

Evaluation of Health, Safety and Environment Impacts Associated With Petroleum Trucks Incidents in Selected Oil and Gas Firms in Nigeria

Peters WerinipreWisdom¹, Joel F. Ogbonna² and Ejikeme Ugwoha³

Centre for Occupational Health, Safety and Environment, University of Port Harcourt, Rivers State, Nigeria

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ABSTRACT: The study looked at the HSE consequences associated with petroleum truck events in Nigeria, which was motivated by a rash of accidents and disasters in the downstream petroleum sector. Primary data was collected through standardized questionnaires and disseminated across five sample states: Lagos, Port Harcourt, Abia, Kaduna, and Abuja. The study's sample is 203 respondents from six of the world's most prestigious oil firms. The nature of the hypothesis offered by the study was evaluated using descriptive statistics and regression analysis. As per the study's finding., Nigerian oil and gas companies are distinguished by a high level of proactive safety measures implemented by stakeholders to prevent accidents during transportation operations. Vehicle incidents in Nigerian oil and gas companies are substantially higher than expected. Nigerian oil and gas companies have a high degree of HSE compliance among petroleum truck drivers. Overall, open and HSE compliance impact are found to be negatively connected with truck incidences, as evidenced by the negative and significant association. As a result of these issues, the study finds that HSE has a significant impact on petroleum tanker disasters. As a result, Nigerian oil companies should ensure and strengthen proactive safety measures taken by stakeholders to decrease accidents during transportation operations by enhancing the technical skills and knowledge base of their staff officers. This can be done by ensuring that employees receive continual training and retraining in their fields of competence.

KEYWORDS: Truck incidence, Oil and Gas Companies, Safety, and Safety Compliance

I. INTRODUCTION

A reliable transportation system is central facet of the manufacturing and distribution process, as well as supply chain logistics. The primary responsibility of transportation in the field of logistics is to securely carry freight to its destination[7]. The transportation industry contributes significantly to the economic growth of several countries (Redding and Turner, 2014). Nigeria's economy is almost entirely reliant on petroleum. Petroleum hauling is a very profitable transportation activity in Nigeria, with around 80% of petroleum hauling taking place on roadways [9]; [10]; [3]; [8]. Over 5,000 semi-trailer tankers are estimated to be active in wet cargo haulage, with about 150 million liters of fuel delivered daily to various fuel stations crosswise the nation, and 2,500 semi-trailer vehicles hauling dry commodities travel Nigerian roads daily. [10]; [8]. In Nigeria, however, here take many daily cases of semi-trailer failures or hazardous accidents while transporting petroleum products and other goods, resulting in freight destruction or spillage, fire hazards and other environmental hazards, road blockages, and multiple accidents with loss of lives and property. The widely held of persons killed in car accidents are those who are not inside the automobiles [8]. The term "transport safety" helps to lessen the menace of incidents and the reduction of accident-related damage. According to a 2011 FRSC report, the FRSC documented 4,017 road traffic collisions (RTC) connecting vehicles and tankers on Nigerian roads between 2007 and June 2010. There were 1,148 instances every year in the middle of the month, and 96 collisions per month

on average. In 2007, 607 crashes were reported, according to the study. In 2008, this number climbed by 102.47 percent to 1,229 people. The sum of bangs fell by 1.3 percent in 2009, after 1,229 to 1,213. As of June 2010, there had been 968 crashes for the year. This means that the figure for vehicle collisions was on the rise. With average monthly accidents examined of 51 in 2007, 102 in 2008, 101 in 2009, 161 in June 2010, the data confirmed the increasing trend of crashes. The report's daily average crashes supported the escalating growth in the number of crashes of 1.66 in 2007, 3.37 in 2008, 3.32 in 2009, and 5.31 in 2010, which occurred on Nigerian roads [8]. Hence, the researcher therefore evaluated HSE impacts associated with petroleum trucks incidents in Nigeria.

II. LITERATURE REVIEW

Petroleum means “rock oil”, and this word is derived from a Latin word “petra” and Greek word “oleum”. This is a liquid mixture of hydrocarbons which is present in suitable rock strata and can be extracted and refined to produce fuels including petrol, paraffin, and diesel oil. The industry has both the upstream and the downstream operations. The extraction, transportation, and storage of crude oil are all part of the upstream process, whereas crude oil refining is part of the downstream process [14].

A HSE policy is a distinct statement of intent, or a definite course or technique of action selected from among alternatives besides this, it is a condition, to guide and determine present and future decisions is also mentioned to as the Bonafede position taken by an organization in comparative to issues and problems. Also, it refers to the face of direction of a company management decides to follow which is mandatory to be well documented and given wide circulation and publicity within its facilities [15].

Petroleum truck is a motor vehicle designed to carry liquid or gases on roads. Tank trucks tend to be large; they may be insulated or non-insulated; pressurized or non-pressurized; and designed for single or multiple loads (often by means of internal divisions in their tank). Petroleum products are distributed by Petroleum trucks from the refineries/tank terminal to retail outlets (Petrol stations) and industrial outlets [5].

Petroleum truck incident in Nigeria: In developing nations, particularly Nigeria, accidents involving the transport of oil products by road have

been linked to a high relative abundance and severe safety effects. This is particularly problematic in Nigeria, where cities and villages are frequently located near major roads that serve as essential transportation corridors, increasing the risk of accidents [6].

Causes of road accidents: According to [12], road fatalities appear to be common in certain flash points, such as sharp curves, deep holes, and poor road conditions. At such times, over speeding drivers may struggle to keep control of their vehicles, resulting in fatal road accidents, especially during night operations. On the other hand, the causes of road accidents have been classified into three groups [13] as: the behavior, the environment, and the road and the automobile.

Related literature and gaps: Several academics have begun research into mishaps involving petroleum trucks. [1] conducted research in southwest Nigeria with the goal of determining the hazards associated with petroleum product distribution and effective risk management. Personnel conformity with HSE requirements, which can potentially be used to control the risk in the transportation of petroleum products, was not included in this study. [4] conducted a thorough investigation into oil tanker truck accidents (2018). The study's scope was limited to determining the causes and health consequences of petroleum tanker accidents, and it did not investigate proactive ways to avoiding petroleum truck hauling accidents. [11] conducted a study on leveraging collision and traffic violation data to forecast truck at-fault crashes. Active safety systems like navigation systems, front lane departure warning and braking, traffic sign recognition, and night vision were not considered in this study. Few studies, however, have identified the characteristics that are specific to single and multiple petroleum truck wrecks in some Nigerian states, and none have undertaken a comparison analysis or assessed the HSE impact associated with petroleum truck occurrences in various Nigerian states.

III. METHODOLOGY

Research methodology: The research methodology deployed for this study was a descriptive research approach, which will aided in the presentation and interpretation of data collected on many aspects of HSE effects on petroleum truck occurrences in Nigeria.

Population and sample size of the study: A total of 203 responses were successfully retrieved and analyzed from a sample size of 225 respondents which were determined from the research population by the famous Taro Yamane sample size technique, and it was drawn from fleet

managers, safety, health, and environment (HSE) managers, as well as fueling and truck drivers from six major fuel oil companies (and their various representations in Lagos, Port Harcourt, Abia, Kaduna, and Abuja).

Table 1: Sample response distribution

S/N	Location	Sample Size
1	Lagos	41
2	Port Harcourt	37
3	Abia	43
4	Kaduna	38
5	Abuja	29
Total		37

Research instrumentation: A questionnaire was prepared, presented, and used with closed ended questions (multiple - choice questions and Likert scale type). The items in the questionnaire were assessed using continuous five-scale ratings spanning from strongly disagree to strongly agree. This assists the researcher in getting quantifiable data from the company's drivers and employees.

Data analysis technique: Descriptive statistical techniques like tables, figures, and percentages. The researcher utilized SPSS version 20 software to analyze, evaluate, and tabulate the data, resulting in a frequency table with percentages to examine the replies of drivers and firm employees on various aspects.

IV. RESULTS AND DISCUSSIONS

Results

Table 2: There is periodic training of staff put in place to instill HSE behavior in workers

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	6	3.0	3.0	3.0
	Disagree	3	1.5	1.5	4.4
	Neutral	9	4.4	4.4	8.9
	Agree	90	44.3	44.3	53.2
	Strongly Agree	95	46.8	46.8	100.0
	Total	203	100.0	100.0	

Table 3: Alcohol tests are always done by traffic police or by the fueling companies to protect road accidents

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	39	19.2	19.2	19.2
	Disagree	38	18.7	18.7	37.9
	Neutral	7	3.4	3.4	41.4
	Agree	54	26.6	26.6	68.0
	Strongly Agree	65	32.0	32.0	100.0
	Total	203	100.0	100.0	

Table 4: Petrol trucks are serviced and maintained regularly

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	3	1.5	1.5	1.5
	Disagree	9	4.4	4.4	5.9
	Neutral	16	7.9	7.9	13.8
	Agree	88	43.3	43.3	57.1
	Strongly Agree	87	42.9	42.9	100.0

Total 203 100.0 100.0

Table5: Defensive driving training provided by the company is sufficient

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	34	16.7	16.7	16.7
	Disagree	41	20.2	20.2	36.9
	Neutral	4	2.0	2.0	38.9
	Agree	62	30.5	30.5	69.5
	Strongly Agree	62	30.5	30.5	100.0
	Total	203	100.0	100.0	

Table6: Is HSE policy enforced by the management on each staff of the company?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	9	4.4	4.4	4.4
	Disagree	12	5.9	5.9	10.3
	Neutral	4	2.0	2.0	12.3
	Agree	73	36.0	36.0	48.3
	Strongly Agree	105	51.7	51.7	100.0
	Total	203	100.0	100.0	

Table7: Does the company carry out toolbox meetings before the start of operations daily?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	66	32.5	32.5	32.5
	Disagree	45	22.2	22.2	54.7
	Neutral	6	3.0	3.0	57.6
	Agree	39	19.2	19.2	76.8
	Strongly Agree	47	23.2	23.2	100.0
	Total	203	100.0	100.0	

Table8: How often are incidents recorded yearly in the companies?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Once Yearly	3	1.5	1.5	1.5
	Twice Yearly	13	6.4	6.4	7.9
	Thrice Yearly	30	14.8	14.8	22.7
	More Than Thrice Yearly	156	76.8	76.8	99.5
	Nil	1	.5	.5	100.0
	Total	203	100.0	100.0	

Table9: How often is speed limit violated by truck drivers

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Drivers violate speed limit regularly	177	87.2	87.2	87.2
	Drivers seldom violate speed limits	24	11.8	11.8	99.0
	Drivers do not violate speed limits	2	1.0	1.0	100.0
	Total	203	100.0	100.0	

Table10: Do you use a safety belt while you drive?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	157	77.3	77.3	77.3
	No	46	22.7	22.7	100.0
	Total	203	100.0	100.0	

Table11: Do you use hard drugs?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	13	6.4	6.4	6.4
	No	190	93.6	93.6	100.0
	Total	203	100.0	100.0	

Table12: Do you smoke before or while driving?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	21	10.3	10.3	10.3
	No	182	89.7	89.7	100.0
	Total	203	100.0	100.0	

Table13: Do you violate the speed limit when there is free flow of traffic to avoid incurring demurrage for your company?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	44	21.7	21.7	21.7
	Disagree	45	22.2	22.2	43.8
	Neutral	6	3.0	3.0	46.8
	Agree	53	26.1	26.1	72.9
	Strongly Agree	55	27.1	27.1	100.0
	Total	203	100.0	100.0	

Table14: Do you use your cell phone while driving?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	73	36.0	36.0	36.0
	Disagree	64	31.5	31.5	67.5
	Neutral	4	2.0	2.0	69.5
	Agree	31	15.3	15.3	84.7
	Strongly Agree	31	15.3	15.3	100.0
	Total	203	100.0	100.0	

Discussion of findings

The study observed that;

- i. Proactive measures adopted by stakeholders have a negative and considerable impact on the number of occurrences reported annually. This indicates that the more these measures are followed, the fewer truck accidents are reported by oil and gas companies. HSE compliance by petroleum truck drivers, on the other hand, accounted for a large portion of the variation in truck incidents.
- ii. There is a negative and significant effect of truck driver HSE compliance on yearly incidents. This indicates that the more these measures are followed, the fewer truck accidents are reported by oil and gas companies. HSE compliance by petroleum truck drivers, on the other hand, accounted for a large portion of the variation in truck incidents.

V. SUMMARY, CONCLUSION AND RECOMMENDATIONS

Summary of findings

The research findings are summarized as follows:

- a. The oil and gas firms in Nigeria is categorized by commendable level of proactive safety measures taken by stakeholders to mitigate accidents during the transport operations.
- b. The oil and gas firms in Nigeria have significantly high level of vehicle incidents than expected.
- c. The oil and gas firms in Nigeria have commendable level of HSE compliance by petroleum truck drivers.
- d. Overall, Stakeholders involvements and HSE compliance impact are observed to be adversely related to the truck incidents as observed by the negative and significant relationship.

Conclusions

The study investigated the relationship between HSE compliance impact and petroleum truck incidents in selected courier service customers in Nigeria. The quantitative analysis of the data gave results that provided answers for the research. The study draws its major decisions grounded on the awareness of study units (customers) in the linear relationship among HSE compliance impact and petroleum truck incidents and the perception of study units on the specific objectives of the study.

Recommendations

The following suggestions are provided considering the study's implications:

- i. The oil firms in Nigeria should ensure and improve proactive safety measures taken by stakeholders to mitigate accidents during the transport operations by advancing the practical services and knowledge base of their personnel officers. This can be achieved through constant training and retraining programs for personnel staffs in their areas of specialties. Knowledge sharing among workers can also improve proactive safety measures taken by stakeholders to mitigate accidents during the transportation processes in the organization and can be attained through team building.
- ii. Organizations should be thorough during customer engagement. Only competent potential customers, by way of their qualifications and experience, should be hired.

Contributions to Knowledge

The study has helped in identifying the discrete nature of relationship between HSE compliance impact and petroleum truck incidents in selected oil and gas firms in Nigeria and has facilitated in uncovering the adverse relationship between HSE compliance impact and petroleum truck incidents in selected oil and gas firms in Nigeria.

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