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Passenger's Challenges on Inland Waterways Transportation in Niger Delta

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ABSTRACT

The study aimed at passenger's challenges on inland waterways transportation in Niger Delta. The study adopted a cross sectional research design; 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. 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, findings on this objective revealed that the major passenger challenges of inland waterways on transport/freight logistics are instability of transport fare, armed robbery activities and inadequate speed boats. The study concluded 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. The recommendations are made base on the study findings; National Inland Waterways Authority (NIWA) should regulate the waterways operations so as to reduce the cost to the users of the waterways. Stiffer punishment should be given to anyone involved in illegal bunkering activities.

Keywords: *Passenger, Inland Waterways, Transport Fare, Freight, Logistics, NIWA*

1.1 Introduction

The need has always existed to move passengers and freight from one place to another through inland water transportation, this make the demand for water transport traditionally necessary for human co-existence and socio-economy development. Nze (2013), inland waterways have a unique role in Nigeria transport system and it's one of the transport alternatives available to most shippers and coastal traders. With the advent of cabotage and the dredging of the lower Niger River, the water ways system have facilitated transportation of freight and passengers but, it is an integral part of the overall transport system. The freight and passenger statistics form the basis for most evaluations of waterways, Nze and Emenike (2016).

Edward (2006) asserts that, transportation is a vital activity in moving both passengers and freight around the world. Inland water transport is essential to the life of mankind and as paramount importance to rural dwellers, especially fishermen, traders, local logisticians and businessman and women involved in commercial activities around the coastal communities in the Niger Delta states. This transport sub-mode had aid commerce as it drives goods home to the residents of coastal communities that are final consumers plus other commodities needed are made available at an affordable rate.

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), 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), "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). 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), 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). 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). 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). 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 remain underutilized when compare among nations.

According to Aderamo & Mogaji (2010), 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) 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). 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).

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), 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) 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). 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) 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).

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.

Madu (2016) is of the view that inadequate operational equipment in the inland water transportation and national disaster as well as adverse weather condition can caused disruption of operation and largely affect the economy of the sector. Other challenges affecting the smooth operation of passengers and freight flow in the Niger Delta includes activities of the militant groups, sea pirates, kidnappers and other water transport crime that had become very rampant in recent time such boat snatchers. These has pose more fear on the passengers and business men and woman travelling along the various water channels due to the increasing rate of maritime arm robbery, as recent happening on the Port Harcourt Bonny Island water route which led to the January 15, 2021 protest to Rivers State Government, lamenting the incessant attacks and killings by pirates for many years, https://plustvafrica.com/.

The usual aesthetic characteristics of water transport have been overturned by fear, tension and apprehension following series of sea craft accidents and boat mishap recorded in Niger Delta region. In some cases, the casualties may be high resulting in disabilities and even fatality; most homes in the region have lost love once and even family bread winners as a result of accident due to safety concerns by implication affecting freight logistics operations.

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) 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.

It's in view of these perennial challenges and the failure of National Inland Waterways Authority (NIWA) in its operational mandate and the national waterways resource which has grossly remain underutilized and underdeveloped when compare among nations leaving the challenges acute that this study was conceived to address the analysis of passengers and freight logistics challenges in the Niger Delta region.

The aim of this research is to analyse the passenger's challenges on inland waterways transportation in Niger Delta; for this study, the under listed hypotheses was tested. Passenger challenges of inland waterways measured by armed robbery activities, kidnapping incidences, inadequate speed boats, loss of luggage, and instability of transport fare have no significant impact on transport/freight logistics in Niger Delta Region.

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 challenges of passengers and freight logistics operations across the Niger Delta inland waterways corridor. The study also extended its survey to obtain with specific attention inland waterways routes with pronounced challenges affecting the efficient 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.

2.1 Literature Review

2.1.1 The Total Logistics Concept

The word logistics is a set of operation that describes the entire process of product and freight distribution into, through and/or out of a private or commercial jetties. Logistics thus include any activity involve in the management of inventory at rest (awaiting production into finished product or distribution at the final point of sale) or in motion (during transportation).

Logistics is necessary for moving products from suppliers to buyers, moving work in progress within a firm, and moving finished goods to customers, returning or recycling goods and also storing these items along the way in supply chains in an international environment. Products have little value to customers until they are moved to customers' usage areas. So it can be seen that transportation, warehousing, information systems and customer service play important roles in the logistics function. In this study the many logistics activities are discussed along with inland waterways logistics nomenclature, the marine logistic issues, and cultural pitfalls (Thillart, 2016).

The total logistics concept (TLC) is an operational framework that treat the various segments that come under the broad process of freight distribution and logistics as one single integrated system. It is a recognition that the interactions between different elements, for example storage and transport delivery, need to be considered within the perspective of the broader supply chain. Thus, the total system should be considered and not just an individual segment or subsystem in isolation. An understanding of the concept is very important when planning for any aspect of logistic distribution. A simple and inversely practical example helps to give emphasis to the point: A company produces plastic toys that are packaged in cardboard boxes. These boxes are packed on to wooden pallets that are used as the basic unit load in the warehouse and in the transport vehicles for delivery to customers.

A study indicates that the cardboard box is an unnecessary cost because it does not provide any significant additional protection to the quite robust plastic toys and it does not appear to offer any significant marketing advantage. Thus, the box is discarded, lowering the unit cost of the toy and so providing a potential advantage in the marketplace. One unforeseen result, however, is that the toys, without their boxes, cannot be stacked on to wooden pallets, because they are unstable, but must be stored and moved instead in special trays. These trays are totally different to the unit load that is currently used in the warehouse and on the vehicles (ie the wooden pallet). The additional cost penalty in providing special trays and catering for another type of unit load for storage and delivery is a high one – much higher than the savings made on the product packaging.

This illustrated packaging strategy for onward transportation and distribution service is also a replica situation in the distribution of commodities or liquid products through jetties across Niger delta. The distribution strategy of petroleum products, the tank farm, road shipment/logistic distribution across the supply chain are all subdivision of the total logistic concept. Thus the study will be achieve on the basis of the total logistics concept.

2.1.2 Location Theory

The Weberian location theory is about cost minimization around triangles. The theory opines that the location of a facility should be based on minimum costs of transportation.

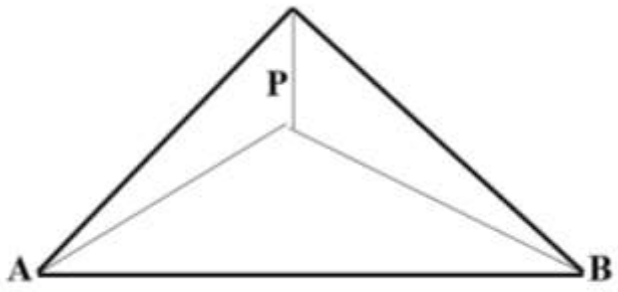

Figure 2.1 Location Theory

The location theory was modified from Adepoju (2020), the theory assumed that there are two places, A and B, from which materials are to be carried to market P. The theory suggests that the least cost of transportation between the two places is to be selected. Though the assumption of same cost of transportation for both materials and finished goods has been faulted about this postulation, it is still useful in port location and transportation feasibility studies (Okoko, 2006).

The inland ports/jetties cannot have the same potential to generate traffic in maritime logistics. According to Haezendonck and Notteboom (2002), it was observed that there are so many factors than can be responsible for the demand of a particular jetty. One of such factors is competition. Parola, et al., (2017), however, disagreed by saying that competition is different from competitiveness, in which the latter connotes the ability of the port/jetty to add value to generate more traffic than others.

Heaver et al., (2001) found out that location is one major factor that can affect inland waterways port development. In similar argument, Adepoju (2020) noted that marine transporters in developed nations are concerned with distance between origin and destination, loading hours, freight handling, trucking, and cost. Notteboom, et al., (2002) realized from their findings that there is a correlation between jetty size and terminal efficiency. According to Burns (2015), the main objective of jetty's strategic location may be based on generating income or a competitive advantage.

In practice, inland waterways maritime industry is volatile, characterized by unexpected fluctuations between the forces of demand and supply. Jetties are influenced by politics, trade agreements, currency, volatile trade prices, and security. The strategic location of a jetty can be based on local markets, the demand and supply of factors of production, transit areas like the Marina, Creek road jetties (Bonny, Bille, and Nembe), Abonnema jetty, NPA jetty Warri and boat building, etc. The logistics and location of a jetty must be properly guided by the transhipment location, dimension of the jetty, hinterland economic dimension, jetty efficiency dimension, and cost dimension**.**

The location theory is ideal as utilise in this study to explain the choice of jetty call by marine transporters, the Niger delta environment is blessed with notable ports and jetties along the major coastal towns of Port Harcourt, Warri, Calabar, Bonny, Oron and other smaller inland ports across the Niger Delta coastline. It is perceived between this jetties (as indicated in the theory as point A and B) that Rivers State jetties attract more boat traffic when compared with other jetties in the region. This imply that the choice of Rivers State jetties can be traced to lower freight cost, clearing charges, availability of equipment's, among other factors tend to influence the decision of marine transporters against other Niger delta jetties.

3.1 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) and Ukwusowa (2013).

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 3.1 List of Jetties for the Three Core Niger Delta States

S/N	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 3.2 Determination of Sample size

S/N	**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 3.3.

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.

Table 3.3: 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

The data obtained from the study survey were analysed descriptively using mean, and frequency.

Objective: Analysis of passenger's challenges on inland waterways transportation in Niger Delta.

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

4.1 Results and Analysis

Table 4.1: Copies of questionnaire administered to Respondents

S/No	Selected Jetties	Number of questionnaire 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*

4.1.1 Passenger's challenges in inland waterways transportation of Niger Delta.

Responses to the statements on Table 4.2 on Passenger's challenges in inland waterways transportation of Niger Delta revealed that the instability of transport fare makes inland waterways unattractive is the major passengers challenge as it ranks 1st with mean score of 2.90.

Ranking 2nd is Loss of luggage by passengers is a routine process in inland waterways transportation with mean score of 2.65. Figures revealed that 92 respondents strongly agree, 98 respondents agree, 67 respondents disagree and 69 respondents strongly disagree.

Statement 3: "Inadequate speed boats affect the transportation of passengers", 95 respondents strongly agree, 88 respondents agree, 65 respondents disagree and 78 strongly disagree yielding to mean score of 2.61 and ranking 3rd.

Statement 1 "Armed robbery activities in inland waterways transportation are high" ranks 4th with mean score of 2.51. 78 respondents strongly agree, 84 respondents agree, 89 respondents disagree and 75 respondents strongly disagree.

71 respondents strongly agree, 96 respondents agree, 77 respondents disagree and 82 respondents strongly disagree to statement 2 "Kidnapping activities in inland waterway transport is a major cause of concern for passengers" resulting to a mean score of 2.50 and ranking 5th.

Table 4.3 shows the total variance explained. The first column (Eigen value) reflects the number of extracted factors which were subjected to factor analysis as Eigen values greater than one (1) was considered reliable. The initial two components had Eigen values greater than one (1.409 and 1.059) which accounted for 49.348% of the variance (see column 6).

Table 4.4 showed the rotated component matrix which was used to identify the most dominant passenger challenge of inland waterways on transport/freight logistics. Factors above 0.5 were considered in the rotated component matrix which forms the basis of the analysis. Loadings in the first or principal component (1) with high correlations are considered very significant. Therefore, the major challenges of inland waterways on transport/freight logistics are instability of transport fare (0.692), armed robbery activities (0.605) and inadequate speed boats (-0.667). Nevertheless, loadings in the second component (2) are also significant with Kidnapping activities (0.818) and Loss of luggage by passengers (-0.652). Hence, the null hypothesis was rejected and we conclude that Passenger challenges of inland waterways measured by armed robbery activities, kidnapping incidences, inadequate speed boats, loss of luggage, and instability of transport fare have significant impact on transport/freight logistics in Niger Delta Region.

Table 4.2: Responses on Passenger's challenges in inland waterways transportation of Niger Delta.

S/N	Passengers challenges	SA (4)	A (3)	D (2)	SD (1)	Mean	Rank	Remark
1	Armed robbery activities in inland waterways transportation is high	78	84	89	75	2.51	4th	Agreed
2	Kidnapping activities in inland waterway transport is a major cause of concern for passengers	71	96	77	82	2.50	5th	Agreed
3	Inadequate speed boats affects the transportation of passengers	95	88	65	78	2.61	3rd	Agreed
4	Loss of luggage by passengers is a routine process in inland waterways transportation	92	98	67	69	2.65	2nd	Agreed
5	The instability of transport fare makes inland waterways unattractive	119	104	54	49	2.90	1st	Agreed

Source: *Researchers field survey, 2023*

Reject if mean score is greater than 2.50

Test of Hypothesis for Objective

H_{01}: Passenger challenges of inland waterways measured by armed robbery activities, kidnapping incidences, inadequate speed boats, loss of luggage, and instability of transport fare have no significant impact on transport/freight logistics in Niger Delta Region.

The Principal Component Analysis: The PCA is a technique first described by Pearson (1901) used to emphasize patterns in data while removing emphasis from randomness in the data. It is used to dimensionally reduce a data set so that dimensions that contribute the least variance are minimized and can be ignored.

By applying PCA to this objective we tend to identify which challenge of inland waterways on transport/freight logistics in Niger Delta Region is most dominant

The Varimax Kaiser Normalization method of Rotation was used for this study. Varimax looks at the percentage contribution of the variables as a conclusion.

Variables

x_1 = Armed robbery activities; x_2 = Kidnapping incidences; x_3 = Inadequate speed boats; x_4 = Loss of luggage; x_5 = Instability of transport fare;

Table 4.3: Result on Total variance of each component for objective

Total Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	1.409	28.171	28.171	1.409	28.171	28.171	1.367	27.335	27.335

2	1.059	21.177	49.348	1.059	21.177	49.348	1.101	22.014	49.348
3	.951	19.027	68.376						
4	.836	16.723	85.099						
5	.745	14.901	100.000						

Extraction Method: Principal Component Analysis.

Table 4.4: Rotated Component Matrix for objective 1

Rotated Component Matrix[a]

	Component	
	1	2
Armed robbery activities in inland waterways transportation is high	.605	
Kidnapping activities in inland waterway transport is a major cause of concern for passengers		.818
Inadequate speed boats affects the transportation of passengers	-.677	
Loss of luggage by passengers is a routine process in inland waterways transportation		-.652
The instability of transport fare makes inland waterways unattractive	.692	

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 3 iterations.

Source: SPSS Output, 2023

4.2 Discussion of Findings

Passenger's challenges in inland waterways transportation of Niger Delta.

Findings on this objective revealed that the major passenger challenges of inland waterways on transport/freight logistics are instability of transport fare, armed robbery activities and inadequate speed boats. This finding is in coherence with that of Odeh *et al* (2020) who identified that piracy/sea, robbery, cultism, smuggling, kidnapping and illegal oil bunkering were major types of security challenges that are common in the Bayelsa waterways as perceived by passengers.

5.1 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. The National Inland Waterways Authority (NIWA) should regulate the waterways operations so as to reduce the cost to the users of the waterways. Similarly, although the navy had been helping the agency in the area of growing security threats it is expedient that personnel of the armed forces put more effort so as to make water transport a choice transportation system in the country.
2. Stiffer punishment should be given to anyone involved in illegal bunkering activities.
3. 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.

References

Abubakar, A. I. (2012). Desk Officer, Water Transportation Unit, Federal Ministry of Transport, Abuja, Nigeria. Personal Communication.

Adepoju, O. O. (2020). New Seaport Development-Prospects and Challenges: Perspectives from

Apapa and Calabar Seaports, Nigeria. Retrieved from http://www.10.3390/logistics4020008

Aderemo, A. J. & Mogaji, S. A. (2010). "Rural Transportation of Public Facilities in Nigeria: a case study of Edu Local Government Area of Kwara State" *Journal of Human Ecology*, 29 (3), 171-179.

Adeyemo, A. M. (2008). Environmental Policy Failure in Nigeria and The Tragedy of Underdevelopment of Niger Delta Region. An inaugural lecture series No. 63 of University of Port Harcourt, Uniport press Ltd.

Agava (2019). Safety challenges in the inland waterways of Niger Delta in Nigeria. *IKOGHO: A Multi-disciplinary Journal.* 18 (1), 323-330.

Agava, L. (2019). Analysis of River Craft Safety Challenges in the Inland Waterways of the Niger Delta. A thesis submitted to the Centre for Logistics and Transport Studies, University of Port Harcourt.

Akpoghomeh O. S. (2008). Port administration and development in Nigeria: (Sea Port Control and Management) Publishers Plc, Ibadan.

Akpoghomeh, O. S. and Okorobia A.M (1999). The Effect of Environmental Constraints on the Development of Transport and Communication in the Coastal Niger Delta, J. App Sci. Environ Mgt. 2:55-58.

Akpoghomeh, O.S. (2000). River Craft Accidents and Safety in the Eastern Niger Delta Region of Nigeria. *Nigerian Geographical Journal. New Series 3:132-147.*

Akpoghomeh, O.S. (2012). The Terror of Transport and The Transportation of Terror. An Inaugural Lecture Series No. 94, University of Port Harcourt, Uniport press Ltd, Nigeria.

Alekhuogie, N. (2016). Enhancing Inland Waterways for More Efficient Transportation. Available at: https://www.thisdaylive.com/index.php/2016/05/13/.../

Amara, T. C. & Amaechi, A. E. (2010). *Manual of Research Methodology and Theses Writing, Revised Editions.* Aba: Ker Experts Books.

Azubuike, H. E. (2018). An Analysis of Inland Freight Distribution From Nigerian Seaports. A dissertation submitted to the Department of Transport Management, Federal University of Technology, Owerri.

Baroud, H., Barker, K., Ramirez-Marquez, J. E., & Rocco S., C. M. (2014). Importance measures for inland waterway network resilience. *Transportation Research Part E: Logistics and Transportation Review*, 62, 55–67.

Edward J. Bordi (2006) The supply chain and the economy in management of Transportation 'International student edition' Publisher Thomason by South Western.

Ezenwaji, E. E. (2010). Constraints on Effective Water Transportation in Some Riverine Communities of Old Anambra L.G.A., Anambra State. A paper Delivered at the 2010 Rural Development Seminar, Rural Transportation in Nigeria. 31st March to April 2010. Imo State University, Owerri.

Ezenwaji, E. E. (2012). Constraints on Effective Water Transportation in Some Riverine Communities of Old Anambra L.G.A., Anambra State. A Paper Delivered at the 2010 Rural Development Seminar, Rural Transportation in Nigeria. Imo State University, Owerri, 31st March to 1st April, 2010.

Haezendonck, E & Notteboom, T. (2002). The Competitive Advantage of Seaports. In Port Competitiveness: An Economic and Legal Analysis of the Factors Determining the Competitiveness of Seaports; Huybrechts, M., (Ed.), *De Boeck*: Antwerp, Belgium, 2002; pp.67–87.

Heaver, T., Meersman, H., & Van de Voorde, E. (2001). Co-operation and Competition in International Container Transport: Strategies for Ports. *Marit. Policy Manag*. *12*(28), 293–305.

Hekkenberg, R. (2016). Optimization of the dimensions of dry bulkships: The case of the river Rhine. *Maritime Economics & Logistics*, 18 (2), 211-229.

Madu, E. O (2016). Fundamentals of Logistics and Supply Chain Management. Mutimix Academy Ltd, Surulere, Lagos, Nigeria.

NIWA (2017) National Inland Waterways Authority, the law establishing NIWA gave it the following statutory roles. Retrieved from http/NIWA.gov.ng 15/12/2018; 08:11PM.

NIWA (2018) Retrieved from www.Lagostevision./com 3000-kilometres-Nigeria-waterways-navigable-Niwa 37/12/2019;09:28am.

Notteboom, T.; Coeck, C., & Van Den Broeck, J. (2002). Measuring and Explaining the Relative Efficiency of Container Terminals by Means of Bayesian Stochastic Frontier Models. *International Journal of Maritime. Economics*. *2000*(2), 83–106

Notteboom, T., (2008). Bundling of freight flows and hinterland network developments. In: R. KONINGS, H. PRIEMUS and P. NIJKAMP, eds, The Future of Intermodal Freight Transport, Operations, Technology, Design and Implementation. . Edward Elgaredn. Cheltanham, pp. 66-88.

Nze I, C. (2013), Analysis of the Fatality Rates of Boat and Ferry Accidents on Inland Waterways in Nigeria. International Organisation of Scientific Research (IOSR), Journal of Business and Management. Vol.11, Issue 2, May-June.

Nze, I.C. (2013) Analysis of the Fatality Rates of Boat and Ferry Accident on Inland Waterways in Nigeria. *IOSR Journal of Business and Management (IOSR-JBM);*112: 17-20.

Nze. C. and Emenike, G. (2016). Inland Waterways Operation and Hinterland Development in Nigeria. University of Port Harcourt Press Ltd, Port Harcourt, Nigeria.

Obed, B. C. (2013), A critical assessment of the Inland Waterways operations and management on the development of the Nigerian Maritime Industry Article. Greener Journal of Environmental Management and Public Safety ISSN: 2354-2276 Vol. 2 (2), pp. 099-107, February 2013. Email: bonmilnigerialimited@yahoo.com.

Obed, B.C.N (2013). A Critical Assessment of the Inland Waterways Operations and Management on the Development of the Nigerian Maritime Industry. *Greener Journal of Environmental Management and Public Safety*, 2(2), 99–107.

Obed, M. C. (2013). The Characteristics of Inland Water Transport in Nigeria. *IOSR Journal of Humanities and Social Science (IOSR-JHSS) Vol. 19, Issue 3, pp 119-126.*

Obeta, M. C. (2014), The Characteristics of Inland Water Transport in Nigeria. Journal Of Humanities And Social Science (IOSR-JHSS). Volume 19, Issue 3, Ver. IV (Mar. 2014), PP 119-126, e-ISSN: 2279-0837, p-ISSN: 2279-0845.www.iosrjournals.org.

Obeta, M.C. (2014). The Characteristics of Inland Water Transport in Nigeria. *Journal of Humanities and Social Science (IOSR-JHSS)* 19(3), Pp 119-126.

Obiora E. Madu (2019). Transport Infrastructure for Hinterland Connectivity. A paper presented at Chartered Institute for Logistics and Transport (CILT) Calabar branch. Multimix.com.ng.

Okoko, E. (2006). *Urban Transportation Planning and Modelling*; Millennium Publishers: Akure, Nigeria, 2006.

Okpe O. S. (2002). Inland water Port Headquarter Lokoja. "Exploring alternative circulation pattern in ports.

Owoputi A. Emmanuela, Paul I. Ifabiyib and Akpudo U. Chijioke (2018). *Opportunities and challenges of inland waterways transport in the southwest coastal belt of Nigeria, Bhúmi, The Planning Research Journal, Vol. 06, No.01, June, 2018.*

Parola, F., Risitano, M., Ferretti, M., & Panetti, E. (2017). The Drivers of Port Competitiveness: A Critical Review. *Transp. Rev.* 37, pp.116–138.

Rodrigue, J-P. (2017) The Geography of Transport Systems,(4th ed.). New York: Routledge. Retrieved from https://people.hofstra.edu/geotrans/eng/methods/ch5m1en.html

Rodrigue, J-P., Comtois, C., & Slack, B. (2013). The Geography of Transport Systems, (3rd ed.). London: Routledge. Retrieved from https://www.book2look.com/embed/9781136777394. https://www.routledge.com/The-Geography-of-Transport-Systems-3rd-Edition/Rodrigue-Comtois-Slack/p/book/9780203371183

Ugbebor, J.N. (2014) Modern Safety, principles and practice. Vertext media Limited, Ibadan, Nigeria.

Ukwusowa, M. P. (2013). Strategies for Managing Burnout among Principals of Public Senior Secondary Schools in Rivers State. PhD Dissertation, University of Port Harcourt, Port Harcourt.

UNCTAD (2019). *Review of Maritime Transport*. United Nations publication. Geneva.

UNDP, (2006). Niger Delta Human Development Report, UNDP, Abuja.