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Oil Spill Prevention and Emergency Response Strategies in Selected Operating Companies in Rivers State, Nigeria

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ABSTRACT: This research is aimed at evaluating and assessing Oil spill prevention and emergency response strategies currently practiced within oil companies operating in Rivers State. Research data were collected using a standard checklist and self-structured questionnaire and a purposive sampling technique adopted from a population of selected international oil companies and indigenous oil companies. The analysis was conducted using t-test and analysis of variance on SPSS with a confidence interval of 95%. The result showed that the mean difference in the oil spill prevention strategies was not significant, whereas, the emergency response strategies showed a slight variation in responses of international oil companies as against national oil companies. Both groups (international and indigenous oil companies) similarly agreed on the causes of oil spill and prevention strategies as indicated by the p-values of 0.743 and 0.106 respectively, and a slight variation in impact of oil spill and emergency response strategies as indicated by the p-values of 0.000 and 0.000 respectively and these results are evidenced in the number of oil spills incidence, and its impact across Rivers State. From the findings and correlation with available oil spill occurrence data, the major contributor to oil spill is sabotage and theft 79%, while process failure account for the remaining 21%. The study therefore advocates for an effective and elaborate stakeholder's cooperation, enforcement of relevant legislations, and proactive oil spill management practice in Rivers State.

KEYWORDS: Oil spill, Operating Companies, mitigation and emergency response strategies.

I. INTRODUCTION

Internationally, oil spill has become a general cause for today worry [1]. The introduction of the business which started in 1859 with the principal revelation of oil with an oil well of 70 feet by Colonel Drake in Titusville Pennsylvania, United States [2]; In an evaluation of the most affected oil environment of the world, FMoE et al. 2006 affirms that Niger Delta is among the top five oil impacted ecosystem of the world with an expected 9 – 13 million barrels of oil spill in the last 50 years of Nigeria's oil and gas exploratory activities and this is comparable to 50 Exxon Valdez Spills. The Niger Delta area is an Environmentally Sensitive district with mangrove swamps, fresh water bodies, huge wetlands and tropical forest. However, with the activities of oil business and the impact emanating from oil spill contamination of streams, waterways, and mangrove area, loss of sea-animals, earthly and bio varieties, and the deficiency of job by the native individuals who rely upon for financial sustenance. Oil spill can be seen during any phase of the crude oil exploration or production phases, refining activities, transportation by means of pipeline, stockpiling vessels and units, and during conclusive utilization stages. Human errors represent half of worldwide oil spill, while 20-40% of the spills are ascribed to hardware disappointments and failing of cycle units [3].

II. RELATED WORK

According to [4] the nation has recorded more than 1,359,715 barrels of crude oil spill both onshore and offshore since the beginning of oil exploration in the Niger Delta. These spills are significant danger to the wellbeing of the host communities of the area, amphibian lives, untamed life, microorganisms, surface and ground water bodies. A report by [5]; stated that erosion of pipelines, and big haulers, are top among the causes of oil spill in Niger Delta. Despite the positive effects of crude oil, there has been huge increase in the number of oil spill cases whose impact results in climate change, loss of vocation and bio-diversities and financial decrease [6]. As indicated by [5] report on evaluation of Ogoni land in Niger Delta Nigeria, the unsightly environment was caused by hydrocarbon pollution of surface and ground water bodies. Oil was found in surface and ground water of about 8cm layer of floating hydrocarbon from layers of meager to thick sheens with readings of about 7,420µg/l. The water quality fishes and other aquatic lives were affected; while the mangrove and timberland were seriously contaminated by spilled oil.



Crude Oil is one of the discoveries that have had such a great amount of effect on the economy of Niger Delta. In Nigeria, oil spill has happened in different locations and at various occasions along the coast. Some significant spills in the waterfront zone are the GOCON's Escravos spill in 1978 of around 300,000 barrels, SPDC's Forcados Terminal tank disappointment in 1978 of around 580,000 barrels and Texaco Funiwa-5 victory in 1980 of around 400,000 barrels [7]; [8]. Other oil spill occurrences are those of the Abudu pipe line in 1982 of around 18,818 barrels, The Jesse Fire Incident which resulted to about 1,000 lives and the Idoho Oil Spill of January 1998, of around 40,000 barrels [8]. A large oil spill incident occurred in Jesse community in Delta State in 2001 when raw petroleum spilled into the surrounding environment.

[9] and DPR-EGASPIN 2002, revised edition assembled the different reasons for oil spill under eight headings as follow: Blow Outs, Sabotage, Corrosion, Equipment Malfunction, Operations/Maintenance Error, Natural Causes, Accident from outsider, and Unknown Causes. In [10], oil spill in Niger delta affects the lives of occupants in the region with long lasting impacts.[11] expressed that oil pollution has affected plant development by lessening the accessibility of soil supplements/nutrient through introduction of harmful substance into the soil. Aside from soil helpless yield, the oil spill has also affected economic trees, food crops by decreasing their yield. This has caused a decrease in family food security [12].

[13] expressed that oil spill contamination of land and water results in obstruction and loss of sporting activities, for example, plunging and games. Organizations that utilize the waterways and ocean for their operation can likewise be negatively influenced by the oil spill. [14] indicated that oil spill affects the socio-economic environment as it compromises the delicate subsistent labourer economy, healthy biodiversity and the social occupation lives of the citizens. Crude oil is a toxic substance, which is hurtful to most types of vegetation, and when oil spills, it taints the environment. A portion of the medical issues emerge from both ecological negative effects, for example, contamination of water sources. The contamination of streams exposes the region occupants to water borne related sicknesses, for example, typhoid, fever and skin illnesses. The impact of oil spill has necessitated the enacted of a few laws and guidelines to help moderate the events of oil spill. Notable amongst these regulations in Nigeria is the (NOSDRA) Act No.15 of 2006, which is legally enabled to facilitate quick responses to oil spill.

III. METHODOLOGY

The design of the study is a cross sectional research survey. The study was conducted amongst oil companies operating in Rivers State. The population of the study comprised international and indigenous oil companies operating in Rivers State, Niger Delta, Nigeria. The populace comprises of a sum of four (4) oil companies which are drawn from two (2) international and indigenous each. The sample of 98 respondents were drawn from a population of hundred and thirty (30) staff of Health, Safety and Environment, Loss prevention department using purposive sampling techniques and Taro Yamane's sample determination method.

The instrument used for the study was a well-structured questionnaire and standard checklist adopted from DPR EGASPIN 2002 revised edition and National Oil Spill Contingency Plan [NOSCP] using a five-point Likert scale. The research instruments were constructed to ensure that the contents and questions raised were able to effectively address and provide suitable answers and explanation to the research objectives through face and content validated by HSE, Loss Prevention and Environmental experts in the Centre for Occupational Health, Safety and Environment, University of Port Harcourt.

The reliability of the instrument was determined through Cronbach Alpha reliability coefficient method for measuring internal consistency of instrument. Ten (10) respondents which were not part of the sample were used in testing the reliability and a reliability coefficient of 0.70 was obtained which showed strong reliability. Copies of the questionnaire and checklist were distributed amongst the selected oil companies using some inclusive and exclusive criteria and ethical consideration and analyzed to determine any difference between international and indigenous oil companies in Rivers State using SPSS: Statistical Package for Social Sciences, variant 20. Therefore, the aim of this research is to evaluate and assess oil spill prevention and emergency response strategies currently practiced within oil companies operating in Rivers State.



IV. RESULTS AND DISCUSSION

Means values of responses on causes of oil spill in Rivers State are presented in table one. The grand means of responses from workers of companies A, B, C and D are 3.15, 3.24, 3.367 and 3.41 respectively. This implies a generally moderate agreement in responses irrespective of the company.

Table One: Causes of Oil Spill in Rivers State

	A	B	C	D
Item	$\bar{x}$	$\bar{x}$	$\bar{x}$	$\bar{x}$
To what extent does corrosion of pipelines and storage vessels cause oil spillage in Rivers State?	3.23	3.45	3.91	3.23
To what extent does equipment failure cause oil spillage in Rivers State?	2.93	3.73	2.88	3.64
To what extent does operational/process failure cause oil spillage in Rivers State?	3.72	2.51	3.46	2.98
To what extent does organizational factors/negligence cause oil spillage in Rivers State?	2.45	3.11	3.26	3.29
To what extent does accident cause oil spillage in Rivers State?	4.01	3.23	2.96	3.72
To what extent does natural disaster cause oil spillage in Rivers State?	2.26	3.18	3.38	3.15
To what extent does sabotage cause oil spillage in Rivers State?	3.86	4.23	4.19	3.66
To what extent do unknown factors cause oil spillage in Rivers State?	2.74	2.48	2.89	3.62
Grand mean	3.15	3.24	3.367	3.41

The results in table one collaborated with [6]; who in their research indicated that the various instances of oil spill in Nigeria were ascribed to absence of customary upkeep (poor integrity) of the pipelines and capacity tanks, as a percentage of these facilities have been used for pretty a lengthy period without substitution. [6] further thought that another significant purpose behind oil spill in Nigeria was the issue of oil burglary. The Shell Petroleum Development Company of Nigeria (Shell) asserted as at 1996 that damage represented in excess of 60% of all oil spilled, of its facilities in Nigeria and recently indicated that it has increased to 95% as at 2019 (Shell, 2019). As opposed to Shell report, acquittal global put consumption as a substantial reason for spills in the Niger Delta, as they blamed the oil organizations for contemptibility in detailing the genuine motive for the widespread spills [13]. [3] affirmed that human blunders represent around 30-half of worldwide oil spill, while 20-40% of the spills are credited to gear disappointments and reduction in cycle units.

The table one showed results for effectiveness of oil spill prevention strategies. Mean responses varied from 3.11 – 4.50. Grand mean responses of workers of companies A, B, C and D are 4.09, 4.04, 3.73 and 3.76 respectively. Results showed moderately high responses among respondents.

Table Two: Effectiveness of Oil Spill Prevention Strategies

	A	B	C	D
Item	$\bar{x}$	$\bar{x}$	$\bar{x}$	$\bar{x}$
How would you rate the effectiveness of your trainings as stipulated by regulators?	3.92	4.04	3.76	3.34
How would you rate the effectiveness of your drills as stipulated by regulators?	4.23	4.12	3.99	3.76
How would you rate the effectiveness of your contingency plan revision done annually or as stipulated by regulators?	4.23	4.12	4.06	4.33
How would you rate the articulateness of the prevention strategies of your company in management of oil spill?	4.02	3.99	3.78	3.45
How would you rate the availability and adequacy of trained for prevention purposes?	4.50	4.24	3.65	3.76
How would you rate the availability and adequacy of equipment/tools for prevention purposes?	3.62	3.74	3.11	3.93
Grand mean	4.09	4.04	3.73	3.76

The individual reactions of the labourers of the IOCs and NOCs to the inquiry "how might you rate all partners' commitment towards a powerful crisis reaction?" display that the NOCs don't get enough help when contrasted with the IOCs. Notwithstanding this is the method that the NOCs don't make appropriate and sufficient spending plan/financing as a feature of their alternate course of action for compelling anticipation and crisis reaction, [8] indicated that the oil establishments working in the Niger Delta do not pay attention to generally wellbeing, security and insurance of the environment. Therefore, responses to oil spill were slow. Weak responses to spills, increases the danger of oil infection on the exposed host communities.

III. CONCLUSION

The surveyed oil companies in the Rivers State varied in their oil spill prevention and emergency response strategies, with the IOCs workers exhibiting higher levels of awareness of health, safety and environment impacts and the companies have a better oil spill emergency response strategy than the NOCs. The researchers therefore recommend that regulatory authorities should be strict with enforcement of relevant laws to guarantee that workers in the oil and gas businesses comply with globally acceptable standards; community dialogue, policing and integration of local surveillance and setting up of modular oil refineries in the Niger Delta.

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