ASEAN Engineering Journal

Full Paper

FACTORS THAT INFLUENCE THE IMPLEMENTATION OF SUSTAINABLE SAFETY AND HEALTH PRACTICES IN THE UPSTREAM SECTOR OF THE NIGERIAN OIL AND GAS INDUSTRY

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Article history
Received
21 January 2025
Received in revised form
20 August 2025
Accepted
24 February 2026
Published online
31 August 2026

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Graphical abstract

Abstract

This study analyses the factors influencing the implementation of sustainable safety and health practices within the Nigerian oil and gas industry. Basically, the study focused on examining organizational commitment, communication strategies, training programs, cultural factors, and human behaviour regarding safety and health practices. This research used a quantitative methodology and questionnaires was administered to 330 experienced employees within the oil and gas industry in the Niger Delta region of Nigeria who were purposefully selected as respondents. SPSS, a social sciences statistical tool was used for data analysis using descriptive statistics and structural equation modelling to establish relationships among the identified variables. The research findings point to the fact that cultural factors and human behaviour have a direct impact on safety practices, considering that the coefficient was found to be $\beta = 0.54$ and $p < 0.05$ indicates a strong significant relationship. On the other hand, communication strategies indicated a positive but insignificant effect on safety practices with $\beta = 0.20$ and $p > 0.05$ respectively while training programs also depicted a positive but insignificant effect with $\beta = 0.05$ and $p > 0.05$ respectively. This shows that while they are essential, communication and training alone cannot develop a healthy safety culture in the organization. Thus, the study concludes that cultural factors and human behaviour become the most significant factors influencing sustainable safety and health practices. Hence, it is suggested that organizations should pay more attention to the development of safety culture in compliance with cultural norms and values besides improving communication and training activities to be more appealing to the workers. Future training programs should include cultural sensitivity to remind the workers of safety measures adequately.

Keywords: Sustainable Practices, Safety and Health, Upstream Sector, Oil and Gas Industry

1.0 INTRODUCTION

The oil and gas industry is one of the most vital industries in Nigeria because it has been contributing largely to the country's GDP. According to Zacchaeus et al. [1], the oil industry in Nigeria is one of the biggest in Africa and has grown considerably especially from the early 1970s when exploration and production of oil formed the key focus of the economy. The study by Okezie et al. [2], discovered that, the sector continues to contribute significantly to the national income, specifically, it provides over 90% of export revenues and 60% of the government's income. This huge dependence on oil and gas in the economy underscores the need to have efficient safety and health management systems in place. Nevertheless, rapid growth of the industry has brought many issues, especially related to safety and health. For instance, Izaye [3], Okogie et al. [4] noted that while production activities have escalated, the corresponding safety measures have failed to be devised, thus raising the risk level and the number of mishaps. Such accidents not only lead to loss of lives but also have other economic consequences such as compensation and loss of reputation. Therefore, the oil and gas

industry is a large economic opportunity, but it is also a large problem when it comes to the maintenance of sustainable and safe working conditions. Measures of safety and health in oil and gas industry are of great importance since the industry involves activities that are very risky. Failure to observe these practices can result to disastrous consequences such as; accidents, deaths and hefty losses. Improvement of safety culture can greatly help in preventing such occurrences thus saving the workers and the environment [5, 6]. According to Ethiaguina et al. [7], sustainable safety practices are mandatory as well as a necessity for work culture change to enhance the wellbeing of the employees. Measures that can reduce risks inherent in the extraction and production of oil and gas include: pro-active risk management, employees' training and appropriate emergency plan significantly reduce risks associated with extraction and production of oil and gas [8]. Besides, while setting up such practices, it is also possible to protect personnel and minimize the likelihood of accidents, which will help improve the organization's effectiveness and stability and the industry as a whole, as well as increase the community's trust in it [9].

In the oil and gas industry, sustainable safety and health practices mean more than just a way of doing things that is environmentally friendly, friendly to the community, and that protects the employees. Management of the environment includes the processes of managing the adverse effects of the oil and gas operations on the environment including; Climate change, oil spills and encouraging the use of clean technologies. For instance, a study conducted by [10], [11] indicate that the implementation of sustainable strategies can greatly reduce the exposure to environmental threats and improve the performance of the oil and gas firms. Another factor is community involvement because firms have to work with communities and listen to their grievances and then look for a resolution. Engagement can therefore result in attainment of social licences to operate, which are crucial for sustainability [12]. In addition, the management of employees' welfare is the key to sustainable safety and health management. This includes aspects such as safety at workplace, proper training, and well-being of the employees.

1.1 Statement Of The Problem

Sustainable safety and health practices may be described as activities performed in order to ensure not only legal requirements to safety standards, but also to create a sustainable culture of safe organization and its goals. These practices are meant to reduce risks, improve the health of the employees, and preserve the environment. According to Oni et al. [13], when employees are valued and their safety is guaranteed, output enhances, and the number of accidents reduces making the workplace more sustainable. Sustainability benefits the industry's longevity by safeguarding local communities and also building corporate image and managing changing standards. According to Tonge [14], the change towards sustainable practices is as a result of the public demanding that the oil and gas industry give an account of how the fossil fuels are being produced and regulated. The extent and manner in which sustainable safety and health practices are implemented in the oil and gas industry depends on several organisational characteristics. One of them is the management commitment as it is right at the heart of building of the safety culture in an organisation. The study of Okezie et al. [2], revealed that, organizations with strong leadership commitment to safety are more likely to implement sustainability practices sustainably. Management commitment defines the level of support and the required approach to safety and health activities. The next factor is the level of the employees' engagement. Employee participation in safety activities implies that they not only have knowledge of safety activities but also contribute to the improvement of the safety activities. According to Izaye [3], the approach makes the workers become responsible for the safety process and this can increase their level of compliance and offer more ideas.

Among the factors that influence implementation, resource factors, which include financial, training and technological resources are considered to be of great influence. The study hypothesizes that those firms that commit sufficient capital to safety programmes are likely to receive positive outcomes in safety performance. Training is particularly crucial since it ensures the employees are ready to work safely and ready to identify risks sufficiently [8]. Northwithstanding, the exchange of information within the organizations can also improve the safety compliance, since it provides information relating to safety practices. As it stands now, the level of safety and health practices in the Nigerian oil and gas industry is quite worrisome given the fact that available literature revealed that the sector has had low levels of compliance to both legal and environmental requirements. Nigeria has received a high incidence of oil and gas sector related accidents and environmental disaster such as oil spillage and gas flaring which are hazardous to the environment and human health [15, 16].

According to Wang et al. [17], the oil and gas industry falls among the most dangerous industries in terms of losing worker's lives across the world. This situation requires improvement of the legal requirements and proper implementation of the safety measures for the improvement of sustainable practices. However, there are still gaps in the effective implementation of the guidelines, and according to the survey, many companies have weak safety management programs. On their part, Ekong and Ogunbawo [18], highlighted that these gaps are due to lack of training and lack of awareness of sustainable practices. Further, the lack of safety culture in many organizations means that people become reckless and do not pay attention to safety measures, thus experiencing high incidences of accidents [19]. Therefore, identifying factors influencing safety and health measures is essential towards dealing with recurrent safety issues while cultivating a responsible and reactive organizational culture.

1.2 Aim and Objectives

To this end, the study was aimed at filling the gaps identified in the implementation of sustainable safety and health practices in the Nigerian oil and gas industry through the following research objectives, as thus:

i. To assess the relationship between organizational commitment and safety and health practice in the Nigerian oil and gas sector.
ii. To examine the relationship between communication strategies and the integration of health and safety practices in the oil and gas sector in Nigeria.
iii. To examine the extent to which training programs have supported the development of sustainable safety and

health culture among the workers in the Nigerian oil and gas industry.

iv. To examine the extent to which cultural factors and human behaviour have supported the development of sustainable safety and health culture among the workers in the Nigerian oil and gas industry.

1.3 Significant Of The Study

Measures of safety and health in the oil and gas industry are important not only to save lives, but also to support the long-term functioning of the industry. The sector is often characterized with accidents and incidents that lead to loss of lives, pollution of the environment among other negative impacts. These negative concerns have made it imperative to pay attention to sustainable safety and health practices due to the unique operational conditions in Nigeria such as; inadequate regulatory frameworks, poor implementation, inefficient cultural orientation to safety and health issues among others.

2.0 RELATED REVIEW

2.1 Theoretical Framework

Several theories and models are available in safety management to inform the correct way of practicing safety management. The most well-known is the safety culture model which states that an organizations' safety performance is highly dependent on the safety culture within the organization [20]. This model defines management commitment and employee participation as key components for building a sound safety culture. In the Nigerian oil and gas industry, where there are well-defined structures of hierarchy of organizations, there is the need to ensure that leadership commitment is integrated with the frontline engagement in order to develop a safety culture, according to Umeokafor et al. [21].

The other theory that is relevant to this study is the human factors theory that focuses on the behaviour of people in safety. This theory emphasizes that most of the accidents are caused by people's mistakes, and it can be prevented if the people are trained. In the context of Nigeria where workers may not have the necessary training or experience to follow safety measures this theory can be applied to come up with broad strategies that can cope with human errors during operations [22].

Also, the systems theory gives a broad view of safety management since it considers the relationships between various components of an organization [23]. This approach is especially relevant to the Nigerian oil and gas industry where the interrelated elements of operations consist of technical sub-systems, people, and the legal structure. An understanding of these interdependencies can help organizations to develop the systems for safety that can address both the short term and long-term needs of the organizations [13].

2.2 Factors Inducing Implementation of Safety and Health

2.2.1 Roles of Organizational Commitment

Management commitment to safety has been examined as one of the most important factors that influence safety performance. For instance, Osuizugbo and Ojelabi [24] showed that having management commitment is crucial for the promotion of organizational safety values and therefore, lowered accident frequency and increased employee participation in safety matters. Furthermore, Obiorah et al. [25] also highlights that, when organizations' management shows commitment to safety, through words and deeds, then the employees are likely to endorse the organization's safety values, hence developing a proactive safety culture. On the other hand, Ye et al. [26] shows that, inadequate managerial commitment, results in a passive safety culture in which people are less motivated to follow safety measures. The focus on the attitudes of managers as the major determinant of safety culture entails that organizations with managerial commitment to safety are more inclined to be successful in the promotion of sustainable safety culture among their personnel.

2.2.2 Effective Communication Strategies

Communication is now acknowledged to be a critical component of promoting safety awareness and raising the standard of safety in organizations. It has been established that verbal and written communication are particularly important in delivering safety information. A study carried by Ajmal et al. [27] revealed how the physical communication and training sessions are more effective in transferring safety knowledge as compared to the other forms of writing. Trisna et al. [28] opined that, the application of safety-related technologies like safety applications and web-based training has been proven to increase the accessibility and interest of the workers, especially those in the oil and gas industry where most operations are conducted online. It is then important to understand that the type of communication used can play a major role in determining the response to the safety messages passed across. In a study conducted by [29], it was established that safety meeting and feedback sessions are more effective forms of communicating safety than methods such as bulletin boards or emails. This means that to enhance the safety awareness in organizations, the communication strategy should be complex and elaborate.

2.2.3 Training and Development

According to Adebiyi et al. [30], effective safety training such as hand-on training, simulation exercises and refresher training improve the level of safety knowledge and safety behavior among the workers. Also, the mode of training delivery can affect the training outcomes; for example, [31] observed that training where learners participate in actual workplace scenarios was more effective in enhancing safe behaviour than the traditional classroom style approach. The same idea was supported by Oyedele et al. [32] where they stated that, continuous education and training updates make sure that the employees know the latest safety measures and ways to identify risks. Focusing on the best training approaches that address the needs of the oil and gas industry, the safety performance of organizations can be enhanced and the number of safety incidents reduced.

2.2.4 Cultural and Human Behavioural Factors

Safety and health cultural beliefs and perception are crucial in safety practices in the Nigerian oil and gas sector. Cultural expectations and norms could shape the way employees view safety measures and their compliance there with. It has been

established that behaviour-based safety interventions have influenced the change in attitude and improvement of safety performance, encouraging organizational commitment towards health and safety [32]. Basically, the need to involve the workers and encourage the development of a safety culture that suits the local culture is essential, since this will improve workers' participation and compliance in general. Moreover, leadership engagement is important in the context of safety culture; good leaders are expected to model safe behaviour and therefore facilitate organizational transformation.

2.3 Barriers to Effective Implementation of Safety and Health Practices in the Nigerian Oil and Gas Industry

According to Goman and Pongpeng [33], there are many challenges that prevent the successful application of safety and health measures in the Nigerian oil and gas industry. Some of the challenges that have been highlighted in different research include; poor training, poor resources, and poor management support. The cost of implementing elaborate safety measures can be prohibitive, and hence organizations end up focusing more on the financial returns than safety, and therefore adopting a more reactive approach to safety [10]. In addition, cultural imperatives to the change of behaviour present another major challenge in that, culture prevents people from adhering to the set safety measures.

Al-Hajri et al. [34] assert that, barriers to effective implementation of safety and health practices in the Nigerian oil and gas industry include inadequate regulatory enforcement, insufficient funding, lack of training and awareness, cultural and organizational resistance, and poor infrastructure, which collectively hinder compliance and sustainability. The effective implementation of safety and health practices in the Nigerian oil and gas industry is hindered by multiple interconnected barriers, including weak regulatory frameworks and inadequate enforcement mechanisms, which allow companies to bypass essential safety standards. Additionally, limited funding and resource allocation for safety measures reduce the ability to invest in modern equipment, protective gear, and training programs for workers [35].

A lack of awareness and expertise among employees and contractors further exacerbates unsafe practices, as they may not fully understand the importance or proper execution of safety protocols. Cultural and organizational resistance to change, often driven by a focus on cost-cutting and production efficiency, undermines efforts to prioritize safety over profits [36]. Compounding these challenges, outdated or poorly maintained infrastructure increases the risk of accidents and environmental hazards, creating a complex environment where the effective implementation of safety and health practices remains difficult.

2.4 The Petroleum Industry Bill

In Nigeria, the Petroleum Industry Bill (PIB) seeks to make the petroleum industry better in governance and safety with wide-ranging reforms that make the operations of the industry more transparent, accountable, and efficient. It does so by addressing some key issues relating to regulatory functions, care for the environment, revenue management, and equitable distribution of resources [37]. In a nutshell, the PIB seeks to attracts investment, modernize the industry, and provide assurance to the economy and people that the full benefits from the petroleum resources are achieved [38]. The Department of Petroleum Resources (DPR) and also the Nigerian Oil and Gas Industry Content Development Act provides guidelines that ought to be followed to ensure safety in the process. Observance of these regulations has been found to reduce risk factors greatly and increase safety responsibility. Stringent regulation does not only provide rules of what is allowed and what is not, but also creates the right attitude towards safety, which eventually results in fewer accidents incidents and better organizational effectiveness [21].

3.0 METHODOLOGY

The study adopted a systematic approach to examine factors that influence the implementation of sustainable safety and health practices in the Nigerian oil and gas industry within the Niger Delta region, using a quantitative research design approach. Figure 1 Shows the 9 states of the oil-rich region in Nigeria.

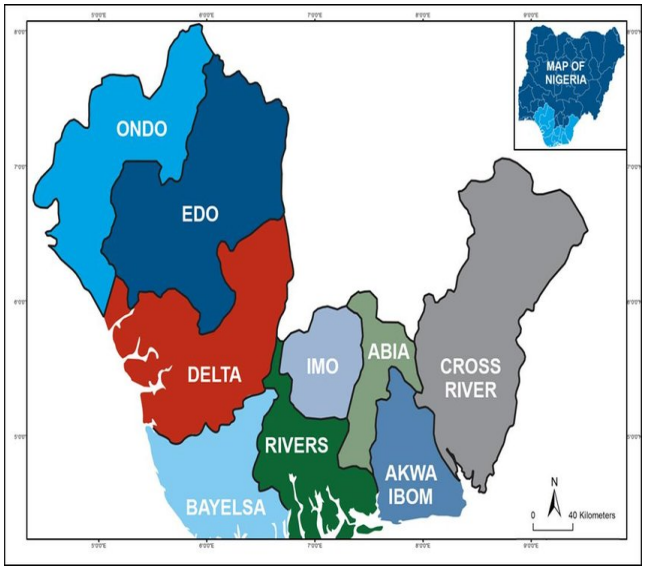

Figure 1 Map of Niger Delta Region Showing the 9 states of the oil-rich region [10]

The structured questionnaires were used to evaluate the terrain of safety and health risks and also identify what safety and health measures were put in place by oil and gas firms. A structured questionnaire was administered to industry experts, employees, and stakeholders with direct input in risk assessment. The questionnaire was designed in such a way that it captures respondents' perceptions regarding the probability as well as seriousness of different safety and health risks while at the same time measuring how much safety and health measures are adopted in their organizations. This was achieved by applying a 5-point Likert scale model, with 1 being the least and 5 being the the highest. Relevance degree as well as depth of responses were purposively selected with focus on persons having at least six months experience in the industry plus previous involvement in risk assessment. However, interns and National Youth Service Corps members were excluded from participation. A purposive and convenience sampling technique was used to select

respondents and 300 questionnaires were physically distributed, this approach was used by Scholars including [39, 40] in their studies respectively. Also, an additional 10% had been calculated to accommodate for possible non-response; thus, establishing a minimum sample size of 330 participants meeting inclusion criteria who completed questionnaires.

The data were analyzed after collection through the use of descriptive statistics where means and standard deviations were computed to describe the responses. This statistical approach allowed the researchers to get a general idea of how safe or unsafe participants felt at work and the degree to which various safety measures were implemented in the organizations of the participants.

In addition, the analysis involved the assessment of structural equation modeling between the factors that were established in the study including organizational commitment, communication strategies, training programs, cultural factors and safety and health practices in the industry. The outputs were regression coefficients and t-statistics that gave information on the efficiency of communication, training and culture in relation to health and safety practices. Figure 2 present the summary of the research methodology as adapted for the study.

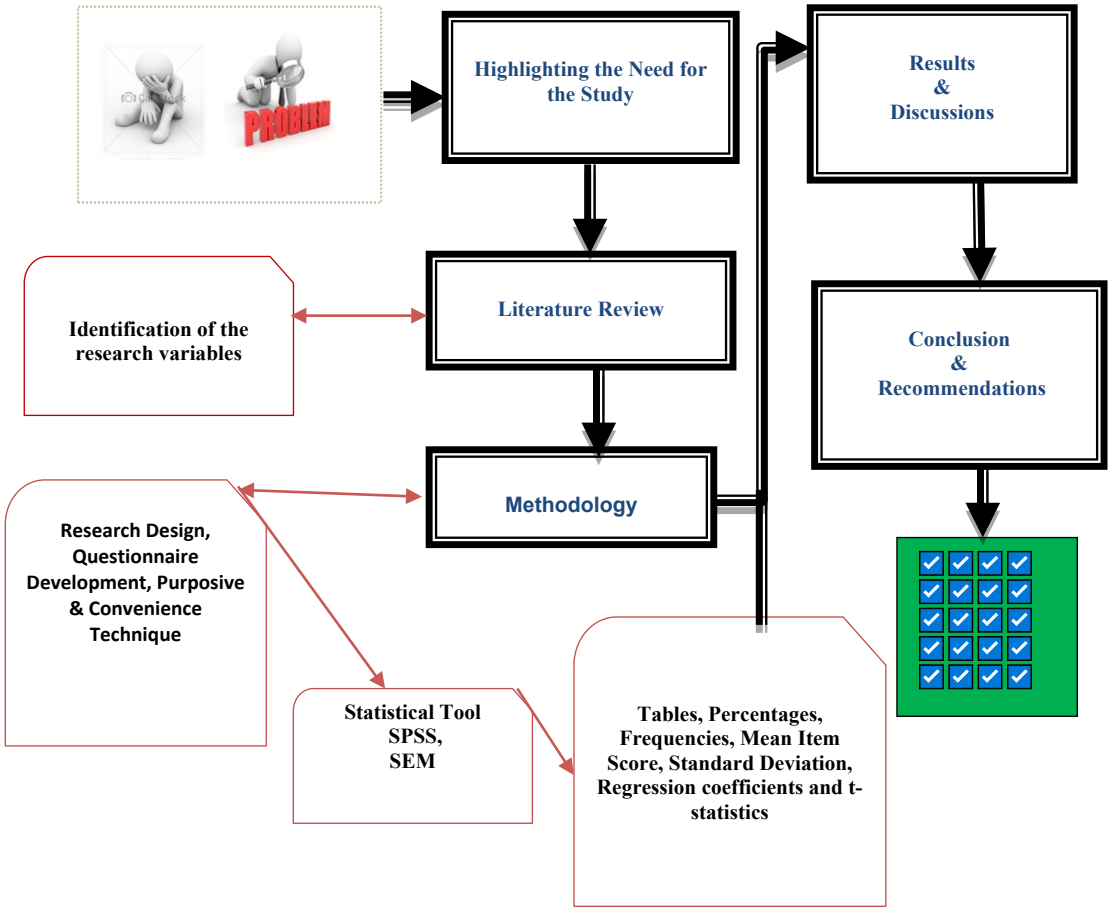

Figure 2: Methodology flowchart of study
Source: Adapted [40, 41, 42]

4.0 RESULTS AND DISCUSSION

4.1 Demographic Analysis

Table presents the demographic distribution of respondents. It revealed significant information about the makeup of the study participants. It reflects a pretty varied group concerning gender, age, and educational qualifications. Out of the total 300 participants, the majority were males accounting for 62.7% while females constituted 37.3%. The aforementioned disparity in genders depicts that the oil and gas sector in Niger Delta region is predominantly masculine; an observation that tallies with the global workforce distribution within that industry. The total percentage presented above confirms that all genders were represented in the study to allow for an expansive analysis of perceptions across the gender spectrum.

Table 1 Demographic distribution of respondents

Factors	Distribution	Freq.	Percent (%)
Gender	Male	188	62.7
	Female	112	37.3
Age Group	18 to 30 years	81	27
	31 to 40 years	113	37.7
	41 to 50 years	66	22
	51 to 60 years	19	6.3
	Above 60	21	7
Highest Educational Qualification	Secondary School	44	14.7
	Diploma	146	48.7
	Bachelor's Degree	94	31.3
	Postgraduate Degree	16	5.3

Table 1 presents the demographic distribution of respondents.In terms of age, the largest percentage of respondents was between 31 and 40 years old, comprising 37.7% of the sample. This was followed by the age group 18 to 30 years at 27% and those aged between 41 and 50 years at 22%. The smallest representation was in the age bracket of those individuals aged between 51 and 60 years at 6.3% and those above 60 years at only 7%. The above suggests that most people in this workforce are middle-aged; hence, actively working in the sector, which also conforms to the roles' technical and physically demanding natures. Cumulative percentages further confirm that proportional representations were made for younger as well as older demographics to ensure they contributed to varied perspectives on safety and health risk awareness.

The data presents an array of formal educational backgrounds for the respondents. Close to half of the participants, 48.7% held a diploma, suggesting that there was an inclination towards technical qualifications among those working in the oil and gas industry. The proportion of respondents with a bachelor's degree was 31.3%, whereas those with secondary school education comprised 14.7% of the sample population. Postgraduate degree holders were the least represented at 5.3%. The distribution above reflects the emphasis on technical skills; a large proportion of workers are educated at diploma levels to satisfy operational needs.

4.2 Descriptive Statistics

The scores presented in Table 2 are the mean response from the stakeholders on safety and health practices in the Nigerian oil and gas sector. Firstly, the mean score of 3.15 for the compliance with national safety regulations and standards, with the standard deviation of 0.61, is moderate level of agreement among the respondents (Table 2).

Secondly, the perceived effectiveness of the risk assessment procedures obtained a mean response of 3.42 (SD= 0.53) which is a slightly higher perception among the respondents regarding the daily risk assessments. This score suggests that organizations are likely to appreciate the role of these procedures in reducing possible risks in operations. The respondents' perception of the adequacy of the emergency response plans can be measured by the establishment and awareness of the plans which was a mean of 3.40 (SD = 0.56). This research also highlights some companies' efforts to address the preparedness of the workforce in case of emergency. In addition, the mean score of the conduction of safety drills and exercises also stood at 3.42 (SD = 0.54), which suggests that organizations are probably practicing systematic training measures to remind employees about safety procedures.

This consistency in training is very important as it leads to better preparedness among the workers, especially since the oil and gas sector is very risky. Finally, the question to do with the system for reporting safety incidents without fear of reprisal received the highest mean score of 3.46 (SD = 0.53). This implies fair understanding of the organizational culture in terms of communication and reporting of safety issues. The freedom that the employees have to report incidents without being punished may enhance a safety culture and therefore promote better safety.

Table 2 Safety and Health Practice in the Nigerian Oil and Gas Sector

Factors	Mean	Std. Dev.
▪ The organization complies with national safety regulations and standards.	3.15	0.61
▪ Risk assessment procedures are effectively implemented in daily operations.	3.42	0.53
▪ Emergency response plans are well established and known by all employees.	3.40	0.56
▪ The organization regularly conducts safety drills and exercises.	3.42	0.54
▪ There is a system in place for reporting safety incidents without fear of reprisal.	3.46	0.53

Table 3 Organizational Commitment Safety and Health

Factors	Mean	Std. Dev.
▪ Management actively promotes a culture of safety within the organization.	3.07	0.63
▪ Employees are encouraged to participate in safety initiatives.	3.26	0.61
▪ Safety is a priority in the organization's strategic goals.	3.08	0.62
▪ There is consistent support from leadership for safety practices.	3.42	0.55

The mean scores presented in Table 3 are the perceptions of organizational commitment towards safety within the Nigerian oil and gas industry. The statement "Management actively encourages safety within the organization" was scored a mean of 3.07 (SD = 0.63). This score suggests that management is moderately effective in promoting a culture of safety according to the views of the employees. The standard deviation also means that there is some variability in the responses which implies that while some of the employees may appreciate the efforts being made by the management, others may consider the efforts as inadequate or irregular.

The results show a relatively positive picture regarding the extent of this encouragement as it scored a mean of 3.26 (SD =

0.61) when responding to the statement, 'Employees are encouraged to participate in safety initiatives'. It is a score that gives an understanding to employees that their participation is appreciated. However, the moderate standard deviation suggests that there may be considerable differences between staff members' perceptions of their level of involvement in safety culture engagement.

The finding for the statement "Safety is a priority in the organization's strategic goals" was a mean score of 3.08 (SD = 0.62) further supporting the organization's recognition of safety in its strategic plan. This score suggests that safety is considered important but may not be embedded in all functional areas or may not be given enough priority compared with other organizational goals. The highest mean score of 3.42 (SD = 0.55) was gained in the statement "Leadership provides steady support for safety measures". This may indicate a more favourable attitude toward the part played by leadership in promoting safety compared to other forms of commitment. A lower standard deviation suggests that respondents are more consistent in their perceptions of leadership support, which may suggest a more cohesive experience of safety advocacy from leadership.

Table 4 Mean Responses on Communication Strategies

Strategies	Mean	Std. Dev.
▪ Safety policies and procedures are clearly communicated to all employees.	3.40	0.54
▪ There is an open line of communication regarding safety concerns.	3.51	0.52
▪ Feedback from employees on safety issues is valued and acted upon.	3.42	0.54
▪ Regular safety meetings are held to discuss safety performance and challenges.	3.29	0.62

Table 4 shows the mean responses of the communication strategies used in the Nigerian oil and gas sector as well as their standard deviations. The average responses indicate moderate level of effectiveness in communication strategies with means ranging from 3.29 – 3.51 on a 5-point scale where 1 is poor and 5 is are good communication practices.

Table 5 Mean Responses on Training Programs

Factors	Mean	Std. Dev.
▪ Employees receive adequate training on safety practices before starting work.	2.73	0.70
▪ Continuous training programs are available to update employees on safety protocols.	3.28	0.61
▪ Simulation exercises are conducted to prepare employees for emergency situations.	3.42	0.54
▪ Training is tailored to address specific risks associated with employees' job roles.	3.26	0.61

In Table 5, the analysis of the training programs in the Nigerian oil and gas sector provides important information on the sufficiency and efficacy of safety training activities.

First of all, the item, Employees receive adequate training in safety practices before starting work received a mean of 2.73 with SD of 0.70. This relatively low score indicates that a large number of employees do not feel that they are ready to handle safety risks before joining the organization. The value of the standard deviation is moderate, which means that the respondents are quite consistent in their answers and point out a weakness in the training of organizations.

On the other hand, the item assessing "Continuous training programs available to update the employees on safety procedures" received a mean response of 3.28 (SD = 0.61). This score is slightly higher and indicates a more positive outlook towards the ongoing training activities, but it also indicates the need to improve on the regularity of updating all employees on safety practices. The readiness for the emergency situation seemed to be more developed, according to the mean score of 3.42 (SD=0.54) for the item "Simulation exercises are conducted to prepare employees for emergency situations." This suggests that organizations focus on realism for the development of training in order to prepare the employees for the occurrence of hazards in the workplace, which is paramount in the risky sectors. Finally, the statement "Training is provided to target certain risks that are inherent in employees' tasks and responsibilities" was rated 3.26 (SD = 0.61). This average is not bad and points to a fairly acceptable level of awareness of the need for role-specific safety training, but it also shows that its application is not uniform throughout the sector.

Table 6 Mean Responses on Cultural Factors and Human Behaviour

Factors	Mean	Std. Dev.
▪ Employees are encouraged to adopt positive safety behaviours in their daily work routines.	3.13	0.60
▪ There is a shared belief among workers that safety is everyone's responsibility.	3.43	0.55
▪ Cultural attitudes positively influence compliance with safety protocols.	3.37	0.54
▪ Employees are motivated to report unsafe conditions without fear of repercussions.	3.43	0.54

The assessment of cultural factors and human behaviour in the Nigerian oil and gas sector provides useful information about safety measures and employees' perceptions of safety in Table 6. The item that said ''Employees are encouraged to display positive safety behaviours in their working activities'' scored a mean of 3.13 and standard deviation of 0.60. This score implies that although there is some level of appreciation of the positive behaviour, there is still more that could be done in ensuring that such behaviour is actively rewarded across the workplace.

On the other hand, the item "workers believe that safety is everybody's business" recorded a higher mean of 3.43 (SD = 0.55). This is a positive view of employees' perception of communal accountability for safety, implying that every worker bears the responsibility that is important in developing the safety culture of the organization.

An average of 3.37 (SD= 0.54) was obtained for the statement "Cultural attitudes enhance safety compliance". This score supports the notion that cultural beliefs influence safety measures compliance thus, organizational cultural values are instrumental in determining the level of safety compliance and safety practice.

Lastly, the belief that ''Employees are motivated to report unsafe conditions without fear of repercussions'' also had a mean of 3.43 (SD = 0.54). This high tally means workers are comfortable to express safety concerns, the crucial consideration for risk prevention in workplaces. It shows that there is favourable climate that enhances participation in the management of safety risks.

Figure 3 depicts the results of the structural equation modelling showing the inter-relationship between the independents and dependent variables of the study.

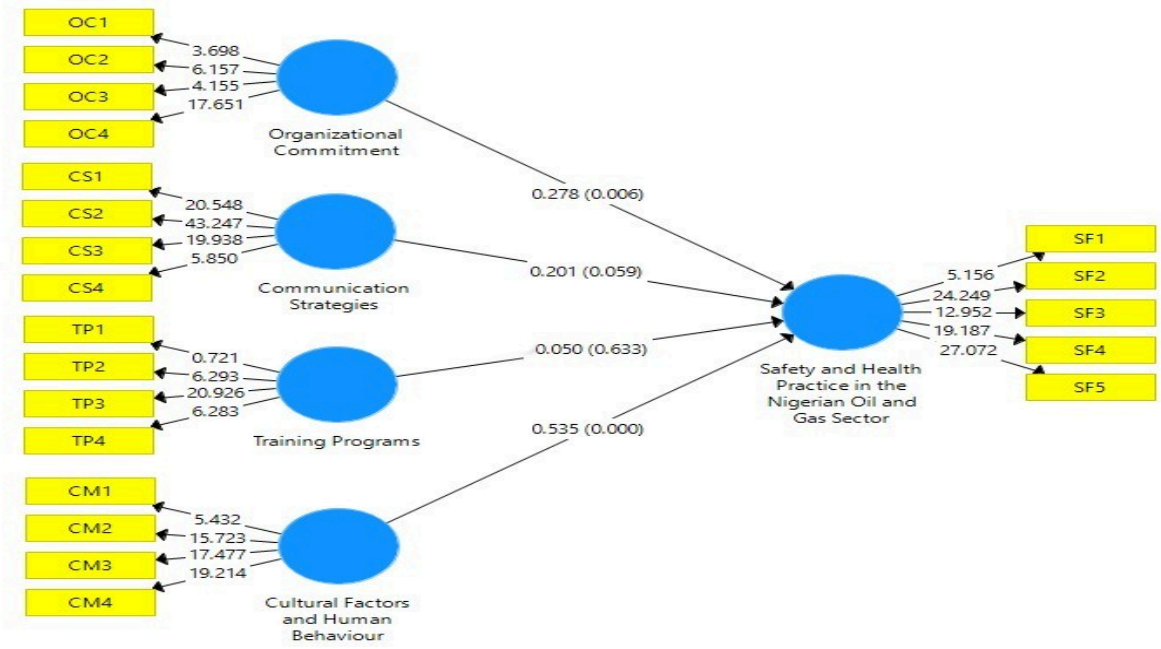

Figure 3 Hypothesis relationship among the study's variables
Author's Computations (2024)

Table 7 Effect of influencing factors on sustainable safety and health practices

Relationships	β	Std Dev.	T Statistics	P Values
▪ Communication Strategies → *Safety and Health Practice in the Nigerian Oil and Gas Sector.*	0.20	0.11	1.89	0.06
▪ Cultural Factors and Human Behaviour → *Safety and Health Practice in the Nigerian Oil and Gas Sector.*	0.54	0.12	4.42	0.00
▪ Organizational Commitment → Safety *and Health Practice in the Nigerian Oil and Gas Sector.*	0.28	0.10	2.77	0.01
▪ Training Programs → *Safety and Health Practice in the Nigerian Oil and Gas Sector.*	0.05	0.11	0.48	0.63

Table 7 present the effect of relationship between influencing factors on safety and health practices. Findings revealed that, communication strategies (β = 0.20, t = 1.89, p > 0.05) demonstrated a positive but insignificant effect on the safety and health practices in the Nigerian oil and gas industry. Also, training programs (β = 0.05, t = 0.48, p > 0.05 exhibited a positive but insignificant influence on the safety and health practices in the Nigerian oil and gas industry. However, Cultural factors and human behaviour (β = 0.54, t = 4.42, p < 0.05) demonstrated a positive and significant effect on the safety and health practices in the Nigerian oil and gas industry. Also, training programs (β = 0.28, t = 2.77, p < 0.05 exhibited a positive and significant influence on the safety and health practices in the Nigerian oil and gas industry.

4.3 Discussion of Findings

The results reveal the influences of various factors on safety and health practices in the Nigerian oil and gas sector. While communication strategies and training programs positively but insignificantly affect safety practices, cultural factors and human behavior are significant determinants.

The results first point out that communication strategies have a positive but non-significant effect on the practice of safety measures (β = 0.20, t = 1.89, p > 0.05). This finding is consistent with an earlier study conducted by [43, 44] which pointed out that the effectiveness of communication in promoting safety largely depends on the methods used. Although organizations can use different strategies to communicate safety information, the finding here of no significant effect indicates that perhaps more reliance is present on passive communication methods instead of enabling participation in initiatives aimed at making people safer. Perhaps continuous feedback and interactive approaches to communication are needed to make safety messaging more effective.

Similarly, training programs had a positive but insignificant effect on safety practices (β = 0.05, t = 0.48, p > 0.05). Adebiyi et al. [30] offered earlier evidence on the vital role of comprehensive training in enhancing workers' safety behavior. Still, the present findings imply that either the depth or frequency or relevance of training falls short of satisfying industrial demands in Nigeria at present. The disparity may illustrate a flaw in either

applying experiential learning techniques or conducting regular refresher courses, as these are important for reinforcing knowledge and skills regarding safety practices.

In stark contrast, the t-factor shows that cultural factors and human behaviour are the most important determinants of safety practices ($\beta = 0.54$, $t = 4.42$, $p < 0.05$). This finding supports the work of [30], who stated that the dominant cultural attitudes toward safety influence those behaviors that adhere to safety standards. While acknowledging the impact of leadership commitment in building a culture of safety, Sabiu et al. [45], remarked that transformational leaders have the capacity to motivate employees toward responsible behavior. It only reinforces this study's strongly correlated relationship with organizations' needs for a robust safety culture compliant with their workforces and cultural values from which an additional safety standard emerges.

Training programs were eventually found to impact safety practices positively and significantly ($\beta = 0.28$, $t = 2.77$, $p < 0.05$), thus marking a significant deviation from the previous finding of no effect. This implies that training programs can be effective in producing quantifiable changes in safety compliance when they are designed to resonate with cultural values and norms and also integrated within the operational framework. Therefore, organizations might find it beneficial to design training programs that not only provide crucial knowledge but also weave in cultural understanding, hence fostering an atmosphere where safety receives prime importance.

5.0 CONCLUSION

The study reveals some important factors affecting the adoption of sustainable safety and health practices in the Nigeria oil and gas sector. The study outcomes indicate that cultural factors and human behaviour are far more influential than the communication strategies and training programs in the development of a strong safety culture. Communication is critical in raising safety consciousness; however, the study shows that its impact on safety practices is not significant. This means that although organizations use communication as an instrumental variable to disseminate safety information, it may not be enough to foster change in safety culture. Likewise, the training programs that are meant to ensure that the employees are trained on the procedural measures to be taken in case of an incident is also reported to make little impact in changing the safety culture. On the other hand, the study develops a positive correlation between cultural factors and human behavior with safety practices. That is why the results indicate the need for creating a high safety culture in which safety is seen as an organizational value. This in turn demands not only the management's commitment but also the change of organizational culture which means the change in all employees' perceptions and practices concerning safety measures. Such a culture could be enhanced by encouraging the reporting of safety concerns and the feedback that is received. Therefore, although there are many different methods for increasing safety measures, the oil and gas industry in Nigeria needs to focus on increasing the organizational culture of safety. By combining well-developed human behavioural models supported by management commitment, it would be possible to reduce the risks related to oil and gas operations to a great extent. This focus will not only improve safety outcomes but also promote sustainable practice for the organization and employees and the community as a whole. Therefore, the following recommendations were proffered:

- Organizations need to have a safety culture that is management driven. This can be achieved through a message that communicates the importance of safety and ensures that leaders are engaged in safety initiatives and that support for safety is ongoing. Involvement of management in safety actions will make all employees members of safe activities, thereby creating ownership.
- There is a need for effective training regimes to be developed and sustained, targeted at the different threats that are inherent in the oil and gas industry, depending on the various job roles. This training should be continuous, and workers should be educated about new safety procedures; also, new simulations should be conducted to give real-life experience of the situations.
- Organizations need to reinforce communication measures with regard to safety by ensuring that all safety policies and measures are communicated effectively to the employees. There should be a promotion of a safety communication channel that would allow the employees to report cases where they have safety concerns and also give feedback to the management, which should then take suitable action.
- Involving the employees more in safety efforts can be beneficial for the development of a good safety culture. This can consist of a daily safety huddle, involving employees in decision making processes with respect to safety and employee programs where employees are rewarded for observing all safety standards.
- One of the important areas to address is the cultural factors that influence employees' behaviors toward safety measures. It is proposed that organizations need to identify those cultural beliefs that are prevailing within their organizations in relation to safety and then design safety interventions which will reflect the cultural systems of the workforce in order to have better compliance and participation in safety.

Acknowledgement

I would like to express our sincere gratitude to my supervisor, Assoc. Prof Dr. Mohd Saidin Misnan, for his painstaking guidance and support throughout the research process. His expertise and insights were cannot be over-emphasized in shaping the research and advising to overcome such challenges. On behalf of the authors, the deepest appreciation goes to those experts whose immense insights and suggestions really enriched the discussions related to sustainable safety and health practices in the oil and gas industry.

Conflicts of Interest

The author(s) declare(s) that there is no conflict of interest whatsoever regarding the publication of this paper.

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