THE IMPACT OF PERSONALITY TRAITS ON SAFETY PARTICIPATION AND COMPLIANCE AMONG WORKERS IN THE NIGER DELTA REGION

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Abstract: This study investigates the impact of personality traits on safety participation and compliance among workers in the Niger Delta Region. The methodology adopted utilize the use of questionnaires in obtaining the personality traits and safety behavior measures of worker in the industry. Three hundred and eighty-four (384) workers in the oil and gas industry operating in the Niger Delta were sampled. Correlation and Structural Equation Modeling via path analysis was used to establish the relationship between the personality trait and safety behavior. The results reveal that Openness and Conscientiousness were prevalent traits among these workers, indicating their intellectual curiosity, problem-solving abilities, organization, and dependability. Neuroticism, on the other hand, was less common among the workers. Path analysis and correlation analysis demonstrate the significant impact of personality traits such as Extraversion, Agreeableness, Conscientiousness, and Openness on safety participation and compliance. Conscientiousness and Agreeableness positively influence safety behavior, as individuals with these traits tend to adhere to safety protocols and regulations, reducing the risk of accidents. Conversely, high levels of Neuroticism lead to negative safety behavior due to impaired decision-making and increased distractions, posing a higher risk of accidents. This study emphasizes the importance of understanding and leveraging personality traits to enhance safety measures in the oil and gas industry.

IndexTerms - **Component,formatting,style,styling,insert.**

I.   INTRODUCTION

The petroleum industry operates within a web of intricate systems, where factors like social, human, technical, organizational, environmental, and managerial elements intricately intertwine (Ifelebuegu et al., 2019). Catastrophic events loom when any of these factors decline due to poor management (Cullen, 2011; Theophilus et al., 2017). Notably, hazards in the workplace stem from physical, human, and managerial realms (Makin & Winder, 2009). Mechanisms exist, like Occupational Health and Safety Management Systems (OHSMS), to identify workplace hazards, profoundly impacting both worker performance and safety in the Petroleum Industry. Within this context, human factors play a pivotal role. Negligence and carelessness, often stemming from human error, stand out as major causes of accidents (Nolan, 2011). Hale and Glendon (1987) stated that 80-90% of occupational incidence are as a result of human factors. Despite technological advancements reducing equipment failures, human errors persist as significant contributors to accidents in the petroleum industry (Mearns & Yule, 2009; Attwood et al., 2006). Efforts to curb accidents have led to the implementation of numerous health and safety regulations, yet accidents persist, with human error as a recurring theme (Grier & Sidnell, 2009; Theophilus et al., 2017). Despite these research attentions have focused on organizational and environmental factors rather than individual level variables (Nadakkavil et al., 2020).

Human behavior influenced by myriad factors such as mood, temperament, and personality traits, constitutes a linchpin in this scenario (Dejoy, 2005; Ifelebuegu et al., 2019). Personality traits, notably the Big Five - conscientiousness, emotional stability, extraversion, openness, and agreeableness - influence worker behavior and by extension workplace safety (Goldberg, 1990). While the human element is central, the specific link between personality traits and safety compliance and participation in the Niger Delta's petroleum industry remains unexplored in the literature. This study aims to understand the relationship between the Big Five personality traits and worker safety behavior within the oil and gas industry in the Niger Delta. By examining how these traits impact safety participation and compliance.

STUDY HYPOTHESIS

Personality traits are presumed to significantly impact safety compliance and participation of workers in oil and gas operations in Nigeria. The hypothesis to be tested suggest that variations in personality traits in workers exert a notable influence on the safety compliance and participation of workers. The theoretical model for the study is shown in Figure 1.

Null Hypothesis (Ho1): There is no significant impact of workers' personality traits on their safety participation in the Niger Delta region.
Alternative Hypothesis (Ha1): Workers' personality traits significantly impact their safety participation in the Niger Delta region.
Null Hypothesis (Ho2): There is no significant impact of workers' personality traits on the safety compliance of companies in the Niger Delta.
Alternative Hypothesis (Ha2): Workers' personality traits significantly impact the safety compliance of companies in the Niger Delta.
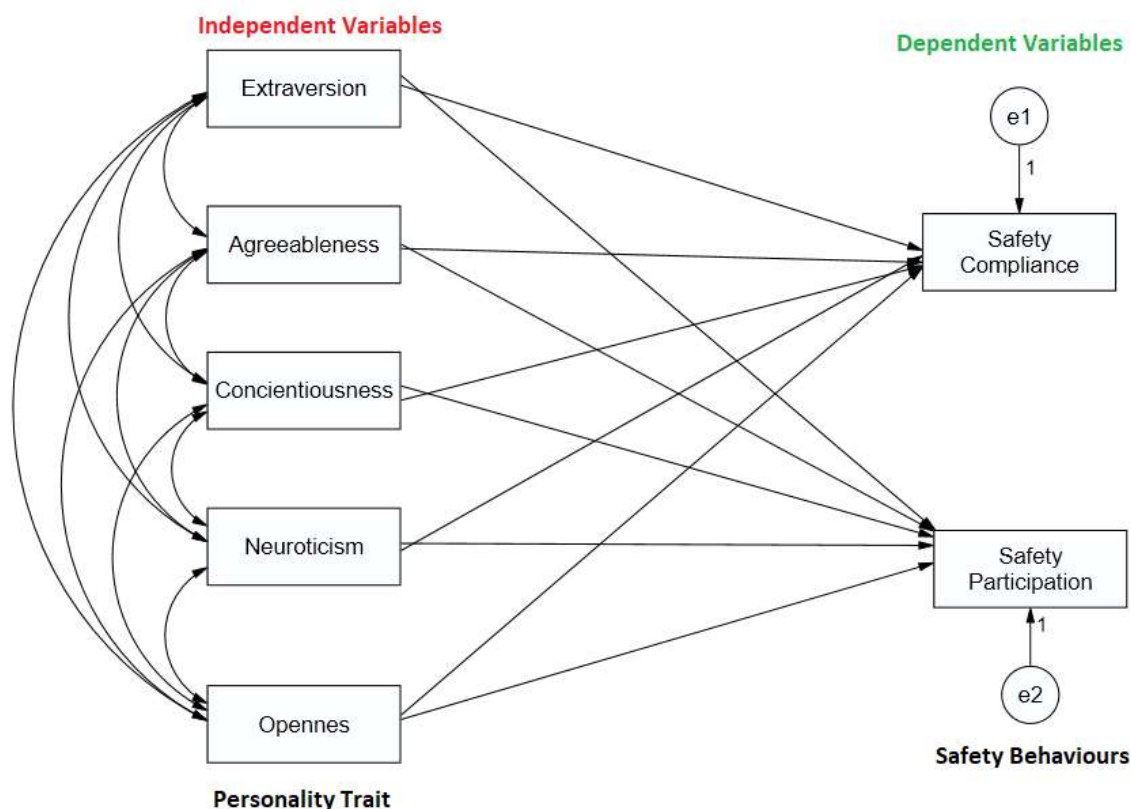

Figure 1: SEM model linking the exogenous and endogenous variables for theoretical model

III. METHODS
3.1 Study Area
The Niger Delta, officially designated by the Nigerian government sprawls over approximately 70,000 km2 (27,000 sq mi), constituting 7.5% of Nigeria's total landmass. Home to approximately 31 million people, this expansive region is located in the southern part of Nigeria. Initially comprising Delta, Bayelsa, and Rivers states, the government expanded its boundaries in 2000, incorporating Abia, Akwa-Ibom, Cross River State, Edo, Imo, and Ondo States into the region.
Ecologically rich, the Niger Delta boasts diverse mangroves that sequester carbon and provide a habitat for a myriad of plant and animal species. The region's economy is closely entwined with agriculture and fishing, forming the backbone of livelihoods for many residents. However, the mismanagement of the Petroleum Industry over the years has led to extensive land, water, and air pollution, profoundly impacting the lives of communities in the area. Despite the region's natural resource wealth, a significant portion of the population lacks access to fundamental services, including electricity, sanitation, primary healthcare, and education. Unemployment rates remain alarmingly high.
The mismanagement of the Petroleum Industry and the region's sluggish development are closely linked to rampant corruption and politically sponsored violence. Since the 1990s, the Niger Delta has been marred by outbreaks of conflict, including episodes of militancy and severe violence during elections, as various factions vie for control over Petroleum revenues. The proliferation of illicit small arms and light weapons in Nigeria has further exacerbated everyday violence, encompassing criminal activities, intra-

communal disputes, and other conflicts. The pervasive impact of these issues underscores the complex and challenging environment within which the study on the influence of personality traits on safety compliance and participation is conducted.
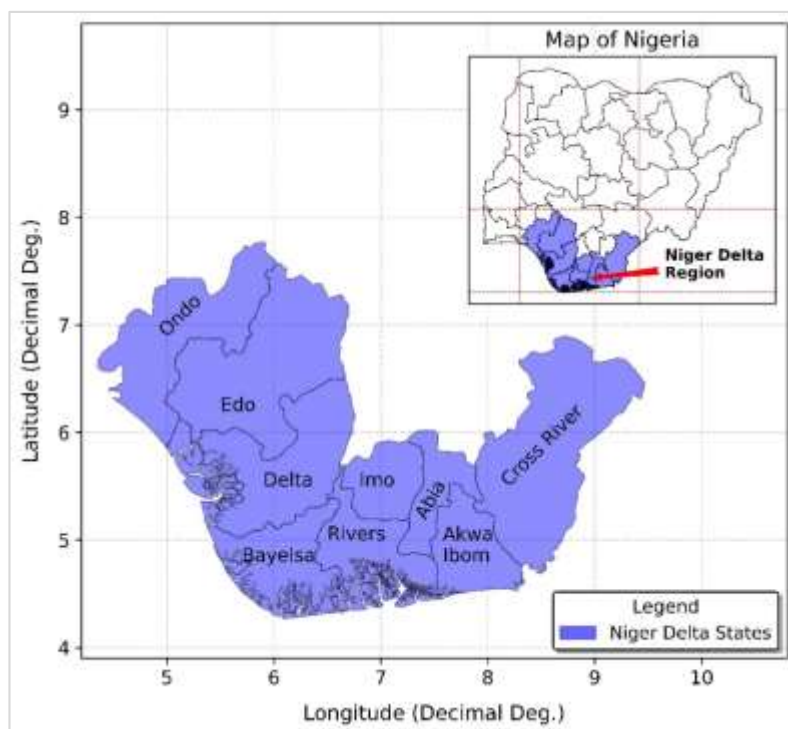

Figure 2: Map of Study Area

3.2 Participants

The participants involved in this study were workers drawn from the Petroleum Industry in the South-South region of Nigeria. The sampling technique employed was proportionate stratified sampling, designed to ensure a representative sample from each company. Proportionate stratified sampling involves dividing the population into strata based on specific criteria, such as job roles in this case. The sample size for each stratum was determined using the formula (sample size/population size) x stratum size. This approach guarantees that the size of the sample strata is proportional to the size of the corresponding population strata, ensuring an unbiased representation of the entire workforce.

The strata included diverse job roles within the Petroleum Industry, such as HSE officers, project/field managers, human resource professionals, engineers, as well as support roles like IT support, legal support, accountants, researcher/lab scientists, and administration workers. The selection process continued until a total sample size of 384, reflective of the industry's diversity, was achieved.

This careful application of proportionate stratified sampling allowed for a comprehensive and accurate representation of the various roles within the Petroleum Industry in the South-South region, enhancing the validity and reliability of the study.

3.3 Instrument for Study

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 a detailed feedback on their personality traits and safety behaviour. Participants were asked to evaluate their personality traits and safety behaviour they exhibit at their workplace.

3.3.1 Personality Trait Instrument

In this study, the assessment of personality traits focused on the renowned "Big Five Inventory" developed by Goldberg (1990). A 5-point Likert scale questionnaire was developed based on Goldberg (1990) "Big Five Inventory". The Big Five Inventory examines five core dimensions of personality:

Openness: Measures an individual's degree of intellectual curiosity, willingness to explore new ideas, experiences, and perspectives. Openness represents an individual's appreciation for art, adventure, and curiosity, fostering intellectual curiosity and willingness to try new experiences. Highly open individuals exhibit creativity and emotional sensitivity, often embracing unconventional beliefs. Eight items were used to measure this construct. Example item: "I am curious about lots of different things."

Conscientiousness: Assesses the degree of organization, responsibility, and dependability in an individual. Conscientiousness signifies self-discipline, goal focus, and competence. Conscientious individuals exhibit carefulness, organization, and perseverance. Eight items were used to measure this construct. Example item: "I do things carefully and completely."

Extraversion: Gauges an individual's level of sociability, assertiveness, and preference for social interactions. Extraversion reflects sociability, assertiveness, and enthusiasm. Extraverts are energetic, outgoing, and enjoy social interactions. Seven items were used to measure this construct. Example item: "I tend to be talkative"

Agreeableness: Measures the tendency to be compassionate, cooperative, and trusting towards others. Agreeableness relates to social harmony, trustworthiness, and pro-social behavior. Agreeable individuals are considerate, helpful, and cooperative. Trust and altruism within agreeableness are essential factors influencing accident involvement. Nine items were used to measure this construct. Example item: "Usually I trust people"

Neuroticism: Assesses emotional stability and the tendency to experience negative emotions. Neuroticism refers to emotional instability and vulnerability to negative emotions. Neurotic individuals are prone to stress, anxiety, and depression. High neuroticism leads to emotional reactivity and impairs decision-making under stress. Seven items were used to measure this construct. Example item: "I do not stay calm in difficult situations."

3.3.2 Safety Behaviors Instrument

Safety behaviors, encompassing safety compliance and participation, were evaluated using items developed by Griffin and Neal (2000).

Safety Compliance: Measures adherence to established safety protocols and procedures to ensure a safe working environment. Six items were used to measure this construct. Example item: "I use correct personal protective equipment for my tasks."

Safety Participation: Assesses active engagement in safety-related activities and initiatives to contribute to a safer work environment. Six items were used to measure this construct. Example item: "I voluntarily carry out tasks or activities that help to improve workplace safety"

3.4 Data analysis and procedures

The data analysis involved the utilization of Structural Equation Modeling (SEM) via Path Analysis to explore the relationships between personality traits and safety compliance and participation. Also, descriptive statistics (mean and standard deviation) were calculated to understand the participants' personality trait profiles within the context of the study. Pearson Correlation analysis was conducted to explore the relationships between personality traits and safety compliance and participation.

IV. RESULTS AND DISCUSSION

4.1 Demographic Analysis

The demographic of the participant revealed that there were more male (53.1%) than female (46.9%) respondents. 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.

4.2 Respondent View on personality traits and safety behavior in the Nigeria Oil and gas industry

Table 1 displays the mean responses for various personality trait factors and safety behavior indicators. The results reveal that for extraversion, the mean response was 3.99, indicating respondents' inclination to socialize and communicate with co-workers, reflecting their friendly and outgoing nature. Agreeableness scored 3.98, signifying a tendency to trust colleagues and offer help, showcasing their cooperative and forgiving traits. Conscientiousness had a mean response of 4.25, depicting respondents' organizational skills, goal-oriented approach, and self-discipline in task execution. Neuroticism scored 2.48, indicating a lack of emotional imbalance, with respondents reporting low levels of sadness, worry, and depression. Openness scored 4.36, suggesting a high degree of intellectual curiosity, creativity, and eagerness to learn new things on the job.

In terms of safety behaviors, safety participation scored 4.40, indicating active involvement in activities influencing workplace safety, such as attending safety meetings and reporting incidents and near misses. Safety compliance had a mean response of 4.47, highlighting strong adherence to safety protocols, including wearing personal protective equipment.

Table 1: 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

4.3 Relations between the leadership style, safety behavior, and safety outcome

The Pearson correlation analysis examined the relationships between personality traits and safety behaviour constructs and the result in shown in Table 2. The inter-correlation between the personality traits revealed that extraversion was positively correlated with agreeableness, Conscientiousness, and Openness. Participants that indicated that they generally love seeking the company of other were also intellectually curious and trusted people and vice versa. There was a negative correlation between extraversion and neuroticism, implying that participants that generally love the company of other tend not to have an imbalance of emotions to experience psychological stress. Agreeableness, Conscientiousness, and openness all had a negative relationship with neuroticism. Safety Participation showed a strong positive correlation with Safety Compliance (0.79), indicating improved safety compliance will better safety participation. The relationship between personality trait and safety behavior revealed that most of the personality traits except neuroticism had a positive relationship with safety compliance and participation. Neuroticism had a negative relationship with safety compliance and participation.

Table 2: Pearson Correlation Coefficient showing relationship between construct and Cronbach alpha

Variables	1	2	3	4	5	6	7
1. Extraversion	(0.72)						
2. Agreeableness	0.50	(0.73)					
3. Conscientiousness	0.06	0.04	(0.89)				
4. Neuroticism	-0.56	-0.44	-0.20	(0.88)			
5. Openness	0.53	0.54	0.38	-0.30	(0.80)		
6. Safety Participation	0.47	0.36	0.45	-0.46	0.61	(0.87)	
7. Safety Compliance	0.24	0.20	0.61	-0.37	0.60	0.79	(0.88)

Values in bold are different from 0 with a significance level alpha=0.05

4.4 Relationships between personality traits and safety behavior

To establish the relationship between personality trait and safety behavior regression modeling and path analysis were utilized.

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

Table 3 illustrates the impact of personality traits on safety participation and compliance. The relationship between personality traits and safety participation revealed that most of the personality traits had a positive effect on safety participation. Extraversion, conscientiousness, and openness positively influence safety participation, with a unit increase in these traits corresponding to 0.140, 0.259, and 0.519 units increase in safety participation, respectively. Conversely, neuroticism negatively affects safety participation, leading to a 0.159 unit decrease with a one-unit increase in this trait. The result obtained from the path analysis indicated that personality trait significantly influenced safety participation which provided sufficient evidence in rejecting the null hypothesis.

Null Hypothesis (Ho2): There is no significant impact of workers' personality traits on the safety compliance of companies in the Niger Delta.

The impact of personality traits on safety compliance revealed that extraversion, conscientiousness, agreeableness, and openness positively influence safety compliance. A one-unit increase in these traits results in 0.198, 0.150, 0.178, and 0.356 units increase in safety compliance, respectively. Conversely, neuroticism negatively affects safety compliance, leading to a 0.101 unit decrease with a one-unit increase in this trait. The result obtained from the path analysis indicated that personality trait significantly influenced safety compliance which provided enough evidence in rejecting the null hypothesis.

Table 4.3: Unstandardized regression weight

Path			Estimate	S.E.	C.R.	P	Label
Safety_Participation	<---	Extraversion	.140	.053	2.625	.009	
Safety_Participation	<---	Conscientiouness	.259	.041	6.303	***	
Safety_Participation	<---	Neuroticism	-.159	.033	-4.775	***	
Safety_Participation	<---	Openness	.512	.063	8.066	***	
Safety_Compliance	<---	Extraversion	.198	.033	-6.092	***	
Safety_Compliance	<---	Agreeableness	.150	.035	-4.312	***	
Safety_Compliance	<---	Conscientiouness	.178	.027	6.709	***	
Safety_Compliance	<---	Neuroticism	-.101	.021	-4.717	***	
Safety_Compliance	<---	Openness	.356	.045	7.881	***	
Safety_Compliance	<---	Safety_Participation	.487	.031	15.677	***	

4.5. Discussion

The results indicated that Openness and Conscientiousness were the prevalent personality traits among oil and gas workers in the Niger Delta. These two personality traits observed among the workers can be attributed to the fact that the industry requires individual that are intellctually curious and can solve problem. Also, having individual that are organized and dependable is vital in for operation in such industry. Notably, Neuroticism was less common among these workers, aligning with findings from other studies (Nadakkavil et al., 2020; Neal et al., 2012; Clarke & Robertson, 2005).

The results of the path analysis and correlation analysis demonstrated that certain personality traits, namely Extraversion, Agreeableness, Conscientiousness, and Openness had positive and significant impacts on safety participation and safety compliance among oil and gas workers in the Niger Delta. Goa et al. (2020) reported that Conscientiousness and Agreeableness positively influenced safety behavior. The conscientious nature of individuals, characterized by a sense of responsibility, drives them to take charge of their well-being and adhere to workplace safety protocols, such as following safety regulations and being prepared for safety measures (Wallace & Chen 2006). Pourmazaherian et al. (2021) stated that Conscientiousness and Agreeableness was positively correlated to occupational accidents of which safety behavior have been shown to be an antecedent to occupational accidents. Goa et al. (2020) had contradicting finding on the relationship between extraversion and safety behavior. They reported that extraversion tend to lead to negative safety behavior. In the present study, neuroticism was found to have a negative influence on safety participation and safety compliance, aligning with previous studies (Goa et al., 2020; Pourmazaherian et al., 2021). Individuals with high neuroticism often take risks to evade negative emotions, impairing their decision-making abilities and resulting in unsafe actions. Furthermore, diminished attention and focus heighten the risk of accidents, as worries and distractions disrupt task concentration, thereby compromising overall safety. Al-Shehri (2015) revealed that neuroticism were significantly related to human errors, while agreeableness were significantly related to safety participation.

Incorporating personality assessments into the hiring process is essential for the oil and gas industry in the Niger Delta. Candidates with traits like conscientiousness, agreeableness, and Openness comply with safety regulation and participate in safety related activities. This good safety behavior reduces incidents /accidents and foster positive team dynamics. Tailoring training based on personality traits enhances effectiveness and ensures cost savings (medical treatment and loss time from accidents) in the long run. By selecting individuals whose personalities align with safety requirements, organizations proactively create a safer, more efficient workplace, benefiting both employees and the industry's overall success.

V. CONCLUSION

In conclusion, the study aimed at understanding the relationship between personality trait and safety compliance and participation of workers in the oil and gas region in the Niger Delta region. Openness, Conscientiousness, Extraversion and Agreeableness positively influence safety participation and compliance, fostering a safer workplace, while Neuroticism has a negative impact. Openness encourages proactive safety approaches. Tailoring safety initiatives to individual traits can enhance overall safety performance. Understanding and leveraging these traits can optimize safety programs and team dynamics, promoting a secure work environment and sustaining organizational well-being.

II.   ACKNOWLEDGMENT

REFERENCES

[1] Al-Shehri, Y. (2015). Relationship between personality trait and multi-national construction workers safety performance in Saudi Arabia, Doctoral dissertation, Loughborough University

Bhatti, U. and Hanif. M. 2010. Validity of Capital Assets Pricing Model.Evidence from KSE-Pakistan.European Journal of Economics, Finance and Administrative Science, 3 (20).

[2] Attwood, D., Khan, F., & Veitch, B. (2006). Occupational accident models—Where have we been and where are we going?. Journal of Loss Prevention in the Process Industries, 19(6), 664-682.

[3] Clarke, S., & T Robertson, I. (2005). A meta‑analytic review of the Big Five personality factors and accident involvement in occupational and non‑occupational settings. Journal of Occupational and Organizational psychology, 78(3), 355-376.

[4] Cullen, E. T. (2011). Effective training: A case study from the oil & gas industry. Professional Safety, 56(03), 40-47.

[5] DeJoy, D. M. (2005). Behavior change versus culture change: Divergent approaches to managing workplace safety. Safety science, 43(2), 105-129.

[6] Ifelebuegu, A. O., Martins, O. A., Theophilus, S. C., & Arewa, A. O. (2019). The role of emotional intelligence factors in workers' occupational health and safety performance—a case study of the petroleum industry. Safety, 5(2), 30.

[7] Goa, Y., Gonzalez, A., & Yin, T. W. (2020). Exploring the relationship between construction workers' personality traits and safety behavior. Journal Construction Engineering Management, 146(3), 04019111

[8] Goldberg, L. R. (1990). An alternative "Description of personality": The Big-Five factor structure. Journal of Personality and Social Psychology, 59, 1216-1229.

[9] Grier, K., & Sidnell, E. J. (2009). Serious occupational health and safety incidents in the oil and gas industry: Legal issues and recommendations. Alta. L. Rev., 47, 387.

[10] Hale, A. R., & Glendon, A. I. (1987). Individual behaviour in the control of danger. Elsevier Science.

[11] Makin, A. M., & Winder, C. (2009). Managing hazards in the workplace using organisational safety management systems: a safe place, safe person, safe systems approach. Journal of Risk Research, 12(3-4), 329-343.

[12] Mearns, K., and Yule, S. (2009). The role of national culture in determining safety performance: Challenges for the global Petroleum industry. Safety science, 47(6), 777-785.

[13] Nadakkavil, K., Hareendran, M., & Kanjiyangat, V. (2020). Study on effectiveness of interventional measures in BBS using personality traits. Life Cycle Reliability and Safety Engineering, 9(4), 353-358.

[14] Neal, A., Yeo, G., Koy, A., & Xiao, T. (2012). Predicting the form and direction of work role performance from the Big 5 model of personality traits. Journal of Organizational Behavior, 33(2), 175-192

[15] Pourmazaherian, M., Baqutayan, S. M. S., & Idrus, D. (2021). The role of the big five personality factors on accident: A case of accidents in construction industries. Journal of Science, Technology and Innovation Policy, 7(1), 34-43.

[16] Theophilus, S. C., Nwankwo, C. D., Acquah‑Andoh, E., Bassey, E., & Umoren, U. (2018). Integrating human factors (HF) into a process safety management system (PSMS). Process safety progress, 37(1), 67-85.

[17] Wallace, C., & Chen, G. (2006). A multilevel integration of personality, climate, self‑regulation, and performance. Personnel Psychology, 59(3), 529-557.