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Evincing the social and economic impact of inland waterways transportation in the development of the Port Harcourt metropolis

Abstract

Road traffic congestion has been decreased by using water transportation. The impact of inland waterways transportation on the socio-economic growth of Port Harcourt Metropolis was investigated in this essay. The study adopted a quantitative research approach using a cross-sectional survey design and employed a multi-stage sampling technique. The first stage involves identifying the locations of the jetties and navigable routes available in the metropolis. The second stage involves the listing of the jetties and navigable routes found within the study area which nine (9) jetties and navigable routes were identified. The third stage involves purposively selecting six (6) jetties out of the nine (9) jetties listed. The selected jetties and navigable routes include (Bonny/Bille/Nembe, Marine Base, Abonnema Wharf, Maccoba, Iwofe, and Akpos). The six (6) jetties were selected because of their frequent usage by commuters. The fourth stage involves randomly selecting 200 commuters who are using these jetties and navigable routes for sampling. Using a random sample technique, a structured questionnaire was designed and distributed to the commuters to acquire data for the study. Descriptive statistics (tables and charts) and inferential statistics were used to analyse the data set. Other sources of data for the study include direct observation and photographs to characterise the study area and inland waterways transportation development in the metropolis. The reason the study chose to focus on the commuters and boat operators is because the commuters and operators are individuals who commonly use inland waterways transportation systems. The study found that lack of funds, poor river basin dredging and canalisation, insufficient security and infrastructure, a lack of safety devices, and inadequate training of boat operators and drivers are among the issues and obstacles. Therefore, the study recommends that the government should support efforts to enhance boat service operations for sustainable modes of transportation to promote their use by more people and ease traffic on the roads.

Keywords: boat, jetties, passengers, inland water transportation, socio-economic impact

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Introduction

Transportation entails the movement of goods, people, and animals from one location to another. It is also the process of making the physical movement of objects easier for people from one location to another. Humans cannot function without movement because is a fundamental activity that must be carried out. Based on this necessity, and the pursuit of social and economic development through science and technology, human movement and transportation facilities are among the most significant human endeavours globally. Transport through inland waterways is the movement of goods and services along a river network.[1,2] Inland waterways transport is an additional mode of transportation in Nigeria. However, in Rivers State, most riverine communities are accessible through navigable waterways as it predominates other modes of transport.[3] Inland waterways transport is one of the most unobtrusive and environmentally friendly options for conveying goods and services because of the significant roles it played during the Industrial Revolution and the early spread of civilisation.[4]

Although the inland waterways transportation system is relatively underdeveloped and recent to Nigerians, there is an extensive network of streams, creeks, rivers, and coastal lagoons in Nigeria that offer enormous potential for the creation of an operative inland waterways transportation system in Nigeria and Rivers State in particular. The need for an inland waterways transport system engenders humans to enjoy the same commercial benefits as the ports which were more fortunate to be located at the seashores leading to the development of effective inland waterways transportation. This is because it has the unique advantage of being able to convey both commodities and humans to interior locations far from the seashore. At the same time, it is more economical because it can haul massive loads to longer distances.[5] Creeks, lakes, and rivers are naturally navigable inland waterways, in addition to the seaside, which uses ferries, boats, and other water-related vehicles to cater for mobility.

As originally envisioned by the British colonial masters, the initial motivation for the development of the colonial regime in Nigeria was to open up the interior hinterlands for resource exploitation and ease of access for administrative purposes hence, the development of inland waterways. It was to operate than other modes of transportation such as railways and roads. It is such that the rivers were intended to be a core component of the multimodal transport system in addition to road, train, and air operating from one tributary to another. After 59 years since their conception, the federal government's efforts to develop the nation's inland waterways transportation through the National Inland Waterways Authority (NIWA) with the dredging of the lower River Niger have been crippled by corruption and poor management.[6] The opportunities such as revenue generation and employment creation inherent in harnessing the potentials of the inland waterways transportation industry in Nigeria are lost daily, and experts have over the years expressed concerns about it.

Sea travellers globally enjoy having good times on sea and have come to believe that river travelling is both exciting and enjoyable. Others view travelling by boat as an alternative means to convey goods and services from one locality to another, across states, and international borders as a remarkable experience. Nigeria with

a thriving population supported by abundant and diverse natural resources has immeasurable and startling growth potential that is enough to provoke jealousy globally from other landlocked countries and countries with limited sources of inland waterways. Nigeria also possesses a long coastline that is supported by a thriving hinterland; and when these factors are applied to shipping, it simply means that with thoughtful planning, methodical growth, and political resolve, there are opportunities to achieve maritime power.

The social and economic development of some of the most difficult-to-access rural areas and the welfare of residents who fall among the lowest-income groups in the social ladder are greatly aided by the inland waterways transport system. Most of the outermost villages would be out-of-the-way or too expensive to service by other methods of transportation in the absence of rivers and other inland waterways transport systems. The opening up of many inland rivers encourages the distribution of goods and services and further serves as a feeder to larger ports. In addition to the use of jetties for shipping services, haulage, storage, and low-cost security, no country has adequate travellers to the extent of establishing itself as the only inland waterways hub in the area. Furthermore, the conditions to be met in the provision of an alternate port in the event of an emergency or security issues have a significant impact on shipping enterprises. The government of Rivers State needs a healthy and responsive inland waterways transportation infrastructure to maintain and improve economic viability, business growth, and productivity.[7] To maximally utilise the emerging technology-driven transportation system, there must be a deliberate policy of a nation to make critical investments that will engender its inland waterways transportation system to be the fulcrum of progress and prosperity. Inland waterways transportation systems are critical to contemporary civilisation since they have enormous economic advantages and minimal negative environmental consequences such as topographic changes, minimal usage of energy and resources, land pre-emption, less noise and air pollution.

As a fundamental economic activity, the inland waterways transportation system represents an efficient alternative for moving freight to engender the survival and continuous growth of the economy. There are a few requirements that must be met to establish an inland waterways transport system in Nigeria because the country has gateways with an excellent network of hinterland connections. These requirements are based on the knowledge that no one would consider treating such a crucially important sector as a good means of transport without the greatest care and consideration. Shipping, short sea, inland waterways, and coastal traffic are all sub-sections that deserve significant attention and research efforts. Inland waterways transportation is indispensable to the expansion and development of all other economic sectors including urban development and growth. Since it is essential to international trade, it also has significant contributions towards bringing various regions of the world closer together. Inland waterways transportation is essential for connecting the foreland to the hinterland and helps to fill in the gap left by land inadequacies of other modes of transportation in keeping up with emerging trends. The purpose of this study therefore is to evince the social and economic impacts of the inland waterways transportation system in the Port Harcourt Metropolis.

Study area

The Port Harcourt Metropolitan area in Rivers State, Nigeria, and a few chosen jetties and loading ports were the subject of this study. The decision of Port Harcourt was influenced by commuter movement and the accessibility of water transportation. It has a complicated nature of commuting within the metropolis characterised by significant traffic congestion and extended travel times. Port Harcourt Metropolis and its environs are located within Latitudes 4°05'30"N and 5°14'25"N and Longitudes 5°40'30"E and 7°11'01"E of the Greenwich Meridian (GM). Obio/Akpor and Port Harcourt City are the two most important local governments within the metropolis. The region is situated inside the sedimentary coastline formation of the Niger Delta. Due to its proximity to the Atlantic Ocean, the coastal city's atmosphere is influenced by the equatorial monsoon climate. The rainfall and temperature patterns in the city are influenced by both the maritime and continental air masses Figure 1–3.[8]

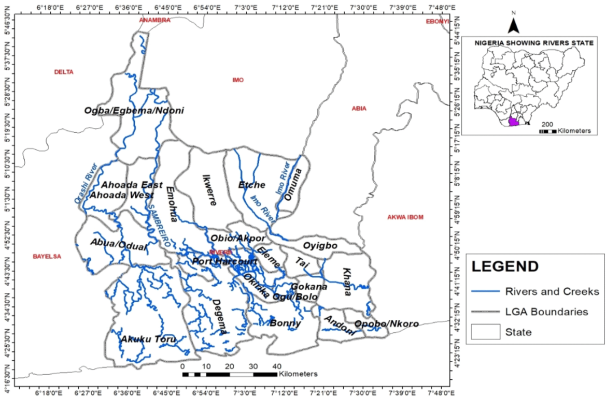

Figure 1 Map of Rivers State showing rivers and creeks and local government boundaries.

Source: Authors Analysis, 2024.

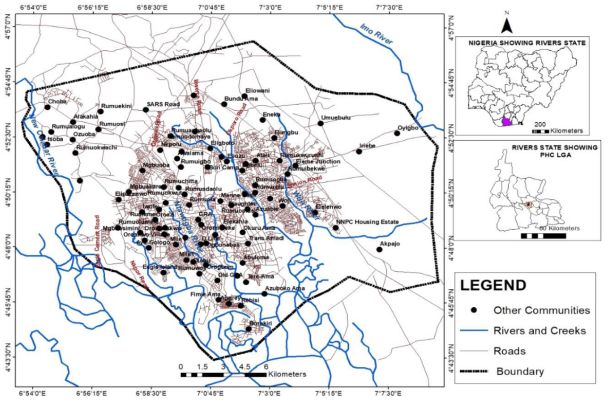

Figure 2 Map of Rivers State showing different communities and its rivers and tributaries.

Source: Authors Analysis, 2024.

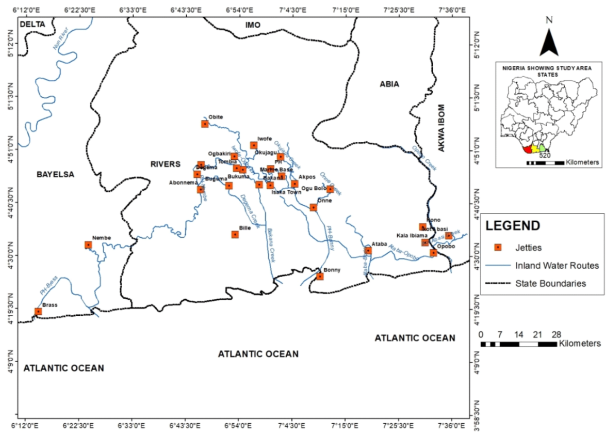

Figure 3 Map of Rivers State showing jetties in the study areas.

Source: Authors Analysis, 2024.

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Methodology

The study adopted a quantitative research approach using a cross-sectional survey design. The study employed a multi-stage sampling technique. The first stage involves identifying the locations of the jetties and navigable routes available in the metropolis. The second stage involves the listing of the jetties and navigable routes found within the study area which nine (9) jetties and navigable routes were identified. The third stage involves purposively selecting six (6) jetties and navigable routes (Bonny/Bille/Nembe, Marine Base, Abonnema Wharf, Maccoba, Iwofe, and Akpos) from the 9 jetties and navigable routes that were identified because of their frequent usage by commuters. The fourth stage involves randomly selecting 200 commuters who are using these jetties and navigable routes for sampling (Table 1). Using a random sample technique, a structured questionnaire was designed and distributed to the commuters in order to acquire data for the study. Descriptive statistics (tables and charts) and inferential statistics were used to analyse the data set. Other sources of data for the study include direct observation and photographs to characterise the study area and inland waterways transportation development in the metropolis. The reason the study chose to focus on this group is because the commuters and operators are individuals who commonly use inland waterways transportation systems.[9–11]

Table 1 Details of questionnaire distribution

Jetty	Sampling Frame	Sample Size (5%)
Bonny/Bille/Nembe	1407	70
Marine Base	501	25
Abonnema Wharf	768	38
Maccoba	557	28
Iwofe	263	13
Akpos	524	26
Total	**4020**	**200**

Source: Field Survey (2024).

Results

The socioeconomic characteristics of the passengers, the quantity of the jetties, and their perceptions of how often they use the ferry were examined. It started with the social and economic characteristics as the focus of the first segment. This was closely followed by the quantity of jetties and the opinions of the passengers on the frequency of using ferries as a mode of transportation were the main topics of the second section.

Gender distribution of passengers

From the available field data, it was found that (54.5%) of the passengers in the research area were men, as indicated in Table 2. The percentage of male passengers at Iwofe Jetty was the largest (66.7%) while that at Akpos was the lowest (44.0%). The proportion of female passengers using the inland boat shuttle was lower than the percentage of male passengers. Of all passengers, women make up 45.5% of the total. The Akpos jetty had the highest percentage of females (56.0%), while the Iwofe jetty had the lowest percentage (33.3%). This implied that males were more likely than females to utilise the water transport system to complete their daily tasks.

Marital status of passengers

Married couples are the top users of boat services across the six jetties in the study area, according to Table 3, which indicates marital status. Singles are the next most frequent users of boat services across all six jetties. This implied that fewer single people use the waterways, while much fewer widows, widowers, and separated people use the boat services to travel to their various places. Additionally, evidence demonstrates that married commuters are more likely to use boat services than singles and widows/widowers to employ the boat service to reach their destinations for financial reasons. Additionally, it is believed that employing boat service will save the married commuters money and time and allow them to reach their various destinations faster and further minimise the hours they would have been stuck in traffic using the roads.

Table 2 Gender distribution inland waterways transportation passengers

Jetty	Gender				Total
	Male	(%)	Female	(%)	
Bonny	37	52.9	33	47.1	70
Okrika	12	48	13	52	25
Bakana	23	60.5	15	39.5	38
Isaka	17	60.7	11	39.3	28
Iwofe	6	66.7	4	33.3	12
Akpos	11	44	14	56	25
Total	**108**	**54.5**	**90**	**45.5**	**198**

Source: Field Survey (2024).

Table 3 Marital status of passengers of passengers who use inland waterways transportation

Jetty	Marital Status				Total (%)
	Single	Married	Widow/ widower	Separated	
Bonny	22	41	1	6	70
Okrika	9	11	2	3	25
Bakana	11	21	4	2	38
Isaka	11	14	1	2	28
Iwofe	4	7	0	1	12
Akpos	6	17	1	1	25
Total	**63**	**111**	**9**	**15**	**198**

Source: Field Survey (2024).

Age distribution of passengers

Data from Table 4 indicates that commuters in the age cohort of 28 years to 37 years who used boats at all the jetties in the study area were more likely to utilise them to travel to various locations on the Island. A total of 55.7% of the respondents said they commuted by boat at Bonny, Bakana (55.3%), Okrika (52%) Iwofe (50%) Akpos (40%) and Isaka (39.3%) jetties. Whereas 22.2% of the respondents fall within the age cohorts of 38 years to 47 years commuted by boat to all six jetties in the study area.

Furthermore, the data from Table 4 indicates that in Isaka Jetty, 32.1% of the respondents were within 38 years – 47 years age cohort. This age cohort is like users in Iwofe (25%), Akpos (24%), Bakana (18.4%), Okrika (16%), and Bonny (7.6%). This analysis reveals that younger people within 28 years –37 years age cohorts in Bonny, which constitutes the modal age cohort (55.7%), used boat services to travel to Bonny and other diverse destinations in this study, while customers from Isaka in the 38 years – 41years age cohorts among the jetties ply the inland waterways in Port Harcourt metropolis to various locations on the Island in Rivers State at a lower rate (32.1%). Since Port Harcourt is the commercial hub of the metropolitan region, the analysis shows a correlation between the age cohorts of 38 years

– 47 years and 38 years – 41 years suggesting that more middle-aged commuters were more likely to access boat services. Therefore, starting daily commuting to get to their various destinations such as places of business, and other economic endeavours would attract more patronage to the inland waterways transport service.

Educational status of passengers

Available data in Table 5 indicates that commuters who have first degrees or their equivalent HND/BSc represent 62.1% of the respondents across the jetties in the study area and are more likely to use inland waterways for transportation. This group of commuters is closely followed by commuters with secondary school diplomas. Since the different destinations are located within the major business centres of the Port Harcourt Metropolitan area, it implies that HND holders were more likely to continue using the boat services to get to their places of employment. Additional information in Table 5 indicates that 19.7% of the respondents with secondary school diplomas used boat services to get to their various destinations in all the jetties. Another possibility is that working-class commuters favour the use of boat services because they think it gets them to their destinations faster, conveniently, and reliably.

Occupational distribution of boat passengers

Data from Table 6 indicates that 23.2% of the respondents in all six jetties who utilise boat services are traders. Overall, 31.8% of respondents in all six jetties of the study region used boats for their various private businesses. Students 11.1% of respondents in all the jetties of the study region use the boat service, followed by civil servants 22.2%, made up the remaining respondents in all the jetties. The main takeaway from this is that commuters who work for private businesses tend to use the boat services more frequently. This implies that the various locations included in the study are within the Port Harcourt Metropolitan commercial zone.

Table 4 Age distribution of passengers who use inland waterways transportation

	Age distribution										Total
Jetty	**<18 years**	**(%)**	**18-27 years**	**(%)**	**28-37 years**	**(%)**	**38-47 years**	**(%)**	**>47**	**(%)**	
Bonny	3	4.2	7	10	39	55.7	15	7.6	6	8.6	70
Okrika	2	8	3	12	13	52	4	16	3	12	25
Bakana	1	2.6	5	13.2	21	55.3	7	18.4	4	10.5	38
Isaka	1	3.6	4	14.3	11	39.3	9	32.1	3	10.7	28
Iwofe	0	0	1	8.3	6	50	3	25	2	16.7	12
Akpos	0	0	5	20	10	40	6	24	4	16	25
Total	**7**	**3.5**	**25**	**12.6**	**100**	**50.5**	**44**	**22.2**	**22**	**11.1**	**198**

Source: Field Survey (2024).

Table 5 Educational status of passengers who use inland waterways transportation

	Educational Status					Total
Jetty	**No Formal**	**Primary**	**Secondary**	**HND/BSc**	**Post-Graduate**	
Bonny	0	4.3%	14.30%	65.7%	15.7%	70
Okrika	0	0	20%	68%	12%	25
Bakana	2.60%	5.3%	28.90%	50%	13.2%	38
Isaka	0	3.6%	17.90%	75%	3.6%	28
Iwofe	0	8.3%	8.30%	58.3%	25%	12
Akpos	0	0	28%	52%	20%	25
Total	**0.50%**	**3.50%**	**19.70%**	**62.1%**	**14.1%**	**198**

Source: Field Survey (2024).

Table 6 Occupation distribution of passengers who use inland waterways transportation

	Occupation distribution												Total
Jetty	**FM**	**(%)**	**TD**	**(%)**	**PB**	**(%)**	**CS**	**(%)**	**ST**	**(%)**	**OT**	**(%)**	
Bonny	2	2.9	19	27.1	21	10.6	17	24.3	7	10	4	5.7	70
Okrika	0	0	4	16	9	36	11	44	1	4	0	0	25
Bakana	4	10.5	8	21.1	11	28.9	6	15.8	5	13.2	4	10.5	38
Isaka	1	3.6	7	25	9	32.1	3	10.7	6	21.4	2	7.1	28
Iwofe	0	0	3	25	6	50	2	16.7	0	0	1	8.3	12
Akpos	4	16	5	20	7	28	5	20	3	12	1	4	25
Total	11	5.6	46	23.2	63	31.8	44	22.2	22	11.1	12	6	198

Label: FM - Farming; TD - Trading; PB - Private business; CS - Civil Service; ST - Student; OT - Others.

Source: Field Survey (2024).

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Income distribution of passengers

Commuters using the boat services within the study area are significantly impacted by their monthly income. The data from Table 7 indicates that those boat users whose income falls between N51,001 and N70,001, represent a cumulative of 35.4% of the total respondents from the various study jetties. Also, respondents whose monthly income falls between N71,001 and N90,000 were close behind representing 23.2% of all respondents across all six jetties in the study area. In evaluating the boat service in Port Harcourt's inland waterways route, respondents who made between N30,000 and N50,000 (18.7%) in all study locations were also highly significant.

Characteristics of Inland Waterways Transport System in the Port Harcourt Metropolitan Region

The opinions of respondents on inland waterways transportation are displayed in Table 8. The study discovered that when the criterion mean was 2.5 or higher, the following factors were all above the criterion mean of -/+2.50: Jetties facilities age (3.2), Poor security network/architecture (3.5), Political Influence (3.4), Underutilisation of inland waterways (3.3), Poor maintenance of facilities (2.6), as well as Facilities easily accessible (2.5), indicating a high negative impact on the characteristics of inland waterways transportation in Port Harcourt Metropolis. The following considerations, however, were all disregarded: Water safety devices/buoyance aids (2.3), Professional skilled employment (2.1), Adequate facilities (1.7), and Sufficient jetties (1.6). The overall mean of 2.6 indicates that the Port Harcourt inland waterways system has poor features.

Evincing the significant social and economic impact of inland waterways transportation on the Port Harcourt Metropolitan Area

Available data in Table 9 indicates a breakdown of the various variables that may have influenced the social and economic impacts of inland waterway transportation in the Port Harcourt Metropolitan area. These variables engender the conclusion that respondents believe that the creation of jobs, businesses, and other strands of income had the greatest impact on the study area, with a mean score of 3.5, followed closely by the creation of jobs within the community by fuel stations located close to jetties and terminals which was represented with a mean score of 3.0. However, inland waterways transportation has an average mean on the social and economic impact of 3.3. Other impacts of inland waterway transportation have mean values above the median job creation, business/income generation, import and export, raises in the living standards, boost food security and tourism in communities along navigable rivers, boat builders are essential in the reduction of the cost of transportation, Jetties also serve as meeting places for other businesses, inland water transit generates employment for cargo handlers, and fuel stations located near those jetties and ports further generate employment locally. With an aggregate grand mean of 3.3, all the parameters were more than the criteria mean of -/+2.50.

Table 7 Income distribution of passengers who use who use inland waterways transportation

	Income Distribution (Naira)					Total (%)
Jetty	**<N30, 000**	**N30, 000-N50,000**	**N51,000-N70,000**	**N71,000-N90,000**	**>N91, 000**	
Bonny	4.30%	24.30%	27.10%	14.30%	30%	70
Okrika	4%	8%	44%	28%	16%	25
Bakana	5.30%	15.80%	34.20%	26.30%	18.40%	38
Isaka	0	25%	32.10%	35.70%	7.10%	28
Iwofe	0	16.70%	58.30%	25%	0	12
Akpos	16.00%	12%	44%	24%	4.00%	25
Total	5.10%	18.70%	35.40%	23.20%	17.70%	198

Source: Field Survey (2024).

Table 8 Characteristics of inland waterways transport according to the passengers who use inland waterways transportation

ITEM	SA	A	D	SD	Total	SWV	Mean	Remark	Rank	$x-\bar{x}$	$(x-\bar{x})^2$
	4	3	2	1							
Adequate facilities	28	57	158	93	198	336	1.7	Rejected	9th	-0.9	0.81
Sufficient Jetties	16	6	210	87	198	319	1.6	Rejected	10th	-1	1
Jetties Facilities aged	284	336	14	8	198	642	3.2	Accepted	4th	0.6	0.36
Facilities Easily Accessible	168	180	102	45	198	495	2.5	Accepted	6th	-0.1	0.01
Waterway under Utilised	332	309	8	8	198	657	3.3	Accepted	3rd	0.7	0.49
Professional Skilled Employed	48	141	182	48	198	419	2.1	Rejected	8th	-0.5	0.25
Facilities poorly Maintained	216	129	124	39	198	508	2.6	Accepted	5th	0	0
Water safety gadgets/buoyance aids	136	123	156	45	198	460	2.3	Rejected	7th	-0.3	0.09
Political Influence	420	237	12	8	198	677	3.4	Accepted	2nd	0.8	0.64
Poor security network	444	228	10	6	198	688	3.5	Accepted	1st	0.9	0.81
Total							**26.2**				**4.46**
Average mean							**2.6**				

Key: SA – Strongly Agree; A -Agree; D -Disagree; SD -Strongly Disagree; SWD - Sum of Weighted Value

Source: Field Survey (2024).

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Table 9 Social and economic impact of inland waterways transportation on Port Harcourt Metropolis

Item	SA	A	D	SD	Total	SWV	Mean	Remark	Rank	$x-\bar{x}$	$(x-\bar{x})^2$
	4	3	2	1							
Creation of Job, Business/income	416	273	4	1	198	694	3.5	Accepted	1st	0.2	0.04
Promote tourism	368	267	24	6	198	665	3.4	Accepted	4th	0.1	0.01
Import & Export	420	237	12	8	198	677	3.4	Accepted	2nd	0.1	0.01
Food security	316	276	32	11	198	635	3.2	Accepted	5th	-0.1	0.01
Improves standards of living	388	267	12	6	198	673	3.4	Accepted	3rd	0.1	0.01
Boat builders are necessary in riverine communities	332	213	76	6	198	627	3.2	Accepted	6th	-0.1	0.01
Jetties serve as meeting points for other businesses	284	252	70	8	198	614	3.1	Accepted	8th	-0.2	0.04
Inland water transport creates jobs for cargo handlers	288	234	78	9	198	609	3.1	Accepted	9th	-0.2	0.04
Fuel stations situated close to jetties/terminals create jobs in the community	276	225	80	14	198	595	3	Accepted	10th	-0.3	0.09
Reduction in transportation cost	324	216	80	5	198	625	3.2	Accepted	7th	-0.1	0.01
Total							**32.5**				**0.27**
							3.3				

Key: SA – Strongly Agree; A -Agree; D -Disagree; SD -Strongly Disagree SWD - Sum of Weighted Value

Source: Field Survey (2024).

Challenges of Inland Water Transportation System in Port Harcourt Metropolis

Table 10 reveals that the respondents' impression of the difficulties with the inland water transportation system in the study area has a mean of 3.4 and a standard deviation of 2.1. The average mean, however, is 2.9. These challenges range in difficulty by 1.3. In the area, effects with a mean above the median are regarded as being extremely severe. Lack of funding from the government or NGO involvement, poor river dredging, inadequate security, inadequate infrastructure, a lack of safety devices and proper training for boat drivers and operators, poor quality of vessels/unsafe vessels, overloading, and an insufficient number of water vessels are among the impacts with high severity, with corresponding mean values of 3.4, 3.4, 3.4, 3.2, 3.0, 2.6, and 2.6, respectively. Effects that met the threshold of 2.5, however, were acknowledged and rated accordingly, while those that did not were disregarded.

Measures to address the challenges of inland waterway transportation in Port Harcourt Metropolis

The result of the study reveals the opinion of most respondents regarding the solutions to the challenges of inland waterways transportation in the study area. The maximum mean of 3.5 is represented by respondents whose perceptions tilt towards the provision of transportation infrastructure facilities in the research area. The lowest mean of 3.1 is represented by respondents who thought about proper maintenance of existing facilities. The mean is 3.3 on average. The range of severity for solutions to inland-water transportation issues is, however, 0.4. In the area, effects with a mean above the median are regarded as being extremely severe. With an aggregate grand mean of 3.3, all the parameters did, however, exceed the criterion mean of -/+2.50 Table 11.

Table 10 Challenges of Inland water transportation system in Rivers State

ITEM	SA	A	D	SD	Total	SWV	Mean	Remark	Rank	$x-\bar{x}$	$(x-\bar{x})^2$
	4	3	2	1							
Overloading	224	144	116	36	198	520	2.6	Accepted	7th	-0.3	0.09
Lack of funding from the Government/NGO Involvement	420	237	12	8	198	677	3.4	Accepted	1st	0.5	0.25
Inadequate infrastructural facilities	284	336	14	8	198	642	3.2	Accepted	4th	0.3	0.09
Poor dredging of the river	388	267	12	6	198	673	3.4	Accepted	2nd	0.5	0.25
Insufficient Number of Water Vessels	216	129	124	39	198	508	2.6	Accepted	8th	-0.3	0.09
Poor Quality of Vessels/Unsafe Vessels	276	225	80	14	198	595	3	Accepted	6th	0.1	0.01
Inadequate Security	368	267	24	6	198	665	3.4	Accepted	3rd	0.5	0.25
High Cost of Transport	48	141	182	48	198	419	2.1	Rejected	10th	-0.8	0.64
Lack of safety gadgets and proper training of boat operators and drivers alike.	316	276	32	11	198	635	3.2	Accepted	5th	0.3	0.09
Floating logs and debris in the river especially the navigable waters.	136	123	156	45	198	460	2.3	Rejected	9th	-0.6	0.36
Total							**29.2**				**2.12**
							2.9				

Key: SA – Strongly Agree; A -Agree; D -Disagree; SD -Strongly Disagree SWD - Sum of Weighted Value

Source: Field Survey, 2024.

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Table 11 Measures to address the challenges of Inland Waterways Transportation in the Port Harcourt Metropolitan Area

ITEM	SA	A	D	SD	Total	SWV	Mean	Remark	Rank	$x-\bar{x}$	$(x-\bar{x})^2$
	4	3	2	1							
Provision of Transportation Infrastructural Facilities	428	264	4	1	198	697	3.5	Accepted	1st	0.2	0.04
Route safety and monitoring gadget	436	252	6	2	198	696	3.5	Accepted	2nd	0.2	0.04
Adapt Professional skills/retraining	408	255	14	6	198	683	3.4	Accepted	5th	0.1	0.01
Adequate Funding by Government	416	273	4	1	198	694	3.5	Accepted	3rd	0.2	0.04
Public Enlightenment	384	240	26	9	198	659	3.3	Accepted	6th	0	0
Strengthening the security architecture	356	225	40	14	198	635	3.2	Accepted	8th	-0.1	0.01
Dredging and canalization of shallow waters	436	237	14	3	198	690	3.5	Accepted	4th	0.2	0.04
Implementation of Cabotage Law	356	219	70	1	198	646	3.3	Accepted	7th	0	0
Private Sector Involvement	340	207	62	9	198	618	3.1	Accepted	9th	-0.2	0.04
Proper Maintenance	324	201	80	10	198	615	3.1	Accepted	10th	-0.2	0.04
Total							**33.4**				**0.26**
							3.3				

Key: SA – Strongly Agree; A -Agree; D -Disagree; SD -Strongly Disagree; SWD - Sum of Weighted Value

Source: Field Survey, 2024.

Discussion of findings

The data presented in Table 2 indicates significant gender variations in passenger distribution across different jetties in the research area. Iwofe Jetty stands out with the highest percentage of male passengers (66.7%), while Akpos has the lowest (44.0%). Conversely, Akpos Jetty has the highest percentage of female passengers (56.0%), and Iwofe Jetty has the lowest (33.3%). The overall pattern suggests a notable gender imbalance in water transportation usage for daily tasks, with many passengers being men. This could be influenced by various factors such as job locations, commuting patterns, or cultural aspects that may lead males to be more inclined towards utilizing water transport. It's important to consider the socio-economic and cultural context of the research area to better understand the reasons behind these gender-based disparities in water transportation preferences. Further investigation to identify factors influencing these patterns would provide valuable insights into the dynamics of daily mobility in the region.[3]

The information from Table 3 suggests a clear trend in boat service usage among different marital statuses. Married couples emerge as the primary users, likely driven by both convenience and financial considerations. The data implies that singles, widows, widowers, and separated individuals are less inclined to utilize boat services, possibly due to factors such as alternative transportation preferences or less reliance on waterways. The financial aspect seems pivotal, with married commuters being more likely to choose boat services for economic reasons. This could be attributed to the perception that using boats is a cost-effective and time-saving alternative to conventional commuting, especially considering the potential reduction in time spent in traffic.[3] However, the specifics of why married couples find boat services financially advantageous are not entirely clear from the provided information. It might be related to reduced commuting time, lower overall transportation costs, or other factors not explicitly mentioned in the text. Further analysis of additional data could provide a more comprehensive understanding of the dynamics at play.

The provided information suggests a correlation between age cohorts and the utilisation of boat services at different jetties in the research region. Commuters within the 28 years to 37 years age cohorts especially in Bonny, show a higher likelihood (55.7%) of using boats to travel within the study area. Meanwhile, respondents age cohorts of 38 years to 47 years, particularly at the Isaka Jetty exhibit a lower rate (32.1%) of using boats. The analysis hints at a potential link between age and commuting preferences, with the younger population favouring boat services, possibly for convenience or other reasons. Moreover, the connection between the 38 years - 47 years age cohorts and increased boat usage suggests that middle-aged individuals are more inclined to access these services, likely for daily activities such as commuting to offices or places of business in the commercial hub of Port Harcourt. This correlation between age brackets and boat utilisation could have implications for transportation planning and service promotion, emphasising the importance of understanding demographic preferences to tailor services effectively.[3]

The data indicates a correlation between education level and the likelihood of using inland waterways for transportation in the study area. HND and BSc holders, comprising 62.1% of respondents, are more inclined to utilize boat services, possibly due to the central business locations in metropolitan Rivers State. This implies a connection between higher education and commuting patterns. Furthermore, the proximity of secondary school diploma holders in boat service usage, particularly in major business centres, hints at varied preferences among education groups. The data from Table 5, indicates that 19.7% of respondents with secondary school diplomas using boat services, adds nuance to this trend. The speculation about HND holders continuing to use boat services for employment transportation aligns with the idea that working-class commuters might prioritise the speed, convenience, and reliability offered by boat services. This suggests a multifaceted relationship between education, occupation, and transportation choices in the research area.[3]

The data from Table 6 indicates the income distribution among passengers of which 23.2% of respondents who use boat services across all six jetties are traders, while 31.8% use boats for private businesses. Notably, students (11.1%) and civil servants (22.2%) constitute the remaining users. The key observation is that those employed in private businesses are the primary boat service users, suggesting a concentration of such businesses in the study region. This implies a commercial hub within Metropolitan Port Harcourt, with most workers in the central business district engaged in private enterprises. The income distribution among passengers significantly influences boat service utilization in the Port Harcourt inland waterways. Notably, those earning between N51,001 and N70,001 form the largest user group, comprising 35.4% of total respondents. The income bracket of N71,001 to N90,000 closely follows,

accounting for 23.2%. Interestingly, respondents earning between N30,000 and N50,000, constituting 18.7%, also play a notable role in evaluating boat services. Table 6 highlights those traders and those with incomes exceeding N90,000 (17.7%) are prominent users, while those earning less than N30,000 (5.1%) show lower utilization. This income-based analysis sheds light on the diverse user dynamics impacting boat services in the region.

The findings from Table 8 suggest that several factors related to inland waterways transportation in the Port Harcourt Metropolitan Area have a significant negative impact. Notably, issues such as the age of jetty facilities, poor security network/architecture, political influence, underutilization of inland waterways, and poor maintenance of facilities were identified as having a considerable negative effect, as reflected by their criterion mean scores above 2.5. Conversely, certain considerations, including water safety devices/buoyance aids, professional skilled employment, adequate facilities, and sufficient jetties, were disregarded due to criterion mean scores below 2.5. This implies that respondents did not perceive these factors as having a substantial impact on inland waterways transportation in the region. The overall mean of 2.6 indicates a generally poor assessment of the features of Rivers State's inland waterways. It suggests that the combination of factors assessed, on average, contributes negatively to the effectiveness and efficiency of inland water transportation in the state.[3] Further analysis and targeted interventions may be necessary to address the identified challenges and improve the overall state of inland waterways in Rivers State.

The data presented in Table 9 evinces the significant social and economic impact of inland waterways transportation on the Port Harcourt Metropolitan Area. This assertion represents the highest mean score of 3.5 which indicates a strong belief in the creation of jobs, businesses, and income as the most influential factor. It is followed closely by the creation of jobs in the community such as fuel stations near jetties and terminals, with a mean score of 3.0.

Outstandingly, the overall average mean score for the social and economic impact of inland waterway transportation is 3.3, surpassing the median. Succinctly put, the mean values above the median include job creation, business/income generation, import and export facilitation, improvement in living standards, enhanced food security, and promotion of tourism in riverside communities. Boat builders play a vital role, emphasizing the interconnectedness of various sectors. Notably, the aggregate grand mean of 3.3 for all parameters surpasses the criteria mean of +/-2.50, indicating a collective positive perception of the socio-economic effects of inland waterway transportation. This suggests a consensus among respondents that the benefits, such as reduced transportation costs, employment generation, and local business opportunities, outweigh potential drawbacks.[3] In conclusion, the study underscores the multifaceted positive impact of inland waterways transportation in Rivers State, highlighting its role in fostering economic growth, community development, and employment opportunities.

Table 10 presents data on respondents' impressions of challenges with the inland water transportation system. The Mean of 3.4 and a standard deviation of 2.1 indicate a varied response among participants. The overall average mean of 2.9 suggests a moderately challenging perception. Challenges with mean values above the median (considered extremely severe) include lack of government or NGO funding, poor river dredging, inadequate security, and insufficient infrastructure, all scoring 3.4. Additionally, issues like a lack of safety devices and proper training (mean 3.0), poor quality or unsafe vessels (mean 2.6), and overloading (mean 2.6) are noted with high severity. The 1.3 range in difficulty highlights the diversity in respondents' views. Effects meeting the 2.5 thresholds were acknowledged and rated, while those below were disregarded, emphasizing a selective approach to assessing challenges. In summary, the findings reveal a nuanced perspective on inland waterways transportation difficulties, with certain issues standing out as notably severe according to respondents' mean ratings.

The study indicates a diverse range of opinions among respondents regarding solutions to inland-water transportation issues in the study area. While transportation infrastructure facilities received the highest mean of 3.5, proper maintenance had the lowest mean of 3.1, resulting in an average mean of 3.3. The narrow range of severity, only 0.4, suggests relatively consistent views among respondents. It's noteworthy that the mean of 3.3 exceeds the criterion mean of -/+2.50, indicating a generally positive perception of the proposed solutions. However, the study emphasises that even though the aggregate grand mean is 3.3, there is variation among specific parameters. The categorisation of effects with a mean above the median as extremely severe provides a qualitative assessment, highlighting areas of particular concern. It would be valuable to explore the nuances behind these perceptions through qualitative methods or further analysis to gain a deeper understanding of respondents' perspectives. In conclusion, the study provides valuable insights into the perceived effectiveness of solutions to inland-water transportation issues, emphasising the importance of both infrastructure facilities and proper maintenance, while acknowledging the need for nuanced considerations within these broad categories.

Conclusion and recommendations

Inland waterway transportation's effects on Rivers State's socioeconomic growth were investigated in this study. It was discovered that the inland waterways were characterised by shoddy maintenance, outdated jetties, and political influence. As a result of the poor supply of jetties and other necessary infrastructure, the capacity of the water mode of transportation was significantly reduced. The importance of inland waterways transportation in the socioeconomic development of the Port Harcourt Metropolitan area, even with its subpar infrastructure, cannot be overstated. The area's increased mobility has been a significant contribution made by inland water transportation. Jetties served as meeting places for other businesses thereby creating jobs for cargo handlers, and fuel stations located close to jetties/terminals also created jobs for the communities within the study area. In addition, it reduced the cost of transportation, improved the standard of living, promoted tourism, increased food security, and brought smiles to the faces of boat builders.

Additionally, the frequency with which commuters who travel by water utilise it suggests that a larger percentage of the population may eventually choose to use it. However, several areas need attention, including a lack of funding, subpar dredging and canalisation of the river basin, insufficient security and infrastructure, a lack of safety devices and adequate training for both boat drivers and operators, poor quality and unsafe vessels, overloading and an insufficient number of water vessels, safety-related issues, and poor security near jetties are the main obstacles that may deter younger generations. To dramatically increase its capacity to fully complement the road transport mode, water transportation must receive more attention from the government and the commercial sector, even though it has immense promise in the area. A larger investment in the infrastructure of water transportation and the provision of contemporary vessels could aid this. Infrastructure for transportation must be provided, routes must be safe and monitored, there must be adequate funding from the government, shallow waters

must be dug up and canalized, professional skill/retraining must be adopted, the public must be educated, the cabotage law must be put into effect, the security architecture must be strengthened, and there must be proper maintenance.

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Conflicts of interest

The author declares there is no conflict of interest.

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