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Research Paper

Assessment of Maritime Safety Standard Compliance among Vessels/Ships Operating in Niger Delta, Nigeria

Wokoma, N. O.
Ignatius Ajuru University of Education, Rivers State, Nigeria
Corresponding Author: Wokoma, N. O.

Abstract
This study assessed maritime safety standard compliance among vessels and ships operating within the Niger Delta, Nigeria. A cross-sectional survey design was used, and 350 questionnaires were administered across selected ports and jetties in Rivers and Delta States. A total of 333 questionnaires were retrieved, representing a 95% response rate. Respondents were mainly male (61.6%), within ages 30–40 years (39.0%), and largely experienced, with 46.2% having 5–10 years of maritime operational experience. Findings showed that organizational priorities were largely focused on preventing damage to ships and equipment (24.3%), minimizing operational costs (21.3%), and ensuring crew safety (17.4%). Overall compliance with IMO operational standards was rated moderate (37.5%), while organizational safety culture was perceived as high (37.8%). Operational safety performance was predominantly moderate (35.7%), although 25.8% rated it very high. The study concludes that despite relatively positive safety culture perceptions, compliance gaps persist, especially in operational execution. Strengthening safety policies, enhancing crew training, and enforcing mandatory IMO-aligned protocols are recommended to improve maritime safety performance in the Niger Delta.

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I. Introduction

Safety at sea is definitely the first thing seafarer must bear in mind before starting his navigation. It is a known fact that sea can be disarmingly attractive in one moment and already in other it can change its deceptive nature and turn into the biggest nightmare ever experienced. Anyone who spent some times at sea has probably felt it on his own skin. Safety is therefore crucial, and the knowledge, experience, skills and safety equipment mandatory part of every sea voyage. Safety first is the slogan that adorns the deck of majority of merchant ships around the world. With this slogan in mind, the mission of each maritime university, academy and training centre is to permanently promote safety at sea (Formela et al., 2019).

Over the years the maritime transportation in Nigeria has been experiencing increased traffic. The Nigeria Ports Authority (NPA) said that it recorded about 41.32 million metric tonnes of cargo throughput for the first half of 2014, indicating an increase of 15.4% when compared to 35.81 million metric tonnes recorded same period in 2013 (Lloyd *et al*., 2020). Liquefied natural gas (LNG) shipment stood at 10.42 million metric tonnes representing a growth of 23 per cent over 8.46 million metric tonnes recorded in the first half of 2013 while 5.98 million metric tonnes of general cargo were handled at the port, indicating an increase of 1.3 per cent over 5.90 million metric tonnes recorded in the corresponding period of 2013 (Lloyd *et al*., 2020).

Nigeria is endowed with a vast coastline and navigable inland water ways. About 80% of the shipping business done in the coast of West Africa is done in Nigeria (Peretomode, 2014) It is reported that between 2009-2012, ship calls to Nigeria and its tonnage grew from 82 million to 150 million with an estimated payment increase from USD 4.1 billion to above USD 7.5 billion, sadly Nigerian participation was zero. Also, the reported export of Nigeria's crude oil was about 900 million barrels per annum, but it is the foreign vessels that earned the freight cost of about USD 2.25 billion from carrying the country's crude with no national freight benefit (Lloyd *et al*., 2020).

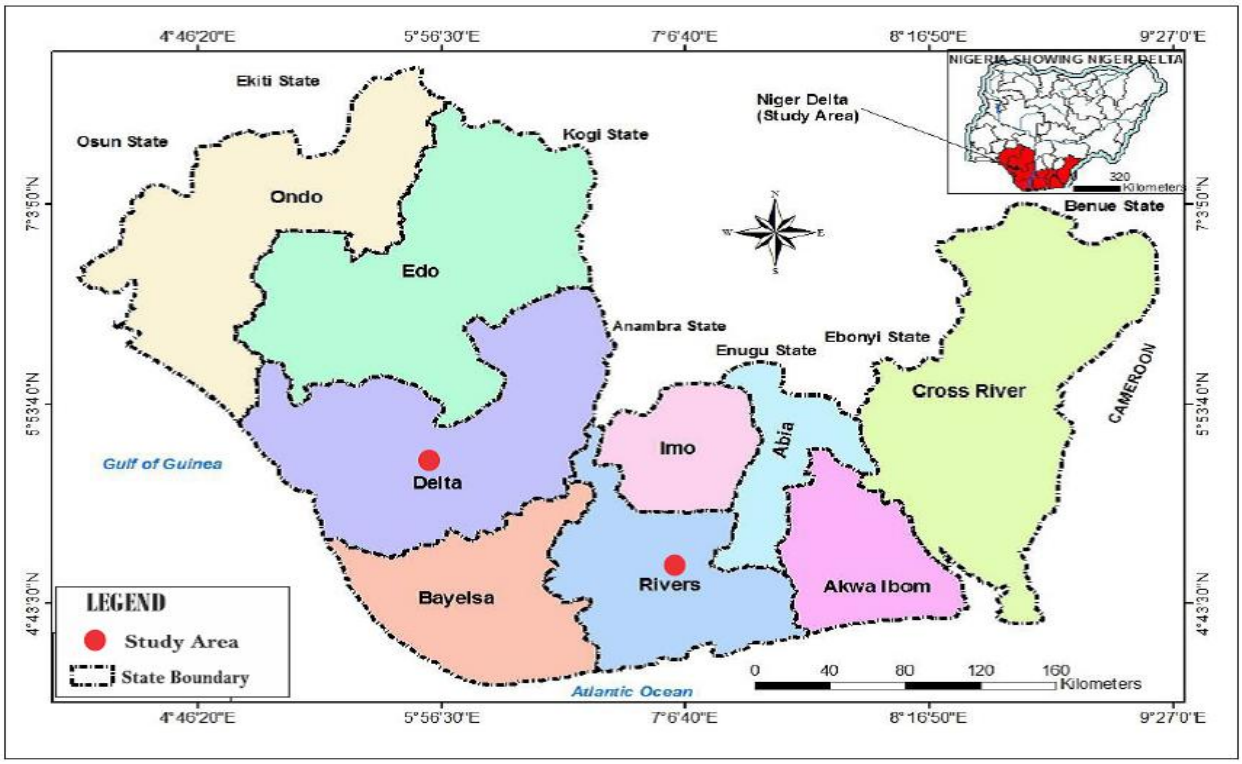
As a result of increased oil and, gas and other maritime related activities in the Niger Delta region of Nigeria, there has been a tremendous increase in merchant accidents, leading to personal injuries, loss of lives and tremendous damage to facilities (Donatus, 2013; Bebeteidoh & Poku, 2016). According to Dogarawa (2012) marine accidents is on the increase not minding the measures put in place to regulate such from happening. The

yearly increase in maritime accidents all over the world, with particular reference to Nigeria has led to this study. Year in year out the Nigerian waterways have been bedevilled with accidents leading to fatality (Dogarawa, 2012; Bebeteidoh & Poku, 2016). Several studies have examined various factors responsible for maritime accidents and their preventive measures (Dogarawa, 2012; John & Ikeagwuani, 2013; Anyanwu, 2014; Bebeteidoh & Poku, 2016; Oluseye & Ogunseye, 2016; Nwokedi *et al*., 2017; Ishak et al., 2019; Oyegun and Ugbebor, 2019) but few of these studies examined the extent of compliance to safety rules and regulations on-board vessels and platforms in respect to vessels/ships. Therefore, the study assesses the maritime safety standard compliance and limiting factors to safety practices among vessels/ships in Niger delta, Nigeria.

II. Materials and Method

Study Area

The study area is Niger Delta region of Nigeria which extends from Aboh (5°33′49″ N and 6°31′38″ E) in the North to palm point (4°16′22″ N and 6°05′27″ E) in the South. The East-West limit is between Benin River estuary (5°44′11″ N and 5°3′49″ E) in the West and Imo River estuary (4°27′16″ N and 7°35′27″ E) (Figure 1) protruding towards the Gulf of Guinea on the Atlantic coast of West Africa (Shittu, 2014). The Niger Delta region is a densely-populated area in Nigeria. Its population is about 31 million people. The land mass extends over about 70,000 km^2, and make up 7.5 percent of Nigeria's landmass. The region consists of the present day Abia, Akwa-Ibom, Bayelsa, Cross- River, Delta, Edo, Imo, Ondo, and Rivers states.



Research Design

A cross-sectional survey research design was employed in this study. This method was adopted because it is a suitable and efficient way of studying large population. It allows only a sample population to be used to represent the entire population. The population of the study comprised of carefully and randomly selected onshore and offshore staff, captains, chief mates, crew members, administrative and safety officers of marine vessels that operate within Niger Delta water.

Sample Size

The Ports of study comprises of Rivers Port, Onne Port, Delta Ports and jetties within the states. A list of registered marine operators was sourced from Nigerian Maritime Administration and Safety Agency (NIMASA) and employment list of the licensed maritime firm handling the selected jetties. The selected ports handle liquid, dry and bulk cargoes, oil and gas free zone, general cargoes and other logistic/multipurpose services (Table 1).

Table 1: Sample Selection from the Population

States	Port/Jetties	No of Terminal	Primary Purpose
Rivers	Rivers Port	2	Liquid, dry and bulk cargoes,
	Onne Port	4	Container oil and gas, dry or wet bulk, general cargoes and other logistic services.
	Jetty	5	Multipurpose services
Delta	Warri Port	8	Multipurpose cargoes
	Jetty	3	Multipurpose services

To get a true representative sample of the target population, the Taro Yamane (1964) formula for sample size determination was used:

$$n = \frac{N}{1 + N(e)^2} \quad \text{..... (3.1)}$$

Where: e= Level of precision (0.05)
N= Population
n= Sample size
` 1= Constant

$$n = \frac{1074}{1 + 1074(0.05)^2}$$

$$n = \frac{1074}{1 + 1074 * 0.0025}$$

$$n = \frac{1074}{1 + 2.685}$$

$$n = \frac{1074}{3.685}$$

$$n = 291.452 \approx 292$$

$$n = 292$$

*For non-response increase by 20% (from the n=292)

= 292 + 58

=350

Date Collection

The method of data collection that was adopted for this study was well-structured questionnaire. Using proportionate sampling techniques, the distribution of the sample size was based on the percentage of each of the staff force from each ports/terminals which also determines the amount of questionnaire that was distributed among the ports/terminals (Table 2).

Table 2: Distribution of the Questionnaire

States	Port	Registered Marine Operators	Taro Yamane Sample size	Sample Population (%)	Questionnaire Distribution
Rivers	Rivers Port	245	**350***	23	81
	Onne Port	379		35	122
	Jetties	125		12	42

Delta	Warri Port	238		22	77
	Jetties	87		8	28
Grand Total		**1,074**			**350**

Data Analysis

The retrieved questionnaires were coded using MS Excel (office 2016) before being transferred to the Data entry of Statistical Package for the Social Sciences (SPSS v. 22) for proper analysis. The descriptive statistics tool such as frequency counts, percentages of response and chats was adopted for the analysis. The use of such statistics allows the researcher to present the evidence of the study in a way that can be understandable and makes conclusion concerning the variables of study.

III. Result

From the 350 questionnaires administered to those involved in the study, 333 of the questionnaires returned filled and useful for further analysis. Approximately, the retrieved questionnaire represents 95% of the aggregated amount administered.

Socio-Demographic Details of the Respondents

The Table 3 showcased the socio-demographic details of respondents involved in the study. The outcome revealed that 61.6% of those engaged are male while 38.4% were female. The age range of the participants deduced that 21.6% are within age 18-29years, 39.0% are within age 30-40years, 24.9% are within age 41-50years while 8.4% and 6.0% of the respondents are within the age of 51-60years and 61years and more respectively. This is an indication that most of the engaged are within the age 30-40years. Approximately, more than half of the sampled population are married (59.8%) while 21.0% are single, 15.6% are divorced and 3.6% of the sampled population claimed widowed. The religion of those involved in the study indicated that more than half are Christianity which represent 52.0%, 25.5% practice Islam while 17.7% and 4.8% of those involved in the study are traditionalist and other form of religion. The educational qualification deduced that 15.9% holds OND/HND qualification, 34.8% holds Bachelor degree education while 18.0% and 21.9% of the respondents holds Master degree education and professional certificate respectively. The outcome indicated that everyone captured in the study are one way or the other educated and understood the content of the study. The position held by the respondents captured in the study indicated 6.3% were captains, 7.5% are chief mate, 34.8% were crew members, 27.3% are safety officers, while 16.2% and 7.8% of the respondents were administrative officers and other positions such as chief engineer. The outcome deduced that 28.2% of the respondents have less than 5years, 46.2% claimed to have 5-10years experience, 12.3% possesses 11-15years experience while 7.2% and 6.0% possesses 16-20years and 21years above experience in maritime operations.

Table 3: Socio-Demographic Details of the Respondents

Variable	Frequency (n=333)	Percentage (%)
Sex of Respondents		
Male	205	61.6
Female	128	38.4
Age (years)		
18-29 years	72	21.6
30-40 years	130	39.0
41-50 years	83	24.9
51-60 years	28	8.4
61 and above	20	6.0
Marital Status		
Single	70	21.0
Married	199	59.8
Divorced	52	15.6
Widowed	12	3.6
Religion		
Christianity	173	52.0
Islam	85	25.5
Traditionalist	59	17.7

Other	16	4.8
Educational Qualification		
OND/HND	53	15.9
B.Sc	116	34.8
M.Sc	60	18.0
Ph.D.	31	9.3
Professional Certificate	73	21.9
Position held on the vessel/Organization		
Captains	21	6.3
Chief Mate	25	7.5
Crew Member	116	34.8
Safety Officer	91	27.3
Administrative Officer	54	16.2
Others	26	7.8
Maritime operational years of experience		
Below 5years	94	28.2
5-10years	154	46.2
11-15years	41	12.3
16-20years	24	7.2
21years and above	20	6.0

Compliance with International Maritime Organization (IMO) Standards

The compliance with IMO standard was presented in Table 4. The outcome deduced that 21.3% of the respondents affirmed that the perceived organization priorities was about minimising the operation cost, 17.1% indicated that it is ensuring on-time performance, 11.4% indicated that the priorities was about preventing damage to good and/or cargo, 24.3% indicated that it is preventing damage to the ship and equipment while 17.4% and 8.4% of the respondent affirmed that the perceived organization priorities was ensuring the safety of the crew and welfare respectively. The extent of compliance of the operational standard deduced that 29.1% claimed the compliance was very high, 6.3% indicated that compliance was high, 37.5% indicated that compliance was moderate while 20.7% and 6.3% of those captured in the study indicated that compliance was very low and low respectively. 20.7% of the captured individuals in the study indicated that organizational safety culture was very high in their organization, 37.8% indicated that the safety culture was high, 30.6% indicated that safety culture was moderate while 8.1% and 2.7% indicated that the organizational safety culture was very low and low respectively. The finding indicated that 25.8% of the respondents affirmed that the extent of operational safety performance was very high, 12.3% indicated that the safety performance was high, 35.7% indicated that it was moderate while 21.0% and 5.1% indicated that the operational safety performance of their organization was very low and low respectively.

Table 4: Compliance with IMO Standards

Variable	Frequency (n=333)	Percentage (%)
Perceived Organization (Company's) Priorities		
Minimising operational cost	71	21.3
Ensuring on-time performance	57	17.1
Preventing damage to good and/or cargo	38	11.4
Preventing damage to the ship and equipment	81	24.3
Ensuring the safety of the Crew	58	17.4
Ensuring the welfare of the crew	28	8.4
Level of Compliance to Operational Standard		
Very High	97	29.1
High	21	6.3
Moderate	125	37.5
Very Low	69	20.7
Low	21	6.3
Level of the Organizational Safety Culture		
Very High	69	20.7
High	126	37.8
Moderate	102	30.6
Very Low	27	8.1
Low	9	2.7
Level of the Operational Safety Performance		

Very High	86	25.8
High	41	12.3
Moderate	119	35.7
Very Low	70	21.0
Low	17	5.1

In understanding the organization compliance with IMO standard, the respondents deduced that the organization priorities was in the order of preventing damage to the ship and equipment, minimizing operational cost, ensuring the safety of the crew, ensure on-time performance, preventing damage to good and/or cargo and ensure the welfare of the crew. The extent of compliance to the operational standard was deduced to be moderate while the organizational safety culture was perceived to be high in their organization. Also, the extent of operational safety performance was deduced to be moderate. The finding shared similar view and measure with the study conducted by Andrei et al., (2015) where the deduced organization priorities included safety, crew wellbeing, low cost of operation and maximum operational outcome. The outcome supported by Formela *et al*., (2019) which asserted the importance of IMO in the regulations and standard set for organizations and workers in the maritime industries. Chauvin (2011) opined that organization must focus on their safety culture which is vital in impacting the staff decision making and attitude. The outcome is in line with the opinion of Oluseye and Ogunseye (2016) which asserted that fostering safety culture is significant in preventing deliberate indiscipline act at sea. Efiok et al. (2015) noted that possessing adequate and effective safety culture is capable of dealing with various human-related maritime hazards.

IV. Conclusion

This study assessed the extent of maritime safety standard compliance among vessels operating in the Niger Delta and revealed that although maritime organizations demonstrate an appreciable level of safety awareness, full compliance with IMO standards remains suboptimal. Organizational priorities are still significantly influenced by cost considerations and asset protection, while safety-related decisions depend largely on existing safety culture and management commitment. The findings show that while safety culture is perceived as high, actual compliance and operational safety performance remain moderate, indicating a gap between stated safety intentions and practical implementation. The demographic profile, which reflects a skilled and experienced workforce, suggests that improved compliance is achievable with strengthened regulatory enforcement, continuous training, and better resource allocation. The study concludes that enhancing operational compliance, improving crew welfare, and reinforcing safety protocols are essential steps toward reducing maritime accidents and promoting safer navigation within the Niger Delta region.

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