e-ISSN 3050-9653
p-ISSN 2805-4364

10.5281/zenodo.15321789 Vol. 8 Issue 03 March - 2025 Manuscript ID: #01893

EMERGENCY PROCEDURES FOR TOTAL LOSS PREVENTION IN SELECTED OIL AND GAS COMPANIES IN RIVERS STATE

E. N. Ogbowu,[1] E. Ugwoha,[2] and V. Amah[3]

Centre for Occupational Health Safety and Environment (COHSE)
University of Port Harcourt, Rivers State, Nigeria
Email*; estallaogbowu@gmail.com.*

ABSTRACT:

This study examined the emergency procedure for total loss prevention in selected oil and gas companies in Rivers State. Descriptive research design was adopted or the study. Five emergency measures for loss prevention were considered, namely emergency exist procedure, emergency fire-accident prevention procedures, housekeeping procedure, electrical wiring and installations procedure and procedures for handling hazardous materials. Population of the study comprised 1364 field workers in three oil and gas firms in the study area from which 400 were sampled using multistage sampling technique. Questionnaire designed based on 5-point Likert scale was used for data collection and the data were analyzed using mean, percentage, weighted mean and Analysis of variance (ANOVA). The results revealed that the five emergency procedures for total loss prevention considered in the study were available in the sampled companies (mean score > 3.00 critical score). Two, all the five emergency procedures are effective for measuring emergency loss prevention in oil and gas firm in Rivers Sates (materials (mean score > 3.00 critical score) and finally, there is no significant difference in the level of effectiveness of the various procedure for emergency loss prevention in oil and gas firm in Rivers Sates ($p = 0.645 > 0.05$ significant level). It concluded that there are available and affective measures for emergency loss prevention in oil and gas firms in Rivers state. It was therefore recommended that management of the oil and gas firms should maintain the five emergency measures for total loss prevention in the oil and gas firms within the study area.

Keywords:

Emergency Procedures, Total Loss Prevention, Oil and gas firms, Rivers State.

How to cite: Ogbowu, E. N., Ugwoha, E., & Amah, V. (2025). EMERGENCY PROCEDURES FOR TOTAL LOSS PREVENTION IN SELECTED OIL AND GAS COMPANIES IN RIVERS STATE. *GPH-International Journal of Applied Science*, 8(03), 66-79. https://doi.org/10.5281/zenodo.15321789

1. Introduction

In as much as the main intention of safety and health department in the oil and gas sector is to assess and mitigate the possibility of accident during oil and gas operations, there is need to develop an emergency procedure for loss prevent in the event of accidents, thus, activities of loss prevention in the oil & gas, energy, chemical and petrochemical industries is concerned with the identification and assessment of possible accidents and losses, including process safety issues, with the aim to ensure the required engineering and operational measures to prevent or mitigate loss (Lees, 2000). The major ways to prevent loss in the oil and gas companies include using access control and surveillance systems, taking inventory regularly, implementing security protocols, training employees on loss prevention, and investing in inventory management. In the oil and gas sector, a well-structured loss prevention function should include a program designed around the six key principles of loss prevention. These six individual but symbiotic principles provide an approach that focuses on the prevention, identification, and resolution of loss. Embracing these principles within the loss prevention function, structure and program will ensure you the best opportunity to promote an environment of profitability and prevention. Thus, the six principles for loss prevention include, Prevention, Awareness, Compliance, Detection, Investigation and Resolution. As the circle moves clockwise, each principle has a relationship with the next principle, starting with and circling back to the primary principle and objective of any loss prevention program which is basically "Prevention". (Hasegawa & Sato, 2008)

Loss prevention techniques in oil and gas facilities are designed to prevent personal injury or loss of life, to protect the installation from fire, explosion, and operational safety hazards inherent to the facilities and protection of the environment by early detection of hazardous conditions and the subsequent shutdown, vapor depressurizing, and ventilation of hydrocarbons (Menon, 2019). The loss prevention philosophy is normally formulated based on a maximum of one major incident occurring at any one time, and the premise that hazards can arise in any section of the facility, in varying degrees of magnitude, and from a variety of sources (Menon, 2019). On normal-manned facilities, personnel are trained to manage operational activities with the highest regard for safe procedures and to react appropriately in the event of emergencies. The safety of the facility requires that the plant is inspected and maintained, safe procedures are used and improved based on experience, to minimize the probability of occurrence of hazardous conditions. On un-manned facilities, fire protection systems are provided based on a formal risk assessment which shows them to be necessary (Menon, 2019).

In the oil and gas industry, the main emergency scenarios that pose a danger to the oil and gas operation include fire outbreak, explosion of fuel assemblies and emergency hydrocarbon leakage (Danzi et al 2021). According to Department of Petroleum Resourced (DPR, 2022), from 2011 to 2021, there are 329 hazardous incidents which occurred in the oil and gas platforms in Nigeria, of which hundred and seventy-one (171) are straight fire outbreaks which account for 51.98% of the total number of emergencies incidents, hundred and forty-two (142) were explosions which account for 43.16%, of the emergency incidents while sixteen (16) were emissions and release of hazardous substances which account for 4.86%, of the emergency incidents, Based on the analysis of the causes of these emergency incidents, it was revealed that, in most cases, the factor of accidents is the human factor such as oil pipe vandalization and violation of safety rules, technical failures such as lack of periodic inspection and neglect in the process of maintenance, lack of equipment and off-design external influences. These analyses on the outcome of investigation on the causes of accidents at oil and gas industry in Nigeria over the past 10 years (2011-2021) revealed that

the major incidents in the oil and gas sector is fire-related events. It was also revealed that poor fire risk assessment and inadequate emergency procedure for loss prevention were the main cause of the accidents on oil and gas platform.

Based on these assessments, it is clear that emergency procedures for loss prevention are related to risk assessment in the sense that a good emergency procedure for loss prevent relies on information from risk assessment in order to determine suitable procedure to adopt in order to prevent loss during emergency situation such as fire accidents situations, hence a good fire risk assessment would lead to design of good procedure for fire emergency and loss preventions due to fire accidents. Hence, this current study is carried out to investigate the emergency procedures used by the oil and gas companies in Rivers State for total loss prevention. Therefore, the aims of this study are to; one,ascertain the emergency procedures adopted by the selected oil and gas companies in Rivers State for loss prevention, and two, examine the effectiveness of the emergency procedures adopted by the selected oil and gas companies in Rivers State for loss prevention.

2. Methodology

2.1. Research design

This study adopted descriptive research design to investigate the emergency procedure designed for accident and loss prevention in the sampled oil and gas firms in Rivers State

2.2 Study area

Rivers State is a state in the Niger Delta region of southern Nigeria, formed in 1967, when it was split from the former Eastern Region, Rivers State borders includes; Anambra and Imo on the north, Abia and Akwa Ibom on the eastern part and Bayelsa and Delta on the west. The state capital, Port Harcourt, is a metropolis that is considered to be the commercial centre of the Nigerian oil industry. With a population of 5,198,716 as of the 2006 census, Rivers State is the 6th most populous state in Nigeria. Rivers State is a diverse state that is home to many ethnic groups, the majority being Igbo, but also including the Ogoni and Ijaw. The state is particularly noted for its linguistic diversity, with 28 indigenous languages being said to be spoken in Rivers State, dominant of which, are the Igbo speaking groups, the Ogoni and Ijaw languages. Rivers State has a total area of 11,077 km^2 (4,277 sq mi) making it the 26th largest state by area and its geography is dominated by the numerous rivers that flow through it, including the Bonny River.Figure 1 is the map of the Rivers State showing the location of the three oil and gas companies sampled in this study while Table 1 show their various coordinates. The map revealed that the coordinate of the Chevron Oil and Gas are 7° 2' 1.5" E and 4° 50' 4.0" N, coordinate of Moni Polu Limited are 7° 0' 34.6" E and 4° 47' 28.3" N while that of SEPLAT are 7° 2' 13.1" E and 4° 48' 4.0" N

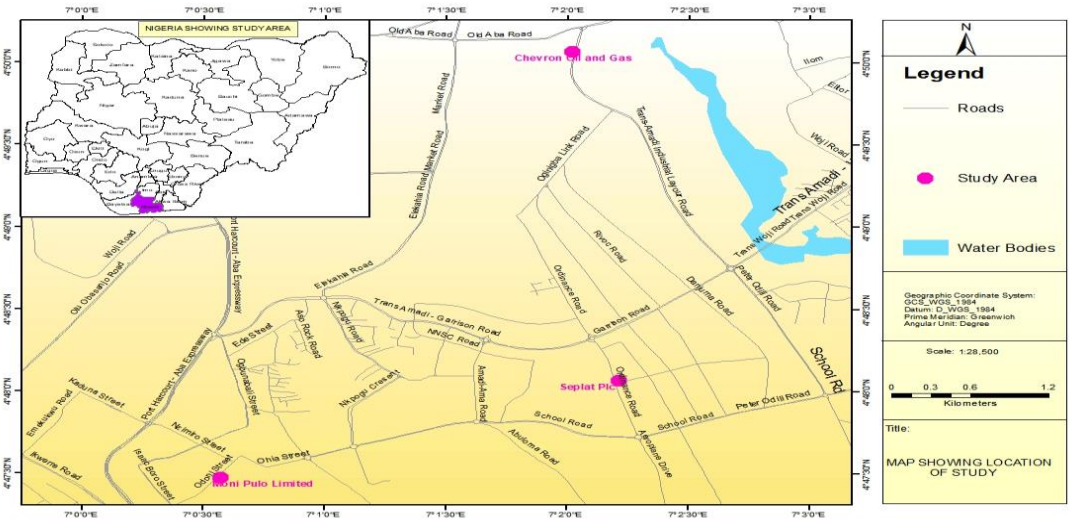

Figure 1 Map of River State showing the location of the three sampled oil and gas companies

2.3 Population and sampling technique of the Study

The population of this study comprised field workers of the sampled oil and gas companies operating in River State. There are one hundred and ninety-five registered oil and gas companies in Rivers state according to DPR, however, only twenty-eight (28) are involved in oil and gas exploration and production. Out of the twenty-eight, three were purposively sampled for this study, and the population of their workers totaled at one thousand three hundred and twenty-six (1326) according to their human resource department

2.4 Sample Size Determination

The sample size of the respondents in this study was determined using the Taro Yamane sample size determination formula. and it is expressed in Equation 1

$$n = \frac{N}{(1+N)(\varepsilon)^2)} \qquad 1$$

Where n = Sample size, N = Population under study and ε = Margin error (which is 0.05 at 5% level of significance respectively). Hence, for the international oil and gas companies, the sample size is calculated as

$$n = \frac{1326}{(1+1326)(0.05)^2)}$$

n = 400,

Thus, the sample size for field workers in the oil and gas companies is 400. This sample size was distributed among the company based on the proportion of their population. Table 1 shows the distribution of the sample size among the various field workers in the various sampled companies.

Table 1 Distribution of the sample size among the field workers

S/N	Companies	Sample				
		HSE Officers	Field Managers	field Supervisors	field Engineers	**Total**
1	Company A	10	10	15	52	**87**
2	Company B	10	10	15	59	**94**
3	Company C	20	25	40	134	**219**
Total		**40**	**45**	**70**	**245**	**400**

2.5 Method and instrument for data collection

Data were collected based on the availability of the field workers sampled. The purpose of the study was explained to these eligible participants. The study questionnaires were administered to them on the days of data collection. The questionnaires were self-administered. All duly completed questionnaires were retrieved on the spot and cross-checked for completeness. Due to size and type of the sampled respondent, the researcher used a research assistant to administer the questionnaire. The questionnaire was comprised of two sections: A to B. Section A was used to determine the available emergency prevention procedures used the oil and gas firms while section B was used to obtain response on the effectiveness of the various emergency procedure for loss prevention respectively. In these sections, the conventional five-point Likert scale of 1, strongly disagreed, 2, disagreed, 3 undecideds, 4 agreed and 5 strongly agreed was used. In this study, five major emergency procedures for Accident and loss prevention were considered and they include Emergency Exist. Emergency Fire Accident Prevention, Housekeeping Measure, Electrical wiring and installations and Measure for handling hazardous materials.

2.6 Methods and instrument of Data Analysis

Descriptive statistics which comprises of mean, percentage, weighted mean and Analysis of Variance (ANOVA). were used for data analysis, and XL-STAT was the instrument usedfor the analysis

3. Results and discussion

3.1 The emergency procedures adopted by the selected oil and gas companies in Rivers State for loss prevention

Table 2 shows the results of the response of the study respondents on the availability of the five major emergency procedures adopted by the selected oil and gas companies in Rivers State for total loss prevention. The emergency procedures considered includes; availability of emergency exist plan and procedure, availability of emergency fire accident preventionplan and procedure, availability of proper housekeeping measure and procedure for loss prevention, availability of proper electrical wiring and installations procedure and availability of measure for handling hazardous materials. The results revealed showed that the respondents agreed that all the five emergency procedures for total loss prevention are

adopted and used by their companies. This is because weighted average of the five emergency procedures which are 3.95. 3.85, 3.75, 3.29 and 3.27 respectively are all greater than 3.00 threshold for acceptance or agreeing to the terms of the items. Also the overall mean of 3.67 which is also greater than 3.000 threshold indicates that majority of the respondents agreed that there is substantial availability of the aforementioned emergency procedures for total loss prevention.

Table 2 Availability of emergency procedures for total loss prevention

S/N	Emergency procedures for total loss prevention	SD.	D.	UN	A.	SA	WA	Remark
1	My company have a detailed emergency exist plan and procedure	19.00 5.580%	20.00 5.88%	53.00 15.58%	98.00 28.82%	150 44.11%	3.95	Agreed
2	My company have emergency fire accident preventionplan and procedure	10.00 2.94%	40.00 11.76%	70.00. 20.58%	100.00 29.41%	120.00 35.30%	3.85	Agreed
3	There is a proper housekeeping measure and procedure for loss prevention in my company	30.00 9.30%	39.00 9.80%	73.00. 20.90%	39.00 12.30%	159.00 47.60%	3.75	Agreed
4	There is a proper electrical wiring and installations procedure	6.00 1.76%	80.00 23.50%	140.00. 41.17%	93.00 25.90%	21.00 6.17%	3.29	Agreed
5	We have comprehensive and detailed measure for handling hazardous materials	26.00 7.64%	69.00 20.29%	97.00 27.70%	108.00 31.76%	44.00 14.60%	3.27	Agreed
	Overall Mean						3.62	Agreed

3.2 The effectiveness emergency procedures adopted by the selected oil and gas companies in Rivers State for loss prevention

Table 3 to Table 7 shows the response of the respondents on the effectiveness the five emergency procedures adopted by the selected oil and gas companies in Rivers State for total loss prevention and the analysis of the effectiveness of each of the five procedures are presented as thus:

3.2.1 The effectiveness of emergency exist plan and procedure used by the selected oil and gas companies in Rivers State for total loss prevention

Table 3 shows the results on the response of the respondents concerning the effectiveness of emergency exit plan and procedures in the selected oil and gas companies as a measure for total loss prevention. Eight research items were used to capture the construct of effectiveness of emergency exit plan and procedures. And the results revealed that majority of the sampled respondents in the selected companies agreed to the items used to capture effectiveness of emergency exit plan and procedures because the weighted average of all the eight items which is 3.95, 3.85, 3.75, 3.27, 3.27, 3.12. 3.26 and 3.10 are all greater than 3.0 threshold for acceptance. Also, the overall weighted average of 3.45 which is greater than 3.0 threshold for acceptance suggest that majority of the respondent agree to the eight items covering the effectiveness of emergency exit plan and procedure for total loss prevention.

Table 3. The effectiveness of emergency exists plan and procedure in the selected oil and gas companies

S/N	Emergency exist plan and procedure	SD.	D.	UN	A.	SA	WA	Remark
1	The number of exits in the company comply with the requirements of the fire code,	19.00 5.580%	20.00 5.88%	53.00 15.58%	98.00 28.82%	150 44.11%	3.95	Agreed
2	Exit routs are continuous from the building's entry point till the discharge point	10.00 2.94%	40.00 11.76%	70.00. 20.58%	100.00 29.41%	120.00 35.30%	3.85	Agreed
3	Exit doors lead directly to a public space	30.00 9.30%	39.00 9.80%	73.00. 20.90%	39.00 12.30%	159.00 47.60%	3.75	Agreed
4	Corridors and exit points are constantly lighted during the building occupancy	6.00 1.76%	80.00 23.50%	140.00. 41.17%	93.00 25.90%	21.00 6.17%	3.29	Agreed
5	Exit signs are adequately placed, and constantly lighted throughout the building	26.00 7.64%	69.00 20.29%	97.00 27.70%	108.00 31.76%	44.00 14.60%	3.27	Agreed
6	There are no obstructions, that reduce the width of an exit	31.00 10.54%	66.00 19.10	91.00 25,40	108.00 31.70	71.00 19.65	3.12	Agreed
7	The statement "PUSH TO EXIT" is available on all fire doors	23.00 6.76%	28.00 8.23%	61.00 17.94	102.00 30.00%	126.00 37.00%	3.26	Agreed
8	The minimum width for any corridor within and around the company is not less than 1.1 meters	39.00 11.47%	50.00 14.70%	130.00. 38,23%	101.00 29.70%	20.00 5.88%	3.10	Agreed
	Overall weighted average						3.45	Agreed

3.2.2 The effectiveness of emergency fire accident preventionplan and procedure,

Table 4 shows the response of the respondents concerning the effectiveness of emergency fire accident preventionplan and procedure in the selected oil and gas companies as a measure for total loss prevention. Seven research items were used to capture the construct that expressed the effectiveness of emergency fire accident preventionplan and procedure in the study. And the results revealed that majority of the sampled respondents in the selected companies agreed to the six out of the seven items used to capture the effectiveness of emergency fire accident preventionplan and procedure. This is because the weighted average of the six items which is 3.66, 3.45, 3.54, 3.74, 3.09 and 3.01 are all greater than 3.0 threshold for acceptance while majority of the respondents disagreed to the last item because the weighted average is 2.12 which is less than 3.0 threshold for acceptance. However, the overall weighted average of 3.23 which is greater than 3.0 threshold for acceptance still imply that majority of the respondent agree to the substantial level of effectiveness of emergency fire accident preventionplan and procedure in the selected oil and gas companies as a measure for total loss prevention

Table 4 Availability and effectiveness of emergency fire accident preventionplan and procedure in the selected oil and gas companies

S/N	Emergency fire accident prevention plan and procedure	SD.	D.	UN	A.	SA	WA	Remark
1	There is a functional fire extinguisher per each 557 square meters in low hazard office areas	10.00 2.94%	30.00 8.80%	100.00 29.40.40%	98.00 28.80%	112.00 32.90%	3.66	Agreed
2	The maximum travel distance to any extinguisher is about 20 m	35.00 9.90.00%	41.00 11.20%	79.00. 23.23%	85.00 25.00%	100.00 29.40%	3.45	Agreed
3	Fire extinguishers are located in visible, yet accessible locations	38.00 11.17%	40.00 11.76%	85.00. 20.90%	100.00 29.40%	77.00 22.64%	3.54	Agreed
4	Portable extinguishers are mounted on hangers	16.00 4.70%	50.00 14.70%	70.00. 20.58%	104.00 30.58%	100.00 29.40%	3.74	Agreed
5	Fire extinguishers are mounted at a height not exceeding 1.5 m from the floor	70.00 20.58%	20.00 5.88%	140.00 41.16%	25.00 7.35%	85.00 25.00%	3.09	Agreed
6	Fire extinguishers are serviced on an annual basis	75.00 22.05%	20.00 5.88	140.00 41.16%	20.00 5.88%	85.00 25.00%	3.01	Agreed
7	Detectors and alarm installations are constantly kept in operational form	102.00 29.980%	45.00 13.23%	85.00 25.00%	30.00 8.82%	68.00 19.99%	2.12	Disagreed
	Overall weighted average						3.23	Agreed

3.2.3 The effectiveness of the housekeeping measure and procedure for loss prevention in the selected oil and gas companies

Table 5 shows the results on the response of the respondents concerning the effectiveness of the housekeeping measure and procedure for total loss prevention in the selected oil and gas companies. Seven research items were used to capture the construct of the effectiveness of the housekeeping measure and procedure for loss prevention in the selected oil and gas companies. And the results revealed that majority of the sampled respondents in the selected companies agreed to the items used to capture the effectiveness of the housekeeping measure and procedure for loss prevention in the selected oil and gas companies. This is also because the weighted average of all the seven items which is 4.15, 3.85, 3.65, 3.25, 4.30, 3.10 and 3.05 are all greater than 3.0 threshold for acceptance. Also, the overall weighted average of 3.62 which is greater than 3.0 threshold for acceptance suggest that majority of the respondent agree to the seven items covering the effectiveness of the housekeeping measure and procedure used for loss prevention in the selected oil and gas companies

Table 5 The effectiveness of the housekeeping measure and procedure for loss prevention in the selected oil and gas companies

S/N	Housekeeping measure and procedure	SD.	D.	UN	A.	SA	WA	Remark
1	Combustible materials are stored in an orderly manner	18.00 5.29%	22.00 8.82%	30.00 1%	100.00 29.40%	170.00 50%	4.15	Agreed
2	Heating devices are positioned at substantial distance from storage spaces	10.00 2.94%	40.00 11.76%	70.00. 20.58%	100.00 29.41%	120.00 35.30%	3.85	Agreed
3	Exit enclosures are free from any form of combustible	30.00 9.30%	39.00 9.80%	72.00. 20.90%	39.00 12.30%	160.00 47.60%	3.65	Agreed

	materials							
4	Mechanical rooms are free from combustible materials	6.00 1.76%	80.00 23.50%	140.00. 41.17%	93.00 25.90%	21.00 6.17%	3.25	Agreed
5	Dump-bins with a capacity exceeding one cubic meter are stored outside the building	25.00 7.35%	13.00 3.82%	32.00 9.41%	90.00 26.46%	180.00 52.92%	4.30	Agreed
6	There is an emergency escape, evacuation and rescue plan in the building	85.00 25.00%	25.00 7.35%	90.00 26.46%	35.00 10.29%	105.00 30.87	3.10	Agreed
7	There is a facilitated access to the fire hydrant	85.00 25.00%	25.00 7.35%	100.00 29.41%	35.00 10.29%	95.00 27.93%	3.05	Agreed
	Overall weighted average						3.62	Agreed

3.2.4 The effectiveness of the electrical wiring and installations procedure for loss prevention in the selected oil and gas companies

Table 6 shows the response of the workers concerning the effectiveness of electrical wiring and installations measures and proceduresin the selected oil and gas companies as a measure for total loss prevention. Six research items were used to capture the construct that expressed the effectiveness of electrical wiring and installations measures and procedures in the study. And the results revealed that majority of the sampled respondents in the selected companies agreed to the five out of the six items used to capture the effectiveness of electrical wiring and installations measures and procedures. This is because the weighted average of the six items which is 4.20, 4.25, 3.15, 3.25 and 3.55 are all greater than 3.0 threshold for acceptance while majority of the respondents disagreed to the fourth item because the weighted average is 2.90 which is less than 3.0 threshold for acceptance. However, the overall weighted average of 3,55 which is greater than 3.0 threshold for acceptance still imply that majority of the respondent agree to the substantial level of effectiveness of electrical wiring and installations measures and proceduresin the selected oil and gas companies as a measure for total loss prevention

Table 6 Availability and effectiveness of the electrical wiring and installations procedure for loss prevention in the selected oil and gas companies

S/N	Electrical Wiring and Installations Procedure	SD.	D.	UN	A.	SA	WA	Remark
1	Extension cords are grounded, with overcurrent protection	18.00 5.29%	22.00 8.82%	30.00 9.30%	90.00 26.46%	180.00 52.94%	4.20	Agreed
2	Electrical wires are directly connected to wall sockets	10.00 2.94%	30.00 9.30%	40.00. 11.75%	110.00 32.34%	150.00 44.10%	4.25	Agreed
3	Extension wires are not running through any components of the interior	62.00 18.23%	39.00 11.46%	100.00. 29.40%	39.00 11.46%	100.00 29.40%	3.15	Agreed
4	Extension cords are not a replacement for permanent wiring	93.00 25.90%	21.00 6.17%	140.00. 41.17%	6.00 1.76%	80.00 23.50%	2.90	disagreed
5	Extension wires are not impaired	6.00 1.76%	80.00 23.50%	140.00. 41.17%	93.00 25.90%	21.00 6.17%	3.25	Agreed
6	A sign reading, “Electrical Room” is posted on the doors	85.00 25.00%	25.00 7.35%	85.00 85.00%	35.00 10.29%	110.00 32.34	3.55	Agreed

of all electrical rooms		
Overall weighted average	3.55	Agreed

3.2 5 The effectiveness of measure for handling hazardous materials for loss prevention in the selected oil and gas companies

Table 7 also shows the results on response of the workers concerning the effectiveness of measure for handling hazardous materials in the selected oil and gas companies as a measure for total loss prevention. In this study five research items were used to express the construct that explained the effectiveness of measure for handling hazardous materials in the selected oil and gas companies as a measure for total loss prevention. And the results revealed that majority of the workers in the selected companies agreed to the five items used to capture the effectiveness of the measure for handling hazardous materials in the selected oil and gas companies. This is because the weighted average of the five items which is 4.30, 4.15, 3.15, 4.05 and 3.90 are all greater than 3.0 threshold for acceptance. Also, the overall weighted average of 3,91 which is also greater than 3.0 threshold for acceptance still maintain that majority of the workers agree to the substantial level of effectiveness of measure used in handling hazardous materialsin the selected oil and gas companies as a measure for total loss prevention

Table 7 The effectiveness of the measure for handling hazardous materials for loss prevention in the selected oil and gas companies

S/N	Measure for handling hazardous materials	SD.	D.	UN	A.	SA	WA	Remark
1	Compatible materials are stored together	18.00 5.29%	22.00 8.82%	30.00 9.30%	90.00 26.46%	180.00 52.94%	4.30	Agreed
2	Incompatible materials are stored separately	18.00 5.29%	22.00 8.82%	30.00 1%	100.00 29.40%	170.00 50%	4.15	Agreed
3	The amount of combustible liquids used for operating equipment in the building is limited to few gallons	62.00 18.23%	39.00 11.46%	100.00. 29.40%	39.00 11.46%	100.00 29.40%	3.15	Agreed
4	Combustible liquids used for operating equipment are stored at substantial distance from any source of heat.	93.00 25.90%	21.00 6.17%	100.00. 29.40%	6.00 1.76%	120.00 35.29%	3.90	Agreed
5	Rooms and areas where flammables like compressed gases are stored are labeled boldly like "**COMPRESSED GAS**"	10.00 2.94%	30.00 9.30%	40.00. 11.75%	100.00 29.40%	160.00 47.10%	4.05	Agreed
	Overall weighted average						3.91	Agreed

3.3 Comparative assessment of the level of effectiveness of the emergency procedures for total loss prevention in selected oil and gas companies in Rivers State

In this study, five emergency procedures for total loss prevention were investigated for the selected oil and gas companies in Rivers State. These emergency procedures include

availability of emergency exist plan and procedure, availability of emergency fire accident preventionplan and procedure, availability of proper housekeeping measure and procedure for loss prevention, availability of proper electrical wiring and installations procedure and availability of measure for handling hazardous materials. Table 3 to 7 showed the outcome of the investigation by expressing the opinion and response of the workers on the effectiveness of the five emergency procedures used by the selected oil and gas firms in Rivers state. This section is focused on conducting a comparative analysis to determine whether there is statistically significant difference in the level of the availability and effectiveness of the emergency procedures for total loss prevention used in the selected oil and gas companies in Rivers State. This comparative analysis is carried out using Bar chart and Analysis of Variance (ANOVA)

Figure 2 shows the overall weighted average evaluated from the response of the workers on the level of the availability and effectiveness of the various emergency procedures for total loss prevention used in the selected oil and gas companies in Rivers State. The results showed that the "Availability and effectiveness of measure for handling hazardous materials" has the highest overall weighted average of 3.91, followed by "Availability and effectiveness of the housekeeping measure and procedure" with overall weighted average of 3.62, "Availability and effectiveness of the electrical wiring and installations procedure" with overall weighted average of 3.55, "Availability and effectiveness of emergency exist plan and procedure" with overall weighted average of 3.45 while the least is "Availability and effectiveness of emergency fire accident preventionplan and procedure" with overall weighted average of 3.23. These results suggest that "Measure for handling hazardous materials" is the most available and effective emergency procedures for lost prevention in the selected oil and gas firms while "Emergency fire accident preventionplan and procedure" are the least available and effective emergency procedure for total loss prevention in the selected oil and gas firms.

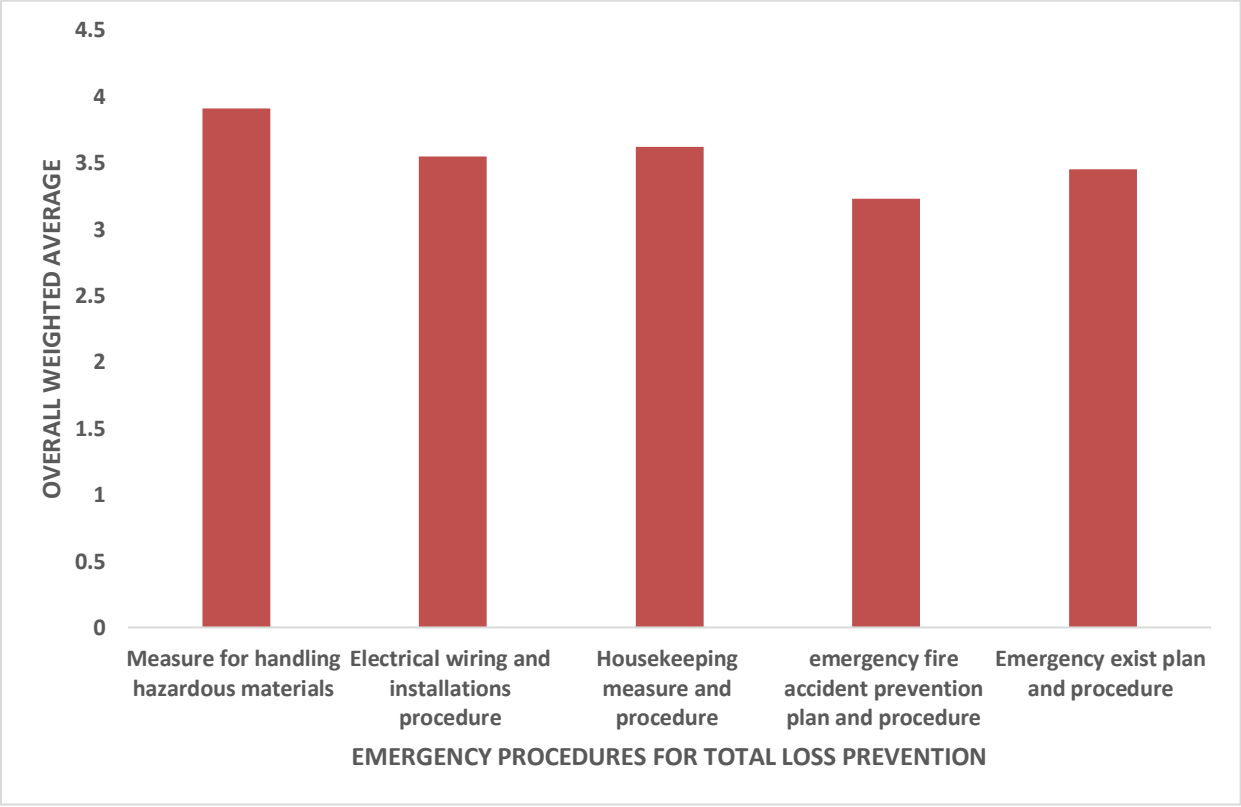

Figure 2 Overall weighted average of the five emergency procedures for total loss prevention

However, the ANOVA analysis carried out on the five emergency procedures at 0.05 significance level as shown in Table 8 and it showed that there is no statistically significant difference in the level of availability and effectiveness of the five emergency procedures used for total loss prevention as the p-value is 0.645 which is greater than 0.05 significant level suggesting that no significant difference was observed among the overall weighted average of the various emergency procedures for total loss prevention. This is confirmed by the turkey analysis in Table 9 which showed that all the emergency procedures are all in the same group which suggest that there is no statistically significant difference among the emergency procedures. This outcome implies that any difference that exist among these various emergency procedures for total loss prevention is by chance and not actually by virtue of their superiority or acceptance.

Table 8: Analysis of Variance (ANOVA) of the level of availability and effectiveness of the five emergency procedures

Source	DF	Sum of squares	Mean squares	F	Pr > F
between groups	6	0.1542	1.3324	0.3870	< 0.645
Error	334	7.1006	0.0525		
Corrected Total	340	7.1870			

Computed against model Y=Mean(Y)

Table 9 Turkey multiple comparison test on the level of availability and effectiveness of the five emergency procedures

Category	**Overall weighted average**	***Groups***
Measure for handling hazardous materials	3,91	A
Housekeeping measure and procedure	3.62	A
Electrical wiring and installations procedure	3.55	A
Emergency exist plan and procedure	3.45	A
Emergency fire accident preventionplan and procedure	3.23	A

Note, No significant difference between members in same group

4. Discussion

Table 2 and Table 3 to 7 respectively showed the availability and effectiveness of the emergency procedures for total for loss prevention adopted by the selected oil and gas companies in Rivers State. The five emergency procedures for total loss prevention were investigated for the selected oil and gas companies in Rivers State. These emergency procedures include availability of emergency exist plan and procedure, availability of emergency fire accident preventionplan and procedure, availability of proper housekeeping measure and procedure for loss prevention, availability of proper electrical wiring and installations procedure and availability of measure for handling hazardous materials. The outcome of the investigation showed the expression of the opinion of the workers on the availability and effectiveness of these emergency procedures for total loss prevention in the selected oil and gas firms in Rivers state. The findings revealed that there is substantial availability and effectiveness of all the aforementioned emergency procedures for total loss prevention in the selected oil and gas firms in Rivers state. Also the finding on the comparative analysis carried out to determine whether there is statistically significant difference in the level of the availability and effectiveness of the various emergency procedures for total loss prevention used in the selected oil and gas companies in Rivers State showed that there is no statistically significant difference in the level of the availability and effectiveness of the emergency procedures for total loss prevention used in the selected oil and gas companies. These finding implied that the selected oil and gas companies in this study have substantial availability of effective emergency procedures for total loss prevention in terms of emergency exist plan and procedure, emergency fire accident preventionplan and procedure, proper/ suitable housekeeping measure and procedure for loss prevention, proper electrical wiring and installations procedure and suitable measure for handling hazardous materials. The finding also supposed that the level of these aforementioned emergency procedures for lass prevention is similar across the selected oil and gas firms.

The outcome of this study aligned with the work of Mohammad (2022) who worked on “Fire Safety Risk Assessment of Workplace Facilities: A Case Study of Oil and Gas firms” in which they presented and analysed several emergency procedures for total loss prevention in the case of fire accidents. And the emergency procedure they considered include, emergency exist plan and procedure, emergency fire accident preventionplan and procedure, proper housekeeping measure and procedure for loss prevention, proper electrical wiring and installations procedure, suitable measure for handling hazardous materials and miscellaneous measures for fire prevention. However, the current study is different from the work of Mohammad. (2022) because it investigated all the emergency measures and procedures for total loss prevention except miscellaneous measures for fire prevention. The finding the current study also aligned with the study by Danzi et al (2021) who conducted study titled “Parametric Fire Risk Assessment Method Supporting Performance Based Approaches” in which they also investigated some emergency measure and procedures for total loss prevention in office building similar to the one considered in this study and also the study by Mohammad. (2022). Theemergency measures and procedures for total loss prevention considered were emergency procedure for existing building during fire accident, emergency procedure fire accident, housekeeping measure and procedure, and measure for using fire extinguishers hazardous. Also similar finding on emergency procedure for total loss prevention were also reported by Campbell (2013), Hall, (2014) and Hassanain, (2008).

5. Conclusion

The emergency procedures for total loss prevention in selected oil and gas firm in Rivers Sates have been assessed and the findings revealed that there are five available emergency procedures for total loss prevention in selected oil and gas firm in Rivers State and they include emergency exist plan and procedure, emergency fire accident preventionplan and procedure, housekeeping measure and procedure for loss prevention, electrical wiring and installations procedure and measure for handling hazardous materials. Also, all the emergency procedures were effective for procedures for emergency loss prevention in oil and gas firm in Rivers Sates and finally. Furthermore, there was significant difference in the level of effectiveness of the various procedure for emergency loss prevention in oil and gas firm in Rivers Sates

References

Campbell, R. (2013). U.S. Structure Fires in Office Properties. Technical Report. Quincy, MA, USA: National Fire Protection Association

Danzi, E., Fiorentini, L., & Marmo, L. (2021). FLAME: A Parametric Fire Risk Assessment Method Supporting Performance Based Approaches. *Fire Technology*. 57 (2), 721–765.

Department of Petroleum Resources (DPR) 101 (2022). Code for Life Safety. Handbook of Fire Protection Engineering

Hall, J. R. (2014). The Total Cost of Fire in the United States. Technical Report. Quincy, MA, USA: *National Fire Protection Association*

Hasegawa K, & Sato, K., (2008) Experimental Investigation of the Unconfined Vapor-Cloud Explosions of Hydrocarbons. *Technical Memorandum of Fire Research Institute, Japan*, 12: 1-118

Hassanain, M. A. (2008). Fire Safety in the Design and Operation of Student Housing Facilities. *Structural Survey*. 26 (1), 55–62. doi:10.1108/ 02630800810857444

Lees F.P., (2000) Loss Prevention in The Process Industry. *Butterworth Heinemann* 1: 527.

Menon, N.S., (2019) Loss Prevention in Hydrocarbon Facilities. Oil Gas Res 4: 160. doi: 10.4172/2472-0518.1000160

Muhammed F (2022) Comparison of Risk Assessment Methods within the Scope of Occupational Safety in the Construction Sector, *European Journal of Science and Technology No. 18, pp. 272-282*, DOI: 10.31590/ejosat.670906