

# The Impact of Safety Climate on Safety Performance of Companies in Onne Oil and Gas Free Zone (OGFZ), Nigeria

Ukpong-Udo, Emmanuel Effiong<sup>1</sup>

Other Authors: Dr John Ugbebor<sup>2</sup>, Prof. Patricks. Chinemerem<sup>3</sup>

Centre For Occupational Health Safety and Environment,

University of Port Harcourt,

Rivers State, Nigeria.

## Abstract

This study examined the impact of Safety Climate on Safety Performance of companies in Onne oil and gas free zone, Nigeria. The study adopted combination of descriptive and regression research design. The Firms used were categorized as bad safety performing firm based on Onne OGFZ Annual HSE report, 10 companies within this category were sampled purposively from 170 companies with 6400 workers population, and 400 were sampled and shared a questionnaire titled "Safety Climate and Safety Performance Questionnaire (SCSPQs, design based on Likert 5-point scale, and analysis was done using descriptive statistics and ordinal regression analysis. The results of descriptive analysis showed that the respondent agree that safety climate of the sampled firms is good;  $(3.78) > (3)$ , frequency of accident occurrence is low  $(3.74 > 3)$  and frequency of incident occurrence is low  $(3.80 > 3)$ . The result of the regression analysis revealed that there is negative and significant relationship between safety climate captured using safety management commitments, safety communication and safety training, and safety performance captured using frequency of incident occurrence  $(0.048 < 0.05)$ , The results also revealed that there is negative and insignificant relationship between safety climate and frequency of accident occurrence  $(0.378 > 0.05)$ , These results means that increase in safety climate results in increase in safety performance captured as decrease in accidents and incident occurrence in the companies thin Onne OGFZ in Nigeria. It was, therefore, concluded that safety climate is a good predictor of safety performance for companies in Onne OGFZ in Nigeria and also recommended that the management of the companies in the Onne OGFZ should improve on their safety climate by encouraging safety communications, organizing safety-related training regularly and also being committed to other safety related issues.

**Key words**, Safety Climate, Safety Performance, Companies in Onne OGFZ

Date of Submission: 06-11-2022

Date of acceptance: 20-11-2022

## I. Introduction

Generally, workplace safety indicates safety of the working environment within an organization and encompasses all factors that impact the safety, health and well-being of employees (Barbaranelli, *et al.* 2015). Issues of workplace safety have raised increasing concerns globally, obviously owing to the significant influence of employee safety on productivity and economic development (ILO, 2021). Simply put, a safe work place would comparatively encourage efficiency, productivity and safety performance (Ajslevet *et al.*, 2017). It is estimated that two million people in worldwide die every year due to work-related diseases and work-related accidents and it is also estimated that approximately 100 million occupational injuries occur worldwide each year (Chau *et al.*, 2008). However, the number of studies focusing on health and safety is not enough. In last two decades, less than 1% of organizational research has focused on issues concerning occupational health and safety (Barling *et al.*, 2002). This statistic is very low considering the significant social and economic costs associated with occupational safety. In light of these social and economic costs resulting from workplace accidents, it is critical that researchers better understand the events preceding work-related injuries, as well as the organizational factors that may affect safety performance of companies (Mullen, 2004).

According to Nevhage and Lindahl (2008) safety performance is defined as the quality of safety related work, and its improvement in any organization can increase the robustness of the organization and lower risk of accidents while safety climate is the general perception held by workers of any organization regarding the safety aspects of their operations. The significant influence of safety climate on accident and injuries has been demonstrated by many empirical studies (Pousette et al 2008). These findings indicate that the higher the level of safety climate, the lower the accident rate. This relationship between safety climate and injuries was mediated by employee's behaviours (Oliver et al 2002). Safety climate was anticipated to positively affect the behaviours of employees. As a result of reward or social exchange theory, a positive safety climate can foster and promote safety performance. However, some studies did not find any relation between the safety climate and safety performance. This study has taken the positive findings into consideration and expected that safety climate has a positive influence on safety performance of companies.. Thus, it would be expected that safety performance would be more greatly influenced by safety climate.

The Onne Oil and Gas Free Zone (OGFZ) is an important business entity in Nigeria and one of the largest conglomerates with the largest population of workers who work for over 170 oil and gas related companies operating within the zone. Most, if not all, of these companies are engaged in high risk operations, such as the oil and gas exploration and production operation, construction operations, the maritime related operations. These high risk operations are connected to some high risk task such as pulling, pumping, lifting, rolling, climbing, folding etc. These high risk operations and their corresponding high risk task, consequently, result in several cases of near-miss, injuries and fatalities which could lead to loss of productive man hour, reduced productivity of operations or death.

For instance, according to the report of the Nigeria Oil and Gas Free Zone Authority in 2019, "Some oil and gas companies, namely Chevron Petroleum, Addax Petroleum, Halliburton petroleum and Agip Petroleum, operating within the Onne oil and gas free zone presented their safety reported which revealed the fatalities cases of 7, 11, 9 and 13, and non-fatalities cases of 124, 167, 267 and 298 respectively from February 2017 to May 2019. This safety report represented a fatality rate of approximately one person in two month for all the companies and non-fatality rate of 3 people per month for Chevron, 4 people per month for Addax petroleum, 6 person per month for Halliburton Petroleum and 7 person for Agip Petroleum". These safety report presented by these companies revealed that the operations and job task of these companies are highly risky and unsafe. The safety report also revealed that there are issues of organizational safety failures in these companies which must be addressed urgently to completely eliminate or drastically reduce these accidents resulting to the fatalities and non-fatalities cases.

Thus, considering these consequences associated with high risks operations and high risk job tasks in these companies operating in this zone, the issues of workplace safety become very critical and relevant. Therefore, to mitigate these consequences, there is need to assess the safety climate in this area and to ascertain how the safety climate affects and safety performance of companies operating within this zone. Thus, this study is conducted to determine the condition of safety climate across selected companies in Onne Oil and gas free zone and to determine the relationship between safety climates captured with safety management commitment, safety communication and safety training, and safety performance captured with frequency of accident occurrence and frequency of incident occurrence. Thus the hypotheses designed to direct this study are; the safety climate of the selected companies within Onne Oil and Gas Free Zone (OGFZ) is not significant. There is no significant relationship between safety climate (safety management commitment, safety communication and safety training) and safety performance (frequency of accident occurrence and frequency of incident occurrence) for selected companies in Onne Oil and Gas Free Zone (OGFZ)

## II. Methodologies

Combination of descriptive and regression design were adopted in this study. The descriptive design was used to determine the perception of the workers on safety climate across the selected companies while regression was used to ascertain the relationship between the safety climate construct and safety behaviour constructs. Employees of organizations in this study area formed the population of the study. There are 170 companies within the Onne OGFZ with 6400 employees. Thus the population of this study were 6400 workers in the companies' operating within the Onne Oil and Gas Free Zone irrespective of level of education and job specialty. Purposive Sampling Technique was used to select Ten (10) poor safety performing companies and their workers were sampled for the safety climate questionnaire survey. These companies were identified and selected using the Onne OGFZ Annual Health, Safety and Environment (AHSE) safety performance assessment reports for 2016-2018. Sample size was determined (or calculated) using a scientifically recognized equation. Thus, this study will use the popular Taro Yamane mathematical equation illustrated as:

$$n = \frac{N}{(1 + N)(\epsilon)^2} \quad (1)$$

Where,  $n$  = Sample size,  $N$  = Population under study,  $\varepsilon$  = Margin error (which could be 0.10, 0.05 or 0.01 for 90%, 95% or 99% level of significance respectively).

Thus, for an estimated total population of 6,400 employees, the sample size for this study, assessed at a margin error of 0.05 level of significance, can be calculated using equation (1) as shown below:

$$n = \frac{N}{(1 + N)(\varepsilon)^2} = \frac{6400}{(1 + 6000)(0.05)^2} = \frac{6400}{(1 + 6000)(0.0025)}$$

$$n = \frac{6000}{(1 + 15)} = \frac{6000}{(16)} = 400$$

From the result above, a total of 400 employees form the basic sample size for this study, therefore 40 employees were selected from each of the ten companies sampled.

**Table 1 Distribution of Companies based on HSE Performance Scores from Total Recordable and Undesirable Incidents (2016 – 2018)**

S/N	Company name	Performance Indicators Score			Average Score
		2016	2017	2018	
<b>A. Bad Safety Performing Companies</b>					
1	Company B1	47	54	33	<b>45</b>
2	Company B2	45	33	33	<b>37</b>
3	Company B3	41	30	30	<b>34</b>
4	Company B4	33	31	32	<b>32</b>
5	Company B5	31	19	19	<b>23</b>
6	Company B6	19	17	27	<b>21</b>
7	Company B7	41	30	30	<b>34</b>
8	Company B8	45	40	41	<b>42</b>
9	Company B9	38	37	32	<b>36</b>
10	Company B10	36	34	38	<b>36</b>

Source: Computed from OGFZA HSE Consultative Committee Report, 2018. Note: Alphanumeric pseudonyms were used for company names as the OGFZA HSE report 2018 is yet to be in public domain.

The study used primary data which was collected through administration of survey questionnaires, during a field survey. This study focuses on safety management commitment, safety training and safety communication as safety climate variables, whereas frequency of accident and frequency of incident occurrence were used as variable for safety performance. Thus, these important safety variables were used to construct the Safety Climate and safety Performance Questionnaires (SCSPQs) for the field survey. The SCSPQs comprises of items to be rated on a 5-point Likert scale. The face and content validities was ascertained by researcher supervisor being experts in Occupational health and safety studies. There searcher's supervisors were required to vet items in this instruments, to look at clarity of words, sentences and whether variables of this study were properly captured

The self-administered SCSPQ was pre-tested among workers in another two poor safety performing companywho were not selected for the study. The pre-test was carried out with a sample size of 10% of the original sample size which is 10% of 400 which is 40 participants were used and their reliability was tested using Cronbach's alpha reliability test. A Cronbach's alpha coefficient of a scale above 0.70 is considered to "suitable" for the research (Nunnally & Bernstein, 1994). See table 2. Four hundred (400) questionnaires were administered and 352 were properly filled and used in the analysis

**Table 2 Summary of Cronbach's Alpha Reliability Result**

Variables	Dimensions/Measures	No. of items	Alpha Coefficients
Safety Climate	Safety Management Commitment	4	0.790
	Safety Communication	3	0.796
	Safety Training	4	0.725
Safety performance	Incident Occurrence	7	0.872
	Accident Occurrence	8	0.884

Source: Researcher's computation

Finally the study employed standard statistical tools and methods to analyse data collected, the descriptive statistics which include means, percentages, weight average and ordinal regression were used for analysis. The descriptive statistic was used to answer research questions and while regression analysis was used to test hypothesis on relationship between variables which are safety climate and safety performance. The Statistical Package for Social Sciences (SPSS) application tool was used to carry out the analyses. Results of findings were presented on tables and charts.

### III. Results

#### What is the safety climate condition across the selected companies within Onne Oil and Gas Free Zone (OGFZ)?

The descriptive analysis was conducted to ascertain the condition of safety climate in this study's area, the descriptive variable assessed were mean, percentage and weight average which helped to answer the research question 1. Table 3 reveals the safety climate construct for the three safety climate variables used in this study which includes safety management commitment, safety communication and safety training. Construct 1 to 4 in these tables captured safety management commitment, construct 5 to 7 captured safety communication, while 8 to 11 captured safety training

**Table 3 Safety Climate Condition for the selected Companies**

SN	Items	S.A	A	D	SD	UN	WA	R
1	My workplace is safe	152.00 43.13%	138.00 39.20%	52.00 14.77%	10.00 2.90%	0.00 0.00%	4.23	Agree
2	Management has made necessary provisions to ensure safety at my workplace	30.00 8.52%	86.00 24.43%	22.00 6.25%	96.00 27.27%	118.00 33.53%	2.47	Disagree
3	Resources made available by management for health and safety are adequate	56.00 15.91%	212.00 60.23%	52.00 14.77%	22.00 6.25%	10.00 2.90%	3.80	Agree
4	There is good preparedness by management for safety emergency here	88.00 25.00%	218.00 61.93%	22.00 6.25%	24.00 6.82%	0.00 0.00%	4.05	Agree
5.	There are good communications here between management and workers about health and safety issues	50.00 14.21%	212.00 60.23%	68.00 19.32%	10.00 2.90%	12.00 3.41%	3.79	Agree
6.	My immediate boss often talks to me about health and safety matters on site	56.00 15.91%	246.00 71.02%	28.00 7.95%	10.00 2.90%	16.00 4.55%	3.92	Agree
7	The company encourages suggestions on how to improve health and safety	86.00 24.43%	178.00 50.57%	50.00 14.21%	22.00 6.25%	16.00 4.55%	3.84	Agree
8	Safety training are done regularly in my company	146.00 41.48%	162.00 46.02%	32.00 9.09%	12.00 3.41%	0.00 0.00%	4.26	Agree
9	I believe the safety training done in my company are adequate	74.00 21.02%	236.00 67.05%	8.00 2.27%	12.00 3.41%	22.00 6.25%	3.93	Agree
10	I believe the safety training done in my company are suitable for my job	66.00 18.75%	232.00 65.91%	20.00 5.68%	24.00 6.82%	10.00 2.90%	3.91	Agree
11	The knowledge I acquired from safety training in my company have help me avoid accidents and incidents	46.00 13.07%	120.00 34.09%	132.00 37.50%	38.00 10.80%	16.00 4.55%	3.40	Agree
	<b>TOAL</b>						<b>3.78</b>	

Source; Researchers Computation 2021

SA-Strongly Agreed, A-Agreed, UN-Undecided, D - Disagreed and SD - Strongly Disagreed WA- Weighted Average R- Remark

Using that 5 point Likert scale in which 1 is strongly disagree, 2 is disagree, 3 is undecided 4 is agree and 5 is strongly agree was used to obtain the descriptive statistics presented above. Therefore, the threshold for acceptance or rejection is 3.00

Based on this scale and considering the average value of the construct in table 3 for the selected companies, it was revealed that weighed average value for the first four constructs (1-4) that captured safety management commitments were 4.23, 2.47, 3.80 and 4.05, these results revealed that the management's commitment on safety issues are highly encouraging for first and fourth construct but not encouraging for the third and fairly encouraging for the third construct. This means that workers in the selected companies agree that management commitments on their safety concerns are encouraging when it comes to providing necessary resources to ensure safety of their workers. Thus, this observation within safety management commitment construct, particularly for second construct, could be reason that triggered poor safety performance.

For the second safety climate variable (safety communication) which was captured by three constructs 5 to 7, it was observed that the mean values for the three constructs are 3.79, 3.92 and 3.84 for the selected

firms. This result, based on the scale, revealed that the workers agree that their safety communication with their superiors is at good acceptable level

For the third and last safety climate variable (safety training) which was captured by four constructs 8 to 11, it was observed that the mean values for the four constructs are 4.26, 3.93, 3.91 and 3.40. This results, based on the scale, revealed that the workers agree that the safety training concerns of the workers are handled very well which suggest a high acceptable level of for all safety climate variable; combining the three safety climate variables considered based on the eleven constructs is 3.76 which, based on the scale, means that safety climate level is good and significant. Thus, having confirmed that the safety climate at these companies is good, we can then investigate how they affect the safety performance of the firms

**What is the safety performance condition (frequency of accident and incident occurrence) across the selected companies within Onne Oil and Gas Free Zone (OGFZ)?**

**Table 4**Frequency of Accident Occurrence for Bad Performing Companies

SN	Items	S.A	A	D	SD	UN	WA	R
1	Sufficient safety resources are made available by management and that has reduced accident or injury at my workplace?	12.00 5.82%	110.00 62.48%	42.00 23.86%	13.00 7.84%	0.00 0.00%	3.69	Agree
2	Management has made necessary provisions for safety at my workplace and that has reduced experiences of accidents or injury in my workplace	10.00 5.68%	112.00 63.62%	40.00 22.72%	15.00 8.52%	0.00 0.00%	3.69	Agree
3	The good safety communication between management and workers has reduced possibility of accident or injury	31.00 17.61%	117.00 66.46%	23.00 13.06%	6.00 3.41%	0.00 0.00%	3.97	Agree
4	The good safety communication between management and workers has reduced chances of accident or injury	37.00 21.02%	108.00 61.34%	31.00 17.64%	0.00 0.00%	0.00 0.00%	3.61	Agree
5.	My company encourages suggestions on how to improve safety and health and that has reduced cases of accident or injury.	12.00 6.84%	117.00 66.46%	41.00 23.30%	6.00 3.41%	0.00 0.00%	3.77	Agree
6.	I consider safety training given by my company adequate and I feel that has minimized chances of accidents occurrence.	24.00 13.68%	105.00 59.64%	37.00 21.02%	12.00 6.84%	6.00 3.41%	3.80	Agree
7	The company gives regular and up-to-date safety training and that has minimized chances of accident occurrence.	12.00 6.84%	105.00 59.64%	37.00 21.02%	6.00 3.41%	6.00 3.41%	3.63	Agree
	<b>TOAL</b>						<b>3.74</b>	

Source; Researchers Computation 2021

SA-Strongly Agreed, A-Agreed, UN-Undecided, D - Disagreed and SD - Strongly Disagreed WA- Weighted Average R- Remark

Table 4 show the descriptive relationship between safety climate and frequency of accident occurrence. It was revealed that weighed average value for the first two constructs (1 and 2) that captured relationship between management commitments to safety and occurrence of accidents were 3.69 and 3.69 for selected firms. These results revealed that the respondent agree that management's commitment on safety issues negatively affected accidents occurrence in their companies which means that increase in commitment of the management on safety of the workers would result to reduction in occurrence of accidents in the companies for both the good and bad performing firms respectively since the weight average for all the construct is above 3.

The next three constructs (3-5) captured response of the respondents on the relationship between communication and interaction of the management staffs with their workers on safety related issues and occurrence of accidents and the weight averages are 3.97, 3.61, 3.77. These results revealed that respondents agree that the level of interaction and communication between management staffs and their worker negatively affects occurrence of accidents in the companies which means that workers in these selected firms agree that increasing the level of interaction and communication of the management and workers on safety related issues helped to reduce occurrence of accident in the companies since the weight average for all the three construct is above 3.00

The last three construct (6-7) captured response of the relationship between safety related training offered by the companies and occurrence of accident in the company for the selected firms. The weight averages of the response are 3.88 and 3.64. These results revealed that the respondents agree that the safety training offered by the selected firms affected occurrence of accident in the companies in negative manner which means that increase in safety related trainings would reduce occurrence of accident in the companies, this is because the weight average for all the three construct is above 3.00,

Finally, the overall relationship between safety climate and accident occurrence which is captured by overall weight average for the selected firms is 3.74. These results means that the respondents agree that the

relationship between overall safety climate and the accident occurrence in the companies is negative which means that the safety climate of the companies is encouraging and that has reduced occurrence of accidents in the companies.

**Table 5. Frequency of Incident Occurrence for Bad Performing Companies**

SN	Items	S.A	A	D	SD	UN	WA	R
1	Sufficient safety resources are made available by management and that has reduced occurrence of incident in my workplace	39.00 22.16%	115.00 65.34%	5.00 2.84%	17.00 9.66%	0.00 0.00%	4.00	Agree
2	Management has made necessary provisions for safety at my workplace and that has reduced Frequency of Incident Occurrence	36.00 20.46%	103.00 58.52%	36.00 20.46%	5.00 2.84%	6.00 3.41%	3.78	Agree
3	The good safety communication between management and workers has reduced Frequency of Incident Occurrence	32.00 18.18%	80.00 78.41%	58.00 32.96%	6.00 3.41%	0.00 0.00%	3.78	Agree
4	My company encourages suggestions on how to improve safety and health and that has reduced occurrence of incident in my workplace	5.00 2.84%	104.00 59.09%	61.00 34.66%	6.00 3.41%	0.00 0.00%	3.61	Agree
5.	My immediate boss often talks to me about health and safety matters on site and that has minimized chances of incident occurrence.	33.00 18.75%	86.00 48.87%	52.00 29.55%	5.00 2.84%	0.00 0.00%	3.84	Agree
6.	My company gives safety training and that has minimized chances of incident occurrence.	30.00 17.05	100.00 56.82%	41.00 23.30%	5.00 2.84%	0.00 0.00%	3.88	Agree
7	I consider safety training given by my company adequate and I feel that has minimized chances of incident occurrence.	38.00 21.59%	90.00 51.14%	37.00 21.02%	11.00 6.25%	0.00 0.00%	3.88	Agree
8	The company gives regular and up-to-date safety training and that has minimized chances of incident occurrence.	8.00 6.81%	102.00 57.96%	50.00 28.41%	6.00 3.41%	6.00 3.41%	3.64	Agree
	<b>TOAL</b>						<b>3.80</b>	

Source; Researchers Computation 2021

SA-Strongly Agreed, A-Agreed, UN-Undecided, D - Disagreed and SD - Strongly Disagreed WA- Weighted Average R- Remark

Table 5 show the descriptive relationship between safety climate and frequency of incidence occurrence. It was revealed that weighed average value for the first two constructs (1 and 2) that captured relationship between management commitments to safety and occurrence of incidents were 4.00 and 3.78 for selected firms. These results revealed that the respondent agree that management's commitment on safety issues negatively affected accidents occurrence in their companies which means that increase in commitment of the management on safety of the workers would result to reduction in occurrence of incidents in the companies in selected firms respectively since the weight average for all the construct is above 3.

The next three constructs (3-5) captured response of the respondents on the relationship between communication and interaction of the management staffs with their workers on safety related issues and occurrence of accidents and the weight averages are 3.97, 3.61, 3.77. These results revealed that respondents agree that the level of interaction and communication between management staffs and their worker negatively affects occurrence of accidents in the companies which means that workers in these selected firms agree that increasing the level of interaction and communication of the management and workers on safety related issues helped to reduce occurrence of accident in the companies since the weight average for all the three construct is above 3.00

The last three construct (6-8) captured response of the relationship between safety related training offered by the companies and occurrence of accident in the company for the selected firms. The weight averages of the response are 3.88, 3.88 and 3.64. These results revealed that the respondents agree that the safety training offered by the selected firms affected occurrence of accident in the companies in negative manner which means that increase in safety related trainings would reduce occurrence of accident in the companies, this is because the weight average for all the three construct is above 3.00,

Finally, the overall relationship between safety climate and incident occurrence which is captured by overall weight average for the selected firms is 3.80. These results means that the respondents agree that the relationship between overall safety climate and the frequency of incident occurrence in the companies is negative which means that the safety climate of the companies is encouraging and that has reduced occurrence of incidents in the companies.

### Ho1. The Safety Climate and frequency of Incident Occurrence in the selected companies in Onne Oil and gas free zone have no significant relationship

Table 6 The Ordinal statistical analysis for the significance of the relationship safety climate and frequency of incidence occurrence for the Bad Safety performing companies in Onne Oil and Gas Free Zone (OGFZ)

**Table 6 Ordinal Regression of relationship between safety climate and frequency of incident occurrence**

Variables	Frequency of Incident Occurrence				Decision
	N.	Degree of Freedom	Pseudo R-Square	Significant level (0.05)	
Safety Management Committeemen	387	1	0.510	0.031	<b>Significant</b>
Safety communication	387	1	0.510	0.040	<b>Significant</b>
Safety Training	387	1	0.510	0.054	<b>Not Significant</b>
<b>Safety Climate</b>	387	1	0.510	0.048	<b>Significant</b>

(Source, SPSS Analysis of Researchers data 2021)

Table 6 above revealed that the Pseudo R-square value for the Safety Climate variables captured using safety management commitment, safety communication and safety training is 0.510. This means that 51% of change in frequency of Incidence Occurrence in the selected companies within this researched areas is due to change in the safety climate; captured by safety management commitment, safety communication and safety training; implying that the remaining 49% change is due to other factors or variables that were not captured in this current model.

Table 6 also revealed that the significant level for the safety climate variables; safety management commitment, safety communication and safety training; are 0.031, 0.040 and 0.054. Using 0.05 significant level, and the rule that when significant values of any independent variable is lower than the 0.05, then such variable is a significant factor that have notable impact on dependent variable while significant values of independent variable higher than 0.05 is not significant and do not have notable impact on change in dependent variable, This means that management commitment to safety and level of safety based communication between workers and superior has significant impact on reduction of incident occurrence in the bad safety performing firms within the researched area while impact of safety training is not significant in reducing incident occurrence. On the overall, the general safety climate significant level is 0.048 which is lower than 0.05 significant limit, therefore, based on the rules, general Safety Climate has significant impact on reducing frequency of incident occurrence which means that the change in overall safety climate; captured by combination of safety management commitment, safety communication and safety training; has significant and notable impact on reduction of frequency of incident occurrence among worker in bad safety performing companies in this researched area.

Therefore based on these results, we reject the null hypothesis which stated that “The Safety Climate and frequency of Incident Occurrence in the selected bad safety performing companies in Onne Oil and gas free zone have no significant relationship” and accept the alternate hypothesis which stated that “The Safety Climate and frequency of Incident Occurrence in the selected companies in Onne Oil and gas free zone have significant relationship”

### Ho2. The relationship between safety climate and frequency of accident occurrence in the selected companies in Onne Oil and gas free zone is not significant

**Table 7 The Ordinal statistical regression analysis for the significance of the relationship safety climate and frequency of accident occurrence**

Variables	Frequency of Accident Occurrence				Decision
	N.	Degree of Freedom	Pseudo R-Square	Significant level (0.05)	
Safety Management Committeemen	387	1	0.435	0.065	<b>Not Significant</b>
Safety communication	387	1	0.435	0.081	<b>Not Significant</b>
Safety Training	387	1	0.435	0.027	<b>Significant</b>
<b>Safety Climate</b>	387	1	0.435	0.378	<b>Not Significant</b>

(Source, SPSS Analysis of Researchers data 2021)

Table 7 above revealed that the Pseudo R-square value for the Safety Climate variables which are; safety management commitment, safety communication and safety training is 0.435. This means that 43.5% of change in frequency of accident Occurrence in the bad safety performing companies within this researched areas is due to change in the safety climate level; captured by safety management commitment, safety

communication and safety training; implying that the remaining 56.5% changes were due to other factors or variables that were not captured in this current model.

Table 7 also revealed that the significant level for the safety climate variables; safety management commitment, safety communication and safety training; are 0.065, 0.081 and 0.027. Using 0.05 significant level, and the rule that when significant values of any independent variable is lower than the 0.05, then such variable is a significant factor that have notable impact on dependent variable while significant values of independent variable higher than 0.05 is not significant and do not have notable impact on change in dependent variable, This means that only safety training has appreciable or notable impact in reducing frequency of accident occurrence while impact of management commitment on safety and safety based communication is not significant in reducing accident occurrence. On the overall, the general safety climate significant level is 0.378 which is higher than 0.05 significant limit, therefore, based on the rules, general Safety Climate has no significant impact on reducing frequency of incident occurrence which means that the change in overall safety climate; captured by combination of safety management commitment, safety communication and safety training; has no significant and notable impact on reduction of frequency of accident occurrence among worker in bad safety performing companies in this researched area. This could be confirmation of the facts that these firms are not really performing well in some key safety areas as concern management commitment to safety and level of safety based interaction between workers and safety personals and superiors, thus making then to rank low in safety charts.

Therefore based on these results, we accept the null hypothesis which stated that “The relationship between safety climate and frequency of accident occurrence in the selected bad performing companies in Onne Oil and gas free zone is not significant” and reject the alternate hypothesis which stated that “The relationship between safety climate and frequency of accident occurrence in the selected bad performing companies in Onne Oil and gas free zone is significant”

#### IV. Discussions

##### 4.1 The Level of Safety Climate and Safety Performance in the companies in Onne Oil and Gas Free Zone

The results from this study have revealed that the safety climate and safety performance in the selected companies in the Onne oil and gas free zone is good. It was expressed in the literatures that Workplace safety is determined by various intervening broad concepts that includes safety performance, and safety climate, on which this study is based. Thus, according to Barling, *et al.* (2013) Safety climate is the concept that concerns with the description of the collective perception of workers as regards to the safety value, safety practices and safety seriousness of their organization or firm, they maintained that Safety climate is among the safety concepts that receive global attention across industry because a good level of safety climate is important in achieving good safety performance at work place.

In an empirical work conducted by According to Cooper & Philips, (2004), Safety climate has been proven to be one of the useful tools for measuring and monitoring organizational safety issues and allows the possibilities of identifying causes of occupational safety failures, and possible measures of preventing workplace safety risks. Fogarty *et al.*, (2017) also affirmed that safety climate surveys are important tools for monitoring safety standards; and workplace errors. Petitta *et al.*, (2017) summarized by stating that good understanding of safety climate is among significant variables for predicting safety compliance and safety participation by employees which in turn enhance safety performance of the employee. Thus is expected that the safety climate level obtained in these companies in Onne oil and gas free zone will translate to good safety performance.

##### 4.2 The relationship between Safety Climate and frequency of Incident Occurrence in companies in Onne Oil and gas free zone

Based on the relationship between Safety Climate and frequency of Incident Occurrence in Onne Oil and gas free zone, the finding of this study stated that “There is negative and significant relationship between safety climate and frequency of Incident occurrence for the selected companies in Onne Oil and gas free zone and,” This results means that increasing the safety climate in the Onne oil and gas free through improving management commitment to safety issues, encouraging productive interaction between workers and their superiors and management and increasing and improving the nature of safety training offered to workers would reduce the frequency of occurrence of incidents among the companies in this area,

This finding concurred with empirical work of Lyu *et al* (2018) who in a work titled “Relationship among Safety Climate, Safety Behaviour and Safety Outcome for Ethnic Minority Construction Workers” investigated the relationships among safety climate, safety behaviour, and safety performance for EM construction workers” and their results showed that that there were significant negative relationships between safety climate and safety performance; captured using frequency of incident occurrence for EM construction workers. In another case Nurulhuda *et al* (2018) carried out an empirical study titled “A Study on Safety

Management Practices and Safety Performance” which was aimed at investigating the relationship between safety management practices and safety performance in port industries, focus on Port Tanjung Pelepas and Port Pasir Gudang at Johor, Malaysia. The data collected by using questionnaire and distributed to 300 employees but only 146 were collected. This study found that a safety management practice which is an indicator of safety climate is important predictor of safety performance in organization. the finding concurred also with work of Carol et al (2014) titled “Relationships between safety climate and safety performance of building repair, maintenance, minor alteration, and addition (RMAA) works) which was aimed at ascertaining possible relationships between safety climate and safety performance of RMAA works and to offer recommendations on ways to improve RMAA safety using SEM to develop their model in which their finding revealed that a significant negative relationship between RMAA safety climate and frequency of self-reported near misses and injuries,

#### 4.3 The relationship between Safety Climate and frequency of Accident Occurrence in companies in Onne Oil and gas free zone

The finding of this current study revealed that Safety Climate negatively and insignificantly influenced frequency of accident occurrence among companies across Onne Oil and gas free zone. This means that that increasing the safety climate in the companies through improving management commitment to safety issues, encouraging productive interaction between workers and their superiors and management, and increasing and improving the nature of safety training offered to workers would reduce the frequency of occurrence of incidents among all the companies in this area

This finding also align with empirical work of Lyu et al (2018) who in a work titled “Relationship among Safety Climate, Safety Behaviour and Safety Outcome for Ethnic Minority Construction Workers” investigated the relationships among safety climate, safety behaviour, and safety performance for EM construction workers” and their results showed that that there were significant negative relationships between safety climate and safety performance; captured using frequency of accident occurrence for EM construction workers. In another case Nurulhuda et al (2018) carried out an empirical study titled “A Study on Safety the finding attuned with work of Carol et al (2014) titled “Relationships between safety climate and safety performance of building repair, maintenance, minor alteration, and addition (RMAA) works) which was aimed at ascertaining possible relationships between safety climate and safety performance of RMAA works and to offer recommendations on ways to improve RMAA safety using SEM to develop their model in which their finding revealed that a significant negative relationship between RMAA safety climate and frequency of self-reported injuries or accidents

### V. Conclusions

It was concluded that; one, there is good safety climate and safety performance in the bad safety performing companies in Onne OGFZ in Nigeria, two, safety climate significantly reduces the frequency of incident in the companies, and three, safety climate also insignificantly reduces frequency of accident occurrence in the companies

### VI.Recommendations

Based on these conclusions, it was recommended that;the management of the companies in the Onne OGFZ should improve on their safety climate by encouraging safety communications, organizing safety-related training regularly and also being committed to other safety related issues as such could help to reduce frequency of incident and accident occurrence and ultimately increase their safety performance.

### References

- [1]. Ajslev, J., Dastjerdi, E. L., Dyreborg, J., Kines, P., Jeschke, K. C., Sundstrup, E., & Andersen, L. L. (2017). Safety climate and accidents at work: Cross-sectional study among 15,000 workers of the general working population. *Safety Science*, 91, 320-325.
- [2]. Barbaranelli C, Petitta L & Probst T.M. (2015). Does safety climate predict safety performance in Italy and the USA? Cross-cultural validation of a theoretical model of safety climate. *Accident Analysis and Prevention*. 77:35–44
- [3]. Chau, N., Bourgkard, E., Bhattacharjee, A., Ravaud, J.F., Choquet, M. & Mur, J.M., (2008). Associations of job, living conditions and lifestyle with occupational injury in working population: a population-based study, *International Arch Occupational Environment Health*, 81:379–389.
- [4]. ILO (2021). Workplace well-being. International Labor Organization. Available at:<https://www.ilo.org>. Accessed: 02 January, 2021.
- [5]. Barling, J., Loughlin, C & Kelloway, E.K., (2002). Development and Test of a Model Linking SafetySpecific Transformational Leadership and Occupational Safety, *Journal of Applied Psychology*, 87(3): 488–496
- [6]. Mullen, J., (2004). Investigating factors that influence individual safety behavior at work, *Journal of Safety Research*, 35: 275–285
- [7]. Nevhage, B., & Lindahl, H. (2008). A Conceptual Model, Methodology and Tool to Evaluate Safety Performance in Organization, pp 1-17.
- [8]. Oliver, A.; Cheyne, A.; Tomas, J.M & Cox, S. (2002) The effects of organizational and individual factors on occupational accidents. *Journal Occupation and Organizational. Psychology*, 75, (473–488).

- [9]. Pousette, A.; Larsson, S & Törner, M (2008). Safety climate cross-validation, strength and prediction of safety behaviour. *Safety Science*, 46, 398–404.
- [10]. Lyu S. Carol K. H. Albert P. C. Francis K. W. Wong 1 & Arshad A. (2018) Relationship among Safety Climate, Safety Behavior and Safety Outcome for Ethnic Minority Construction Workers” *International Journal. Environment. Research and Public Health*, 15, (2-16) 484; doi:10.3390 /ijerph15030484
- [11]. Cooper M.D & Phillips R.A (2004). Exploratory analysis of the safety climate and safety behavior relationship, *Journal of Safety Research*. 35 (497–512)
- [12]. Fogarty, G. J., Murphy, P. J., & Perera, H. N. (2017). Safety climate in defence explosive ordnance: survey development and model testing. *Safety Science*, 93, 62-69.
- [13]. Petitta, L., Probst, T. M., Barbaranelli, C., & Ghezzi, V. (2017). Disentangling the roles of safety climate and safety culture: Multi-level effects on the relationship between supervisor enforcement and safety compliance. *Accident Analysis & Prevention*, 99, 77-89.
- [14]. Nurulhuda A. R. Nor-Izzati N.R. Ain-Najjiah K & Azieera D. D. (2018) A Study On Safety Management Practices and Safety Performance, 8th International Economics and Business Management Conference, ISSN: 2357-1330
- [15]. Carol K.H. HonA ChanM Yam C.H (2014) Relationships between safety climate and safety performance of building repair, maintenance, minor alteration, and addition (RMAA) works, *Safety Science*65(10-19)