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Maritime Tanker Accident on Coastal Areas in Nigeria

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Abstract- This study though limited due to poor attitude on the part of the respondents as regards to releasing some data that would have been helpful, was still able to investigate the effect of maritime tanker accidents on coastal areas in Nigeria, with a case study of Bayelsa and Rivers State. Five hypothesis were designed for this study, the study focused on the affect of oil tanker accidents around the Nigeria coastal environment (Bayelsa and Rivers State). With emphasis on the scope of work essentially, data were collected through the administration of questionnaires to the selected people connected with tanker and environmental industry in Nigeria. The analysis of the collected data was carried out with a descriptive statistical tool like the simple percentage and pie charts which hypothesis specified were tested using chi-squares test statistical tool. Result obtained shows that the major cause of marine tankers accident in Nigeria is as a result of human factor errors and this human error has greatly led to the negative effects, the tanker accidents have posed in the coastal environment (Bayelsa and Rivers State) in Nigeria. The safety practical level of the tanker industry in Nigeria had lowered drastically which for the need for proper training and certification of Nigeria oil tanker operators the level of emergence response is relatively poor as compared to other nations with massive oil maritime transport activities. Finally, the Nigerian government should fully empower and support the maritime agencies in checkmating cases of maritime pollution and environment deprecation and not boycott corners process thereby sacrificing the standards for effective and efficient maritime operations in Nigeria. Recommendation were made towards the elimination of tanker accidents and the enhancement of the Nigerian coastal environment, which needed government to formulate and promulgate laws which have stringent penalties for violators of the Pollution Act. Also national authorities through the local authorities should create awareness by enlightening and sensitizing the public about their responsibility to the environment.

Keywords: accident, crude oil, maritime tanker, coastal water, pollution, safety.

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I. INTRODUCTION

In recent time, looking at accidents without the marine industry clearly indicates an alarming increase. Severe accidents causing extensive loss of lives and pollution have been too frequent during the last decades. Some accidents have had high impact on the society and public at large and had triggered international regulations and conventions as well as national requirements which consequences are not totally foreseeable. In 1956, Shell British Petroleum (now

Royal Dutch Shell) discovered crude oil at Oloibiri, a village in the Niger Delta, and commercial production began in 1958. Today, there are 606 oil fields in the Niger Delta, of which 360 are on-shore and 246 off-shore. (Nigeria Country Analysis Brief, 2005). Nigeria is now the largest oil producer in Africa and the sixth largest in the world, averaging 2.7 million barrels per day (bbl/d) in 2006.

Nigeria's economy is heavily dependent on earnings from the oil sector, which provides 20% of GDP, 95% of foreign exchange earnings, and about 65% of budgetary revenues (CIA World Fact Book, 2005). Nigeria's state-held refineries (Port Harcourt I and II, Warri, and Kaduna) have a combined capacity of 438,750 bbl/d, but problems including sabotage, fire, poor management and lack of regular maintenance contribute to a low current capacity of around 214,000 bbl/d, according to World Markets Research Center. Plans for several small, independently owned refineries are also being developed, with the Nigerian government planning for three new refineries to come on stream by 2008. (Nigeria Country Analysis Brief, 2005).

II. PROBLEM STATEMENT

a) *Oil Spill in Nigeria*

Oil Spill Incidents in Nigeria have occurred in various parts and at different times along our coast. Some major spills in the coastal zone are the GOCON's Escravos spill in 1978 of about 300,000 barrels, SPDC's Forcados Terminal tank failure in 1978 of about 580,000 barrels and Texaco Funiwa-5 blow out in 1980 of about 400,000 barrels. Other oil spill incidents are those of the Abudu pipe line in 1982 of about 18,818 barrels, The Jesse Fire Incident which claimed about a thousand lives and the Idoho Oil Spill of January 1998, of about 40,000 barrels. The most publicized of all oil spills in Nigeria occurred on January 17 1980 when a total of 37.0 million litres of crude oil got spilled into the environment. This spill occurred as a result of a blow out at Funiwa 5 offshore station. Nigeria's largest spill was an offshore well-blow out in January 1980 when an estimated 200,000 barrels of oil (8.4million US gallons) spilled into the Atlantic Ocean from an oil industry facility and that damaged 340 hectares of mangrove (Nwilo and Badejo, 2005).

According to the Department of Petroleum Resources (DPR), between 1976 and 1996 a total of 4647 incidents resulted in the spill of approximately

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2,369,470 barrels of oil into the environment. Of this quantity, an estimated 1,820,410.5 barrels (77%) were lost to the environment. A total of 549,060 barrels of oil representing 23.17% of the total oil spilled into the environment was recovered. The heaviest recorded spill so far occurred in 1979 and 1980 with a net volume of 694,117.13 barrels and 600,511.02 barrels respectively.

Available records for the period of 1976 to 1996 indicate that approximately 6%, 25%, and 69% respectively, of total oil spilled in the Niger Delta area, were in land, swamp and offshore environments. Also, between 1997 and 2001, Nigeria recorded a total number of 2,097 oil spill incidents.

Thousands of barrels of oil have been spilled into the environment through our oil pipelines and tanks in the country. This spillage is as a result of our lack of regular maintenance of the pipelines and storage tanks. Some of these facilities have been in use for decades without replacement. About 40,000 barrels of oil spilled into the environment through the offshore pipeline in Idoho. Sabotage is another major cause of oil spillage in the country. Some of the citizens of this country in collaboration with people from other countries engage in oil bunkering. They damage and destroy oil pipelines in their effort to steal oil from them. SPDC claimed in 1996 that sabotage accounted for more than 60 percent of all oil spilled at its facilities in Nigeria, stating that the percentage has increased over the years both because the number of sabotage incidents has increased and because spills due to corrosion have decreased with programs to replace oil pipelines (SPDC, 1996).

Pirates are stealing Nigeria's crude oil at a phenomenal rate, funneling nearly 300,000 barrels per day from our oil and selling it illegally on the international trade market. Nigeria lost about N7.7 billion in 2002 as a result of vandalisation of pipelines carrying petroleum products. The amount, according to the PPMC, a subsidiary of NNPC, represents the estimated value of the products lost in the process.

Illegal fuel siphoning as a result of the thriving black market for fuel products has increased the number of oil pipeline explosions in recent years. In July 2000, a pipeline explosion outside the city of Warri caused the death of 250 people. An explosion in Lagos in December 2000 killed at least 60 people. The NNPC reported 800 cases of pipeline vandalization from January through October 2000. In January 2001, Nigeria lost about \$4 billion in oil revenues in 2000 due to the activities of vandals on our oil installations. The government estimates that as much as 300,000 bbl/d of Nigerian crude is illegally bunkered (freighted) out of the country.

In Nigeria, fifty percent (50%) of oil spills is due to corrosion, twenty eight percent (28%) to sabotage and twenty one percent (21%) to oil production operations. One percent (1%) of oil spills is due to engineering drills, inability to effectively control oil wells,

failure of machines, and inadequate care in loading and unloading oil vessels.

III. OBJECTIVES OF STUDY

The objectives of this study are: -

- To find out the causes of oil tanker accidents in the Nigerian waters.
- To investigate and examine the impact and implications of such tanker accidents on the environment.
- To identify the efforts being made by the appropriate authorities to drastically reduce or if possible completely put a stop to tanker accidents leading to water pollution in Nigeria.
- To identify the contributory roles of both ship owners and the Ship's Crew to these tanker accidents.
- To assess the level of safety consciousness and preparedness for emergencies among the personnel involved coastal sea operations.

IV. RESEARCH QUESTIONS

Below are the research questions for this research work.

- What are the causes of oil tanker accidents in Nigeria?
- What are the impacts of oil tanker accidents on the Maritime environment?
- What the relevant authorities in the maritime industry contributing to the prevention of oil tanker accidents and their resultant environmental hazards?
- Is the current increase of tanker accidents rate and environmental pollution, a management, human or technical problem?
- What is the current level of emergency preparedness relating to the protection of our environment in Nigeria?

a) Hypothesis

H_{0_1} : That oil tanker accident does have adverse effect around the Nigerian coastal environment.

H_{0_2} : That the level of safety practices in the oil tanker industry in Nigeria had been lowered.

H_{0_3} : That the current level of emergency preparedness in Nigeria is relatively low.

H_{0_4} : That oil tanker accident has adverse effect on other section of the national economy.

H_{0_5} : That poor national economy is a contributory factor to the problem of environment degradation in Nigeria.

b) Review of Related Literature Review

Moffat and Linden (1995) stated that "according to the official estimates of the Nigerian National Petroleum Corporation (NNPC), a total of approximately 23,000m³ of oil is spilled in 300 separate incidents

annually. However, as the oil and tanker companies frequently underestimate quantity of oil spilled and a large number of other spills go unreported, the total volume of oil spilled may be ten times higher than the official figure". This is pointing to the fact that the actual oil being spilled into the Nigerian maritime environment is far more than what an individual tanker man can estimate, showing that the contributory spills from the tankers and oil companies has far more devastating effects on the maritime environment that what is imagined.

Marion (1982), an American author pointed out the fact that "some tankers, old and rusty, are relics of bygone era, others are so futuristic, so thoroughly automated, that their crew members feel more like astronauts than tanker men. And in all likelihood, the future tanker men will need the training and temperament of an astronaut". This simply reveals the importance of maintenance of tanker and the specialized training of tanker men, which is of high necessity in the tanker industry so as to avoid tanker accidents leading to pollution and environmental degradation. It also shows the presence of some old, rusty and fairly used tankers in the developing nations of the world such as Nigeria.

Okokon (2000) calls for the need to establish a National Transportation Commission charge with the responsibility of transport research and policy question. Regulatory and control functions should also be part of the responsibilities of the so called National Transport Commission.

Ajoku (2001) also stated that "ship-owners or tanker owners must accept change and changing environment of shipping. For Nigeria to effectively take advantage of the PSC (Port State Control) certain IMO (International Maritime Organization) convention must be ratified and fully implemented in Nigeria and other West African sub-region. These include MARPOL 73/78 (International Convention for the Prevention of Pollution from ships, 1973, as modified by the protocol of 1978 relating thereto), the ratification of the convention is an important step in the right direction. Nigeria must take immediate step to demonstrate this convention along with ISM (International Safety Management) code and the STCW '95 (Standards of Training, Certification and Watch keeping for sea fares 1978 as amended in 1995)". The purpose of the ratification and implementation of these conventions in Nigeria is to enhance maritime safety and environmental protection.

Uchegbu (1998) also revealed that oceans are ecosystems, quite susceptible to pollution. They are fragile environments, which are able to measure the detrimental effects of our actions. An ocean is made up of the continental shelf and the deep ocean. Incidentally, it is the continental shelf that is most productive in terms of food supply which also receives the greatest pollution load.

c) *Review of Marine Oil Tanker Accidents on the Nigerian Coastal Environment*

The Nigerian coastal environment has suffered untold degradation from the activities of tanker men and tanker operations in Nigeria; worst among these activities is the issue of tanker accidents. The rate of tanker accidents is highly determined by the level of safety practices in the carriage of oil by sea, as it is widely believed in the maritime industry that eighty percent of the accidents occurring in the shipping industry are caused by human error while the remaining twenty percent is attributed to technical or equipment failure (Freudentahl 1992).

i. *Human Error*

Accidents do not just happen; they are usually the results of often many contributing elements of which each one certainly is manageable, in other words, they are caused. Examining table 1 in sub-section 2.3.4 of this chapter, which will show the list of oil tanker accidents that, had occurred in Nigeria, it is obvious that all the stated accidents are caused by human error one way or the other. The tanker accidents caused by human error range from poor maintenance and carelessness, to negligence and sometimes lack of experience in one way or the other both on the part of the operators/seafarers on one side and also on the part of the shore-based management team on the other side. Others include lack of effective safety management system between the ship and the shore and lack of adequate motivation for the seafarers. Looking at the nature of accidents in table 1, it could be clearly pointed out that no tanker accident listed was caused by an Act of God. However, within the scope of human error, the causes of accidents in the carriage of, oil in Nigeria could basically be said to be operational error or management/managerial negligence.

ii. *Equipment/Technical Malfunctions*

Although these equipments are usually operated by human beings, yet, their sudden or unexpected failure/malfunction and their consequential effects in the tanker industry cannot be underestimated. Sometimes, some of the accidents in the tanker industry are caused by technical problems which in some cases do occur without any prior warnings, such equipment failure or technical problem include; the failure of navigational equipment, loss of steering system, loss of propeller, pipe burst, hose burst, loss of propulsion power, blackout and so on. Technical problems such as loss of steering system or propeller, pipe burst, hose burst, loss of propulsion power, blackout and so on. Technical problems such as loss of steering system or

d) *Environmental Degradation in Nigeria*

Pollution has been defined under S.38 of the Federal Environmental Protection Agency Decree (No. 58 of 1988) as man-made or man-aided alteration of the chemical, physical or biological quality of the environment to the extent that is detrimental to that environment or beyond acceptable limits and pollutant shall be constructed accordingly.

The increasing pressure on the natural environment caused by oil exploitation and transportation, exploited population growth, increasing human needs and demand for survival, poverty, unemployment are the chief causes of environmental degradation in the Nigerian coastal environment. However, this paper will not deal with all the causes of environmental degradation but will focus on environmental degradation resulting from accidents/incidents occurring onboard coastal oil tankers.

e) *Oil Companies and the Environment*

Oil is one of the very few fossil fuels formed millions of years ago through the decomposition of remains of plant and animal by the anaerobic process. Other fossil fuels are natural gas and coal. As a result of very long time frame required for their formation, they are otherwise classified as non-renewable resources. And because of their origin or sources of formation, they are known to be made up of complex hydrocarbons. The prospecting, exploration, production, transportation and utilization of these hydrocarbons pose severe threat to the environment.

i. *Oil Spill in Nigeria*

According to the official estimates of the Nigerian National Petroleum Corporation (NNPC), a total of approximately 23,000 cubic meter of oil is spilled in 300 separate incidents annually. However, as the oil and tanker companies frequently underestimate quantity of oil spilled and a large number of other spills go unreported, the total volume of oil spilled may be ten times higher than the official figure. Shell figure indicates that, since 1989, there has been 190 oil spills a year in the Nigerian coastal environment. Oil spills in Nigeria have often given rise to degradation of otherwise fertile agricultural lands as well as pollution of sea, streams, creeks, and other water bodies. This has resulted in the death of valuable plant life, animals, fishes and crabs. Each stage of oil production, starting from its exploration through storage, refining, transportation and consumption has effects and there is hardly any doubt that these effects have been devastating especially on the environment, anywhere oil operations are prevalent. For instance, in an effort to avoid environmental degradation, the entire 5000 strong U'wa tribe in Colombia vowed to commit mass suicide by leaping from a cliff unless Occidental de Colombia, a subsidiary of US Company, Occidental Petroleum, abandons its

plans to drill for oil on their land in the eastern foothills of the Andes Mountains (Timbiri, 2001).

f) *Oil Tanker Accidents in Nigeria*

The recent increase in oil tanker accidents in Nigeria together with their associated environmental implications has called for a course for concern. Even though the most worrisome of them all as of now are the global environmental ones. Each particular problem has a linkage effect with another, which tends to exacerbate the effects of others thus creating waves of anxiety, worry and concern for all lovers of the environment. The problems created by oil tanker accidents are threats to both aquatic and terrestrial life and can lead to their extinction. The major environmental problems caused by oil tanker accidents range from pollution of air, water and land to biological losses and atmospheric contamination, these are as a result of accidents such as fire outbreak, collision, explosion, grounding, flooding, sink age and so on. Oil tanker accidents such as fire outbreak and exposure lead to the release of gases such as SO₂, NO₂, H₂S, NH₃ and CO which produce organic acids resulting in acid rain.

g) *Environmental Impact of Marine Oil Tanker Accidents*

The impact on the environment of oil tanker accidents in Nigeria cannot be overemphasized. The issue of environmental hazards resulting from tanker accidents in mostly and popularly traced to pollution problems caused by accidents such as explosion fire outbreak, collision grounding, sinking, flooding and so on which subsequently lead to economic losses. The pollution phenomenon occurs whenever potentially harmful substances are released into the environment during these accidents, it is usually classed according to the receiving agents of air as emission (e.g. during oil spillage, collision and grounding). And land as dumps (e.g. undissolved spilled oil and permanent grounding). Apart from pollution, wrecked tankers and permanently grounded ones constitute nuisance and obstructions to navigable waters, anchorages, fishing grounds and beaches.

h) *Implications of Oil Tanker Accidents and their Environmental Impact on the National Economy*

Having examined the various accidents that had occurred in the tanker industry together with their associated negative impact on the Nigerian coastal environment, the following are the implications of these tanker accidents and their environmental impact on the national economy.

- i. Pollution from oil spillages spoil beaches and recreation areas, which in turn affect the tourism industry and thereby depriving of the revenue earned.

- ii. Pollution from effluent and other discharges released during these accidents destroys and limits the growth of marine life, which in turn affects the marine agricultural industry such as the fishing industry.
- iii. It creates bad image, default status and reputation for Nigeria in the international community as relating to the maritime, tourism and environmental sectors of the national economy.
- iv. It is a potential source of acid rain thereby inducing accelerated corrosion and/or degradation of materials (e.g. roofing materials, clothing, motor vehicle and other metallic structures) around the Nigerian coastal environment thereby resulting in wastage and the erosion of personal income of the Nigerian population and subsequent effect on the national economy.
- v. The pollution caused during these tanker accidents impairs vegetation, crop and soil leading to decreased leaf chlorophyll content, decreased internodes length in some plants and suppressed flowering in others, high percentage loss in crop yield has been observed and in some cases, direct mortality has been reported, this has a great adverse effect on the agricultural industry and subsequently the national economy.
- vi. It causes damages to life and property from accidents such as explosion, fire outbreak, flooding and sinking thereby leading to the depletion of the national human and economic resources.
- vii. It ruins wildlife-nesting areas along the Nigerian coast, which eventually adversely affects the agricultural sub-sector of the national economy.
- viii. It leads to the destruction of nature and the eroding of man's food and economic base.
- ix. It contaminates drinking water, which affects the society at large and subsequently the national economy.
- x. It leads to the erosion of national funds due to the excessive cost of cleaning up branches for tourism purposes and high cost of treating water so as to make it potable for the society.
- xi. It leads to the disruption of ecological balance, which is the primary basis for economic, agricultural, technological and scientific researches, thereby having a consequential effect on the national economy as a whole.
- xii. It releases noxious vapour into the atmosphere thereby endangering man's health and other life forms, this adversely affect the productivity of the labour force in which environment and a consequential effect on the national economy.
- xiii. All the above stated negative impacts lead to general loss of revenue to individuals and the community, and the erosion of the national

economy, which has a resultant effect on the socio-economic life of every Nigerian.

j) Causes of Maritime Tanker Accidents in Nigerian Coastal Bodies

i. Causes of Oil Spillage

In Nigeria, fifty percent (50%) of oil spills is due to corrosion, twenty eight percent (28%) to sabotage and twenty one percent (21%) to oil production operations. One percent (1%) of oil spills is due to engineering drills, inability to effectively control oil wells, failure of machines, and in adequate care in loading and unloading oil vessels. Thousands of barrel so foil have been let loose in to the environment through our oil pipelines and tanks in the country. This loss is as a result of our lack of regular maintenance of the pipelines and storage tanks. Most pipelines from the flow stations are obsolete. By international standards, oil pipes ought to be replaced after 15 to 20 years, but most pipe lines in use are 20 to 25 years old, making them subject to corrosion and leakage. Some of these pipes are laid above ground level without adequate surveillance, exposing them to wear and tear and other dangers (Oyem, 2001). About 4000 barrels of oil spilled into the environment through the offshore pipeline in Idoho. Sabotage is another major cause of oil spill age in the country. Some of the citizens of this country in collaboration with people from other countries engage in oil bunkering. They damage and destroy oil pipelines in their effort to steal oil from them. Pirates are stealing Nigeria's crude oil at a phenomenal rate, funneling nearly 300,000 barrels per day from our oil and selling it illegally on the international trade market.

Illegal fuel siphoning as a result of the thriving black market for fuel products has increased the number of oil pipeline explosions in recent years. In July 2000, a pipeline explosion outside the city of Warri caused the death of 250 people. An explosion in Lagos in December 2000 killed at least 60 people. The NNPC reported 800 cases of pipe line vandalization from January through October 2000. In January 2001, The Nigeria lost about \$4billion in oil revenues in 2000 due to the activities of vandals on our oil installations.

Nigeria lost about N7.7billion in 2002 as a result of vandalisation of pipelines carrying petroleum products. The amount, according to the PPMC, a subsidiary of NNPC, represents the estimated value of the products lost in the process. The Nigerian government and oil companies say up to 15 percent of the country's two million barrels per day oil production is taken illegally taken from pipelines in the NigerDelta and smuggled abroad.

j) Review of Oil Spill Incidents in Nigerian

Oil spill incidents have occurred in various parts and at different times along our coast. According to the Department of Petroleum Resources (DPR), between 1976 and 1996 a total of 4647 incidents resulted in the

spill of approximately 2,369,470 barrels of oil into the environment. Of this quantity, an estimated 1,820,410.5 barrels (77%) were lost to the environment. Available records for the period 1976 to 1996 indicated that approximately 6%, 25%, and 69% respectively, of total oil spilled in the Niger Delta area, were inland, swamp and offshore environments. Some major spills in the coastal zone are the GOCON's Escravos spill in 1978 of about 300,000 barrels, SPDC's Forcados Terminal tank failure in 1978 of about 580,000 barrels and Texaco Funiwa-5 blow out in 1980 of about 400,000 barrels. Other oil spill incidents are those of the Abudu pipeline in 1982 of about 18,818 barrels, The Jesse Fire Incident which claimed about a thousand lives and the Idoho Oil Spill of January 1998, of about 40,000 barrels. The most publicized of all oil spills in Nigeria occurred on January 17 1980 when a total of 37.0 million litres of crude oil got spilled into the environment. This spill occurred as a result of a blowout at Funiwa 5 offshore station. The heaviest recorded spill so far occurred in 1979 and 1980 with a net volume of 694,117.13 barrels and 600,511.02 barrels respectively.

k) Impacts of Oil Spillage on the Environment

Little is known about the effects of petroleum pollution on shore line communities (Garrity and Levings, 1990; Mc Guinness 1990; Burn set al, 1993; Gesamp, 1993) Major oil spills heavily contaminate marine shore lines, causing severe localised ecological damage to the near-shore community.

Ever since the discovery of oil in Nigeria in the 1950s, the country has been suffering the negative environmental consequences of oil development. The growth of the country's oil industry, combined with a population explosion and a lack of environmental regulations, led to substantial damage to Nigeria's environment, especially in the Niger Delta region, the center of the country's oil industry.

Oil spills pose a major threat to the environment in Nigeria. If not checked or effectively managed, they could lead to total annihilation of the ecosystem,

especially in the Niger Delta where oil spills have become prevalent. Life in this region is increasingly becoming unbearable due to the ugly effects of oil spills, and many communities continue to groan under the degrading impact of spills (Oyem, 2001).

In the Nigerian Coastal environment large areas of the mangrove ecosystem have been destroyed. The mangrove was once a source of both fuel woods for the indigenous people and a habitat for the area's biodiversity, but is now unable to survive the oil toxicity of its habitat. The oil spills also had an adverse effect on marine life, which has become contaminated; in turn having negative consequences for human health from consuming contaminated sea food. Oil spill has also destroyed farmlands, polluted ground and drinkable water and caused draw backs in fishing off the coastal waters.

Oil spills in the Niger Delta have been a regular occurrence, and the resultant environmental degradation of the surrounding environment has caused significant tension between the people living in the region and the multinational oil companies operating there. It is only in the past decade that environmental groups, the Nigerian federal government, and the foreign oil companies that extract oil in the Niger Delta have begun to take steps to mitigate the damage. Although the situation is improving with more stringent environmental regulations for the oil industry, marine pollution is still a serious problem.

V. RESEARCH METODOLOGY

A sample survey research method was applied to this work. The method is appropriate for the examination of the topic because the sample survey research studies a very small population due to nature of the trade by selecting by selecting and studying samples chosen from the population to discover the relative incidence on the sociological, economical, psychological variables

Table 1 : Analysis of response to Questions

VARIABLES	SAMPLE SIZE	ACTUAL RESPONSE	PERCENTAGE
Does oil tanker accidents do have an adverse effect on the Nigerian coastal environment.	90		
Yes		71	79%
No		19	21%
That the level of safety practices in the tanker industry in Nigeria had been lowered.	90		
Yes		80	89%
No		10	11%
That the current level of emergency preparedness in Nigeria is relatively low.	90		
Yes		78	87%
No		12	13%

That oil tanker accident has adverse effect on other sectors of the national economy Yes No	90	82 8	91% 9%
That poor national economy is a contributory factor to the problem of environmental degradation in Nigeria. Yes No	90	77 13	86 14
What is the major cause of tanker accidents Human error Mechanical error	90	88 2	91 9

Source: field study response.

Test of Hypothesis using the Chi Square Statistics

Hypothesis 1

NULL HYPOTHESIS (H ₀)	ALTERNATIVE HYPOTHESIS (H ₁)
That oil tanker accidents do have adverse effect on the Nigerian coastal environment	That oil tanker accident does not have adverse effect on the Nigerian coastal environment.

$$\text{Using Chi-Square, } (X^2) = \left\{ \frac{(F_o - F_e)^2}{F_e} \right\}$$

Where: F_o = observed frequency

F_e = expected frequency

{ = Summary

F _o	F _e	F _o -F _e	(F _o -F _e) ²	$\frac{(F_o - F_e)^2}{F_e}$
4	4.733	-0.733	0.537	0.113
2	1.267	0.733	0.537	0.424
9	9.467	-0.467	0.218	0.023
3	2.533	0.467	0.218	0.086
25	23.667	-1.333	1.777	0.075
5	6.333	-1.333	1.777	0.281
33	33.133	1.333	0.018	0.001
9	8.867	0.133	0.018	0.002
				1.005

Source: Chi square table

Computed value of X²

Degree of freedom = (R-1) (c - 1)

= (4-1) (2-1)

= (3) (1) = 3

Degree of Freedom = 3

The table of value X² at 0.05 with 3 degree of freedom is 7.815

Interpretation: Since the computed value of X² which is 1.005 is less than the table value of X² at 0.05 which is 7.815, the hypothesis is within the acceptance region. Therefore, the hypothesis is accepted by the respondents.

Hypothesis 2

NULL HYPOTHESIS (H ₀)	ALTERNATIVE HYPOTHESIS (H ₁)
That the level of safety practices in the tanker industry in Nigeria has been lowered	That the level of safety practices in the tanker industry in Nigeria had not been lowered.

Fo	Fe	Fo-Fe	(Fo-Fe) ²	$\frac{(Fo-Fe)^2}{Fe}$
5	5.333	-0.333	0.111	0.021
1	0.666	0.333	0.111	0.166
9	10.667	-1.666	2.779	0.261
3	1.333	1.667	2.779	2.085
28	26.667	1.333	1.777	0.067
2	3.333	-1.333	1.777	0.533
38	37.333	0.667	0.445	0.012
4	4.667	-0.667	0.445	0.095
				3.24

Calculated value of $\chi^2 = \frac{(Fo-Fe)^2}{Fe} = 3.24$

Degree of freedom = 3

The table value of χ^2 at 0.05 with 3 degree of freedom is 7.815

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Interpretation: Since the computed value of χ^2 (3.24) is less than the table of value of χ^2 (7.815), the hypothesis is therefore accepted by the respondents.

Hypothesis 3

NULL HYPOTHESIS (H ₀)	ALTERNATIVE HYPOTHESIS (H ₁)
That the level of safety practices in the tanker industry in Nigeria has been lowered	That the level of safety practices in the tanker industry in Nigeria had not been lowered.

Fo	Fe	Fo-Fe	(Fo-Fe) ²	$\frac{(Fo-Fe)^2}{Fe}$
5	5.2	-0.2	0.04	0.008
1	0.8	0.2	0.04	0.05
10	10.4	0.4	0.16	0.015
2	1.6	0.4	0.16	0.1
27	26	1	1	0.038
3	4	-1	1	0.25
36	36.4	-0.4	0.16	0.004
6	5.6	0.4	0.16	0.029
				0.494

Calculated value of $\chi^2 = 0.494$

Degree of freedom = 3

The table value of χ^2 at 0.05 with 3 degree of freedom is 7.815

Interpretation: The hypothesis is accepted by the respondents because the calculated value of χ^2 which is 0.494 is less than the table value of χ^2 which is 7.815.

Hypothesis 4

NULL HYPOTHESIS (H ₀)		ALTERNATIVE HYPOTHESIS (H ₁)		
That oil tanker accident has adverse effect on other sectors of the national economy.		That oil tanker accident does not have adverse effect on other sectors of the national economy.		
Fo	Fe	Fo-Fe	(Fo-Fe) ²	$\frac{(Fo-Fe)^2}{Fe}$
6	5.467	0.533	0.284	0.052
0	0.533	-0.533	0.284	0.533
11	10.933	0.067	0.004	0.0004
1	1.067	-0.067	0.004	0.0004
26	27.333	-1.333	1.777	0.065
4	2.667	1.333	1.777	0.666
39	38.267	0.733	0.537	0.014
3	3.733	-0.733	0.537	0.143
				1.4774

Calculated value of $X^2 = 0.48$

Degree of freedom = 3

The table value of X^2 at 0.05 with 3 degree of freedom is 7.815

Interpretation: Since the computed value of X^2 (0.48) is less than the table value of X^2 (7.815), the hypothesis is therefore accepted by the respondents.

Hypothesis 5

NULL HYPOTHESIS (H_0)	ALTERNATIVE HYPOTHESIS (H_1)
That poor national economy is a contributory factor to the problem of environmental degradation in Nigeria.	That poor national economy is not a contributory factor to the problem of environmental degradation in Nigeria.

Fo	Fe	Fo-Fe	(Fo-Fe) ²	$\frac{(Fo-Fe)^2}{Fe}$
4	5.133	-1.133	1.284	0.250
2	0.867	1.133	1.284	1.481
9	10.267	-1.267	1.605	0.156
3	1.733	1.267	1.605	0.926
27	25.667	1.333	1.777	0.069
3	4.333	-1.333	1.777	0.410
37	35.933	1.067	1.138	0.032
5	6.067	-1.067	1.138	0.188
				3.512

Calculated value of $X^2 = 3.51$

Degree of freedom = 3

The table value of X^2 at 0.05 with 3 degree of freedom is 7.815

Interpretation: The hypothesis is accepted by the respondents because the calculated value of X^2 which is 3.51 is less than the table value of X^2 which is 7.815.

VI. DISCUSSION OF FINDINGS

Below are the findings from the study carried out during the course of the study.

It was discovered that the major cause of marine tankers accidents in Nigeria is as a result of human factor errors and this human error has greatly led to the negative effects, the tanker accidents have posed in the coastal environment in Nigeria. Water bodies have suffered a great deal of infection that has triggered the death of aquatic organisms, widespread of diseases and reduced food cultivation. The safety practice level of the tanker industry in Nigeria had been lowered drastically which for the need for proper training and certification of Nigeria oil tanker operators. The level of Emergence response is relatively poor as compared to other nations with massive oil maritime transport activities. Tanker operators and the managers have a very important role to play in the safety of their tankers and the protection of the marine environment. Finally, the Nigerian government should fully empower and support the maritime agencies in checkmating cases of maritime pollution and environmental degradation and not boycott corners process thereby sacrificing the standards for effective and efficient maritime operations in Nigeria.

VII. CONCLUSION

Marine oil tanker accidents in Nigeria had over the years contributed immensely to the degradation of

the Nigerian coastal environment, hence, the need to examine and investigate into the causes of these tanker accidents together with the practices and problems associated with them in Nigeria. The chapter one of this research work had so far given a general overview into the introduction to this research project, this includes the focus of the study, purpose of study, research questions, area of study and the significance of study, particular emphasis was laid on subjects such as the review of the impact of marine oil tanker accidents on the Nigerian coastal environment, environmental degradation in Nigeria, oil companies and the environment, oil spill in Nigeria, tanker accidents in Nigeria and their implications on the national economy, the assessment of the current level of pollution control in the Nigerian coastal environment and the need for improvement on the level of environmental protection in Nigeria. Chapter three consists basically of the methodology utilized in this research work, which includes the systems and techniques engaged in the collection of data used for the research project. Chapter four deals with the presentation of collected data and the statistical analysis of variables, data were also subjected to hypothetical testing of which the valid results and their interpretations were expressly stated and chapter five presents the summary, findings, recommendations and conclusion of the study.

VIII. RECOMMENDATIONS

In view of the many problems, findings and conclusion drawn in this research work, the following recommendation are made towards the elimination of tanker accidents and the enhancement of the protection of the Nigerian coastal environment.

- The Federal Government should fully establish a body such as the coastal guard changed with the responsibility of enforcing already existing laws and regulations that has to do with the protection of the Nigeria coastal environment. Such laws include the petroleum regulation of 1969, oil in Nigeria waters act of 1968, criminal code of Nigeria , Federal environment protection decree no 58.
- There is also for the government to formulate and promulgate laws which have more stringent penalties for violators of the pollution act. If the tanker operator and managers become aware of stringent consequences, it will make them to be more safety conscious during the normal cause of their operation which will in turn enhance the protection of the environment.
- Knowing that it take time , money and energy to combat the menace of pollution the federal government and the local authorities need to put all resources together to ensure adequacy in the protection of our environment .
- The Nigeria government should also establish a central coordinating unit saddled with the responsibility of pollution and environmental protection in a unified manner so no one aspect of the environment will be left without control or protection.
- The National Authorities through the local authorities should create awareness by enlightening and sensitizing the public about their responsibility to the environment.
- The federal Ministry of Transport should establish an efficient Port State Control (PSC) which will see to the issue of safety on board ships particularly Nigerian Tankers in all the Nigeria ports.
- NIMASA in conjunction with the ship owners association of Nigeria should ensure that seminars, retraining and workshops are organized for both ship owners and the shore based management team to facilitate success in creating awareness about the vital role they can play in the general safety of their tankers and the protection of marine environment.

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