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Influence Of Demographic Variable On Personality Trait And Safety Performance Outcomes Of Oil And Gas Workers In The Niger Delta Region

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Abstract
The study aimed at understanding the Influence of Demographic variables on Personality trait and safety performance outcomes of Oil and Gas workers in the Niger Delta Region. Using proportionate stratified sampling, 384 participants from diverse job roles were selected. A five-point Likert scale questionnaire was used in assessing the personality traits and safety behaviour. The findings revealed significant correlations between demographic variables, personality traits, and safety behaviour. Men exhibited higher conscientiousness levels than women, with workers above the age of 49 displaying the highest conscientiousness. Interestingly, no significant gender difference was observed in neuroticism, deviating from some existing literature. Workers above 49 displayed higher neuroticism, potentially linked to managerial responsibilities. A curvilinear relationship between age and openness emerged, peaking among workers aged 40-49. Openness level was relatively lower among younger and older workers. Marital status was linked to slightly better safety compliance among married individuals, highlighting the potential influence of personal relationships on workplace behaviour but no significantly difference was established with personality trait.

Keywords*: Personality traits, safety compliance, safety participation, worker behavior, Niger Delta, safety performance, workplace safety.*

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I. Introduction

Demographic variables (age, gender, education status) play a role in the differences in personality traits exhibited by people. Several studies have investigated the role gender, age, and education level play in the personality traits of people (Goldberg et al., 1998, Wood & Roberts, 2015; Costa Jr. et al., 2001). Macoby and Jacklin (1974) conducted one of the first research on the role gender plays in cognition and temperament in both adults and children. In their study, they concluded that men tend to be more assertive and less anxious than women. Feingold (1994) in a meta-analysis also confirmed that gender differences in adult plays a significant role in the difference observed in personality trait in people. Understanding the interplay among demographic variables, personality traits, and safety performance is imperative in comprehending the dynamics of human behaviour within the workplace. One factor that might influence the safety performance of oil and gas workers is their personality traits (Goldberg et al., 1998). Previous studies have suggested that some personality traits, such as agreeableness, conscientiousness, openness, extraversion, and neuroticism, can predict the safety-related behaviour of workers in different domains (Al-Shehri, 2015). The demographic composition of a workforce, including factors such as age, gender, education, and experience, can significantly influence one's personality traits which further impact the safety performance workers exhibit in the workplace. Moreover, differences in personality traits can affect the team dynamics in the working environment. Personality traits have been shown to affect various aspects of human behaviour, such as emotional states, decision-making, stress coping, and risk-taking (Miller, 1992; Martínez-Tejada, 2020). With the relationship between demographic variables and personality traits, it is possible that demographic variables may also moderate the effects of personality traits on the safety performance outcomes of oil and gas workers.

The aim of this paper is to examine the influence of demographic variables on personality traits and safety performance outcomes of oil and gas workers in the Niger Delta region. The paper will contribute to the existing knowledge on the factors that affect the safety and well-being of the oil and gas workers in the Niger Delta region, and provide recommendations for improving their safety performance outcomes.

Study Hypothesis

Gender and age are presumed to significantly impact personality traits and safety compliance and participation of workers in oil and gas operations in Nigeria. The hypothesis to be tested suggest that variations in personality traits varies across gender and age of the workers.

Null Hypothesis (Ho1): There is no significant impact of gender of workers' on personality traits and their safety participation in the Niger Delta region.

Alternative Hypothesis (Ha1): There is a significant impact of gender of workers' on personality traits and their safety participation in the Niger Delta region.

Null Hypothesis (Ho2): There is no significant impact of age of workers' on personality traits and their safety participation in the Niger Delta region.

Alternative Hypothesis (Ha2): There is significant impact of age of workers' on personality traits and their safety participation in the Niger Delta region.

II. Methods

Study Area

The Nigerian government officially recognizes the Niger Delta as a region that covers about 70,000 km2 (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.

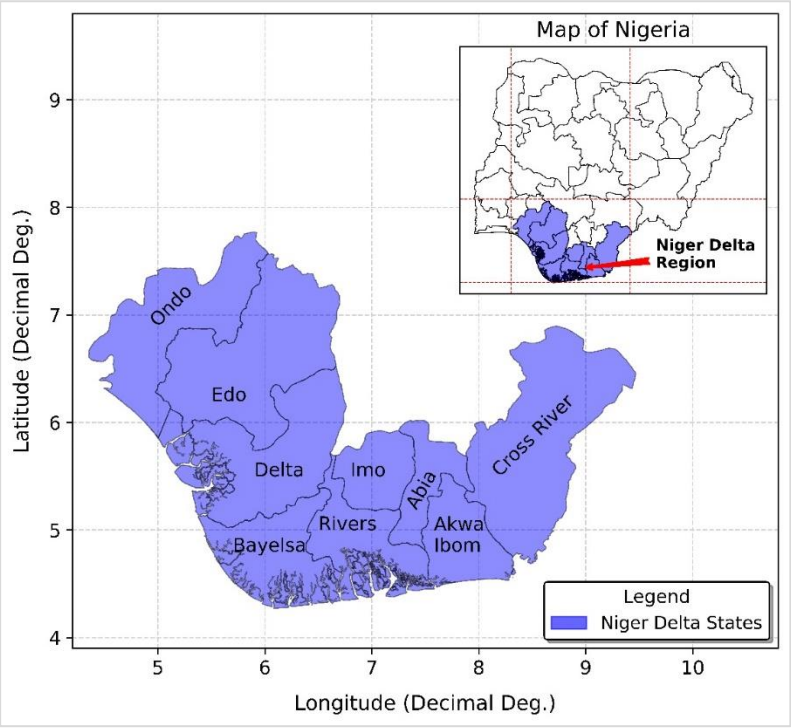

Figure 2: Map of Study Area

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 sample/ population size ×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 researchers asked the participants to assess their personality 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.

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.

Personality Trait Instrument

This study used the well-known "Big Five Inventory" by Goldberg (1990) 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 lack of direction and lead to dangerous behavior. 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."

Safety Behaviors Instrument

The items developed by Griffin and Neal (2000) were used to evaluate safety behaviors, 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"

Data analysis and procedures

The data analysis employed Principal Component Analysis (PCA) to examine the association between demographic variables, personality traits, and safety performance. Additionally, descriptive statistics (mean and standard deviation) were computed to describe the participants' personality trait profiles in relation to the study. Welch and Brown-Forsythe tests were used to determine the significant differences in personality traits across demographic variables, and Games-Howell post hoc tests were used to identify where the differences were located. Welch and Brown-Forsythe tests were used due to the data violating the assumption of homogeneity of variances.

III. Results

Demographic Analysis

The demographic of the participants revealed that there were more male (53.1%) than female (46.9%) respondents as shown in Table 1. Regarding marital status, 64.3% were single, 31.7% were married, and 4% were widows. In terms of education, 95.7% had a university degree, while 4.3% had a secondary school degree. Age-wise, 50.4% were between 20-29 years old, 23.5% were between 30-39 years old, and 7.5% were above 49 years old.

Table 1: Summary of the Distribution of Demographic variables

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

Respondent's View on personality traits and safety behaviour in the Nigeria Oil and gas industry

Table 2 shows the average ratings for different personality factors and indicators of safety behaviour. The results show that the respondents were high on extraversion (3.99), meaning they liked to interact and talk with their co-workers, showing their sociable and outgoing personality. They were also high on agreeableness (3.98), meaning they trusted and helped their colleagues, showing their cooperative and forgiving nature. They scored high on conscientiousness (4.25), meaning they had good organizational skills, goal-oriented attitude, and self-discipline in performing their tasks. They were low on neuroticism (2.48), meaning they did not have emotional instability, and reported low levels of sadness, worry, and depression. They scored high on openness (4.36), meaning they had a lot of intellectual curiosity, creativity, and willingness to learn new things at work. Regarding safety behaviours, the respondents rated high on safety participation (4.40), meaning they actively participated in activities that improved workplace safety, such as attending safety meetings and reporting incidents and near misses. They also rated high on safety compliance (4.47), meaning they followed the safety rules, including wearing personal protective equipment.

Table 2: Mean and standard deviation responses to construct

Construct	Mean	Std. Dev.
Extraversion	3.99	0.67
Agreeableness	3.98	0.58
Conscientiousness	4.25	0.70

Neuroticism	2.48	0.95
Openness	4.36	0.52
Safety Participation	4.40	0.70
Safety Compliance	4.47	0.59
Safety Climate	4.52	0.66

Relations between the demographic factor, personality traits, and safety performance

Principal component Analysis (PCA) was used to understand the relationship between personality traits, safety performance indicators, and some demographic criteria. The result of the PCA is presented in Tables 3 and 4, while the biplot showing the relationship between the personality trait and demographic criteria is presented in Figure 1. The result from Table 3 shows the eigenvalue and proportion of variance before and after varimax rotation. The result showed that the first and second components had eigenvalues of 4.029 and 1.444 respectively and both components accounted for a cumulative proportion of variance of 68.41%. The selection of the components to be retained was based on the Eigen-one criterion and cumulative proportion of variance. The first and second components had eigenvalues greater than 1 which aided in the decision to retain the first and second components, but the cumulative proportion of variance of the two components retained did not account for up to 70% of the total variance which is a cut-off mostly used. This led to retaining the third component which made a total of three principal components that were retained. In other to allow for easy interpretability of the factor loading scores, varimax rotation was applied to the initial solution and the eigenvalue and proportion of variance are presented in Table 3. The result from Table 3 showed that the first three components retained a cumulative variance of 77.32%. The result of the factor loading is presented in Table 4 and the criteria used to select variables that loaded strongly on the principal components were variables with factor loading greater than 0.5. The result from Table 3 showed that four variables loaded strongly on principal component 1, two variables loaded strongly on principal component 2, and two variables loaded strongly on principal component three.

Table 3: Eigen-value and Percentage of proportion before varimax rotation

Principal Components		Before Varimax		After Varimax	
	Eigenvalue	Variability (%)	Cumulative %	Variability (%)	Cumulative %
F1	4.029	50.358	50.358	35.684	35.684
F2	1.444	18.053	68.411	23.193	58.876
F3	0.713	8.909	77.32	18.443	77.32
F4	0.636	7.956	85.275	7.956	85.275
F5	0.504	6.299	91.574	6.299	91.574

The solution of the factor loading also showed a simple structure, implying that variables that had high factor loading on one component had low factor loading on the other two components.

The result of the biplot as shown in Figures 1 and 2 showed that conscientiousness, Openness Safety Participation, Safety Compliance, and Safety Climate all loaded strongly on principal component 1. Extraversion and Agreeableness loaded strongly on principal component two. The result from the biplot showed that male respondents have a higher level of conscientiousness, Openness Safety Participation, and Compliance than the female respondents. The result from the biplot also showed that female workers had higher neuroticism than male workers. The result implies that male workers tend to exhibit both direct and indirect behavior that influences safety at work than female respondents. The result also indicated that male oil and gas workers tend to be more goal-oriented and are generally more organized when carrying out their tasks than female workers. Also, respondents who are married showed slightly better safety compliance and participation than single respondents. The result from the biplot showed that respondents between the ages of 40-49 showed higher levels of agreeableness, openness, and extraversion.

Table 4: Factor Loading Score for workers behaviour

	D1	D2	D3
Extraversion	0.086	0.581	0.634
Agreeableness	0.045	0.845	0.253
Conscientiouness	0.823	-0.150	0.072
Neuroticism	-0.197	-0.145	-0.930
Openness	0.512	0.669	0.123
Safety Participation	0.778	0.378	0.284
Safety Compliance	0.876	0.128	0.205
Age-20-29	-0.133	0.106	-0.025
Age-40-49	0.111	0.200	-0.026
Age-30-39	0.106	0.046	0.217

Age-above 49	-0.083	-0.572	-0.264
Gender-Male	0.309	0.233	-0.055
Gender-Female	-0.309	-0.233	0.055
Marital_status-Single	-0.039	0.204	-0.061
Marital_status-Married	0.041	-0.122	0.108
Marital_status-Widow	-0.001	-0.209	-0.106
Education-Tertiary	-0.199	-0.090	0.025
Education-Secondary	0.199	0.090	-0.025

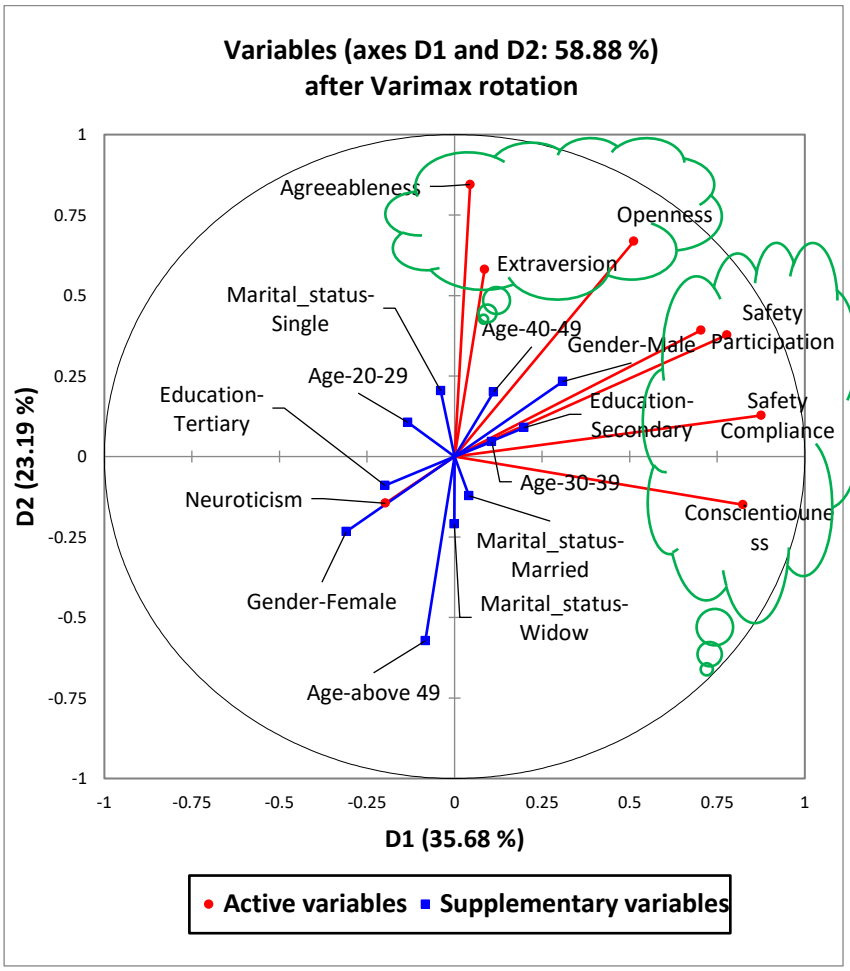

Figure 1: Bi-plot for principle component 1 and 2

Significance difference in personality traits and safety performance based on demographic variables Welch and Brown-Forsythe tests showed significant differences in the personality traits among the demographic variables.

Extraversion

Welch test showed that there was a significant difference in the level of extraversion among the oil and gas workers of different ages F-value (3, 124.29) = 276.238, p-value > 0.00. The result showed that the age of workers tends to significantly affect the level of extraversion in oil and gas workers in the Niger Delta region. Games-Howell Simultaneous pairwise comparison test showed that oil and gas workers between the ages of 40 to 49 tend to be more social than oil and gas workers above the age of 49 or oil and gas workers between the ages of 20 to 29. There was no difference between the extraversion level between age groups 30-39 and 40-49.

The result showed that male workers tend to be more extraversion than female workers. The result from the Welsh test showed that there was a significant difference in the mean response of extraversion between male and female workers F-value = 8.23, p-value = 0.004.

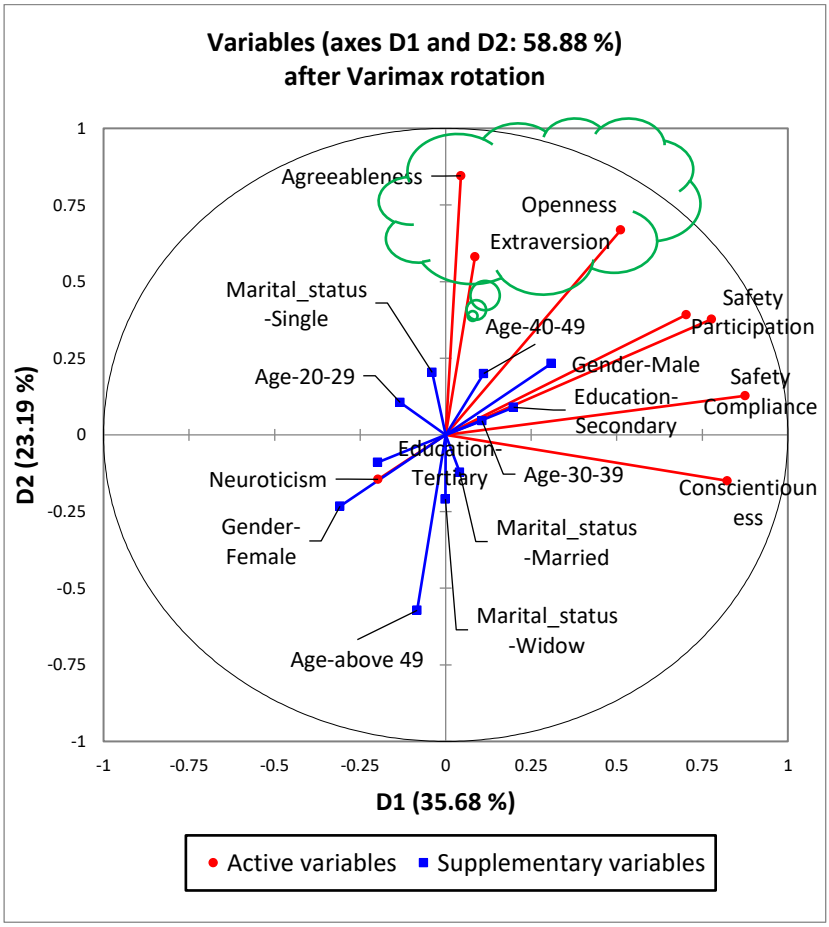

Figure 2: Bi-plot for principle components 1 and 3

Agreeableness

The result showed that there was a significant difference in the level of agreeableness among the oil and gas workers of different ages F-value (3, 94.195) = 13.49, p-value > 0.001. The result showed that the age of workers tends to significantly affect the level of agreeableness in oil and gas workers in the Niger Delta region. Games-Howell Simultaneous pairwise comparison test showed that oil and gas workers between the ages of 30 to 39 tend to be more helpful to their coworkers than other age groups while workers above the age of 49 tend to be the least helpful.

The result of the comparative analysis for gender showed that male workers tend to have more agreeableness than female workers F-value = 14.64, p-value > 0.001. The result from the Welsh test showed that there was a significant difference in the mean response to agreeableness between male and female workers.

Conscientiousness

The result showed that there was a significant difference in the level of conscientiousness among the oil and gas workers of different ages. The result showed that the age of workers tends to significantly affect the level of conscientiousness in oil and gas workers in the Niger Delta region F-value = 24.60, p-value > 0.001. Games-Howell Simultaneous pairwise comparison test showed that oil and gas workers above the age of 49 tend to be more organized and goal-oriented than any other age group. The results also showed that there was no significant difference in conscientiousness among the other age groups.

The result of the comparative analysis for gender showed that male workers tend to have more conscientiousness than female workers F-value = 16.19, p-value > 0.001. The result from the Welsh test showed that there was a significant difference in the mean response to conscientiousness between male and female workers.

Openness

The result showed that the age of workers tends to significantly affect the level of openness in oil and gas workers in the Niger Delta region F-value = 179.56, p-value > 0.001. Games-Howell Simultaneous pairwise

comparison test showed that oil and gas workers between the ages of 40-49 are more curious and have higher intellect than people between the ages of 20-29 and above the ages of 50.

The result of the comparative analysis for gender showed that male workers tend to have more openness than female workers. The result from the Welsh test showed that there was a significant difference in the mean response to openness between male and female workers F-value = 26.40, p-value > 0.001.

Neuroticism

The result showed that there was a significant difference in the level of neuroticism among the oil and gas workers of different ages F-value = 14.93, p-value > 0.001. The result showed that the age of workers tends to significantly affect the level of neuroticism in oil and gas workers in the Niger Delta region. Games-Howell Simultaneous pairwise comparison test showed that oil and gas workers above the age of 49 tend to be more worried than other age groups.

The result from the biplot in the PCA showed that female workers tend to have higher levels of neuroticism than male workers. However, the result from the Welsh test showed that there was no significant difference in the mean response to neuroticism between male and female workers F-value = 0.90, p-value =0.345.

The result of Welch and Brown-Forsythe provided sufficient evidence in stating that demographic variables like age and gender affect the personality traits and safety behaviour of workers in the oil and gas industry in the Niger Delta region. The test confirms the researcher's claim on the influence of demographic variables on personality traits.

IV. Discussion

The results from the study suggest that demographic variables affect the personality traits and the safety behaviour of workers in the oil and gas industry in Nigeria. The outcomes of the study shed light on the personality traits of oil and gas workers in the Niger Delta region, with a particular focus on the influence of demographic variables such as gender, age, and marital status. The finding from this study resonated with the finding done in similar studies (Goldberg et. Al, 1998; Wood & Robert, 2006, Schmitt et al., 2008).

The result of this study showed that men had higher conscientiousness levels than women workers. The finding from the result also showed that workers above the age of 49 had the highest level of conscientiousness and it was significantly different from other age groups. Goldberg et al. (1998) also had similar findings in their studies, as they stated that age had a strong correlation with conscientiousness. They stated that older individuals become more organized, traditional, and more conservative than a younger individual. Wood and Roberts (2006) also shared this sentiment that conscientiousness increases with the age of a person. The high level of conscientiousness found among workers above 49 can be attributed to the fact that older people tend to have more self-regulation, experience, and wisdom. These attributes enable them to be more organized and more goal-oriented than younger individuals.

Several studies have reported that female displays a higher level of neuroticism than male (Goldberg et. al., 1998; Weisberg et. al., 2011; Costa et. al., 2001; Lynn & Martin, 1997). The findings from this study did not support the findings from other studies. It was observed that no significant difference between the male and female workers. This might be due to where the study was carried out, as most of the previous studies were not carried out in a working environment. The finding also revealed that workers about 49 had higher neuroticism than other age group. The higher neuroticism found in worker above the age of 49 might be attributed to the fact that most workers within that age group are either in managerial positions or leading a team, and are responsible for the success or failure of their team or department they are heading.

Openness had a rather interesting relationship with age. It was observed that the peak of openness was observed in workers between the ages of 40-49. Older and younger workers exhibited relatively lower openness than other age groups. This curvilinear relationship of openness with respect to the age of people was also observed in other studies (Robert et al., 2006; Wood & Robert, 2015). The lower openness in younger workers might be attributed to lack of job experience while for older worker might be due to unwillingness to learn from new experience and stick to their reservoir of previous knowledge grained.

Marital status emerged as a notable factor, with married respondents demonstrating slightly better safety compliance and participation compared to their single counterparts. This finding correlates with the idea that marital status may influence certain behaviours in the workplace but no significant correlation was found with marital status and the personality traits for working environment.

V. Conclusion

In summary, this study explored the impact of demographic variables on personality traits and safety behavior among oil and gas workers in the Niger Delta. Findings align with previous research, noting age-related increases in conscientiousness, but deviate from some gender-related neuroticism patterns. The curvilinear relationship between age and openness reveals a peak in workers aged 40-49. Married individuals demonstrated

slightly better safety compliance. These insights emphasize the need for tailored interventions in the industry, considering the nuanced relationships between demographics, personality, and workplace behaviour.

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