7, pp-01-15
www.ajer.org
Research Paper Open Access

A Critical Analysis of the Current State of Environmental Health and Safety in the Oil Industry in Nigeria

P.U. Oritseje[1] and P. Ebiarede[2]
[1]*Technische Universität, Berlin, Germany*
[2]*Electrical Engineering Department, Nigeria Maritime University, Okerenkoko, Nigeria*
Corresponding Author: P. Ebiarede

ABSTRACT : *This research is a comprehensive review of the current state of environmental health and safety in the oil and gas industry with particular focus on Nigeria. The author has taken time to review from the origin of the oil industry to the present state in a bid to expose the lapses and proffer solutions on how a total compliance to HSE-MS plays a critical role in harnessing the best of the industry in terms of gains in business, and to the overall good of all the stakeholders in the industry in order to achieve the MDGs of sustainability of life and the environment.*
KEYWORDS *Environment, health, safety, risk, sustainability.*

Date of Submission: 02-07-2025 Date of acceptance: 12-07-2025

I. INTRODUCTION

The modern history of oil and gas exploration began in the 18th century, with the first well drilled in Baku in 1846 (Udosen et al., 2009). At that time, oil exploration was performed with percussion tools having a depth of about 21 m. In the same year, Abraham Pineo Gesner discovered the kerosene refilling process for coal in Nova Scotia. Evidence revealed natural petroleum seepage in World Oil and Gas Business in 1847 by James Young, suitable for lighting lamps and lubricating machinery. In 1850, Canadian geologist Abraham Pineo Gesner discovered oil shale, liquid fuel from coal and refined bitumen, creating a gas light company and lighting the streets and cities of Halifax in Canada. The company expanded in 1854 to New York and Long Island in the United States, where North American kerosene gas light was created. A Few years later, Edwin Drake drilled a 69 ft oil well, with an estimated capacity of 25 barrels per day in Creek, near Pennsylvania and Titusville in the United States. Crude oil was first discovered in Warren, Pennsylvania, by David Beaty in 1875, leading to the opening of the Bradford oilfield refinery, which produced 77% of the world oil supply in the 1880s (Ite et al., 2016).

Between 1881 and 1950, a significant number of oilfields were discovered across the globe. Examples are Peru in 1863; Zorritos District, Dutch East Indies, in 1885; Sumatra, Persia, in 1908; Masjed Soleiman, Venezuela, in 1914 and Maracaibo Basin, Alberta, Canada, in 1947. This also includes Oil Rocks Neft Dashlari in 1949 at the Caspian Sea, off Azerbaijan (Enyoghasim et al., 2019). However, coal exploration and/or extraction remained paramount up until 1950s before it was replaced by oil. In 1956, oil was discovered at Oloibiri in Bayelsa State, which is in the Niger Delta of Nigeria (Pona et al., 2021). The Niger Delta area (Figure 1), where most of the oil operations in Nigeria takes place, is situated in the Gulf of Guinea between the longitude (5.05 E & 7.17 E) and latitude (4.15 N & 7.17 N). Nigeria has 2.58% of the total world population, estimated at 213 million, according to the United Nations World meter data as of 31 December 2021. It is situated on the west coast of Africa and, lies on the latitudes of 3° to 14° on the east of the Greenwich Meridian and 4° north of the equator. It has an area of 923,768.64 billion m². Nigeria shares boundaries with the Republics of Benin in the west, Niger and Chad in the north, the Gulf of Guinea in the south, and Cameroon in the east (Efua, 2022).

The oil and gas industry is principal to the development of many economies of the world, and the Nigerian economy is no exception. The reason is because the energy used in almost all the sectors of

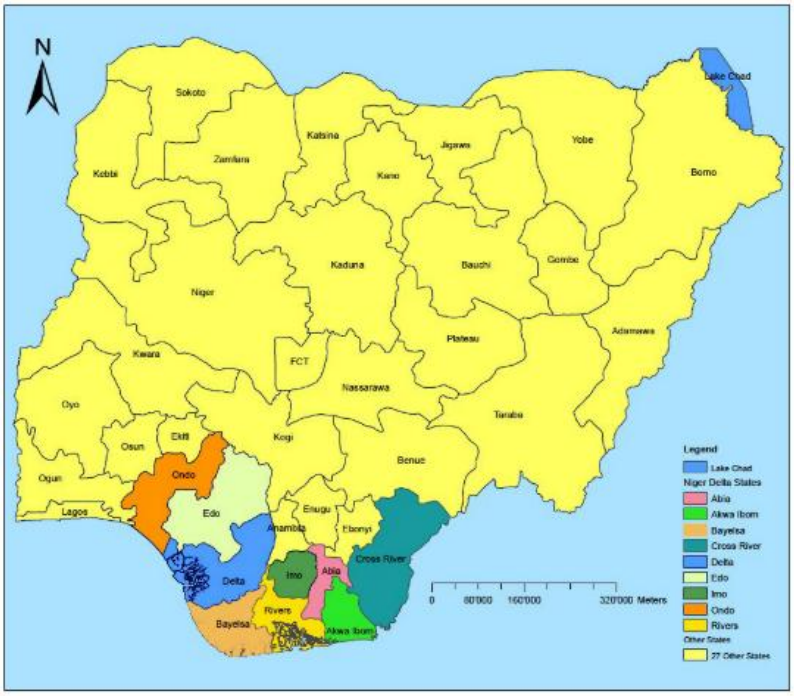

Fig. 1. The Niger Delta region in Nigeria(Ite et al., 2016)

these countries is from the oil and gas industry (Uwabimfura & Revocatte, 2020). The increasing demand for oil and gas has led to increased risks to human safety, and the preservation of the environment. The oil and gas industry places a significant emphasis on health, safety, and environmental (HSE) practices due to the potential risks involved in extraction, processing, and transportation. Increasing demand for oil and gas has led to increased risks to human safety, and the preservation of the environment (Sakib, 2021). The oil and gas industry places a significant emphasis on health, safety, and environmental (HSE) practices due to the potential risks involved in extraction, processing, and transportation. HSE management systems are implemented to mitigate these risks, and ensure the well-being of workers and the environment.

The oil and gas industry is made of three sectors; upstream, midstream, and downstream. The upstream sector is about exploration and production of the natural resource, searching for potential underground or underwater crude oil and natural gas reservoirs, drilling exploratory wells, subsequently drilling and operating the wells that recover and bring the oil and or natural gas to the surface and advanced recovery which is targeted at recovery by sophisticated means whatever is left of a source before such sources is completely phased out. The midstream is about product transportation (pipelines and shipping), storage, and marketing of the product (Umeokafor et al., 2014). The downstream sector is the part of the industry that is responsible for the final processing (refining) of the product, product distribution, and sales to different categories of outlets, and final consumers. Proper compliance with HSE regulations should, therefore, cut across all the mentioned sectors of the oil and gas industry.

Compliance means when a company or establishment has to fully meet the requirements of law, regulations, court orders and rules, requiring them to meet certain operational standards. Compliance with health, safety and environmental management is defined as the act of following set down safety policies and guidelines and participating fully in the mandatory safety activities. Health, safety and environment compliance focuses on behaviors that ensure work safety excellence is strictly adhered to. This may include complying with all safety precautions, doing exactly as told in a safe and timely manner and using appropriate safety tools and equipment (Odeyemi, 2022). The Petroleum Industry Act, which seeks to provide legal government regulatory and fiscal framework for the Nigerian petroleum industry, points out that ‘a contractor, sub-contractor, licensee, the corporation or any other person engaged in a petroleum activity shall take steps to eliminate or reduce risks or hazards to people, the environment or assets in accordance with the regulations and in compliance with the best industry practices (Petroleum Industry Act of Nigeria, 2021).

Companies are therefore compelled by law to abide by set HSE rules. However, enforcement of regulations is critical in ensuring the efficacy of regulations. Thus, regulations without proper enforcement is tantamount to no

regulations (Mafimisebi, 2016). The lack of strict enforcement of Health, Safety and Environmental (HSE) regulations would lead eventually to non-compliance with HSE regulations. On the other hand, it is argued that enforcement and compliance with HSE regulations is not the stand-alone requirement for improving HSE, as improving organizational culture can also improve HSE compliance. However, it is worth noting that the benefits of proper enforcement of HSE regulations are evident in countries with remarkable health and safety records.

Health, safety, and environmental management, in the oil and gas business, is described as the existence of a secure environment where the workers of an organization are protected on their jobs by mostly eradicating the possibilities of incidents occurring, which will therefore result in either major or minor injuries and accident, while also limiting the damage to the environment (Asare et al., 2021). Safety is a mixture of behaviors designed to invariably increase or decrease the risk of harm. Health, Safety and Environment (HSE) is a management system for managing risks within the company, to ensure the protection of employees, assets, and company reputation. The HSE management system has the following elements (Udosen et al., 2009);

- Hazards and effects management process
- Strategic policy objectives
- Responsible resources organization
- Leadership management
- Implementation audit
- Management review

Successful management of employee safety and health is paramount to reducing the statistics of workplace accidents and injuries (Kelechi, 2023). To achieve this, management must incorporate methods of finding and understanding all hazards, including potential hazards that could result from a change or series of changes in conditions or practices. Then management must either prevent or control those hazards so that workers are not exposed. For safety, health and environmental management system, there is a guideline document published and agreed in 1994 in Nigeria through the industry international exploration and protection forum.

The major components of HSE in the oil and gas industry include; health, safety and environmental protection (Chidiebere & Akpobolokami, 2020). Health involves the monitoring and management of the health of workers, addressing occupational hazards, providing proper medical care, and promoting wellness programs among workers. Safety has to do with implementing safety protocols, conducting regular safety inspections, providing adequate training, and ensuring the use of personal protective equipment (PPE) to prevent accidents and injuries. Environmental protection involves implementing measures to reduce environmental impact, including waste management, emissions control, spill prevention, remediation procedures, and habitat preservation (Nkwocha et al., 2018).

The federal government of Nigeria has set up various agencies and legislation to manage environmental issues. For instance, in the year 2000, several government agencies (e.g., Niger Delta Development Commission (NDDC) and Nigeria Federal Ministry of Environment) were established (Aletor & Ejikeme, 2022). Ite et al. (2013) evaluated the roles and practices of these agencies and impacts of existing legislation and suggested that they have failed to make a significant impact in managing environmental issues. The major issues attributed to their failure include fragmented environmental policies and lack of effective collaboration among the affected stakeholders. In agreement with Ite et al. (2013), Ola et al., (2024) concluded that the existing collaborative measures to tackle environmental issues have not been successful because of uncoordinated roles and practices of the participating stakeholders. Consequently, stakeholders that implement the policies often find themselves in regulatory competition because of overlapping, vague roles and responsibilities.

On August 16, 2021, the Petroleum Industry Bill was signed into law as the principal legislation regulating Nigeria's oil and gas industry. The Act seeks to provide legal, governance, regulatory and fiscal framework for the Nigerian Petroleum Industry. The Petroleum Industry Act (PIA) overhauls the regulation and governance of the oil and gas industry (Efua, 2022). The law provides for two regulatory agencies—the Nigerian Upstream Petroleum Regulatory Commission (NUPRC) and the Nigerian Midstream and Downstream Petroleum Regulatory Authority, (NMDPRA). Together, they will be responsible for the technical and commercial regulations of petroleum operations in their respective sectors, and have the power to acquire, hold, and dispose

of property, as well as sue and be sued in their own name (Petroleum Industry Act of Nigeria, 2021).
.

II. MATERIALS AND METHOD

This section presents the research method. HSE compliance Data from some sampled oil and gas companies from Nigeria are presented and analyzed to ascertain the level of compliance by different contractors. HSE data have been generated mostly from company records that have been made available by company operatives.

Nigeria Liquefied Natural Gas (NLNG)

Data from NLNG and its contractors showing their HSE compliance level is presented in tables 1 to 15. NLNG score itself and its contractors based on consideration of some already outlined criteria as listed in the compliance summary tables. Alphabets have been used to represent the different contractors for the purpose of confidentiality. It should be noted that NLNG has a scoring system as follows;

Greater or equal to 65: unconditionally meets company's HSE requirements

40 – 64: Conditionally meets company's HSE requirements

Less than 40: Falls short of company's HSE requirements

Table 1 Summary of HSE Compliance for NLNG

SN	HSE ASSESSMENT CRITERIA	SCORE
1	Leadership and Commitment	4.00
2	Policy and Strategic Objectives	4.00
3	Organization, Responsibility, Resources and Standards	18.33
4	Hazards and Effects Management	16.88
5	Planning and Procedures	8.75
6	Implementation and Monitoring	28.90
7	HSE Audit	4.00
8	HSE Management Review	4.00
	TOTAL SCORE	**89**

Table 2 Summary of HSE Compliance for Contractor A

SN	HSE ASSESSMENT CRITERIA	SCORE
1	Leadership and Commitment	3.00
2	Policy and Strategic Objectives	4.00
3	Organization, Responsibility, Resources and Standards	16.25
4	Hazards and Effects Management	16.25
5	Planning and Procedures	6.00
6	Implementation and Monitoring	28.90
7	HSE Audit	2.00
8	HSE Management Review	3.00
	TOTAL SCORE	**79**

Table 3 Summary of HSE Compliance for Contractor B

SN	HSE ASSESSMENT CRITERIA	SCORE
1	Leadership and Commitment	2.00
2	Policy and Strategic Objectives	2.00
3	Organization, Responsibility, Resources and Standards	9.17
4	Hazards and Effects Management	6.25
5	Planning and Procedures	2.25
6	Implementation and Monitoring	14.45
7	HSE Audit	2.00

8	HSE Management Review	2.00
	TOTAL SCORE	**40**

Table 4 Summary of HSE Compliance for Contractor C

SN	HSE ASSESSMENT CRITERIA	SCORE
1	Leadership and Commitment	3.00
2	Policy and Strategic Objectives	3.00
3	Organization, Responsibility, Resources and Standards	12.50
4	Hazards and Effects Management	11.88
5	Planning and Procedures	6.00
6	Implementation and Monitoring	26.35
7	HSE Audit	2.00
8	HSE Management Review	2.00
	TOTAL SCORE	**67**

Table 5 Summary of HSE Compliance for Contractor D

SN	HSE ASSESSMENT CRITERIA	SCORE
1	Leadership and Commitment	2.00
2	Policy and Strategic Objectives	2.00
3	Organization, Responsibility, Resources and Standards	5.00
4	Hazards and Effects Management	0.00
5	Planning and Procedures	4.75
6	Implementation and Monitoring	16.15
7	HSE Audit	2.00
8	HSE Management Review	2.00
	TOTAL SCORE	**34**

Table 6 Summary of HSE Compliance for Contractor E

SN	HSE ASSESSMENT CRITERIA	SCORE
1	Leadership and Commitment	2.00
2	Policy and Strategic Objectives	2.00
3	Organization, Responsibility, Resources and Standards	6.67
4	Hazards and Effects Management	6.25
5	Planning and Procedures	6.00
6	Implementation and Monitoring	11.90
7	HSE Audit	2.00
8	HSE Management Review	2.00
	TOTAL SCORE	**39**

Table 7 Summary of HSE Compliance for Contractor F

SN	HSE ASSESSMENT CRITERIA	SCORE
1	Leadership and Commitment	3.00
2	Policy and Strategic Objectives	4.00
3	Organization, Responsibility, Resources and Standards	15.00
4	Hazards and Effects Management	15.63
5	Planning and Procedures	6.83
6	Implementation and Monitoring	28.90
7	HSE Audit	2.00
8	HSE Management Review	2.00
	TOTAL SCORE	**78**

Table 8 Summary of HSE Compliance for Contractor G

SN	HSE ASSESSMENT CRITERIA	SCORE
1	Leadership and Commitment	2.00
2	Policy and Strategic Objectives	2.00
3	Organization, Responsibility, Resources and Standards	6.67
4	Hazards and Effects Management	6.25
5	Planning and Procedures	1.67
6	Implementation and Monitoring	10.20
7	HSE Audit	3.00
8	HSE Management Review	3.00
	TOTAL SCORE	**35**

Table 9 Summary of HSE Compliance for Contractor H

SN	HSE ASSESSMENT CRITERIA	SCORE
1	Leadership and Commitment	3.00
2	Policy and Strategic Objectives	2.00
3	Organization, Responsibility, Resources and Standards	12.50
4	Hazards and Effects Management	11.88
5	Planning and Procedures	6.67
6	Implementation and Monitoring	22.10
7	HSE Audit	2.00
8	HSE Management Review	3.00
	TOTAL SCORE	**63**

Table 10 Summary of HSE Compliance for Contractor I

SN	HSE ASSESSMENT CRITERIA	SCORE
1	Leadership and Commitment	3.00
2	Policy and Strategic Objectives	4.00
3	Organization, Responsibility, Resources and Standards	7.92
4	Hazards and Effects Management	11.88
5	Planning and Procedures	6.67
6	Implementation and Monitoring	20.40
7	HSE Audit	2.00
8	HSE Management Review	3.00
	TOTAL SCORE	**89**

Table 11 Summary of HSE Compliance for Contractor J

SN	HSE ASSESSMENT CRITERIA	SCORE
1	Leadership and Commitment	3.00
2	Policy and Strategic Objectives	0.00
3	Organization, Responsibility, Resources and Standards	5.00
4	Hazards and Effects Management	6.25
5	Planning and Procedures	2.25
6	Implementation and Monitoring	10.20
7	HSE Audit	3.00
8	HSE Management Review	3.00
	TOTAL SCORE	**33**

Table 12 Summary of HSE Compliance for Contractor K

SN	HSE ASSESSMENT CRITERIA	SCORE
1	Leadership and Commitment	2.00
2	Policy and Strategic Objectives	3.00
3	Organization, Responsibility, Resources and Standards	5.00
4	Hazards and Effects Management	7.50
5	Planning and Procedures	6.00
6	Implementation and Monitoring	12.75
7	HSE Audit	2.00
8	HSE Management Review	0.00
	TOTAL SCORE	**38**

Table 13 Summary of HSE Compliance for Contractor L

SN	HSE ASSESSMENT CRITERIA	SCORE
1	Leadership and Commitment	3.00
2	Policy and Strategic Objectives	4.00
3	Organization, Responsibility, Resources and Standards	15.83
4	Hazards and Effects Management	13.75
5	Planning and Procedures	8.33
6	Implementation and Monitoring	26.35
7	HSE Audit	2.00
8	HSE Management Review	2.00
	TOTAL SCORE	**75**

Table 14 Summary of HSE Compliance for Contractor M

SN	HSE ASSESSMENT CRITERIA	SCORE
1	Leadership and Commitment	4.00
2	Policy and Strategic Objectives	4.00
3	Organization, Responsibility, Resources and Standards	18.33
4	Hazards and Effects Management	13.13
5	Planning and Procedures	7.67
6	Implementation and Monitoring	26.35
7	HSE Audit	2.00
8	HSE Management Review	4.00
	TOTAL SCORE	**77**

Table 15 Summary of HSE Compliance for Contractor N

SN	HSE ASSESSMENT CRITERIA	SCORE
1	Leadership and Commitment	3.00
2	Policy and Strategic Objectives	2.00
3	Organization, Responsibility, Resources and Standards	7.50
4	Hazards and Effects Management	11.88
5	Planning and Procedures	6.00
6	Implementation and Monitoring	20.40
7	HSE Audit	2.00
8	HSE Management Review	2.00
	TOTAL SCORE	**55**

HSE Data from Seplat Energy Plc

Data from Seplat Energy Plc and its contractors showing their HSE compliance level is presented in tables 16 to 30. For the purpose of confidentiality contractor names have been replaced with alphabets. It should be noted that Seplat Energy Plc has a scoring system as follows;

Greater or equal to 178 – unconditionally meets company's HSE requirements

103 to 177 – Conditionally meets company's HSE requirements

Less than 103 – Falls short of company's HSE requirements

Table 16 Summary of Seplat HSE Compliance

SN	HSE ASSESSMENT CRITERIA	SCORE
1	Leadership and Commitment	26.00
2	Policy and Strategic Objectives	42.00
3	Organization, Responsibility, Resources and Standards	151.00
4	Hazards and Effects Management	41.00
5	Planning and Procedures	29.00
6	Implementation and Monitoring	100.00
7	HSE Audit and Review	32.00
8	HSE Management	20.00
	TOTAL SCORE	**441.00**

Table 17 Summary of HSE Compliance for Contractor A

SN	HSE ASSESSMENT CRITERIA	SCORE
1	Leadership and Commitment	12.00
2	Policy and Strategic Objectives	31.00
3	Organization, Responsibility, Resources and Standards	67.00
4	Hazards and Effects Management	24.00
5	Planning and Procedures	12.00
6	Implementation and Monitoring	36.00
7	HSE Audit and Review	6.00
8	HSE Management	3.00
	TOTAL SCORE	**191.00**

Table 18 Summary of HSE Compliance for Contractor B

SN	HSE ASSESSMENT CRITERIA	SCORE
1	Leadership and Commitment	6.00
2	Policy and Strategic Objectives	6.00
3	Organization, Responsibility, Resources and Standards	18.00
4	Hazards and Effects Management	9.00
5	Planning and Procedures	3.00
6	Implementation and Monitoring	21.00
7	HSE Audit and Review	3.00
8	HSE Management	3.00
	TOTAL SCORE	**69.00**

Table 19 Summary of HSE Compliance for Contractor C

SN	HSE ASSESSMENT CRITERIA	SCORE
1	Leadership and Commitment	12.00
2	Policy and Strategic Objectives	15.00
3	Organization, Responsibility, Resources and Standards	48.00
4	Hazards and Effects Management	25.00
5	Planning and Procedures	12.00
6	Implementation and Monitoring	30.00
7	HSE Audit and Review	6.00
8	HSE Management	20.00
	TOTAL SCORE	**168.00**

Table 20 Summary of HSE Compliance for Contractor D

SN	HSE ASSESSMENT CRITERIA	SCORE
1	Leadership and Commitment	12.00
2	Policy and Strategic Objectives	18.00
3	Organization, Responsibility, Resources and Standards	48.00
4	Hazards and Effects Management	30.00
5	Planning and Procedures	15.00
6	Implementation and Monitoring	58.00
7	HSE Audit and Review	15.00
8	HSE Management	12.00
	TOTAL SCORE	**208.00**

Table 21 Summary of HSE Compliance for Contractor E

SN	HSE ASSESSMENT CRITERIA	SCORE
1	Leadership and Commitment	19.00
2	Policy and Strategic Objectives	28.00
3	Organization, Responsibility, Resources and Standards	119.00
4	Hazards and Effects Management	38.00
5	Planning and Procedures	29.00
6	Implementation and Monitoring	88.00
7	HSE Audit and Review	36.00
8	HSE Management	16.00
	TOTAL SCORE	**373.00**

Table 22 Summary of HSE Compliance for Contractor F

SN	HSE ASSESSMENT CRITERIA	SCORE
1	Leadership and Commitment	3.00
2	Policy and Strategic Objectives	6.00
3	Organization, Responsibility, Resources and Standards	27.00
4	Hazards and Effects Management	9.00
5	Planning and Procedures	9.00
6	Implementation and Monitoring	21.00
7	HSE Audit and Review	6.00
8	HSE Management	3.00
	TOTAL SCORE	**84.00**

Table 23 Summary of HSE Compliance for Contractor G

SN	HSE ASSESSMENT CRITERIA	SCORE
1	Leadership and Commitment	3.00
2	Policy and Strategic Objectives	9.00
3	Organization, Responsibility, Resources and Standards	27.00
4	Hazards and Effects Management	6.00
5	Planning and Procedures	9.00
6	Implementation and Monitoring	18.00
7	HSE Audit and Review	6.00
8	HSE Management	3.00
	TOTAL SCORE	**81.00**

Table 24 Summary of HSE Compliance for Contractor H

SN	HSE ASSESSMENT CRITERIA	SCORE
1	Leadership and Commitment	12.00
2	Policy and Strategic Objectives	24.00
3	Organization, Responsibility, Resources and Standards	78.00
4	Hazards and Effects Management	24.00
5	Planning and Procedures	18.00
6	Implementation and Monitoring	57.00
7	HSE Audit and Review	6.00
8	HSE Management	6.00
	TOTAL SCORE	**225.00**

Table 25 Summary of HSE Compliance for Contractor I

SN	HSE ASSESSMENT CRITERIA	SCORE
1	Leadership and Commitment	9.00
2	Policy and Strategic Objectives	12.00
3	Organization, Responsibility, Resources and Standards	63.00
4	Hazards and Effects Management	12.00
5	Planning and Procedures	9.00
6	Implementation and Monitoring	36.00
7	HSE Audit and Review	15.00
8	HSE Management	9.00
	TOTAL SCORE	**165.00**

Table 26 Summary of HSE Compliance for Contractor J

SN	HSE ASSESSMENT CRITERIA	SCORE
1	Leadership and Commitment	6.00
2	Policy and Strategic Objectives	18.00
3	Organization, Responsibility, Resources and Standards	60.00
4	Hazards and Effects Management	12.00
5	Planning and Procedures	15.00
6	Implementation and Monitoring	36.00
7	HSE Audit and Review	9.00
8	HSE Management	12.00
	TOTAL SCORE	**168.00**

Table 27 Summary of HSE Compliance for Contractor K

SN	HSE ASSESSMENT CRITERIA	SCORE
1	Leadership and Commitment	3.00
2	Policy and Strategic Objectives	6.00
3	Organization, Responsibility, Resources and Standards	27.00
4	Hazards and Effects Management	6.00
5	Planning and Procedures	12.00
6	Implementation and Monitoring	24.00
7	HSE Audit and Review	6.00
8	HSE Management	3.00
	TOTAL SCORE	**87.00**

Table 28 Summary of HSE Compliance for Contractor L

SN	HSE ASSESSMENT CRITERIA	SCORE
1	Leadership and Commitment	6.00
2	Policy and Strategic Objectives	9.00
3	Organization, Responsibility, Resources and Standards	27.00
4	Hazards and Effects Management	6.00
5	Planning and Procedures	9.00
6	Implementation and Monitoring	18.00
7	HSE Audit and Review	6.00
8	HSE Management	12.00
	TOTAL SCORE	**93.00**

Table 29 Summary of HSE Compliance for Contractor M

SN	HSE ASSESSMENT CRITERIA	SCORE
1	Leadership and Commitment	22.00
2	Policy and Strategic Objectives	32.00
3	Organization, Responsibility, Resources and Standards	130.00
4	Hazards and Effects Management	34.00
5	Planning and Procedures	38.00
6	Implementation and Monitoring	94.00
7	HSE Audit and Review	32.00
8	HSE Management	16.00
	TOTAL SCORE	**398.00**

Table 30 Summary of HSE Compliance for Contractor N

SN	HSE ASSESSMENT CRITERIA	SCORE
1	Leadership and Commitment	16.00
2	Policy and Strategic Objectives	28.00
3	Organization, Responsibility, Resources and Standards	131.00
4	Hazards and Effects Management	38.00
5	Planning and Procedures	29.00
6	Implementation and Monitoring	97.00
7	HSE Audit and Review	36.00
8	HSE Management	16.00
	TOTAL SCORE	**391.00**

PRESENTATION OF RESULTS AND DISCUSION

Analysis of HSE compliance data from both companies show varying degrees of compliance and non-compliance. Making use of the scoring criteria for both companies a HSE scores have been computed for the sampled contractors. Tables 31 and 32 present a summary of the HSE compliance for each sampled contractor from NLNG and Seplat energy respectively.

Table 31 Summary of compliance levels of contractors under NLNG

SN	ASSESSMENT CRITERIA	NLNG CONTRACTOR													
		A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	Leadership and Commitment	3	2	3	2	2	3	2	3	3	3	2	3	4	3
2	Policy and Strategic Objectives	4	2	3	2	2	4	2	2	4	0	3	4	4	2
3	Organization, Responsibility, Resources and Standards	16	9	12	5	6	15	6	12	7	5	5	15	18	7
4	Hazards and Effects Management	16	6	11	0	6	15	6	11	11	6	7	13	13	11
5	Planning and Procedures	6	2	6	4	6	6	1	6	6	2	6	8	7	6
6	Implementation and Monitoring	28	14	26	16	11	28	10	22	20	10	12	26	26	20
7	HSE Audit and Review	2	2	2	2	2	2	3	2	2	3	2	2	2	2
8	HSE Management	3	2	2	2	2	2	3	3	3	3	0	2	4	2
	TOTAL SCORE	**79**	**40**	**67**	**34**	**39**	**78**	**35**	**63**	**89**	**33**	**38**	**75**	**77**	**55**

Table 32 Compliance levels for contractors under Seplat Energy

SN	ASSESSMENT CRITERIA	SEPLAT ENERGY CONTRACTOR													
		A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	Leadership and Commitment	12	6	12	12	19	3	3	12	9	6	3	6	22	16
2	Policy and Strategic Objectives	31	6	15	18	28	6	9	24	12	18	6	9	32	28
3	Organization, Responsibility, Resources and Standards	67	18	48	48	11	27	27	78	63	60	27	27	130	131
4	Hazards and Effects Management	24	9	25	30	38	9	6	24	12	12	6	6	34	38
5	Planning and Procedures	12	3	12	15	29	9	9	18	9	15	12	9	38	29
6	Implementation and Monitoring	36	21	30	58	88	21	18	57	36	36	24	18	94	97
7	HSE Audit and Review	6	3	6	15	36	6	6	6	15	9	6	6	32	36
8	HSE Management	3	3	20	12	16	3	3	6	9	12	3	12	16	16
	TOTAL SCORE	**191**	**69**	**168**	**208**	**373**	**84**	**81**	**225**	**165**	**168**	**87**	**93**	**398**	**391**

The information in tables 31 and 32 have been used to prepare bar charts and pie charts as shown in Figures 2 to 6. Figure 2 compares the HSE compliance scores of the sampled NLNG contractors while Figure 3 shows the level of compliance in terms of pass and fail percent. Figure 4 is a bar chart comparing the HSE performance for the sampled contractors under Seplat energy while Figure 5 shows the percentage of sampled Seplat energy contractors that have complied with HSE guidelines as against those that have not complied with HSE guidelines. Figures 6 presents an aggregation of the compliance level for all sampled contractors from both NLNG and Seplat energy in terms of percentage of pass against fail.

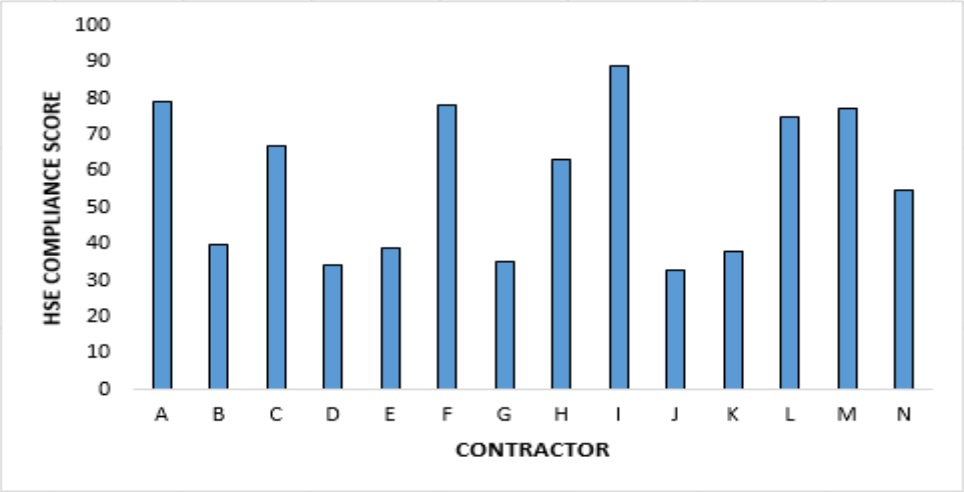

Fig. 2. Bar chart representation of NLNG contractors HSE compliance

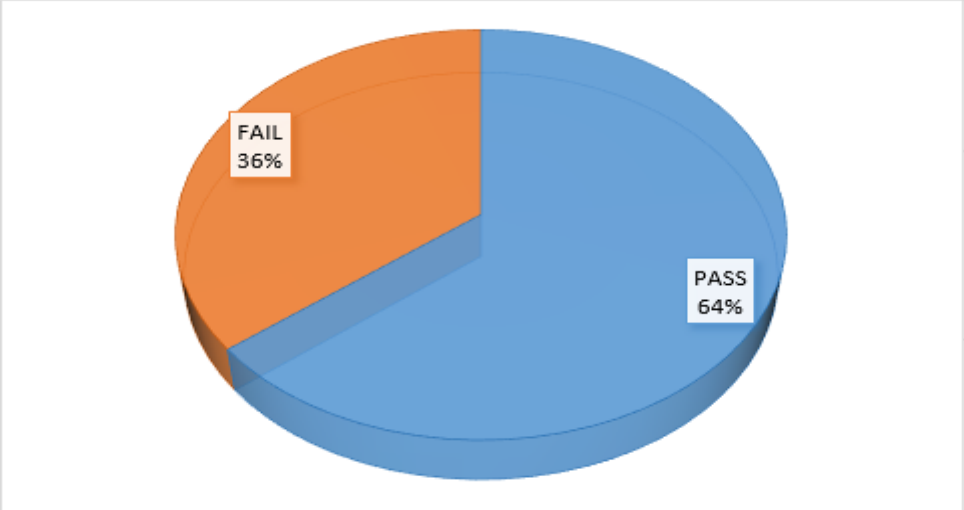

Fig. 3 Pie chart comparing the percentage pass and fail of NLNG contrctors

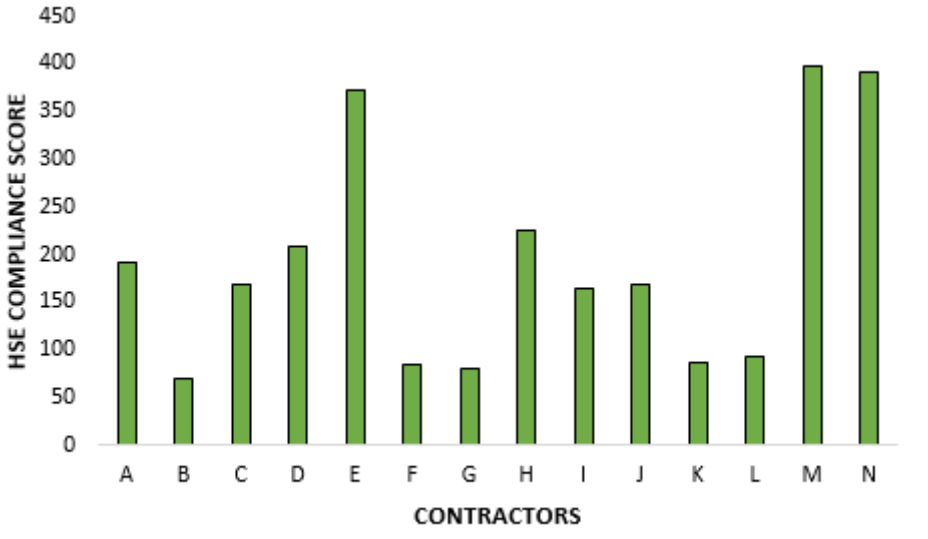

Fig. 4. Bar chart showing the HSE compliance levels of the contractors under Seplat energy

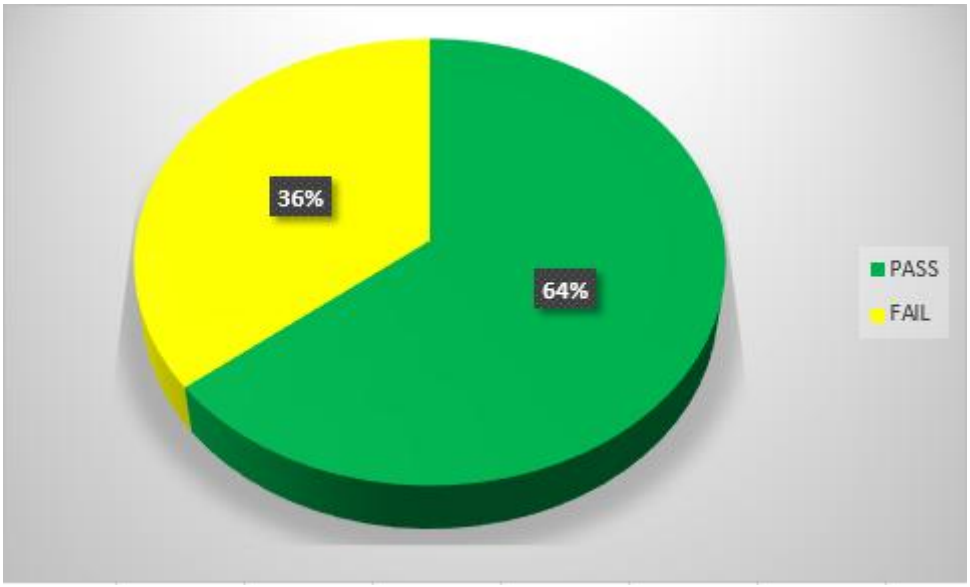

Fig. 5. Comparing the HSE compliance levels of the contractors under Seplat energy in terms of pass and failure percent

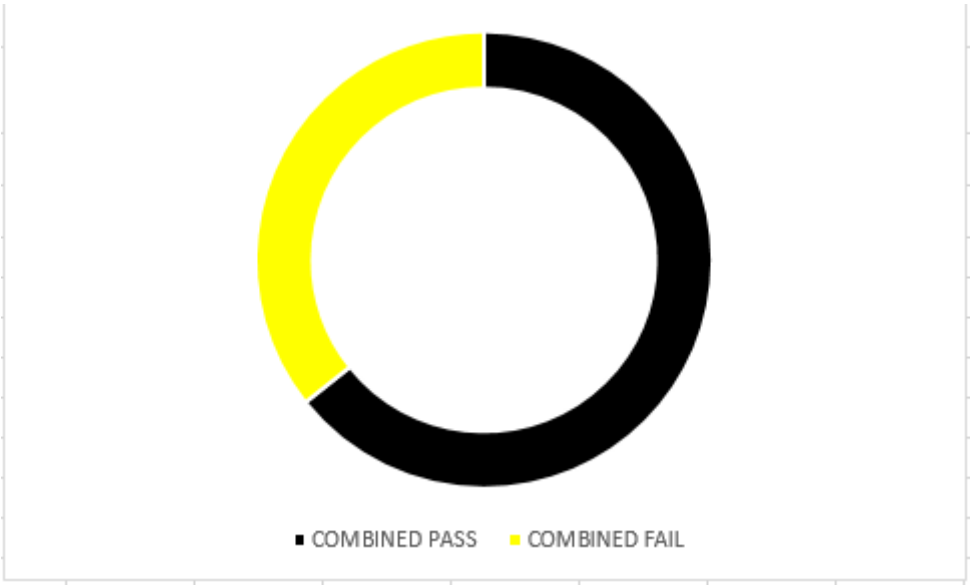

Fig. 6. Combined HSE compliance levels of the contractors under both NLNG and Seplat energy

III. CONCLUSION

This research has shown that the HSE-MS in Nigeria is up-to-date when compared to best practices all over the world in terms of major oil industry (which have direct link/ties with IOCs) and contractor companies. There is room for growth since major stakeholders in the oil business are fully involved. The Government of Nigeria in collaboration with the international community especially the European Union has shown outright commitment in terms of policy, legislation and regulation. This is backed up with clean up exercises with adequate funding and monitoring. The government has also shown commitment in enforcing that oil companies show responsibility in restoring lost environments in the course of their operations, and be up to date with their corporate social responsibilities, which will drastically reduce conflicts, and court cases between the oil companies and their host communities.

REFERENCES

[1]. Aletor, A., & Ejikeme, U. (2022). Occupational Health and Safety Legislations and Management in Selected Oil and Gas Companies in Nigeria. *International Journal of Legal Developments and Allied Issues*, *8*(1), 282–333.

[2]. Asare, S. A., Francis, G. S., & Mensah, P. A. A. (2021). Assessment of Compliance with Environmental Health and Safety Procedures in the Petroleum Downstream Sector - A Case Study of Fuel Service Stations in the Adentan Municipal Area of the Greater Accra Region, Ghana. *International Journal of Environmental Science*, *6*(January), 69–115.

[3]. Chidiebere, V., & Akpobolokami, A. (2020). Health and Safety Training and Employee Performance in Oil and Gas Companies in Rivers State, Nigeria. *British International Journal of Education And Social Sciences*, *7*(8), 41–50.

[4]. Efua, E. (2022). *Development of Evidence Based Factors to Enhance Safety Behaviour in Oil and Gas Industry in the Niger Delta Region of Nigeria*.

[5]. Enyoghasim, M. O., Anochiwa, L., Agbanike, F. T., Uwazie, I. U., Kalu, E. U., Onwuka, O. K., … Ogbonnaya, I. O. (2019). Oil Exploration and Exploitation in Nigeria and the Challenge of Sustainable Development : An Assessment of the Niger Delta. *International Journal of Energy Economics and Policy*, *9*(4), 369–380.

[6]. Ite, A. E., Ufot, U. F., Ite, M. U., Isaac, I. O., & Ibok, U. J. (2016). Petroleum Industry in Nigeria : Environmental Issues , National Environmental Legislation and Implementation of International Environmental Law. *American Journal of Environmental Protection*, *4*(1), 21–37. https://doi.org/10.12691/env-4-1-3

[7]. Kelechi, F. M. (2023). Occupational Health , Safety , and Environmental Risk Management in the Oil and Gas Sector : Challenges , Precautions , and Implications. *Petroleum Technology Development Journal*, *13*(2), 87–103.

[8]. Mafimisebi, O. P. (2016). Environmental Risk of Gas Flaring In Nigeria: Lessons from Chevron Nigeria and Ilaje Crisis. *Journal of Environment and Earth Science*, *6*(3), 180–204.

[9]. Nkwocha, A. C., Ekeke, I. C., & Olele, P. C. (2018). Health, Safety and Environment in the Oil and Gas Industry. *International Journal of Engineering Applied Sciences and Technology*, *3*(7), 51–56.

[10]. Odeyemi, O. O. (2022). *Integrating Environmental and Health and Safety Management System in the Oil and Gas Sectors: A Case Study of Nigeria*.

[11]. Ola, I., Drebenstedt, C., Burgess, R. M., Mensah, M., Hoth, N., & Külls, C. (2024). Remediating Oil Contamination in the Niger Delta Region of Nigeria : Technical Options and Monitoring Strategies. *The Extractive Industries and Society*, *17*(July 2023), 101405. https://doi.org/10.1016/j.exis.2024.101405

[12]. *Petroleum Industry Act of Nigeria*. , (2021).

[13]. Pona, H., Xiaoli, D., Ayantobo, O. O., & Daniel, N. (2021). Environmental Health Situation in Nigeria : Current Status and Future Needs. *Heliyon*, *7*(February), 1–12. https://doi.org/10.1016/j.heliyon.2021.e06330

[14]. Sakib, S. M. N. (2021). The Impact of Oil and Gas Development on the Landscape and Surface in Nigeria. *Asian Pacific Journal of Environment and Cancer*, *4*(1), 9–17. https://doi.org/10.31557/APJEC.2021.4.1.9

[15]. Udosen, C., Etok, A. S., & George, I. N. (2009). FIFTY YEARS OF OIL EXPLORATION IN NIGERIA : THE PARADOX OF PLENTY. *Global Journal of Social Sciences*, *8*(2), 37–47.

[16]. Umeokafor, N., Isaac, D., Jones, K., & Umeadi, B. (2014). Enforcement of Occupational Safety and Health Regulations in Nigeria: An Exploration. *European Scientific Journal*, *3*(February), 93–104.

[17]. Uwabimfura, J., & Revocatte, N. (2020). Investigation on Impacts of contamination of Oil exploration and Production on Environment and its Implications on People's Health. Case Study: NIGERIA. *International Journal of Scientific and Research Publications*, *10*(4), 69–77. https://doi.org/10.29322/IJSRP.10.04.2020.p10008