

# Comparative Analysis in the Variation of Personality Traits, Safety Behaviour and Performance of Workers in Local and Foreign-Based Operated Oil and Gas Companies in the Niger Delta

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**How to cite this paper:** Esuuk, E., Nwaogazie, I., Ugbebor, J. and Chinemerem, P. (2024) Comparative Analysis in the Variation of Personality Traits, Safety Behaviour and Performance of Workers in Local and Foreign-Based Operated Oil and Gas Companies in the Niger Delta. *Open Journal of Safety Science and Technology*, 14, 62-74. <https://doi.org/10.4236/ojsst.2024.143005>

**Received:** June 13, 2024

**Accepted:** July 27, 2024

**Published:** July 30, 2024

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## Abstract

This study was aimed at comparing the personality traits and safety behaviour of workers in local and foreign-based operated oil and gas companies in the Niger Delta region. Questionnaires were developed to measure workers' personality traits and level of safety behaviour. A total of 384 participants from local and foreign-operated companies participated in the survey. Descriptive statistic was used to evaluate the level of personality traits and safety behaviour among the workers. Principal Component Analysis (PCA) was used to examine links between personality traits, safety behaviour and company type. Results showed workers in foreign-operated oil and gas companies scored higher on extraversion, agreeableness, conscientiousness, and openness, while workers in locally-operated companies had higher neuroticism. Workers in foreign-operated companies also demonstrated better safety participation and compliance, reporting fewer incidents. Findings from the study suggest that workers in local companies can benefit from stress management which can help locals reduce neuroticism, promote positive personality traits, and foster a safety culture. The study emphasizes the role of personality traits in safety, advocating tailored strategies for improved worker safety in the industry.

## Keywords

Personality Traits, Safety Compliance, Safety Participation, Worker Behaviour, Niger Delta, Safety Performance, Workplace Safety

## 1. Introduction

Nigeria, which is one of the twelve member countries in the Organization of the Petroleum Exporting Countries (OPEC), is tasked with the responsibility of production of oil and gas needed to meet the world oil demand [1]. This makes Nigeria a critical player in the global energy market. OPEC regulates the oil market by setting production quotas, and a 1.8 million barrel per day production quota was assigned to Nigeria. As of May 2024, it was estimated that Nigeria had a production output of 1.28 million barrels per day, which is far below its production quota specified by OPEC [2]. Efficient production practices by both foreign (multinational) and local oil and gas companies are essential to increase their production output. Given the challenging socio-economic and political environments in which these operations occur, understanding the variations in personality traits, safety behaviour, and performance among employees is crucial. Safety issues bring about incidents and accidents which can result in downtime in production, thereby further impacting Nigeria's production output. Several research studies have attributed most safety issues to human error, with personality traits tending to affect human behaviour [3]-[6].

Personality traits are characteristics or qualities that define an individual's behaviour, thoughts, and emotions. Personality traits influence individual behaviour, which in turn influences one's safety behaviour, an antecedent to incidents and accidents. In the demanding and hazardous conditions of the oil and gas industry, these traits are particularly critical in understanding worker safety. Employees' personality traits affect their adherence to safety procedures and their ability to manage job-related stress and risks [7]-[9].

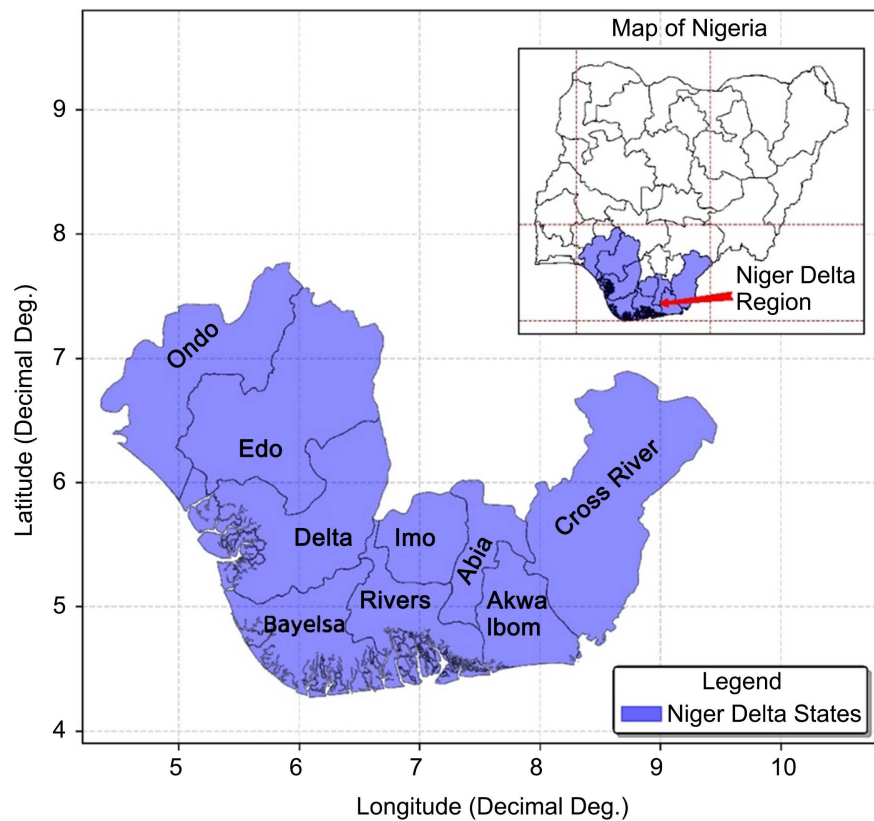
Safety behaviour consists of two components: safety compliance and safety participation [10]. Safety compliance entails one's adherence to safety rules and regulations, while safety participation involves voluntary behaviours that contribute to a safer work environment. Neal and Griffin [10] stated that these two components are influenced by factors such as individual attitudes towards safety, perceived safety climate, and organizational safety culture. Adherence to safety protocols and robust safety management systems are essential to prevent accidents and ensure a safe working environment. Cultural differences and organizational practices significantly influence personality traits and safety behaviour [11] [12]. Comparing the personality traits of local and foreign company workers and how these traits influence their safety behaviour can provide insights into best practices and areas for improvement. This study aims to fill the research gap by providing a comparative analysis of personality traits, safety behaviour, and performance across local and foreign oil and gas companies operating in the Niger Delta, thereby offering insights into optimizing operational efficiency and workforce well-being.

## 2. Materials and Methods

### 2.1. Study Area

The Nigerian government officially recognizes the Niger Delta as a region that

covers about 70,000 km<sup>2</sup> (27,000 sq-mi), or 7.5% of the country's total area. The region, which is located in the south of Nigeria, has a population of about 31 million people. The original Niger Delta consisted of Delta, Bayelsa, and Rivers states, but the government added Abia, Akwa-Ibom, Cross River State, Edo, Imo, and Ondo States to the region in 2000. The Niger Delta is rich in ecology, with diverse mangroves that store carbon and support various plant and animal species. Agriculture and fishing are the main economic activities in the region, providing livelihoods for many people. However, the region has suffered from severe land, water, and air pollution due to the poor management of the Petroleum Industry over the years. This has affected the quality of life of the people in the region. Many people in the region do not have access to basic services, such as electricity, sanitation, primary healthcare, and education. The unemployment rate is also very high. The poor management of the Petroleum Industry and the slow development of the region are related to the widespread corruption and violence sponsored by political actors. The Niger Delta has experienced various conflicts since the 1990s, including militant attacks and violent clashes during elections, as different groups compete for the Petroleum revenues. The availability of illegal small arms and light weapons in Nigeria has also increased the level of violence in the region, involving criminal acts, communal disputes, and other conflicts. These issues create a complex and difficult context for the study on how personality traits affect safety compliance and participation (**Figure 1**).



**Figure 1.** Map of study area.

## 2.2. Participants

This study involved workers from the Petroleum Industry in the South-South region of Nigeria as participants. The researchers used proportionate stratified sampling to obtain a representative sample from each company. This sampling technique divides the population into subgroups based on a specific criterion, which was the job role in this case. The researchers calculated the sample size for each subgroup using the formula  $\text{sample/population size} \times \text{subgroup size}$ . This ensured that the sample subgroups were proportional to the population subgroups, reflecting the diversity of the workforce.

The subgroups comprised various job roles in the Petroleum Industry, such as HSE officers, project/field managers, human resource professionals, engineers, and support roles like IT support, legal support, accountants, researcher/lab scientists, and administration workers. The researchers selected participants from each subgroup until they reached a total sample size of 384. This method of proportionate stratified sampling enabled the researchers to capture the different roles in the Petroleum Industry in the South-South region, increasing the validity and reliability of the study. The sampling was done for workers in both local and foreign-based operated companies in the Niger Delta region.

The researchers asked the participants to assess their personalities using the Big Five instrument. They also asked them to rate their safety behaviour in terms of safety compliance and participation. The researchers used a five-point Likert scale to collect the participants' opinions. The scale ranged from 1 (Strongly Disagree) to 5 (Strongly Agree), allowing the participants to give nuanced and detailed feedback on their personality traits and safety behaviour.

## 2.3. Instrument for Study

Participants were asked to evaluate their personality traits and safety behaviour they exhibit at their workplace. A five-point Likert scale was utilized, providing a comprehensive spectrum for participants to express their opinions. The scale ranged from 1 (Strongly Disagree) to 5 (Strongly Agree), allowing respondents to provide nuanced and detailed feedback on their personality traits and safety behaviour.

### 2.3.1. Personality Trait Instrument

This study used the well-known "Big Five Inventory", (Openness; Conscientiousness; Extraversion; Agreeableness; and Neuroticism), by [13] to measure personality traits. The Big Five Inventory evaluates five main aspects of personality:

**Openness:** Indicates how much an individual is interested in learning new things, trying new experiences, and seeing different perspectives. Openness shows an individual's liking for art, adventure, and curiosity, enhancing intellectual curiosity and openness to new experiences. Open individuals are creative and emotionally aware, often holding unconventional views. Openness can foster innovation and exploration, but it can also be seen as a lack of direction and

lead to dangerous behaviour. Example item: “I am curious about lots of different things.” Conscientiousness: Measures how organized, responsible, and reliable an individual is.

Conscientiousness implies self-control, goal orientation, and competence. Conscientious individuals are careful, organized, and persistent. High conscientiousness is related to safety performance, as conscientious individuals tend to follow safety rules and exhibit self-restraint. Example item: “I do things carefully and completely.”

Extraversion: Assesses how sociable, assertive, and outgoing an individual is. Extraversion expresses sociability, assertiveness, and enthusiasm. Extraverts are energetic, friendly, and enjoy social interactions. Although the evidence is mixed, some studies suggest that extraversion affects accident involvement. Extraverted individuals may be more likely to have accidents due to their lower attention and willingness to take risks. Example item: “I tend to be talkative.”

Agreeableness: Indicates how friendly, caring, and willing to cooperate with others one is. Agreeableness reflects the desire for social harmony, honesty, and kindness. People who score high on agreeableness are courteous, supportive, and collaborative. People who score low on agreeableness are competitive and uncooperative, which may increase the risk of accidents. Agreeableness also involves trust and generosity, which are important factors for avoiding accidents. Example item: “I usually believe what people say.”

Neuroticism: Evaluates how emotionally stable and resilient one is. Neuroticism captures the tendency to experience negative emotions such as stress, anxiety, and depression. People who score high on neuroticism are easily upset and have difficulty coping with stress. People who score low on neuroticism are calm and composed and can make better decisions under pressure. Example item: “I tend to lose my temper in challenging situations.”

### **2.3.2. Safety Behaviours Instrument**

The items developed by [10] were used to evaluate safety behaviours, which include safety compliance and participation.

Safety Compliance: Refers to following the safety rules and guidelines that are set to create a safe work environment. Example item: “I wear the appropriate personal protective equipment for my tasks.”

Safety Participation: Measures the extent to which employees are involved in safety-related actions and programs that aim to enhance workplace safety. Example item: “I willingly do tasks or activities that help to increase safety at work”.

## **2.4. Data Analysis and Procedures**

The data analysis employed Principal Component Analysis (PCA) to examine the association between personality traits and safety performance among workers in local and foreign-based operated companies in the oil and gas industry in the South-South region of Nigeria. Additionally, descriptive statistics (mean and standard deviation) were computed to describe the participants’ personality trait

profiles for workers in local and foreign-based operated companies.

### 3. Results

#### 3.1. Demographic Analysis

The demographic distribution among respondents in this study, encompassed workers from both local and foreign-operated oil and gas companies in the Niger Delta. Among the total participants, 52.8% identified as male, while 46.8% identified as female. In terms of age distribution, most respondents fell within the 30 - 39 age bracket (50.4%), followed by those aged 20 - 29 (23.5%), 40 - 49 (18.7%), and those aged above 49 (7.5%). Regarding marital status, the largest proportion of respondents were single (64.3%), followed by married individuals (31.7%), and a smaller percentage of widowed participants (4.0%). Furthermore, educational attainment revealed that the vast majority of respondents held a university degree (95.7%), while a smaller subset reported no university degree (4.3%). A total of 236 respondents who took part in the survey worked for foreign-operated oil and gas companies, while 139 respondents represented locally operated companies (**Table 1**).

**Table 1.** Summary of the distribution of demographic variables of respondents.

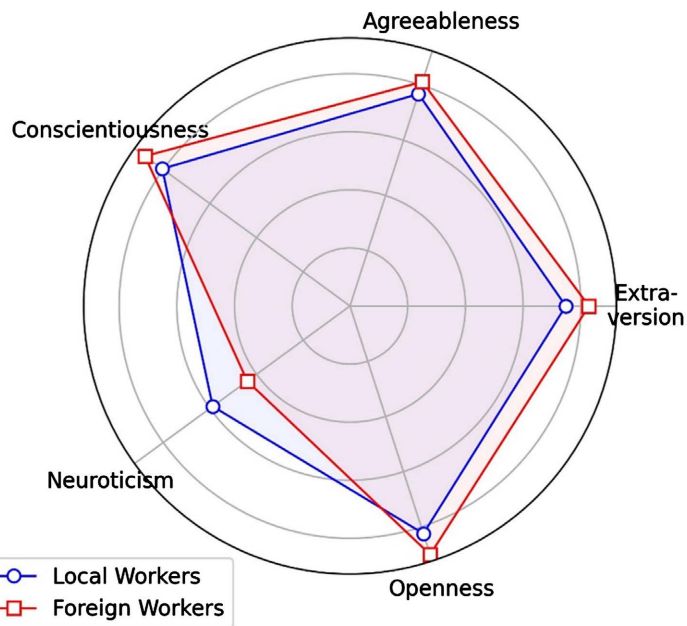
Demographic Criteria	Qualitative Values	Frequency	Percentage (%)	Cumulative Percentage (%)
Gender	Male	199	53.1	53.1
	Female	176	46.9	100
Age	20 - 29	88	23.5	23.5
	30 - 39	189	50.4	73.9
	40 - 49	70	18.7	92.5
	Above 49	28	7.5	100
Marital Status	Single	241	64.3	64.3
	Married	119	31.7	96.0
	Widow	15	4.0	100.0
Educational status	No university degree	16	4.3	4.3
	University degree	359	95.7	95.7

#### 3.2. Respondent's View on Personality Traits and Safety Behaviour of Workers in Local and Foreign-Based Operated Companies in the Nigeria Oil and Gas Industry

The result of the differences in personality traits and safety performance of workers in local and foreign-based operated companies in oil and gas companies operating in Nigeria is presented in **Figure 2** and **Figure 3** while the mean score of the various constructs is presented in **Table 2**. The radar chart in **Figure 2** illustrates the comparative personality traits of workers in local and foreign-operated

companies. The result indicates that foreign workers score higher across most personality traits. Specifically, foreign workers exhibit higher levels of extraversion (4.14), agreeableness (4.06), conscientiousness (4.39), and openness (4.50) compared to their local counterparts who scored 3.74, 3.84, 4.02, and 4.12 for similar personality traits respectively. Neuroticism on the other hand was higher among workers in locally operated companies (2.94) compared to foreign counterparts (2.20), suggesting that local workers may experience higher levels of emotional instability.

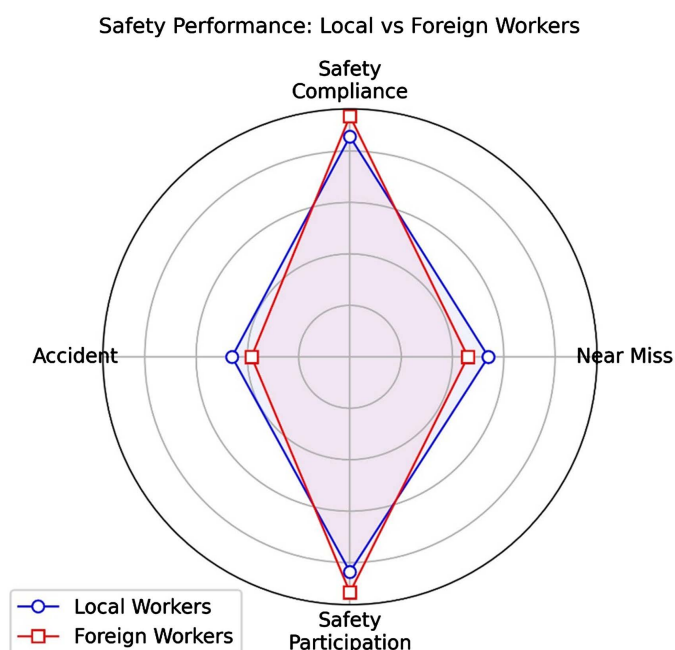
Personality Traits: Local vs Foreign Workers



**Figure 2.** Personality traits of workers in local and foreign-based operated companies in the Nigeria Oil and gas industry.

**Table 2.** Mean score of personality traits and safety performance of workers in local and foreign-based operated companies in oil and gas companies operating in Nigeria.

Factors	Constructs	Local Workers	Foreign Workers
Personality Traits	Extraversion	3.74	4.14
	Agreeableness	3.84	4.06
	Conscientiousness	4.02	4.39
	Neuroticism	2.94	2.2
	Openness	4.12	4.5
Safety Behaviour	Safety Participation	4.18	4.58
	Safety Compliance	4.28	4.68
Safety Outcomes	Near Miss	2.70	2.30
	Accidents	2.32	1.92

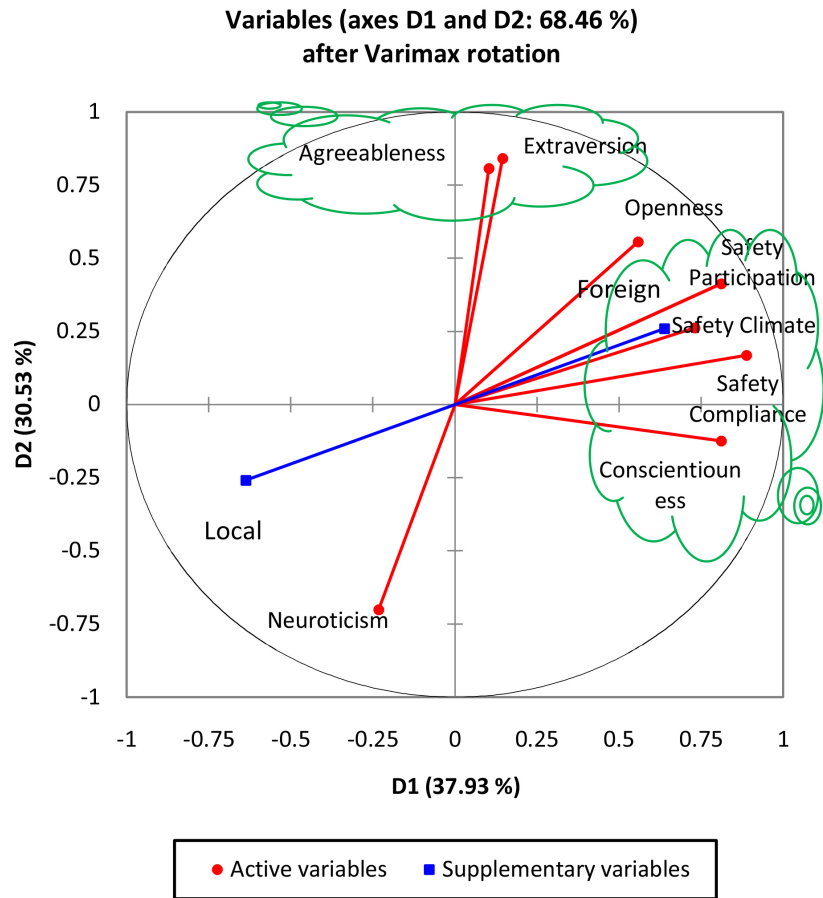


**Figure 3.** Safety performance of workers in local and foreign-based operated companies in the Nigeria Oil and gas industry.

**Figure 3** compares the safety performance metrics between workers in local and foreign-operated companies. Workers in foreign-operated companies showed better performance in safety participation (4.58) and safety compliance (4.68) than workers in locally operated companies, who scored 4.18 and 4.28 respectively. Furthermore, workers in foreign-operated companies reported fewer near misses (2.30) and accidents (1.92) compared to local workers, who reported near misses and accidents at 2.70 and 2.32, respectively. This suggests that workers in foreign-operated companies might be more diligent in adhering to safety protocols and participating in safety measures, possibly contributing to a lower incidence of accidents. The comparative analysis reveals that workers in foreign-operated companies tend to possess higher levels of positive personality traits and demonstrate superior safety performance metrics compared to workers in locally operated companies.

### 3.3. Relations between Personality Traits and Safety Performance of Workers in Local and Foreign-Based Operated Companies in Oil and Gas Companies Operating in Nigeria

The result of the Principal Component Analysis is presented in **Tables 3-5**, while the visualization of the relationship between the constructs and the workers of local and foreign-operated companies is presented in the biplot in **Figure 4**. The result from **Table 3** indicated a chi-square observed value of 1715.930, which was significantly higher than the critical value of 41.337, suggesting that a factor analysis test can be conducted on the data. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was 0.700, further confirming the appropriateness of the dataset for PCA.



**Figure 4.** Bi plot for principal components 1 and 2.

**Table 3.** Bartlett’s sphericity test.

Chi-square (Observed value)	1715.930
Chi-square (Critical value)	41.337
DF	28
p-value	<0.0001
alpha	0.05

**Table 4.** Eigenvalue and percentage of proportion before varimax rotation.

Principal Components	Eigenvalue	Before Varimax Rotation		After Varimax Rotation	
		Variability (%)	Cumulative %	Variability (%)	Cumulative %
F1	4.025	50.314	50.314	37.926	37.926
F2	1.452	18.145	68.459	30.533	68.459

**Table 5.** Factor loading score for workers behavior.

Constructs	D1	D2
Extraversion	0.145	0.841
Agreeableness	0.103	0.807
Conscientiousness	0.811	-0.124
Neuroticism	-0.233	-0.702
Openness	0.558	0.556
Safety Participation	0.811	0.412
Safety Compliance	0.888	0.168
Company Type-Local	-0.637	-0.259
Company Type-Foreign	0.637	0.259

The result from the eigenvalue presented in **Table 4** showed that two principal components explained most of the variation in the original dataset. The first factor (F1) explained 50.314% of the variance before Varimax rotation and 37.926% after rotation. The second factor (F2) accounted for 18.145% of the variance. The selection of principal components was based on eigenvalues and the proportion of variance retained by each component. Principal components with eigenvalues greater than 1 were retained. The two principal components accounted for 68.46% of the total variance. Varimax rotation was applied to the original solution for ease of interpreting the final solutions which is the factor loading presented in **Table 5**.

The factor loading scores revealed the contribution of each construct to the identified principal components. It was evident that the first principal component (D1) was heavily influenced by constructs such as conscientiousness, safety participation, and safety compliance with factor loading greater than 0.45. These constructs reflected a strong relationship with overall safety behaviour and adherence to safety protocols. On the other hand, the second principal component (D2) was more associated with personality traits like extraversion, agreeableness, and openness, indicating a significant relationship between interpersonal aspects and openness to experience. From the factor loading scores, it was clear that the first principal component was strongly related to safety behaviour constructs, such as safety participation and safety compliance, indicating that these aspects were critical in influencing workers' safety performance. Constructs like extraversion, agreeableness, and openness were more aligned with the second principal component, highlighting the importance of these personality traits in shaping interpersonal dynamics and openness to new experiences within the workplace.

The biplot visualization of the principal component analysis further illustrated the relationship between different constructs, the principal components and the supplementary variables. The supplementary variable used was workers who

work in locally or foreign-based operated companies. The result showed that foreign workers tended to score higher on constructs related to safety performance and positive personality traits, while local workers scored higher on neuroticism. This distinction underscored the potential differences in personality traits and safety behaviour between local and foreign workers in the Nigerian Petroleum Industry.

#### 4. Discussion

The findings of this study have important implications for safety management and human resources in the Nigerian oil and gas industry. The higher levels of positive personality traits and better safety performance among workers in foreign operated companies suggest the need for targeted interventions to enhance the safety behaviour of local workers. These interventions could include training programs focused on stress management to reduce neuroticism and initiatives to promote conscientiousness, extraversion, agreeableness, and openness. The significant differences in safety participation and compliance between workers of local and foreign-operated companies also highlight the necessity of fostering a strong safety culture within local companies. This could be achieved by implementing stricter safety protocols, providing regular safety training, and encouraging active participation in safety programs. The results of this study corroborate findings from previous research that suggest personality traits significantly influence safety behaviour and performance. Clarke and Robertson [14] found that conscientiousness and agreeableness are strong predictors of safety behaviour in various industries. Similarly, a study by [15] highlighted the role of personality traits, such as conscientiousness and neuroticism, in predicting safety performance. However, the present study contradicts findings from some studies that did not find a significant relationship between personality traits and safety behaviour. Huang *et al.* [16] reported that the impact of personality traits on safety behaviour was minimal compared to situational factors. This discrepancy may be attributed to differences in industry context, cultural factors, and the specific personality traits examined.

#### 5. Conclusion

The study examined the relationship between personality traits and safety performance among workers in local and foreign-operated oil and gas companies in Niger Delta, Nigeria. The results revealed significant differences in both personality traits and safety performance metrics between these two groups of workers. Specifically, foreign workers exhibited higher levels of positive personality traits, such as extraversion, agreeableness, conscientiousness, and openness, while local workers showed higher levels of neuroticism. In terms of safety performance, foreign workers demonstrated better adherence to safety protocols and reported fewer incidents of near misses and accidents compared to their local counterparts. Local companies should consider introducing programs that are

capable of improving the personality traits of their workers such as Emotional Intelligence in their training and development planning.

### Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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