SAFETY CLIMATE AND PERFORMANCE IN THE NIGERIAN OIL AND GAS SECTOR

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Abstract

This study empirically examined the link between safety climate and safety performance in the Nigerian oil and gas industry. The safety climate constructs examined include safety supervision, safety promotion and safety commitment. A cross-sectional survey was used in carrying out the investigation. The population of this study comprised four (4) selected oil and gas producing companies with a total population of 1300 employees. The sample size as determined using Yamane's formula consists of 306 employees proportionally selected from the four companies. The research instrument used for collecting data was the questionnaire. The data obtained were analyzed using frequency distribution, mean, standard deviation, correlation and regression analyses. The study found that safety climate constructs such as safety supervision (β = -0.212; t = -4.817), safety promotion (β = 0.427; t = 6.207), and safety commitment (β = 0.290; t = 5.389) significantly impact safety performance. The study concluded that the involvement of the employees will help to change unconstructive attitudes and make them more dedicated to the attainment of the organizations' goals. The study therefore recommended that an effective safety climate can be sustained by applying the appropriate leadership practices, promote a healthy safety system and reward the safety commitment of workers. It is also recommended that the management of oil and gas firms should encourage employees to offer suggestions and ideas for improving performance in safety-related issues.

Keywords: Oil and gas firms, Performance, Safety commitment, Safety promotion, Safety supervision.

Introduction

Safety climate is part of the overall common understanding of the "state of safety" in the place of work. The term was first used based on the Chernobyl nuclear calamity when it was recommended that accidents can be reduced

and safety incidents promoted in organisations by cultivating positive safety hallmarks (Hatch, Ron, Bouville, Zablotska & Howe, 2005). Safety climate is not only prominent in the oil and gas sector but also in sectors such as healthcare, manufacturing, aviation, transportation, military and so on. Safety culture and safety climate are used substitutably. However, in this research work, safety culture is an umbrella term encapsulating different viewpoints of values and actions on safety-related issues in organisations while safety climate specifically deals with perceptions of staff on safety and its management in organisations.

Performance of employees is higher when they are physically and emotionally stable to work and cultivate a desire to work especially in a safe and secure environment. A higher level of performance leads to an increase in productivity, which in turn can lead to higher profits (Olatunji, 2018). As opined by Riedel (2001:169), "greater gains may be experienced when employees work in a safe environment thereby leading to improved quality of goods and services, greater creativity and innovation, enhanced resilience and increased intelligent capacity".

Previous studies on the link between safety climate and performance in the Nigerian context is scanty. Aside from a study conducted by Olatunji (2018) on safety management and job performance of employees in selected hospitals in Ondo State, Nigeria, there are no clear-cut studies on the nexus between safety climate and performance in Nigeria. Most studies on safety climate were conducted outside Nigeria. For instance, Kalteh, Mortazavi, Mohammadi and Salesi (2019) examined the relationships between safety climate and safety performance indicators in retrofitting works while Skogdalen, Utne and Vinnem (2011) developed safety parameters for checkmating offshore oil and gas deepwater drilling blowouts. Other prominent works done in this area include comparing the differences in safety climate in healthcare and petroleum industries (Oslen & Aase, 2010); safety climate and mindful practices in the oil and gas industry (Dahl & Kongsvik, 2018); safety compliance and safety climate (Kvalheim & Dahl, 2016); developing and validating safety climate scale for the manufacturing industry (Ghahramani & Khalkhali, 2015), among others. A critical review of the aforementioned studies shows that common safety climate dimensions include safety commitment and communication, safety involvement and training, positive safety practices, safety competence, safety promotion and procedures, supportive environment, safety prioritization, safety supervision, safety system, work pressure, safety communication, management value, top management commitment to safety, top management safety practices,

supervisory safety behaviour, among others (Ghahramani & Khalkhali, 2015; Oslen & Aase, 2010; Dahl & Kongsvik, 2018; Kvalheim & Dahl, 2016). The relationship between these construct have not been empirically validated in the Nigerian oil and gas sector. Therefore, the crux of this study is to empirically investigate some of these constructs in the oil and gas sector in Nigeria.

The justification for focusing on the oil and gas sector is that the sector plays a strategic role in generating substantial financial resources in Nigeria for financing both capital and recurrent expenditure. It is believed that the industry will continue to serve as the backbone of the Nigerian economy in the nearest future. Discourse on safety climate and performance is germane in the sector because safety is rooted in the perceptions of individual employees (Borgheipour, Eskandari, Barkhordari & Tehrani, 2020). Safety in the workplace is a philosophy that empowers every member of the organisation in terms of participation, contribution and making valuable suggestions for improvement in organisations (Fapohunda, 2012). Safety consciousness helps to advance continuous and sustained improvement in quality and performance, and develop an attitude of quality culture and pattern (Fapohunda, 2012). The safety climate constructs selected in this study for empirical investigation include safety supervision, safety promotion and safety commitment and how they impact the safety performance of oil and gas companies in the country.

Literature Review

Safety Performance

Safety performance is defined as “the quality of safety-related work” (Nevhage & Lindahl, 2008). According to Mousavi, Cudney and Trucco (2017), “safety performance improvements in an organization can increase its resistance or robustness and lower the risk of accidents”. Kuranchie-Mensah and Amponsah-Tawiah (2016) described performance as the work-related actions anticipated of a worker and how soundly those activities are implemented. Abiante (2018) succinctly captures performance as “what is to be achieved at an organizational level by workers as it involves the workers agreed on measures, skills, competency requirements, development plans, and the delivery of results”.

In line with OSHA (2013) postulations, effective safety performance is characterised by having the following interrelated and interconnected core elements necessary for attaining success are:

Employee participation: Due to the unique employees' knowledge of the workings of the organisations, their involvement in all aspects of the safety and health management system is highly required. This participation can be inform of goal setting, identification and reporting of hazards, incidents investigations and progress tracking (Simsekler, 2019). Employees must be properly trained in understanding their role and responsibilities under the safety and health system to carry out their duties effectively. A conducive environment that promotes open communication with management and reporting safety and health concerns helps to enhance the participation of employees in organisational activities and safety issues (Curcuruto, Strauss, Axtell & Griffin, 2020).

Risk identification, assessment and prevention: Hazard identification and risk assessment involve a critical sequence of information gathering and the application of a decision-making process (Onuegbu & Eniola, 2018). Processes and procedures must be put in place to guarantee continuous identification and evaluation of workplace hazards and risks. In doing this, the first step is to assess existing hazards and put in place appropriate control mechanisms. This must be followed by intermittent reassessment for identifying new hazards and designing preventive framework and control measures (White, 2010). Finally, processes, procedures and programmes are formulated and implemented to minimize hazards in the workplace to achieve safety and health goals.

Education and training: Education plays a critical role in helping all employees to perform their responsibilities under the safety and health management system. Besides, all employees should be taught the nitty-gritty of the procedures for identifying hazards in the workplace and the appropriate control mechanisms to forestall risks and accidents.

Safety climate and its dimensions in the Workplace

Generally, safety means the absence of occurrence of injury or loss arising from various degrees of hazards in the workplace. Thus, Aswathappa (2004) describes safety in the workplace as the protection of employees from the hazards of industrial accidents. Safety is an important concept in management and organizational behavior. Abraham Maslow in his

motivational theory identified safety as the second order of needs that individuals desired to satisfy in the hierachy of needs (Maslow, 1989). Organisations that seek to motivate employees for exceptional performance often formulate appropriate policies and guidelines that guarantee and promote safety from different occupational hazards. According to Vinodkumar and Bhasi (2009:660), “safety climate can be described as “employees shared perceptions of the importance and the priority of the safety together with the safety policies, practices and applications in the workplace”. In this study, three constructs of safety climate are examined namely: safety supervision, safety promotion and safety commitment. These constructs are discussed as follows:

Safety Supervision: As opined by Flin and O'Dea (2000), management/supervision measure of safety climate is clearly explained in the literature. Supervision is generally measured by evaluating employees' satisfaction with supervision or their assessment of the supervisors' attitude and behaviour towards safety issues. As explained by Zohar (2010), employees’ perception of types of behaviour that are expected, supported and rewarded determine the safety climate in the workplace. As a result of this, supervisors or management play a critical role in communicating and setting safety behaviour standards. Yang (2010) found that leaders or supervisors positively determine the safety climate among workers by expressing safety concerns, explaining safety policies and rewarding safe behaviour in the workplace. Dahl and Olsen (2013) observed that leadership is also found to be more positive when leaders are involved in the daily operations of the company.

If effective supervisory platforms are created for employees to fully participate in safety activities and programmes, they will acquire new skills and knowledge. Effective supervision in safety programmes will assist in realizing the benefits of higher performance; and obtain a sense of attainment by solving safety-related problems in the workplace (Zhang, 2000). Organisations need to design a formal system for encouraging, monitoring and rewarding employee involvement and participation. As identified by Ahire, Waller and Golhar (1996) and Kumar and Gupta (1991), cross-functional quality improvement teams with requisite evaluation and reward framework help in improving safety consciousness.

Safety Promotion: According to Maurice, Lavoie, Laflamme, Svanström, Romer and Anderson (2007), “safety promotion is a process that promotes safety at the workplace. Safety promotion is the process applied at a local,

national and international level by individuals, communities, governments and others, including enterprises and non-governmental organisations, to develop and sustain safety". This process includes modifying structures, environment (physical, social, technological, political, economic and organisational) and employees' attitudes and behaviours toward safety matters in the workplace. In this study, safety promotion is selected as one of the safety climate constructs. Safety promotion can be evaluated using items related to identifying safe-conduct as a positive factor for promotion; compensate employees for reporting hazards, create advertency among workers through programmes such as safety week celebrations and promoting healthy competition among workers to report acts and conditions that are not safe as well as encouraging workers to report safety matters (Vinodkumar & Bhasi, 2010).

Safety promotion that will result in better performance in the organisation should be based on rewarding employees for disclosing safety hazards by giving them cash or other forms of recognition; celebrating safety week and other safety promotional activities; creating safety consciousness among the employees; and creating room for wholesome competition among employees to identify and report conditions and acts that are not safe in the workplace, amongst others.

Safety Commitment: Safety literature glaringly demonstrates the need for top management support and commitment as a key determinant for successfully implementing safety practices and advancing business effectiveness and efficiency. Safety consciousness must be entrenched throughout organization which must be championed and demonstrated by top management. Deming (1986) argues that top management must see themselves as role models and mentors in taking the lead in planning, communicating, training and evaluating performance to guarantee effective attainment of corporate goals. As pointed out by Oakland (2003), senior directors and other management teams must show commitment to safety as a way of leading by example and the need to promote a safe workplace.

According to Garvin (1986), "high levels of quality performance have always been achieved by an organizational commitment to that goal and high-product quality which does not exist without strong top management commitment". Chapman and Hyland (1997) suggest that top management plays critical role in transforming the environment of the organisations by providing leadership supports and creating platforms for continuous interactions among the organisational members. Quality plans should be

actively developed by top management to achieve business goals and objectives; disseminate the philosophy of the company to the employees and engage them in safety activities and advancement to motivate employees to achieve results and ensure that available resources are prudently used for employee education and training (Jurburg, Viles, Tanco & Mateo, 2017).

Theoretical Framework

This paper is built on action theory. The theory as explained in relation to safety climate suggests that objective situational factors such as management commitment to safety, management safety practices and supervisory safety behaviour are social actions that must be considered within systems of action orientation at the organisation level. For instance, if a worker or employee perceived that top management is not showing commitment to his/her protection and welfare in the workplace, this could lead to poor performance. According to Dekker, Clilliers and Hofmeyr (2011), action theory explains safety climate as "an emergent model because of complex reciprocal interactions and relationship about the priority of safety based on how safety climate factors influence actions". Studies have been conducted to establish the relationship between safety climate and performance using action theory as a theoretical framework. Some of the studies include Kalteh *et al* (2019); Kauabenan, Ngueutsa and Mbaye (2015); Kiani and Khodabakhsh (2013); Oah, Na and Moon (2017), amongst others.

Methodology

The focus of the research is to examine the link between safety climate and performance in oil and gas producing companies in Rivers State. The type of research design is causal as the study seeks to establish the link between safety climate and performance. The survey research approach was employed through the use of a structured questionnaire. The level of control the researcher has over the elements of the research is minimal as it is survey research in a non-contrived setting. In terms of time horizon, the research is a cross-sectional study as it was carried out once and represents a snapshot of one point in time.

The population of this study comprised four (4) selected oil and gas producing companies namely: Nigeria Agip Exploration Limited, Total Nigeria Limited, Nigerian Agip Oil Company and BWO Offshore Limited. The selection was based on organizations that have been in existence for over ten (10) years and operating as oil and gas companies in Rivers State. The population of the

companies as at the time of questionnaire administration is 120, 650, 420 and 110 for Nigeria Agip Exploration Limited, Total Nigeria Limited, Nigerian Agip Oil Company and BWO Offshore Limited respectively. The total population of staff in the four oil and gas companies is 1300.

Using Yamane's formula, $n = \frac{\mathrm{N}}{1+\mathrm{N}(e^2)}$, the sample size was computed to be 306. Due to the heterogeneous nature of the population and subsequent sample, the proportional sampling technique was deployed in selecting the representative sample. The sample size of the companies are 28, 153, 99 and 26 for Nigeria Agip Exploration Limited, Total Nigeria Limited, Nigerian Agip Oil Company and BWO Offshore Limited respectively.

The method of data collection was a structured questionnaire for employees of the selected oil and gas producing companies. The questionnaire was structured according to the different constructs used for safety climate and organisational performance using five-point Likert scale with '5' for 'Strongly Agree' and '1' for 'Strongly Disagree'. The content validity of the research instrument was established by experts in the field of safety management and human resource management. For the reliability test, SPSS Cronbach's Alpha test was used. The reliability values for the variables are: safety supervision (0.720); safety promotion (0.652); safety commitment (0.831); and safety performance (0.755). It can be concluded that the instrument is reliable. The different analyses (descriptive and inferential) were done using SPSS version 24.0 software to estimate the link between safety climate and safety performance.

Results and Discussion

Description of respondents' background information

This section contains the different background information of the respondents which includes company, gender, age, marital status, educational qualification, training frequency and the departments of the respondents. The results are presented in Tables 1 and 2 below:

Table 1: Questionnaire distribution to sampled oil and gas firms

S/N	Organizations	Questionnaire		Response Rate (%)
		Administered	Valid	
1	Nigeria Agip Exploration Limited	153	133	86.9
2	Total Nigeria Limited	28	14	50.0
3	Nigerian Agip Oil Company	99	78	78.8
4	BWO Offshore Limited	26	18	69.2
Total		**306**	**243**	**79.4**

Note: $\text{Response rate} = \frac{\text{Number of valid questionnaire}}{\text{Number of administered questionnaire}} \text{X } 100$

Table 1 shows that 306 copies of questionnaire were administered while 243 copies were found to be valid and usable. The response rates for the companies are Nigeria Agip Exploration Limited (86.9%), Total Nigeria Limited (50%), Nigerian Agip Oil Company (78.8%), and BWO Offshore Limited (69.2%). The overall total response rate stands at 79.4%.

Table 2: Respondents demographics

Variable	Category	Frequency	Percent
Gender	Male	216	88.9
	Female	27	11.1
	Total	243	100
Marital status	Single	36	15.5
	Married	197	84.5
	Total	233	100
Age	Below 21years old	5	2.1
	21-30years	18	7.4
	31-40years	89	36.6
	41-50years	105	43.2
	51years and Above	26	10.7
	Total	243	100
Educational qualification	First Degree	121	49.8
	Masters	117	48.1
	PhD	5	2.1
	Total	243	100

Table 2 reveals that majority of the respondents are male, which are 216 accounting for 88.9% of the respondents. The female respondents were 27

representing 11.1%. For the marital status, the result shows that 36 (14.8%) of the respondents were single, while 197 (81.1%) were married. Only 10 respondents representing 4.1% of the total respondents did not indicate their marital status. The age distribution shows that majority of the respondents (105; 43.2%) were between 41 and 50years old. This is followed by 31-40 years old (89; 36.6%) and 51years old and above18-24years (26; 10.7%). Finally, age groups of 30years and below jointly account for 9.5% of the total respondents. Table 2 also shows that 121 (49.8%) of the respondents have first degree (HND/B.Sc/B.Engr Degree). Respondents with master's qualification account for 48.1% while 5 (2.1%) of the total respondents have PhD as their highest educational qualification. It can be inferred that the respondents are well educated and knowledgeable in giving acceptable responses to the questions asked.

The implication of the result is that majority of the employees of oil and gas companies in the region are male that are married. The result also implies that adults that are 31years and above dominate the staff category of the companies. However, majority of them are First degree holders with substaintial number with Masters qualification.

Descriptive statistics and correlation analyses

Mean, standard deviation and Pearson correlation coefficients were computed on the data for all the variables in the study. The results are shown in Table 3:

Table 3: Mean, standard deviation & Pearson correlation coefficients

Variables	SAFS	SAFP	SAFC	SPERF
Safety Supervision (SAFS)	1			
Safety Promotion (SAFP)	-0.284*	1		
Safety Commitment (SAFC)	-0.224*	0.322*	1	
Safety Performance (SPERF)	-0.414*	0.501*	0.453*	1
Mean	3.323	3.715	3.658	3.214
Standard Deviation	0.832	0.549	0.691	0.697

Key: N = 243; * = P<5%.

Table 3 shows the Pearson's correlation coefficients between the constructs. According to Bryman and Cramer (1997), " the Pearson's correlation coefficient (r) should not exceed 0.80; otherwise, the independent variables

that show a relationship above .80 may be suspected of having multi-collinearity". The results in Table 3 show that all the correlation coefficients are below 0.80, hence, ruling out any form of multi-collinearity in the model. Table 3 shows that safety performance is significantly related to Safety Supervision (r = -0.414, p < 0.05), Safety Promotion (r =0.501, p < 0.05), and Safety Commitment (r =0.453, p < 0.05). The mean and standard deviation values of the variables are: Safety Supervision ($\overline{X} = 3.323, SD = 0.832$), Safety Promotion ($\overline{X} = 3.715, SD = 0.549$), Safety Commitment ($\overline{X} = 3.658, SD = 0.691$) and Safety performance ($\overline{X} = 3.214, SD = 0.697$). Since the mean scores of the variables are all greater than 3.0, it implies that the safety climate measured by safety supervision, safety promotion and safety commitment is high in the oil and gas companies in the region.

Estimation of Research Model

This contains the estimation of the relationship between safety climate constructs and safety performance. The results are shown in Table 4:

Table 4: Estimated regression model of safety climate and performance

Independent Variables	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	1.272	0.353		3.602	0.000
Safety Supervision (SAFS)	-0.212	0.044	-0.254	-4.817	0.000
Safety Promotion (SAFP)	0.427	0.069	0.337	6.207	0.000
Safety Commitment (SAFC)	0.290	0.054	0.287	5.389	0.000
R^2 = 0.404; Adj. R^2 = 0.396; F -statistic = 53.921; Prob (F -statistic) = 0.000; DW -Statistic = 1.991					
Dependent variable = Safety Performance					

Table 4 show that Safety Supervision (β= -0.212, t= -4.817); Safety Promotion (β= 0.427, t= 6.207); and Safety Commitment (β= 0.290, t= 5.389) are significantly related to safety performance. The R^2 is 0.404. The result implies that safety climate variables (safety supervision, safety promotion, and safety commitment) jointly explained 40.4% of the changes in safety performance. The adjusted R^2 is computed as 0.396. It can be deduced from the results that safety climate variables considerably explain safety performance. The F-Statistic is 53.921 with a probability value of less than 1% (0.0000). The result implies that the goodness of fit of the model is appropriate. Therefore, such a model is of high-quality for guiding in policy

implication. The value of the Durbin Watson is 1.991. The result further confirms the absence of multicollinearity in the estimated research model.

Discussion of Findings

Firstly, this study found that safety supervision does significantly impact on safety performance of selected oil and gas firms operating in Rivers state. This research outcome is supported by the work of Kvalheim and Dalh (2016) that found that safety supervision significantly influences safety compliance and performance. Effective safety supervision is expected to play a critical role in enhancing performance. Supervision is generally measured by evaluating employees' satisfaction with supervision or their assessment of the supervisors' attitude and behaviour towards safety issues. As found by Zohar (2010), the safety climate in the workplace is determined by the perception of employees towards the kind of behaviour anticipated, encouraged and rewarded. As a result of this, supervisors or management play a critical role in communicating and setting safety behaviour standards. Yang (2010) empirically established that supervisors positively determine the safety climate among workers by expressing safety concerns, disseminating safety policies and reward safe behaviour in the workplace. If effective supervisory platforms are created for workers to fully take part in safety activities and programmes, they will acquire new skills and knowledge. Effective supervision in safety programmes will assist in realizing the benefits of higher performance; and obtain a sense of accomplishment by solving safety-related problems in the workplace (Zhang, 2000).

Secondly, the study found that there is a significant relationship between safety promotion and safety performance of selected oil and gas firms operating in Rivers state. Safety promotion is fundamental to promoting a safe workplace. To improve organisation performance, the safety promotion programme should incorporate all efforts jointly reached by modifying structures, environment (physical, social, technological, political, economic and organisational) and employees' attitudes and behaviours toward safety matters in the workplace. One of the ways of evaluating safety promotion in the workplace as found by Vinodkumar and Bhasi (2010) is by employing items related to identifying safe-conduct as a positive factor for promotion; compensate employees for reporting hazards, create advertency among workers through programmes such as safety week celebrations and promoting healthy competition among workers to report acts and conditions that are not safe as well as encouraging workers to report safety matters. Safety promotion that will result in better performance in the organisation

should include rewarding employees for disclosing safety hazards by giving them cash or other forms of recognition; celebrating safety week and other safety promotional activities; creating safety consciousness among the employees; and creating room for wholesome competition among employees to identify and report conditions and acts that are not safe in the workplace, amongst others.

Finally, the study found that a significant relationship exists between safety commitment and safety performance of selected oil and gas firms operating in Rivers state. This finding is consistent with the outcome of the work of Hong, Ramayah and Subramaniam (2018) that found that the visibility and support of top management is a major determinant for the successful implementation of safety practices and in promoting business efficiency and effectiveness. White (2018) add credence to this by asserting that safety consciousness must be entrenched throughout organisation, and it must start at the top with the chief executive or equivalent.

Conclusion and Recommendations

The focus of this study was to empirically establish the relationship between safety climate and safety performance in the Nigerian oil and gas industry. The safety climate constructs examined include safety supervision, safety promotion, and safety commitment. Based on the results of the empirical analyses, the study concludes that safety climate constructs such as safety supervision, safety promotion, and safety commitment significantly impact safety performance.

Based on the findings of this study, the following recommendations are suggested:

i. Management of oil and gas firms should encourage employees to provide suggestions and ideas for improving performance in safety-related issues. The involvement of the employees will help in changing unconstructive attitudes and make them more dedicated to achieving organizational success.
ii. The significant relationship between safety climate constructs such as safety supervision, safety promotion, and safety commitment and safety performance is an indication for management to strengthen these variables to guarantee a sustained improvement in the organisations outcomes.

iii. The study recommends that an effective safety climate can be sustained by applying the appropriate leadership practices, promote a healthy safety system and reward the safety commitment of workers.

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