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User Safety Compliance Measures in Freight Logistics Operation in Inland Waterways in Niger Delta

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Abstract

The study aimed at examination on user safety compliance measures in freight logistics operation in inland waterways in Niger Delta. The population consisted of the 26 operators and 26,505 users which make up the population as at the time of reconnaissance study. The data obtained from the study survey were analysed descriptively using mean, and frequency, mean and standard deviation was used for inferential statistics while the Principal Component Analysis was adopted to test the hypothesis. The study revealed that, safety compliance measures in the inland waterways are partially adhered as opined by 67% of the respondents. Nevertheless, when subjected to statistical test further revealed that level of safety compliance across each jetty differ with its significant level below the p-value criterion. The study concluded that Safety compliance measures in the inland waterways are partially adhered as opined by 67% of the respondents. The recommendations are made base on the study findings; the study suggest that improved compliance activities of operators and passengers, boat helmsmen should be strictly monitored to guarantee operation of only licensed captains in approved jetties and also zero tolerance should be adopted for operation of illegal jetties and use of non-seaworthy boats. Individual services should be supported in conjunction with currently available technical systems like Very High Frequency (VHF) radio, moiled data communications system, Global Navigation Satellite System (GNSS), Internet, Inland Electronic Chart Display and Information System (ECDIS).

Keywords: Passenger, Inland Waterways, Safety, Freight, Logistics, Seaworthiness

1. Introduction

A well-functional inland water transport system devoid of challenges is an essential requirement for the social economy development of any country of the world as well as for supporting regional and global cooperation and integration. Owoputi, Ifabiyib and Akpudo (2018) [37], deposits that, as society and economic organization have become complex, so the need for transport has expanded and men have found it essential to use other forms of transport services. Ocean freight or inland water transport is probably the oldest and earliest means of transport used by man, in fact since the creation, water transportation have played a significant impact in feats which man have made to date. Indeed, there is no doubt that quite a substantial volume of freight and cargoes are handled daily in the inland waterways transport Industry.

According to Akpoghomeh (2012) [10], "the role of water transport is not limited to merely servicing other things, for it often serves as a tool of development especially in the remote, undeveloped and underdeveloped parts of a country" which Niger Delta is not an exception. In the past few years, the importance of passenger movement and freight logistics as well as supply chain management to a country's economy has been repeatedly highlighted through various media despite its numerous challenges (Madu, 2016) [21]. Similarly, Rodriguez, Comtois and Slack (2006), affirm that an increase in freight flows and passenger movements has been a fundamental component of contemporary changes in economic systems on a global, regional and local scale.

The significant importance of inland water transportation was explained by Okpe (2002) [36], that River Niger from Baro downstream was the main source of import and export of finished or semi-finished goods in the pre-colonial era. While the development of road transport network has tremendously reduced the use of the river Niger except along the riverine

communities, especially in the Niger Delta region where high traffic of boats and vessel still persist due to petroleum related activities in the creeks and lagoons. During the colonial period no major works were done on the river routes to save the elementary improvements of cutting the inside of bends, light dredging, weeding, and the creation of channels walls by pilling where banks were weak.

With the inland navigable water ways of about 10,000km and an extensive coastland of about 852km, Nigeria had a great potential in the movement of goods from the coast to the hinterland by water transport, Nze and Emenike (2016) [28]. The Nigeria Inland Waterways Network is reputed to be one of the longest in the world spanning over 3000 kilometres. It consists of 50 Rivers, including Rivers Niger, Benue, Cross River, Kaduna, Imo, Ogun, Sokoto and Lakes in Oguta and Chad, Obiora (2019) [34]. However, this great transport resource is still underutilized, and the development and utilization of inland waterways in Nigeria will improve logistics to a large extent, which explains recent efforts by the government to dredge the River Niger by the Nigeria Inland Waterways Authority.

Its due to the underdevelopment of inland waterways transport and its numerous challenges that the Nigeria Inland Waterways Authority (NIWA) was established through Decree No. 13 in 1997 and commence operation fully in 1998 with the mandate to provide solutions to this challenges and formulate relevant laws to improve and develop the inland waterways for navigations, also to provide an alternative mode of transportation for evacuation of economic goods and persons, among others, NIWA, (2018) [23]. But this government regulatory agency noted that despite its great potential and opportunities to provide economic development to this transport sub-mode, the national waterways resource is grossly remained underutilized when compare among nations.

According to Aderamo & Mogaji (2010) [3], the Niger Delta part of Nigeria is relatively an undeveloped region with inadequate transport infrastructure and poorly utilised inland water transport system that had been the driver of socio-economic development of the region by extension Nigeria. Water transport is a functional tool for development in Nigeria, among the major modes is the waterways transport system which is very vital to the nation's economy with the existence of many rivers, lakes, lagoons, creeks and canals from the stand point of passenger traffic and goods haulage, particularly in the Niger Delta region. The inland waterways system basically has to do with the carriage of passengers, commercial operations and haulage of goods (freight) within the internal waters.

Nze and Emenike (2016) [28] described inland water transport as that sub-mode that plays a vital role in economic development especially for remote rural areas, while the potential role of this sector depends considerably on the specific regional contest such as geographical conditions, level of roads and waterways development and socio-economic conditions. The inadequate nature of accessible roads in which had from its' pre-state status relied on the inland waterways in moving commodities from place of more to place of lack (from city centres to the riverine communities/hinterland), by allowing supply chain which includes all the various business involved in the process of delivering finished and unfinished goods to consumers at their locations, necessitate the movement of goods and services through the inland waterways to the hinterlands which is one of the oldest means of transporting passengers, goods and services from one point to another.

Inland water transport offers the most economical, energy efficient and environmental friendly means of transporting all types of cargo/freight plus passengers from place to place. It also offers safer and cheaper rates in areas where water exists naturally, Alekhuogie (2016) [11]. The existence of waterways has been an important factor in the development of regions even before the colonial era; waterways have served first as paths of exploration and new settlement and later as avenues for commerce and trade. Although slower than rail, road, and air transport, water transport is less expensive and accommodates such bulk cargoes as coal, ores, grain, and lumber, etc, Azubuike, (2018) [13].

The study of Ezenwaji (2010), postulate that inland waterways transverse 20 out of the 36 states within the nation and that area adjacent to the navigable rivers represent the nations' most important agricultural and mining regions. The direct impact of inland waterways transport, for instance, was highlighted for the deltaic areas of southern Nigeria. Abubakar (2012) [1], noted that inland waterways transport is a necessary factor and critical for all facets of development in the region. Gray (2006) also added that about 48% of all the rural residents in the region live in remote, isolated and inaccessible communities with no motorable roads and another 29% live in communities with limited services. For such people inland waterways transport is absolutely imperative for survival and for accessing social services-education, health, etc.

Agava (2019) attest that, inland water transport operation is advantageous in terms of costs of moving heavy and bulky cargoes; especially where speed is not a considerable factor than cost, for instance, a single 15-barge tow is equivalent to above 225-rail-road cars or 870 tractor-trailer trucks. This would be of more optimum benefits in the transportation of tones of agricultural products from the city centres to the hinterlands, and from the Middle Belt areas to the Delta areas via this medium and vice versa; hopefully bringing about a fall in food prices in the regions, likewise other coastal generated cargo and passenger movements from and to where they are of more value and demand.

Azubuike (2018) [13] observed that, with the development of modern production and trading systems, freight transportation and passenger inter-change has become part of an integrated logistics system. The logistics approach treats transport (inland water) as an integrated part of an overall planned system which links purchasing, production, inventory management and marketing. In this context, ships/vessels, barge/boat can be considered as "moving warehouse" whereas ports may be conceived as logistics and distribution centers.

In international shipping, seaports can be treated as maritime logistics centers- when they provide freight logistic services at the seashore and shore land interfaces. Many ports in the world have an established body of knowledge and experience in providing value-added logistics activities for ship-cargo consignments, but not all ports can claim a logistics centre status, as observed in the Deltaic region, Azubuike (2018) [13]. Typical logistics functions include cargo handling and transfer operations, storage and warehousing, break/bulk and consolidation; value added activities, information management and other related activities among others. In recent years, there has been some

emphasis on the role of inland logistics centers where all freight logistical operations not necessarily requiring to be carried out in the seaport area can take place.

More so, given Nigeria highly limited and congested transport environment, where the opportunity cost of the transport is high, inland water transport is an extreme case of inefficiency and neglect of a valuable resource. It is therefore, urgent to establish inland water transport sub-sector development strategy. Inland water transport systems in the area have not yet reached its full potential despite the nation being generously endowed with navigable and potentially navigable inland waterways but has experienced latent capacity and inadequate investment, Adimoha (2014). In this region of Nigeria, inland water transport has been neglected and remains outside the mainstream transport development planning, often overshadowed by other sectors such as road transport, aviation, and more recently railway, etc. Akpoghomeh (2000) [9] support the fact that, there is need for effective regulation of inland water transport across the country. All boats must be licenced as well as their operators.

In view of the above, Agava (2019) added that, inland water transport is also of utmost importance to rural/riverine dwellers especially fishermen, traders, and other businessmen and women involved in trading activities around the riverine communities in the Niger Delta. Through this sub-mode of water transport, goods get to the residents of such communities who incidentally are the final consumers. Through Inland waterways transport, food stuff, fishing equipment, building materials and other relevant commodities needed to keep life going are made available at the appropriate time and at an affordable rate.

Thus, in Niger Delta regardless of the immense benefits this transport mode provides for economic development, inland waterways resources are grossly underutilized and underdeveloped because it had a long history of neglect from the government and private sector. This is why Obed, (2013) lamented that instead of an increase in the utilisation of the inland waterways, there has been a considerable decline in the use of this mode of transport in Nigeria. This was attributed to several physical constraints impeding the growth and performance of freight and passenger logistics operation in this sub-sector in Nigeria. For this observed decline to be address there must be an urgent pragmatic and radical innovative actions and strategies that can identify the remote and immediate causes of this challenges and improve the sector to its pride of place as it continues to remain the bedrock of trade, industrial and economy growth in this region.

It's in view of this background that this study was conceived to analyse passengers and freight logistics challenges as associated with inland water transportation in the Niger Delta.

In the riverine and hinterland communities of the Niger Delta, construction of roads is almost impossible because of the terrain; hence creeks and lagoons provide the major mode of transportation across the coastal communities in the Niger Delta. In the past few years, the importance of passengers and freight logistics, and supply chain management to a country's economy has been repeatedly highlighted through various media despite its numerous challenges, Madu (2016) [21].

The movement of passengers and freight flow has been a fundamental component of contemporary changes in economic systems on a global, regional and local scale. The socioeconomic wellbeing of coastal communities can be greatly hampered if the operation of inland water transport is distorted or disrupt due to challenges emanating from the various actors of the sector, Rodriguez, Comtois and Slack (2014).

The Niger Delta inland water transportation of passengers and freight logistics system has been faced with the following identified challenges; the poor safety culture of sea craft operator's in transportation of goods to the hinterlands communities has greatly affected the increasing free flow of passengers and freight distribution, the lack of efficient multi-modal system in the area has reduced the level of patronage of cargo distribution, the infrastructural deficiency and lack of maintenance (dilapidated jetties/boats) over the years has contributed to the poor nature of doing business in the region, the alarming and worrisome unsecured nature of the Niger Delta waterways routes is of national disturbance and has stupendously affected passengers and freight logistics activities for both operator's and users, lack of adequate and frequent training of sea-crafts riders/operators are among the major cause(s) of boat/sea craft mishaps on the waterways; the absent of periodic dredging of the canals and water routes by the Nigeria Inland Waterways Authority (NIWA) and relevant government agencies has pose navigational challenges for operator's; also, the presence of wrecks with no warning sign(s) and abuse of waterways operational guidelines constitute so much challenges to passengers and freight logistics across the coastal channels of the Niger Delta, lack of cargo handling equipment for perishable goods guaranty more damage and financial lost to commercial users, lack of specialise boat(s) to convey both liquid or dry bulk cargoes/goods (whether perishable or not) without joining passengers on board require urgent special attention to stop the menace been done by operator's, poor policy implementation by government regulatory agencies, bribery plus corruption has negates the overall passengers and freight logistics operations in the Niger Delta, which in turn impacted negatively to coastal livelihood.

These challenges had collectively affected customer patronage, boat traffic, quality of service and freight distribution across the length and breadth of the region. Akpoghomeh (2012) [10] also observed that, the private boat operations which are in number, are unorganized, and records of their operations are poorly kept. They are poorly supervised including their safety standards especially in the interior parts of the riverine states.

The aim of this research is to examine user safety compliance measures in freight logistics operation in inland waterways of the Niger Delta; for this study, the under listed hypotheses was tested. There is no significant difference in Safety compliance measures in freight logistics operation across Jetties in inland waterways of the Niger Delta.

Inland water trade contributes significantly to the development of Nigeria’s economy particularly in revenue generation and employment opportunities and as well utmost attention is needed to safe the industry and keeping its operations running healthy. Findings emanating from this study will help to curtail some of the challenges associated with maritime industry particularly inland waterways commercial activities as described in the problem statement. It will uncover the possibilities of inland waterways and the advantages when the potentials are explored. The study

among others will equipped the public towards changing the attitude towards inland waterways transportation since it contributes massively to the advancement of Nigeria and reduced commercial activities on other transport modes.

The research focused on the user safety compliance measures in freight logistics operation in inland waterways across the Niger Delta inland waterways corridor. The study also extended its survey to obtain with specific attention inland waterways routes with pronounced user safety compliance measures in freight logistics operation of the sector. The actual study survey covered major operational jetties in the three (3) core Niger Delta (Bayelsa State, Delta State, and Rivers State) based on their volume of passengers.

2. Methodology

This study adopted a cross-sectional survey research design. This is an observational research type of survey that analysed data of variables collected at one given point of time across a sample population or a pre-defined subset and it's good for descriptive analysis. Cross-sectional research studies are descriptive in nature because it's used to describe characteristics that exist in demography and geographical location but does not help to determine cause and effect. This research design was used thus; it gives room for procedures of collecting and analysing of data capable of solving the research problem.

Research design is a plan or the arrangement that guides the compilation and examination of data used for a research. It employs the use of structured data response instruments such as the questionnaire, interviews and observation combined for adequate data collection, Amara and Amaechi (2010) [12] and Ukwusowa (2013) [42].

The study is carried out in the Niger Delta region of Nigeria, a region of swamps and muddy creeks between which lies small area of drier ground. Niger Delta is a dispositional environment brought about by littoral drift and sedimentary of the Niger Delta through distributaries.

Due to the heterogeneous nature of the population in the study area, the target population for this study consists of boat operators and inland water transport users (passengers) in the three core Niger Delta states within the selected under listed waterfront jetties not including waterside. The population consisted of the 26 operators and 26,505 users which make up the population as at the time of reconnaissance study.

Table 1: List of Jetties for the Three Core Niger Delta States

S. No.	Rivers State	Bayelsa State	Delta State
1	Haastrup Jetty	Sagbama Jetty	Ijaw Jetty
2	Ibeto Jetty (harbor road)	Swali Jetty (Yenegoa)	NPA Jetty
3	Magobar Jetty	Ogbia Jetty	Independet Jetty
4	NPA/Abonnema Wharf Jetty	Amasoma Jetty	Aladija Jetty
5	Marine Base/Mot Jetty	Nembe Jetty	Ovwian Jetty
6	Nembe Jetty	Akassa Jetty	Igbudu Jetty
7	Kaa Jetty	Ekeremor Jetty	Ogla Jetty
8	FOT Jetty	Okpoma Jetty	Sapele Jetty
9	Abuloma Jetty	Brass Jetty	Bomadi Jetty
10	Abonnema town Jetty	Kaiama waterside	Patani Jetty
11	Buguma Jetty		Koko Port
12	Okrika Jetty		Ase Waterside
13	Bodo city Jetty		
14	Nig. Naval Base Jetty (pathfanther)		
15	Iwofe Jetty		
16	Bitumen Jetty		
17	NLNG Jetty/(eastern bye pass)		
18	Bille Jetty (Creek road)		
19	Bonny Jetty		
20	Octupos Jetty		
21	ATC Jetty		
22	Abiama river		
23	Ndeni waterside		
24	Kono waterside		
25	Krakrama Jetty		
26	Tara Jetty		

Source: Research reconnaissance survey, 2023

The intended population in the study area is large due to so many jetties where passenger transport, loading and unloading of freight operations take place. Therefore, to have a manageable population for the study, and the heterogeneous nature of the population in the study area, the selected jetties was drawn from the three core Niger Delta states based on the volume of passenger and freight logistics traffic at the jetties. However, the study made use of the Taro Yamane formula to obtain a reduced population as the study sample size and applied the simple random sampling techniques during the study survey.

Table 2: Determination of Sample size

S. No	States	Name of Jetties	No. Of Freight Operators	Boat Seating Capacity	Daily Boat Traffic						weekly Boat Traffic	Total no. of Passengers/Freight Per Jetty
					Mon	Tues	Wed	Thur	Fri	Sat	83	15x83= 1.245
1		Bile Jetty	1	15	17	12	12	11	15	16	131	15x131= 1,965
2		Nembe Jetty	1	15	20	21	19	20	28	24	183	15x183=2,745
3		Bonny Jetty	3	15	33	29	30	26	34	31	24	50x24=1,200
4		NLAG Jetty	1	50	4	4	4	4	4	4	38	15x38=570
5		NPA/Abonnema Jetty	1	15	7	5	5	6	8	7	100	15x100=1,500
6	**RIVERS**	Aboloma Jetty	1	15	15	13	18	15	20	19	88	15x88=1,320
7		Marime Base Jetty	1	15	14	16	12	21	10	15	96	15x96=1,440
8		Iwofe Jetty	2	15	16	16	21	10	13	20	70	15x70=1,050
9		Magobar Jetty	1	15	10	11	13	11	13	12	**3813**	**1,3035**
		Total	**12**									
10		Ogbia Jetty	2	15	14	9	12	10	14	15	74	15x74=1,110
11	**BAYELSA**	Swali Jetty	3	15	20	20	16	18	22	19	115	15x115=1,725
12		Sagbama Jetty	1	15	10	13	14	10	20	18	85	15x85=1.275
13		Amasoma Jetty	1	15	8	4	4	6	7	8	37	15x37=555
		Total	**7**								**311**	**4,665**
14		NPA Jetty	2	15	29	32	25	32	35	34	187	15x187=2,805
15		Independent Jetty	1	15	7	11	9	5	11	13	56	15x56=840
16	**DELTA**	Ogbe-Ijoh Jetty	1	15	21	17	17	19	21	25	120	15x120=1,800
17		Bomadi Jetty	1	15	27	23	28	15	31	30	154	15x154=2,310
18		Sapele Jetty	2	15	11	12	9	12	14	12	70	15x70=1,050
		Total	**7**								**587**	**8,805**
		Total	**26**									**26,505**

Source: Researcher's Reconnaissance 2023

Taro Yamane (1967), which provides a simplified way to determine sample size, was used to obtain a manageable sample size for this study;

Therefore; $n = \frac{N}{1 + N(e)^2}$

Where; n = the sample size
N = the population
1 = a constant figure
e = the acceptable sampling error of 0.05.

$$n = \frac{N}{1 - N(e)^2}$$

$$n = \frac{26505}{1 - 26505(0.05)^2}$$

$$n = \frac{26505}{1 + 26505(0.0025)}$$

$$n = \frac{26505}{1 + 66.2625}$$

$$n = \frac{26505}{67.2625}$$

$$n = 394$$

The study applied the proportionate allocation method to aid the distribution of the research questionnaire to the population strata as showed in Table 3.
This study adopted two major types of data, which include the primary data and secondary data.

The research employed questionnaire and structured interview for users and operators of inland waterways transport to ensure relevant data were collected. The researcher employed the 15 field assistants at different sampling units to aid the administration of the survey instrument to respondents at the jetty terminal prior to their departure time. The researcher and field assistants briefed the jetty operators on the purpose of the questionnaire before they were given the opportunity to access their passenger.
The data obtained from the study survey were analysed using mean and frequency and the descriptive analysis while ANOVA was used to test the hypothesis formulated.

Objective:
Examine user safety compliance measures in freight logistics operation in inland waterways of the Niger Delta.

Source of data:
The data needed to analyse this objective was obtained from users of inland waterways transport through administered questionnaire.

Table 3: Computed Sample Size Proportional Allocation to each Jetty

S. No	Selected Jetties	Total No. of passenger/freight per Jetty	Proportional allocation method
1	Bile Jetty	1,245	$\frac{1245x394}{26505} = 18$
2	Nembe Jetty	1,965	$\frac{1965x394}{26505} = 29$
3	Bonny Jetty	2,745	$\frac{2745x394}{26505} = 41$
4	NLNG Jetty	1,200	$\frac{1200x394}{26505} = 18$
5	NPA/Abonnema Jetty	570	$\frac{570x394}{26505} = 8$
6	Aboloma Jetty	1,500	$\frac{1500x394}{26505} = 22$
7	Marine Base Jetty	1,320	$\frac{1320x394}{26505} = 20$
8	Iwofe Jetty	1,440	$\frac{1440x394}{26505} = 21$
9	Magobar Jetty	1,050	$\frac{1050x394}{26505} = 16$
10	Ogbia Jetty	1,110	$\frac{1110x394}{26505} = 17$
11	Swali Jetty	1,725	$\frac{1725x394}{26505} = 26$
12	Sagbama Jetty	1,275	$\frac{1275x394}{26505} = 19$
13	Amasoma Jetty	555	$\frac{555x394}{26505} = 8$
14	Independent Jetty	840	$\frac{840x394}{26505} = 12$
15	Ogbe-Ijoh Jetty	1,800	$\frac{1800x394}{26505} = 27$
16	Bomadi Jetty	2,310	$\frac{2310x394}{26505} = 34$
17	Sapele Jetty	1,050	$\frac{1050x394}{26505} = 16$
18	NPA Jetty	2,805	$\frac{2805x394}{26505} = 42$
	Total	**26,505**	**Total 394**

Source: Researcher's computation, 2023

3. Results and Analysis

Table 4: Copies of questionnaire administered to Respondents

S. No	Selected Jetties	Number of questionnaires administered	Number of questionnaire returned	Return Rate (%)
1	Bile Jetty	18	16	88.9
2	Nembe Jetty	29	25	86.2
3	Bonny Jetty	41	38	92.7
4	NLNG Jetty	18	13	72.2
5	NPA/Abonnema Jetty	8	6	75.0
6	Aboloma Jetty	22	19	86.4
7	Marine Base Jetty	20	19	95.0
8	Iwofe Jetty	21	19	90.5
9	Magobar Jetty	16	14	87.5
10	Ogbia Jetty	17	12	70.6
11	Swali Jetty	26	21	80.8
12	Sagbama Jetty	19	13	68.4
13	Amasoma Jetty	8	5	62.5
14	Independent Jetty	12	8	66.7
15	Ogbe-Ijoh Jetty	27	18	66.7
16	Bomadi Jetty	34	31	91.2
17	Sapele Jetty	16	13	81.3
18	NPA Jetty	42	36	85.7
	Total	**394**	**326**	**82.7**

Source: Researchers field survey, 2022

3.1 Safety compliance measures in freight logistics operation in inland waterways of the Niger Delta

Responses to the questionnaire on Safety compliance measures in freight logistics operation in inland waterways of the Niger Delta on Table 5 reveals that majority of respondents (126) strongly agree that passengers caution boat drivers when they over speed. 91 respondents agree, 58 disagree, 51 strongly disagree which yields to mean score of 2.90 and ranks 1st.

Statement six "Reckless driving habits are cautioned by passenger" ranks 2nd, "115 respondents strongly agree, 123 respondents agree, 17 disagree and 71 strongly disagree resulting to mean score of 2.87.

With a mean score of 2.65, statement 4: "Passengers are not allowed to overload the boat" ranks 3rd. 36 respondents strongly agree, 195 respondents agree, 41 respondents disagree and 54 respondents strongly disagree.

Ranking 4th is statement 3: "Passengers accept the use of dilapidated safety kits". 90 respondents strongly agree, 85 agree, 84 disagree and 67 strongly disagree resulting to mean score of 2.61

95 respondents strongly agree, 77 agree, 77 disagree and 77 strongly disagree that, boat operators always mandate intending passengers to use safety jacket assigned to them, which yields an accepted mean score of 2.58 and ranks 5th.

Statement 1 "Passengers don't use their personal safety jacket" ranks 6th with rejected mean score of 2.18.

Based on the responses we draw conclusion that passengers adhere to safety compliance measures in freight logistics operation in inland waterways of the Niger Delta with a grand mean score of 2.63 accounting for 52.6%.

Furthermore, the ANOVA Table 7 revealed a significant variation in the level of Safety compliance measures in freight logistics operation across selected Jetties in the Niger Delta Region as the p-values obtained were less than the critical level of $\alpha = 0.05$. Hence, the null hypothesis was rejected and we conclude that there is significant difference in Safety compliance measures in freight logistics operation across Jetties in inland waterways of the Niger Delta which implies that the level of safety compliance across each jetty differ.

Table 5: Responses on Safety compliance measures in freight logistics operation in inland waterways of the Niger Delta

S. No	User Safety Compliance	SA (4)	A (3)	D (2)	SD (1)	Mean	Rank	Remark
1	Passengers don't use their personal safety jacket	68	64	54	140	2.18	6th	Disagreed
2	Boat operators always mandate intending passengers to use safety jacket assigned to them	95	77	77	77	2.58	5th	Agreed
3	Passengers accept the use of dilapidated safety kits	90	85	84	67	2.61	4th	Agreed
4	Passengers are not allowed to overload the boat	36	195	41	54	2.65	3rd	Agreed
5	Passengers caution boat drivers when the over speed	126	91	58	51	2.90	1st	Agreed
6	Reckless driving habits are cautioned by passenger	115	123	17	71	2.87	2nd	Agreed
	Grand Mean					**2.63**		

Source: Researchers field survey, 2022

Reject if mean score is greater than 2.50.

Test of Hypothesis for Objective (3)

H_{03}: There is no significant difference in Safety compliance measures in freight logistics operation across Jetties in inland waterways of the Niger Delta.

The above hypothesis was tested using the Analysis of Variance (ANOVA)

The **ANOVA** compares the means between two or more populations.

Model Specification for ANOVA

$$X_{ij} = \mu + \alpha_i + \varepsilon_{ij}$$

Where,

X_{ij} = is the observation of the treatment (perceived response on the safety compliance measures in freight logistics operation)

μ = the universal mean

α_i = is the effect of the treatments (Jetties)

ε_{ij} = the random error component.

Where,

α_1 = Bile Jetty, α_2 = Nembe Jetty, α_3 = Bonny Jetty, α_4 = NLNG Jetty, α_5 = NPA/Abonnema Jetty, α_6 = Aboloma Jetty, α_7 = Marine Base Jetty, α_8 = Iwofe Jetty, α_9 = Magobar Jetty, α_{10} = Ogbia Jetty, α_{11} = Swali Jetty, α_{12} = Sagbama Jetty, α_{13} = Amasoma Jetty, α_{14} = Independent Jetty, α_{15} = Ogbe-Ijoh Jetty, α_{16} = Bomadi Jetty, α_{17} = Sapele Jetty and α_{18} = NPA Jetty.

Decision Rule

When the **P–Value < α (0.05)** at a given degree of freedom (df): Reject the Null Hypothesis (H_0)

When the **P–Value > α (0.05)** at a given degree of freedom (df): Accept the Null Hypothesis (H_0)

Table 6: Dataset used for safety compliance measures in freight logistics operation across Jetties in inland waterways of the Niger Delta

S. No	Jetties	Passengers don't use their personal safety jacket	Boat operators always mandate intending passengers to use safety jacket assigned to them	Passengers accept the use of dilapidated safety kits	Passengers are not allowed to overload the boat	Passengers caution boat drivers when the over speed	Reckless driving habits are cautioned by passenger
1	Bile Jetty	1.00	3.44	2.81	3.00	4.00	4.00
2	Nembe Jetty	1.00	3.16	2.52	3.00	4.00	3.44
3	Bonny Jetty	1.26	2.66	2.63	3.00	3.16	2.66
4	NLNG Jetty	2.54	2.23	3.08	3.00	2.31	1.69
5	NPA/Abonnema Jetty	2.00	3.33	1.83	3.00	2.33	1.00
6	Aboloma Jetty	1.74	2.05	2.26	3.00	2.53	1.00
7	Marine Base Jetty	2.84	2.05	2.95	3.00	2.95	1.74

8	Iwofe Jetty	2.53	2.58	2.16	2.68	2.58	3.00
9	Magobar Jetty	2.64	2.50	2.86	2.71	2.79	3.00
10	Ogbia Jetty	2.83	2.83	2.67	2.67	2.75	3.00
11	Swali Jetty	2.33	2.62	2.48	2.48	2.76	3.00
12	Sagbama Jetty	2.77	1.85	2.85	1.77	2.92	3.00
13	Amasoma Jetty	2.60	2.20	2.60	2.20	3.00	3.00
14	Independent Jetty	2.75	3.00	3.63	1.87	2.88	3.00
15	Ogbe-Ijoh Jetty	2.61	2.39	2.39	2.39	2.44	2.72
16	Bomadi Jetty	2.71	2.48	2.55	2.55	2.52	3.61
17	Sapele Jetty	2.15	2.69	3.31	2.62	2.38	4.00
18	NPA Jetty	2.58	2.58	2.31	2.19	2.89	3.17
	Total	2.18	2.58	2.61	2.65	2.90	2.87

Source: Researchers computation, 2022

Note: Mean score below mean criterion of 2.5 is rejected

Table 7: ANOVA table for safety compliance measures in freight logistics operation across Jetties in inland waterways of the Niger Delta

ANOVA Table							
			Sum of Squares	df	Mean Square	F	Sig.
Passengers don't use their personal safety jacket * Jetties	Between Groups	(Combined)	139.748	17	8.220	7.785	.000
	Within Groups		325.209	308	1.056		
	Total		464.957	325			
Boat operators always mandate intending passengers to use safety jacket assigned to them * Jetties	Between Groups	(Combined)	47.096	17	2.770	2.268	.003
	Within Groups		376.168	308	1.221		
	Total		423.264	325			
Passengers accept the use of dilapidated safety kits * Jetties	Between Groups	(Combined)	36.559	17	2.151	1.865	.021
	Within Groups		355.184	308	1.153		
	Total		391.742	325			
Passengers are not allowed to overload the boat * Jetties	Between Groups	(Combined)	42.310	17	2.489	3.624	.000
	Within Groups		211.521	308	.687		
	Total		253.831	325			
Passengers caution boat drivers when the over speed * Jetties	Between Groups	(Combined)	75.949	17	4.468	4.460	.000
	Within Groups		308.505	308	1.002		
	Total		384.454	325			
Reckless driving habits are cautioned by passenger * Jetties	Between Groups	(Combined)	198.929	17	11.702	17.071	.000
	Within Groups		211.132	308	.685		
	Total		410.061	325			

Source: SPSS output, 2022

3.2 Discussion of Findings

Safety compliance measures in freight logistics operation in inland waterways of the Niger Delta

Findings revealed that safety compliance measures in the inland waterways are partially adhered as opined by 67% of the respondents. Nevertheless, when subjected to statistical test further revealed that level of safety compliance across each jetty differ with its significant level below the p-value criterion. This finding could be seen as an improvement from the findings of Aderibigbe (2017) who said that travelling on Nigeria's waterways whether for leisure or business can be fun but scary due to poor safety compliance amongst passengers and operators in inland waterways of the Niger Delta.

4. Conclusion and Recommendation

Based on the findings of this study, the study concludes that the major passenger and operator's challenges of inland waterways on transport/freight logistics in the Niger Delta Region are instability of transport fare, armed robbery activities, inadequate speed boats, illegal bunkering activities along inland waterways and Inadequate government control over the waterways.

Based on the findings of this study, the following recommendations were made;

1. For improved compliance activities of operators and passengers, boat helmsmen should be strictly monitored to guarantee operation of only licensed captains in approved jetties and also zero tolerance should be adopted for operation of illegal jetties and use of non-seaworthy boats.
2. Individual services should be supported in conjunction with currently available technical systems like Very High Frequency (VHF) radio, moiled data communications system, Global Navigation Satellite System (GNSS), Internet, Inland Electronic Chart Display and Information System (ECDIS) and vessel tracking and tracing systems such as inland Automatic Identification System (AIS).

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