



Safety Performance Compliance in the Oil and Gas Industry in Delta State

EJAIRU Akpobome Andrew¹ and IBEZUTE Albert Chukwuemeka.¹

¹Department of Environmental Management and Toxicology, College of Sciences, Federal University of Petroleum Resources, P.M.B. 1221, Effurun, Delta State, Nigeria.

Corresponding author: Albert C. Ibezute

Abstract

Introduction: This study examines safety performance compliance in the oil and gas industry in Delta State, Nigeria, focusing on the availability, awareness, and effectiveness of Health, Safety, and Environment (HSE) and Safety Culture and Performance (SCP) policies. Given the high-risk nature of the industry, ensuring strict adherence to safety regulations is crucial for minimizing workplace hazards. The study aims to assess the extent of policy implementation, training effectiveness, compliance challenges, and management commitment, ultimately providing recommendations for improving safety standards. **Materials and Methods:** A descriptive survey design was employed, with data collected via a structured questionnaire using a 5-point Likert scale. Respondents, comprising managers and professionals from major oil and gas companies, provided insights across five sections: demographic profiles, policy availability and implementation, training practices, compliance challenges, and management commitment. **Results:** Findings reveal robust institutional support for safety, as a high percentage of respondents confirmed the existence and effective implementation of HSE/SCP policies on projects. Overall HSE practices received positive ratings; however, workforce adherence to safety guidelines was mixed, indicating inconsistencies in compliance. Although the importance of multi-skilling and intellectual capital was highly rated, variability in training frequency suggests room for improvement in training practices. Management commitment was rated very favorably, reflecting strong leadership support in fostering a safety culture. **Discussion and Conclusion:** Nonetheless, some gaps in the application of environmental protection guidelines were noted, pointing to the need for enhanced training and stricter enforcement measures. The study recommends targeted improvements in training programs, monitoring mechanisms, and management accountability to further enhance safety performance compliance in Delta State's oil and gas sector.

Keywords: Safety Performance Compliance, Oil and Gas, Delta State, HSE Policies, SCP Management, Training Effectiveness

Received 17 Mar., 2025; Revised 28 Mar., 2025; Accepted 31 Mar., 2025 © The author(s) 2025.

Published with open access at www.questjournals.org

I. Introduction

The oil and gas industry is a cornerstone of Nigeria's economy, and Delta State plays a pivotal role in the nation's hydrocarbon production. However, the inherently high-risk nature of this sector necessitates strict adherence to safety performance compliance measures to protect workers, communities, and the environment. Despite robust regulatory oversight from agencies such as the Department of Petroleum Resources (DPR) and the Nigerian National Petroleum Corporation (NNPC) [1] and [2], ensuring consistent safety compliance remains a formidable challenge in Delta State. Factors such as aging infrastructure, inadequate workforce training, lapses in management commitment, and insufficient investment in modern safety technologies have contributed to recurring safety incidents and operational disruptions [3]; [4] and [5].

The significance of safety performance in the oil and gas sector extends beyond immediate worker protection; it directly influences the operational efficiency and reputation of companies operating within the industry. Global standards, such as those set by the International Association of Oil & Gas Producers (IOGP) and the Occupational Safety and Health Administration (OSHA), underscore the critical need for comprehensive safety protocols [6]. In Delta State, however, local economic pressures and a complex regulatory environment

have often led to compromised safety practices, thereby exposing the industry to potential catastrophic failures and long-term environmental degradation [7].

This study examines safety performance compliance within the oil and gas industry in Delta State by exploring the extent to which industry practices align with national and international safety standards. It investigates the key drivers behind non-compliance, including regulatory constraints, economic pressures, and operational challenges[8], and evaluates the effectiveness of current safety protocols. By analyzing safety records, incident reports, and compliance audits, the study aims to identify critical gaps in safety management and recommend practical measures to enhance overall safety performance.

Furthermore, the research considers the broader socio-economic impact of safety lapses, including the effects on local communities[9], environmental sustainability, and the long-term viability of the oil and gas sector in the region[10]. In doing so, it highlights the interconnectedness of safety performance with corporate reputation, regulatory credibility, and community trust. The findings of this study are intended to inform policymakers, industry stakeholders, and regulatory bodies about strategies to improve safety compliance, foster a culture of continuous improvement, and ultimately ensure that Delta State's oil and gas operations can sustain their contributions to Nigeria's economy without compromising the well-being of workers and local communities [11].

II. Materials And Methods

2.1. DESCRIPTION OF THE STUDY AREA

Delta State, located in the heart of Nigeria's Niger Delta, is one of the country's most pivotal oil and gas producing regions. Characterized by a diverse landscape of wetlands, swamps, and riverine environments, the state has long been recognized for its abundant hydrocarbon resources. Major oil fields, refineries, and ancillary facilities are distributed across key urban centers such as Warri, Sapele, and Escravos, making Delta State a critical contributor to Nigeria's energy sector [1] and [2].

The region's unique geography not only supports extensive oil production but also influences local socio-economic activities, including agriculture and fishing, which coexist with the extractive industries[12]. However, the rapid expansion of oil and gas operations has led to significant environmental challenges and infrastructural decay[13]. These issues have been compounded by complex socio-political dynamics, where tensions frequently arise between local communities and multinational oil companies over resource control and environmental management [5] and [10].

In recent years, the interplay between economic opportunities and environmental degradation in Delta State has heightened concerns over safety performance compliance within the oil and gas industry [14]. Regulatory oversight is provided by local and national agencies, including the DPR and NNPC, yet ensuring consistent adherence to safety standards remains challenging in this high-risk operational environment [1] and [2]. This study area, therefore, presents a dynamic context where the demands of energy production intersect with critical issues of environmental sustainability and community safety, offering a valuable setting to assess and improve safety performance compliance.

2.2. RESEARCH DESIGN

The research design adopted in this study is a descriptive survey design. This design was selected to assess and interpret safety performance compliance in the oil and gas industry in Delta State, Nigeria. A structured questionnaire, employing a 5-point Likert scale (ranging from 1 to 5 with an "unsure" option), was developed to capture data on various aspects of safety performance. This approach is supported by [15] and [16], who suggest that a five-category scale is particularly effective for unipolar assessments.

2.3. POPULATION OF THE STUDY AND SAMPLING TECHNIQUE

The study population comprises professionals from major oil and gas companies operating in Delta State, including Shell Petroleum Development Company (SPDC), Chevron Nigeria Limited (CNL), Heritage Nigeria Limited (HNL), and Agip Nigeria Limited (ANL). These companies represent the principal oil exploration and production operations in partnership with the Nigerian Federal Government. A stratified random sampling method was used to ensure representation of key functional and line management levels such as SCP managers, geologists/scientists, engineers, project managers, and consultants. Snowball sampling was also employed during face-to-face contacts to identify additional key respondents.

2.4. INSTRUMENT USED FOR DATA COLLECTION

Data were collected using a structured questionnaire, which was divided into five sections:

- **Section A:** profile of the respondents and key aspects of safety performance compliance within the oil and gas industry in Delta State

- **Section B:** Awareness and Perception of HSE/SCP Policies, Standards, and Guidelines
- **Section C:** Impact of Training and Employee Skills on SCP Management
- **Section D:** Factors Affecting On-Site Safety Performance and Challenges
- **Section E:** Management Commitment, Safety Culture, and Corporate Social Responsibility (CSR) in SCP

Each item was rated on a 5-point Likert scale to measure various constructs related to safety performance compliance.

2.5. . VALIDITY OF INSTRUMENT

To ensure validity, each questionnaire item was cross-matched with the research objectives. The draft questionnaire was reviewed by the project supervisor and relevant subject matter experts for clarity, relevance, and comprehensiveness. Necessary revisions were implemented before the final version was administered.

2.6. . METHOD OF DATA COLLECTION

Data were collected on-site using the structured questionnaire. The researcher personally administered the questionnaire to the selected professionals in various departments of the target companies, including engineering, exploration, production, and corporate services. Prior to administration, the researcher explained the study's purpose and assured respondents of confidentiality, thereby encouraging honest and informed responses.

2.7. . METHOD OF DATA ANALYSIS

The data collected were analyzed using the simple percentage method of data analysis. The simple percentage was used for easy understanding and clarity. It was used to analyze the demographic data and the responses in the section B of the questionnaire. Adopting the simple formula below:

$$\%x = \frac{R}{N} \times \frac{100}{1}$$

R = Number of respondents

N = Total number of respondents

X = Total responses of respondents to questions

III. RESULTS

Table 1 summarizes the demographic and safety performance compliance profile of the respondents. According to the data, 45% of respondents are from operational management, 37% from middle management, and 18% from top management, indicating that most insights are derived from those directly involved in day-to-day operations. In terms of professional discipline, 48% of respondents are engineers, 30% are project managers, and 22% are geologists or HSE professionals, ensuring a balanced mix of technical and managerial perspectives. A notable 93% of respondents confirmed the existence of an operational training policy within their organization, with only 7% reporting its absence. This high level of policy availability underscores a strong institutional commitment to safety training. However, when examining the frequency of SCP training courses, the responses were distributed as follows: 30% reported attending more than 6 courses, 27% attended between 6 and 10 courses, and 33% attended between 11 and 20 courses. This variability suggests differences in training intensity among the organizations. When assessing workforce adherence to safety policies, 8.9% of respondents rated it as very poor, 32.8% as poor, 17.9% as average, 8.9% as good, and 31.3% as excellent. These figures indicate that while a considerable proportion of respondents' view adherence favorably, there remains a significant portion perceiving the adherence level as suboptimal. Similarly, overall safety performance compliance received ratings of 7.9% for very poor, 31.8% for poor, 21.9% for average, 7.9% for good, and 30.3% for excellent. This distribution suggests that, although there is a positive perception of safety performance among nearly one-third of respondents, a combined 39.7% see room for improvement. Collectively, these findings highlight both strengths and weaknesses in the safety compliance framework, with strong policy existence and a mixed perception of training frequency and compliance levels that suggest potential areas for targeted improvement.

Table 1: profile of the respondents and key aspects of safety performance compliance within the oil and gas industry in Delta State

		Respondents options	Response (%)
1	Levels of Management	Operational /Middle/Top	45/37/18
2	Professional Discipline	Engineers/project managers/Geologist and HSE professionals	48/30/22
3	Existence of operational training policy	Yes/No	93/7
4	Frequency of SCP Training Courses	> 6 ≤ 10.> 11 ≤ 20, and	30/27/33
5	Workforce Adherence to Safety	Very Poor / Poor / Average / Good / Excellent	8.9/32.8/17.9/8.9/31.3

	Policies		
6	Overall Safety Performance Compliance	Very Poor / Poor / Average / Good / Excellent	7.9/31.8/21.9/7.9/30.3

Figure 1 captures respondents' perceptions of key safety performance compliance aspects using a five-point Likert scale, ranging from "Strongly Disagree" to "Strongly Agree." In terms of overall Health, Safety & Environment practices, all respondents provided positive feedback—60% agreed and 40% strongly agreed—indicating a very favorable perception of the organization's HSE performance. For "Safe work practices, Standards & procedures," no respondents expressed disagreement; however, 26.7% remained neutral, 53.3% agreed, and 20% strongly agreed. This suggests that while most view these practices positively, a quarter of the respondents are uncertain about their effectiveness. The item on "Workforce adherence to SCP/HSE policies/guidelines" shows a more mixed response. Specifically, 8.9% strongly disagreed and 32.8% disagreed, while 17.9% were neutral; on the other hand, 8.9% agreed and 31.3% strongly agreed. This nearly even split between negative and positive responses points to considerable variability in compliance among the workforce. Regarding the implementation of SCP policies on projects, responses were overwhelmingly positive, with 26.7% agreeing and 73.3% strongly agreeing, and no neutral or negative responses reported. This indicates that project-level safety measures are very well implemented. Finally, for the application of environmental protection and pollution control guidelines, 14.9% of respondents strongly disagreed and 5.9% disagreed, while 8.9% were neutral; 34.3% agreed and 35.8% strongly agreed. Although a combined 70.1% offered a positive evaluation, about one-fifth of respondents expressed concerns regarding the consistent application of these environmental standards. These findings, consistent with previous research on safety performance measurement [15] and [16], highlight both the strengths in overall HSE practices and SCP policy implementation at the project level, as well as areas for improvement in workforce adherence and environmental guideline application.

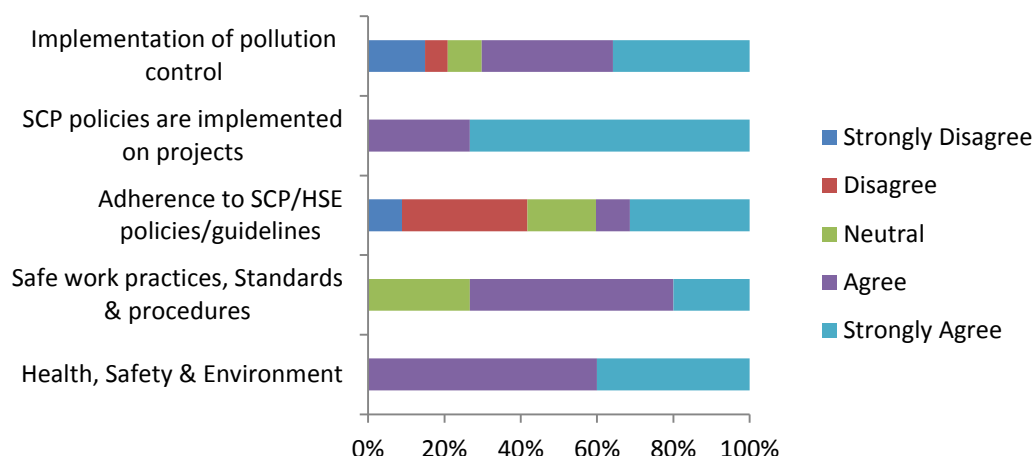


Figure 1: Assess Availability, Awareness, and Compliance with HSE/SCP Policies, Standards, Guidelines, and Procedures

Figure 2 captures respondents' perceptions regarding training and human capital factors as they relate to safety performance compliance. For the importance of multi-skilling employees, only 5% of respondents strongly disagreed and 16.7% disagreed, while 28.3% remained neutral. In contrast, 31.7% agreed and 18.3% strongly agreed that multi-skilling is critical for operational excellence. This suggests that although 50% view multi-skilling as important, nearly one-third are unsure of its significance. Regarding the development and utilization of intellectual capital, a small 3.3% strongly disagreed and 15% disagreed, 33.3% were neutral, while 35% agreed and 13.3% strongly agreed. This indicates that roughly 48.3% of respondents believe intellectual capital is essential for driving innovation and maintaining competitive advantage, although one-third are uncertain. For the importance of training top management, 11.7% strongly disagreed and 20% disagreed, with 33.3% remaining neutral; only 20% agreed and 15% strongly agreed. This mixed response suggests that fewer respondents see comprehensive top management training as vital compared to other training dimensions. In terms of actual training practices, 80% of respondents confirmed that all lower and middle-level managers have been trained in SCP (20% agree, 60% strongly agree), indicating strong support for managerial training. Similarly, for project managers and project team members, 53.3% agreed and 40% strongly agreed that they undergo SCP training, with only 6.6% remaining neutral. Finally, regarding whether lower and middle-level managers willingly release employees for SCP training, only 6.7% were neutral, while 26.7% agreed and 66.7%

strongly agreed. This result reflects strong managerial support for employee training initiatives, which is crucial for sustaining a robust safety culture. These findings collectively suggest that respondents value multi-skilling and intellectual capital highly and perceive that effective training practices are in place for both management and project teams, with strong managerial support for facilitating continuous learning. Such insights are consistent with previous studies highlighting the importance of training and human capital in maintaining high safety performance [15] and 16].

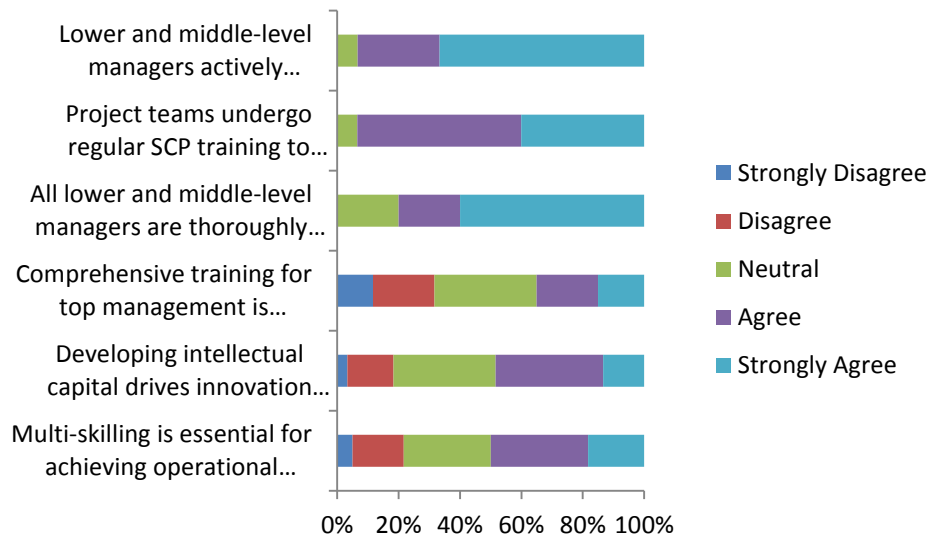


Figure 2: Examine the Impact of Training on SCP Management

Figure 3 captures respondents' perceptions regarding the effectiveness of internal communication and employee engagement in fostering a robust safety culture within their organization. For the statement on the communication of organization values, none of the respondents expressed any disagreement or neutrality—20% agreed while a substantial 80% strongly agreed. This overwhelmingly positive response suggests that organizational values are very clearly and effectively communicated. Similarly, when asked if the organization encourages employees to develop positive health and safety (H&S) attitudes, 73.3% of respondents strongly agreed and 20% agreed, with only 6.7% remaining neutral. This result indicates strong support for initiatives aimed at promoting positive H&S attitudes among employees. Regarding the enhancement of employees' understanding of the H&S outcomes associated with their decisions, 66.7% of respondents strongly agreed and 26.7% agreed, with a small 6.7% neutral response, demonstrating that most employees believe the organization successfully increases awareness of the consequences of their actions. In terms of encouraging employee engagement in the SCP management process, 66.7% strongly agreed, 26.7% remained neutral, and 6.7% disagreed, suggesting overall positive perceptions but also indicating some hesitation regarding active participation in SCP management. When examining the item on enabling employees to increase their knowledge of hazard management and implement SCP processes, 53.3% agreed and 33.3% remained neutral, while 13.3% disagreed. This more moderate result points to a relatively positive view with room for improvement in empowering employees. Finally, for clarifying to immediate employees the specific behaviors required and expected of them, 53.3% agreed, 33.3% were neutral, and 13.4% (combined 6.7% strongly disagree and 6.7% disagree) expressed negative views. Overall, these findings indicate that while the organization is generally successful in communicating values and engaging employees in safety culture initiatives, further efforts may be needed to clarify behavioral expectations and to enhance knowledge transfer regarding hazard management.

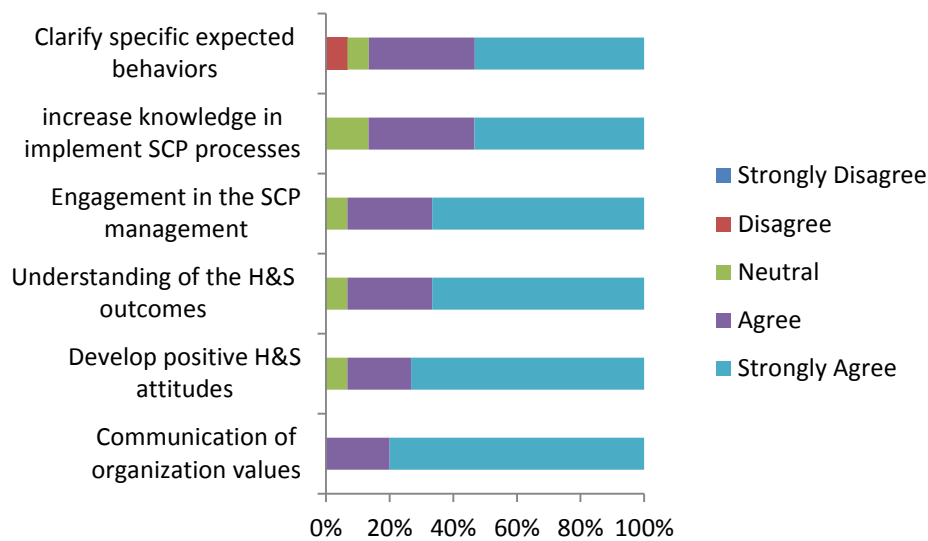


Figure 3: Assess Safety Culture and Employee Engagement in SCP

Figure 4 provides a clear picture of respondents' views on management commitment to safety culture and the strategic integration of SCP practices within their organizations. For the item "Your SCP management culture elucidates dedication and commitment," no respondent disagreed; instead, 60% strongly agreed, 26.7% agreed, and 13.3% remained neutral. This overwhelmingly positive response indicates that the vast majority perceive their organization's management as highly dedicated to safety. Similarly, when respondents were asked whether "Management recognizes the implications of SCP," a dominant 80% strongly agreed, with an additional 13.3% agreeing and only 6.7% remaining neutral. This suggests that nearly all respondents believe that management fully appreciates the critical importance of SCP in their operational environment. In evaluating executive support, 60% strongly agreed that executives visibly support SCP through presentations, correspondence, and active participation in safety meetings, while 33.3% agreed and 6.7% remained neutral. These findings imply robust support from senior leadership, a factor often linked to enhanced safety performance (Church et al., 2001). For the statement "Management at all levels recognizes the benefits possible from implementing sound SCP practices," 66.7% of respondents strongly agreed, 20% agreed, with 6.7% neutral and another 6.7% disagreeing. Although a small minority expressed disagreement, the overall sentiment remains highly positive. Additionally, regarding the support from lower and middle-level managers, 53.3% strongly agreed and 40% agreed that these managers are fully supportive of SCP, with only 6.7% neutral. Finally, when assessing whether "Strategic SCP is successfully integrated for managing projects," 60% strongly agreed, 33.3% agreed, and 6.7% were neutral. Collectively, these results indicate that respondents hold a very positive view of management's commitment and active engagement in safety practices. The high levels of agreement across all items suggest that both executive and lower-level management are effectively fostering a strong safety culture and integrating strategic SCP practices, which is essential for maintaining high safety performance in high-risk industries [15] and [16].

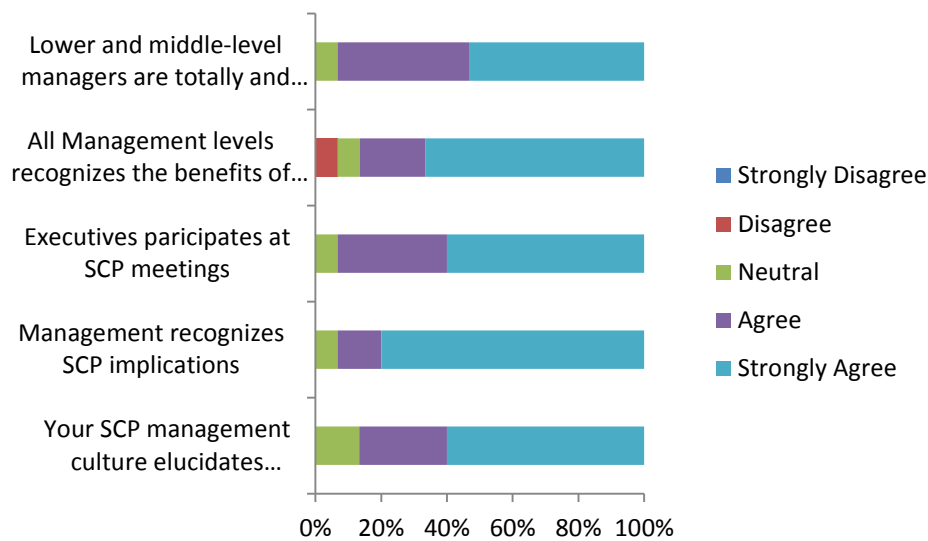


Figure 4: Evaluate Management Commitment and Attitudes toward SCP Practices

Figure 5 illustrates respondents' perceptions regarding corporate social responsibility and community engagement within the context of safety performance compliance. For the item on "Good public relation practices in dealing with Communities/Stakeholders," no respondents strongly disagreed; however, 13.3% disagreed and 20% remained neutral, while a combined 66.6% (53.3% agree and 13.3% strongly agree) expressed a positive view. This suggests that although there is a generally favorable opinion regarding public relations practices, there remains some uncertainty or dissatisfaction among a minority of respondents. In the case of "Host communities are treated as stakeholders during the project design stage," all respondents provided positive feedback, with 40% agreeing and 60% strongly agreeing. This unanimous positive response indicates that the integration of host community interests into the project design is highly valued. For the statement "Demonstrate a strong conviction on SCP as it relates to host communities," none of the respondents disagreed; only 6.7% remained neutral, while 33.3% agreed and 60% strongly agreed. Such a high level of strong agreement underscores the importance of a committed stance towards integrating safety culture with community welfare. Lastly, regarding the item "Encourage dialogue with host communities on issues relative to H&S/environmental pollution at the production stage of a project," no respondents expressed disagreement; 13.3% were neutral, 33.3% agreed, and 53.3% strongly agreed. This indicates a robust support for active dialogue between the organization and host communities. Collectively, these findings suggest that respondents view community engagement and corporate social responsibility practices very favorably, especially in terms of involving host communities and maintaining strong communication channels. The overall positive ratings are indicative of a well-integrated approach to stakeholder engagement within the safety performance compliance framework [15] and [16].

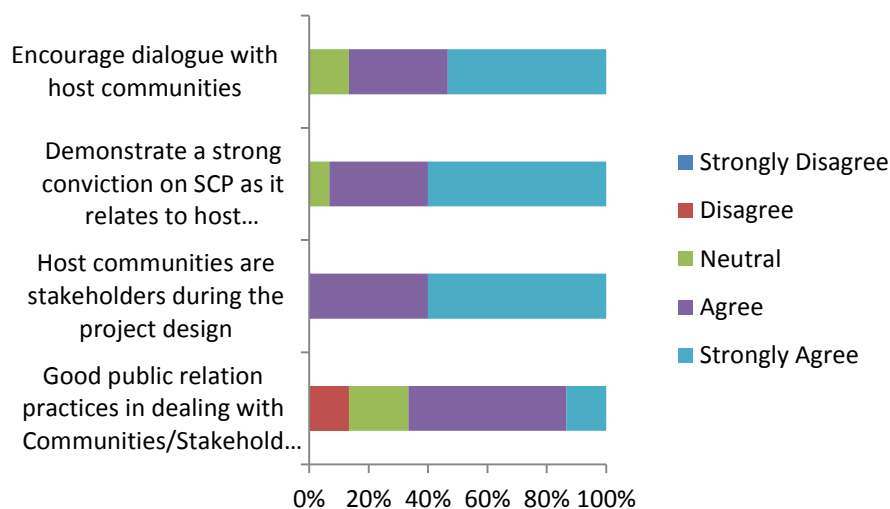


Fig 5: Assess Corporate Social Responsibility (CSR) and Community Engagement in SCP Culture

IV. CONCLUSION

This study assessed safety performance compliance in the oil and gas industry in Delta State using a structured quantitative survey. The findings reveal that organizations in the region generally have robust Health, Safety & Environment (HSE) frameworks in place. Respondents overwhelmingly supported the existence and effective implementation of safety policies, as evidenced by high levels of agreement on HSE practices and SCP policy execution at project levels. Moreover, strong management commitment and visible executive support were consistently rated very positively, underscoring the critical role leadership plays in fostering a strong safety culture.

However, despite these strengths, the study identified areas that require further attention. The mixed responses regarding workforce adherence to SCP/HSE policies indicate variability in compliance, which could compromise overall safety performance. Additionally, although the majority of respondents expressed satisfaction with training and the importance of multi-skilling and intellectual capital, there remains a need to ensure that training practices translate into consistent on-site behavior. Concerns were also noted regarding the consistent application of environmental protection and pollution control guidelines, suggesting potential gaps in the operationalization of these standards.

In light of these findings, it is imperative that oil and gas companies in Delta State not only maintain but also enhance their safety performance strategies. Focusing on improving workforce adherence and bridging gaps between training and actual compliance may yield significant benefits. Further research is recommended to explore the factors influencing these discrepancies, as well as the impact of continuous training and technological integration on improving safety outcomes. Overall, while the current safety performance compliance measures are commendable, targeted improvements in critical areas could further strengthen the operational safety environment in this high-risk industry.

ACKNOWLEDGMENTS: We acknowledge the Department of Environmental Management and Toxicology Federal University of Petroleum Resources Effurun Delta State Nigeria.

CONFLICT OF INTEREST: We, the authors of this manuscript hereby declare that we have no conflict of interest related to the research presented in this manuscript. No financial or personal relationships with organizations or individuals that could have influenced the work. This research was conducted in an unbiased manner, the findings and conclusions presented in the manuscript are based solely on the research data and analysis.

AUTHORSHIP: The manuscript entitled (SAFETY PERFORMANCE COMPLIANCE IN THE OIL AND GAS INDUSTRY IN DELTA STATE). Was prepared by the following authors: EJAIRU Akpobome Andrew¹ and IBEZUTE Albert Chukwuemeka. Each author has contributed to the conception, design, data acquisition, analysis, and interpretation of research presented in this manuscript.

REFERENCES

- [1]. Department of Petroleum Resources (DPR). (2020). Safety regulations and compliance guidelines. Retrieved from [DPR website].
- [2]. Nigerian National Petroleum Corporation (NNPC). (2019). Annual safety performance report. Retrieved from [NNPC website].
- [3]. Tulchinsky, T. H., and Varavikova, E. A. Environmental and Occupational Health. *The New Public Health*, 2014. 471–533. <https://doi.org/10.1016/B978-0-12-415766-8.00009-4>
- [4]. Kruk, M. E., et al., High-quality health systems in the Sustainable Development Goals era: time for a revolution. *The Lancet. Global health*, 2018 6(11), e1196–e1252. [https://doi.org/10.1016/S2214-109X\(18\)30386-3](https://doi.org/10.1016/S2214-109X(18)30386-3)
- [5]. Okafor, N. Challenges in operational safety: A study of Nigeria's oil and gas sector. *Nigerian Journal of Energy and Safety*, 2020. 15(2), 88–102.
- [6]. Adewale, O. Enhancing safety culture in high-risk industries: Insights from the oil and gas sector in Nigeria. *Journal of Industrial Safety*, 2021 10(1), 45–60.
- [7]. UN Environment Programme (UNEP). 2011. The devastating impact of the oil industry in Ogoniland, and set out urgent recommendations for clean-up. Retrieved from [UNEP website].
- [8]. Sundaram Haridos., Health and Safety Hazards management in Oil and Gas Industry. *International Journal of Engineering Research and Technology (IJERT)*, 2017. 6(6).
- [9]. Iduemre, Ochuko., Socio-economic impact of oil and gas exploration in ologbo community, ikpoba-okha local government area, edo state, nigeria. *International Journal of Management, Social Sciences, Peace and Conflict Studies (IJMSSPCS)*, 2020. 3 (3); 463 - 471; ISSN: 2682-6135
- [10]. Umar, H. A., Abdul Khanan, M. F., Ogbonnaya, C., Shiru, M. S., Ahmad, A., and Baba, A. I. Environmental and socioeconomic impacts of pipeline transport interdiction in Niger Delta, Nigeria. *Heliyon*, 2021. 7(5), e06999. <https://doi.org/10.1016/j.heliyon.2021.e06999>
- [11]. Eze, C., Technological innovation and safety compliance in the Nigerian oil and gas industry. *Energy Policy Review*, 2022. 18(3), 112–128.
- [12]. Suku, Piety, Ugwoha, Ejikeme, Orikpote, Ochuko and Ewim, Daniel. The Socio-Economic and Environmental Impacts of Petroleum Refinery Operations in the Niger Delta Region. *The Journal of Engineering and Exact Sciences*. 2023 9. 18333-18333. 10.18540/jcecv9iss11pp18333.
- [13]. Johnston, J. E., Lim, E., and Roh, H. Impact of upstream oil extraction and environmental public health: A review of the evidence. *The Science of the total environment*, 2019. 657, 187–199. <https://doi.org/10.1016/j.scitotenv.2018.11.483>

- [14]. Zephaniah Osuyi Edo., The challenges of effective environmental enforcement and compliance in the niger delta region of nigeria Journal of Sustainable Development in Africa. 2012. 14, (6)
- [15]. Church, A. T., Waclawski, J., and Reynolds, S., Evaluating the effectiveness of Likert scales in organizational research. Journal of Business and Psychology, 2001 16(3), 247–265.
- [16]. Alwin, D. F. Measurement error and research design. Cambridge University Press. 2010
- [17].