OPERATIONAL PERFORMANCE OF INLAND WATER TRANSPORT IN MOKWA LOCAL GOVERNMENT AREA, NIGER STATE

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Abstract

Inland water transport (IWT) is a major mode of transport for a significant population of the country, Nigeria, especially for those residing in riverine areas. The performance of the IWT services plays an important role as it determines the efficiency and effectiveness of the IWT in achieving its mobility aims. This study accesses the operational performance of IWT in Mokwa Local Government Area (LGA) of Niger state. The study further explores the influence of safety practices on operational performance of IWT. Adopting a descriptive survey research design, the study adopts a quantitative method, relying on data collected using structured questionnaires administered to the users of IWT services. The responses were coded and analysed using mean average, standard deviation and regression analysis. The findings revealed that IWT services performance in Mokwa LGA was moderate. However, the system is faced with some challenges and deficiencies such as safety, overloading and reliability of service. The finding further revealed that adherence to safety practices had a significant influence on the operational performance of the IWT system. The study recommended that government's focus should be directed to implementation of safety laws, the supply of proper safety gear, and the periodic maintenance of ships and infrastructure.

Keywords: *Inland Water Transport, Operational Performance, Safety Practices, Service Reliability, Mokwa LGA*

Introduction

Inland water transportation (IWT) is a mode of transport that offers cheap, energy efficient, safe and environmentally friendly alternative to mobility needs of people in riverine areas. According to Sriraman as cited by Udechukwu and Mobolaji (2020), inland water transportation (IWT) is a component of water transportation concerned with the transportation of people or goods within national territories using watercrafts such as

pontoons, river ferries, and boats over a body of water, such as a lake, river or canal. It is an unobtrusive and environmentally friendly alternative for the movement of people and goods, which played significant role in the spread of civilisation and industrial revolution (Ogboeli *et al.*, 2024)

IWT is one of the major modes of transportation in Nigeria, with a reach that cuts across 20 out of the 36 states of the federation. The IWT has a total length of 8600 kilometres and a coastland of 852 kilometres making it the second longest waterways in Africa (Ezenwaji, 2010). The significance of IWT in Nigeria, asides its impact on the economy, is its ability to satisfy the mobility needs in most riverine areas where other modes of transportation are either unavailable, inaccessible or unaffordable. According to Akpudo *et al.*, (2022), the areas surrounding the Nigerian waterways represents the nation's most important agricultural and mining regions, which are two important sectors of the Nigerian economy.

In Mokwa Local Government Area of Niger State, IWT is a major mode used by mostly rural dwellers living in riverine communities. These communities depend largely on boats and canoes for their daily travel and trade. However, despites its important role, the operational performance of water transport in these areas remains far from optimal as there are indications of operational challenges such as poor infrastructure, low level of maintenance, lack of standardization and adherence to safety practices. Akpudo (2021) pointed out that an increase in the adoption of water transportation has created some as challenges especially in the areas of accidents or mishaps leading to loss of lives and properties, thereby raising concerns about the sustainability and safety of water transportation in the state. In order to enhance the efficiency and effectiveness of water transportation in Niger state, this study seeks to assess the operational performance of inland water transportation in Mokwa LGA. Specifically, the study explores the reliability, safety, efficiency of IWT as well as the influence on safety practices on operational performance of IWT in Mokwa LGA.

Literature Review

The Concept of Inland Water Transportation

The inland waterway transportation (IWT) system is playing a growing part in the trade and business of both developed and emerging countries, especially with rise in container in barge transportation which allows intermodal transportation (Bu & Nachtmann, 2023). Some industrialised nations are motivated to revive inland canal transportation due to global worries about climate change and traffic congestion on the highways (Wang and Li, 2012).

According to Aderamo and Mogaji (2020), inland waterways is a broad term used to refer to water bodies such as navigable rivers, lakes, coastal creeks, lagoons, and canals. As part of water transportation, inland water transportation (IWT) refers to the movement of people and goods within national borders by watercrafts including boats, pontoons, and river ferries over a body of water, such as a lake, river, or canal (Akpudo & Stephens, 2020). Inland port and terminal operators, shippers, vessel operators, skippers, truck operators for pre-

and end-haulage, and logistics service providers are often among the actors involved in IWT processes. The importance of IWT to the Nigerian socio-economic and political sectors cannot be overlooked, as it facilitates trade, population mixing, and sub-regional integration, (Akali and Idoko, 2010).

Water Transportation in Nigeria

Inland water transport (IWT) in Nigeria is one of the major modes of transport especially in riverine areas with navigable stretching to about 8600km, making Nigeria, as a country with one of the most expansive inland water networks in Africa (Ahmad *et al.* 2022). Despite its geographical advantage, it remains one of the most underdeveloped modes of transport unlike the road or air transport modes. The industry is plagued by several challenges ranging from inadequate infrastructure, policy neglect and safety concerns.

Historically, IWT has played a major role in precolonial and colonial eras of the country as it served as a major means of transportation, especially in the Niger Delta region. Its role in the modern era has only doubled, extending to promoting socio-economic activities such as agricultural production, trade, tourism and providing employment opportunities (Jatau *et al.* 2023). However, the potential of IWT to complement other modes of transportation has remained largely untapped due to poor funding, lack of adequate infrastructure and inconsistent regulatory framework.

Empirical Review

Dapa *et al.* (2024) assessed the dynamics of inland water transportation in Port Harcourt, Nigeria. Seven (7) rivers namely Abutoru creek, Dockyard creek, Victory creek, Okubiakiri creek, Ajugo river, Nembe waterside and Abonnema waterfront were the focus of the study. The study adopted a survey research design utilizing structured questionnaire for data collection. The study population comprise of head of households within the seven communities closest to each of the seven rivers. A total of 384 heads of households served as the sample size for the study. A mix of snowballing and convenience sampling technique was adopted to locate respondents, with each community being allocated a sample size of 55, except one that was allocated 54. Descriptive statistics was adopted for data analysis. The findings revealed that inland water ways operated as a passenger, freight, recreational and industrial mode of transport. Majority of the boats were outboard speedboats with very few hand-paddled canoes. The Inland water transport (IWT) was utilized for business, social, religious and educational purposes. In fact, about 60% of respondents agreed that IWT was a dependable mode of transport. It was further revealed that there was a high level of connectivity between jetties and road indicating availability and avenue for intermodal or multimodal transportation. IWT had significant social and environmental impact as it helps reduce reliance on road transport thereby reducing congestion while also servings as source of livelihood for residents and workers. The study however, noted that IWT had very poor service perception among users, with

75% of respondents giving low ratings raging from 'fair' to 'very bad'. The study recommended that adequate infrastructures such as docking, terminals and navigational aids should be provided.

Jatau *et al.* (2023) investigated the socio-economic benefits of the IWT system in Nigeria utilising a quantitative research design, relying on secondary data sourced from the Nigeria Inland Waterways Authority (NIWA). Findings from the study revealed that IWT had socio-economic benefits with noted influence on trade facilitation, creation of job opportunities, resulting in wealth creation and reduction in poverty. The study further noted that IWT had significant positive impact on national development through the enhancement of infrastructure and improvement of citizens' wellbeing. It was also noted as a sustainable mode of transport that helped in the reduction in carbon emission due to its ability to reduce pressure on other modes of transport like rail and road by diverting traffic. The study concluded that IWT had the potential to promote massive socio-economic and national development in Nigeria. The study therefore, recommended that attention should be diverted to the development of IWT through the prioritisation of the IWT development during budget allocation.

Roso *et al.* (2020) examined the drivers and barriers to the adoption of IWT in Sweden using a benchmark case in Netherlands. The study adopted a qualitative case study research design, relying on qualitative data collected through reference group meetings, semi structured interview, site visits and literature review. Key stakeholders from a total of eight companies were interviewed and collected data were analysed using thematic analysis. Findings from the study revealed that the key drivers for IWT were reliability of the mode, safety, sustainability, cheapness, economies of scale as well as its ability to reduce congestion in other modes of transport. However, the study noted that the major challenges and barriers to IWT were high investment cost, poor hinterland connectivity, slow pace of development, longer delivery times, administrative complexity as well as resistance to change. The study recommended increased government support and subsidy for IWT infrastructure and operation as well as awareness campaign of the potential benefits of IWT to stakeholders.

From the mainland China, He *et al.,* (2017) measured water transport efficiency in the Yangtze River Economic Zone (YREZ) from 2003 to 2011. They conducted spatial analysis to identify the leading factors influencing efficiency; and provided scientific evidence for a macroscopic grasp of water transport development and optimization of YREZ. Data Envelopment Analysis (DEA) and the Malmquist Index were used as a model framework. The research came up with the following results: the water transport technical efficiency (TE) in the YREZ is low and in fluctuating decline; the spatial pattern of TE has gradually changed from complexity and dispersion to clarity and contiguity; and the water transport efficiency has slightly improved through technological change. The authors recommended that decision-makers should consider strengthening intra-port competition and promoting water transport efficiency.

Methodology

This study, conducted in Mokwa LGA of Niger state adopted a descriptive research design. The population of the study comprised of 11, 150 weekly users of IWT in four major IWT ports located in some selected villages in Mokwa LGA. The ports are *Gbajibo, Poluwaya, Bukka-GunguZaki,* and *Gbajibo Modi* villages. A total sample size of 371 users was calculated using Krejcie and Morgan (1970) sample size formular. This was distributed across the different villages using Bowley's proportion to achieve 186 users in *Gbajibo;* 23 users in *Poluwaya;* 35 users in *Bukka-GunguZaki* and 127 users in *Gbajibo Modu*. These ports were selected due to the high level of IWT activity originating and terminating therein. Primary data was collected from users of IWT using structured questionnaires administered at points of departure, in transit or arrival. Collected data were analysed using descriptive and inferential statistics. Descriptive statistics involved the use of mean average and standard deviation while regression analysis was used to examine the relationship between safety practices and IWT operational performance. Map of Niger State, Mokwa LGA and study areas presented in Figure 2.3.

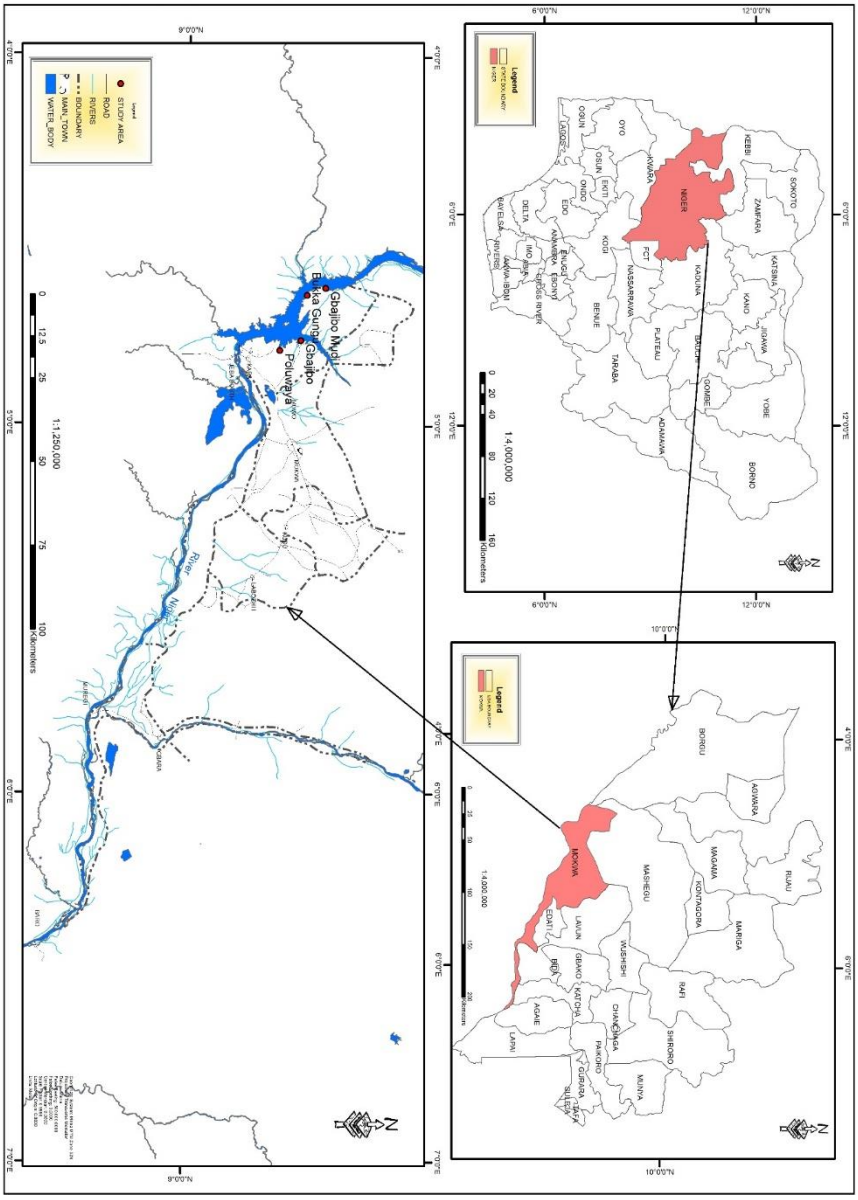

Figure 2.3 Map of Mokwa, Niger State and Study areas.
Source: Author's Field Survey (2026)

Results and Discussion

Operational Performance of IWT

The operational performance of IWT was discovered to be at average with a mean of 2.61 and a Standard Deviation (SD) of 0.51, as shown in Table 4.1. An in-depth explanation of the findings is further presented below under the various subheading.

Table 4.1 Operational performance of IWT in Mokwa LGA

S/No	Variables	N	Mean	Std. Deviation
1.	The ports are easily accessible and well connected to other modes of transport.	352	2.08	.350
2.	Boats are readily available when I need to travel.	352	3.63	.774
3.	The fare charged for inland water transport is affordable.	352	4.00	.982
4.	I consider the amount I pay for IWT services fair.	352	3.98	.158
5.	Boats depart at the scheduled time.	352	2.36	.584
6.	IWT operates consistently on a daily basis.	352	4.42	.549
7.	Boats are available even during the rainy or dry seasons.	352	3.56	.320
8.	IWT is a dependable mode of transportation.	352	2.05	.982
9.	My journeys using IWT are completed within the expected time.	352	2.65	.662
10	Boats are not usually overcrowded.	352	1.15	.639
11	Operators do not carry passengers beyond the boat's capacity.	352	1.10	.608
12	I feel comfortable with the number of passengers on the boat.	352	1.48	.751
13	The body of the boats used for IWT are in good condition.	352	1.93	.350
14	The engines and other parts of the boats function properly.	352	1.70	.452
15	The boarding points or jetties are well maintained.	352	1.65	.622
16	Life jackets are provided for all passengers on board.	352	1.60	.496
17	Safety instructions are given before departure.	352	1.85	.700
18	I feel safe when travelling on inland water transport.	352	2.18	.158
19	Boat operators are skilled and experienced.	352	4.08	.267
20	Operators behave professionally during trips.	352	2.98	.463
21	Boat operators can navigate well even under poor weather or water conditions.	352	3.90	.379
22	I am satisfied with the overall services provided by IWT.	352	2.88	.404
23	I would recommend the use of IWT to others.	352	3.05	.221
24	Travelling by boat is a pleasant experience for me.	352	3.08	.267
25	There is a proper way to report complaints or concerns to IWT authorities.	352	1.21	.405
26	Complaints are taken seriously by operators or IWT officials.	352	2.65	.221
27	Safety concerns are addressed quickly by the relevant authorities.	352	3.28	.961
	Grand mean	**352**	**2.61**	**0.51**

Source: Author's Survey (2026)

Availability and Accessibility

The fact that the ports are well connected and easily reachable by all other means of transport obtained a low mean score of 2.08 (SD = 0.350), which implies general disagreement among the respondents. This implies low intermodal connectivity and inaccessibility to boarding points.

Regarding the service availability, the respondents accepted that boats are easily accessible when they are required (Mean = 3.63; SD = 0.774) and that IWT is available on a day-to-day basis (Mean = 4.42; SD = 0.549). There was also a report of boats in every season both in rainy and dry seasons (Mean = 3.56; SD = 0.320) showing that they operated relatively without much seasonal changes.

Fare and Affordability

One of the most solid strong points of IWT is affordability. The fare paid on inland water transport was identified to have a high mean of 4.00 (SD = 0.982) and fairness of the amount paid had a mean of 3.98 (SD = 0.158). It indicates a general agreement that fares are reasonable and economical to the users.

Timeliness and Reliability

The findings indicated that the level of timeliness and reliability of service was poor. The departure schedules were irregular as 'boats sending out at regular time' had a mean of 2.36 (SD = 0.584). On the same note, travels that were done on time had an average of 2.65 (SD = 0.662) which reflects moderate levels of dissatisfaction with the predictability of travel time.

Moreover, the assertion that IWT is a reliable form of transportation had a low mean of 2.05 (SD = 0.982) indicating that the perception of the respondents on the reliability of the system did not strongly support the idea that the system is a reliable mode of transportation regardless of the fact that it operates on a daily basis.

Capacity and Comfort

Capacity management also seems to be a major challenge. The mean of the statement, 'boats are not usually overcrowded' was very low (1.15) with the SD = 0.639. In the same way, the respondents did not agree that operators do not carry more passengers than necessary (Mean = 1.10; SD = 0.608), and the level of comfort with the number of passengers was also low (Mean = 1.48; SD = 0.751). These results are a strong indicator of regular congestion and laxity in safety threshold regulations. An image of an overloaded boat is presented in Figure 4.1.

Figure 4.1. An overcrowded boat, showing passengers without life jackets
Source: Author's Field Survey (2026)

Physical Environment and Facilities

The physical condition of the boat also received poor rating. The statement 'The body of the boats used for IWT are in good condition' received a mean rating of 1.93 (SD = 0.350) whereas the statement "engines and other parts of the boats function properly" received a mean rating of 1.70 (SD = 0.982). Infrastructural deficiencies were also severe since boarding points or jetties had a low rating (Mean = 1.65; SD = 0.622).

Safety Measures

The indicators of safety were quite poor. Life jackets provided to all passengers had a mean of 1.60 (SD = 0.496) and safety instructions given to passengers prior to departure had 1.85 (SD = 0.700) which means there is a high level of disagreement with both statements, thereby indicating dissatisfaction from the users.

Even though the respondents rated the issue of safety concerns being addressed as moderately quick (Mean = 3.28; SD = 0.961), in general, they did not believe that they were safe using IWT (Mean = 2.18; SD = 0.158). This implies that authorities can act upon incidents, but safety prevention measures are ineffective.

Competence and Professionalism of the Operators

Operators were viewed as well trained and experienced despite infrastructural and safety issues (Mean = 4.08; SD = 0.267). They also fared well in terms of their capabilities to manoeuvre through the unfavourable weather or water conditions (Mean = 3.90; SD = 0.379). Nevertheless, professionalism during travels was rated moderately (Mean = 2.98; SD = 0.463) which means that there is an opportunity of the service to improve its conduct.

General Customer Satisfaction and Customer Complaint System

The level of satisfaction with IWT services across the area was low (Mean = 2.88; SD = 0.404), corresponding with the study from Dapa *et al.* (2024) and Akpudo and Stephens (2020) who stated similar perception from other IWT users in Port Harcourt and Anambra respectively. The readiness to recommend IWT (Mean = 3.05; SD = 0.221) and the perception of travelling as a pleasant experience (Mean = 3.08; SD = 0.267) imply ambivalence among the users.

The complaint mechanism seems low, with the statement about the presence of an appropriate method to disclose concerns having very low mean of 1.21 (SD = 0.405). Even though complaints being taken seriously had a moderate mean of 2.65 (SD = 0.221), a lack of accountability may happen due to the lack of a distinct reporting structure.

Influence of Safety Practices on Operational Performance of IWT in Mokwa

A linear regression analysis was conducted to measure the influence of safety practices in IWT operations on the operational performance of IWT in Mokwa LGA. The Independent variable was safety practices index (availability of life jackets for passengers, provision of safety instructions before departure, adherence to passenger capacity limits to avoid overcrowding, structural and mechanical condition of boats, maintenance of engines and other essential components, adequacy of jetties and boarding points, and the responsiveness of operators and authorities to safety concerns) while the dependent variable was operational performance index(which included availability of boats when needed, affordability and fairness of fares, adherence to scheduled departure times, consistency of operations on a daily basis, availability of services across seasons, perceived dependability of the transport mode, adequacy of travel time, overall satisfaction with services, and the extent to which journeys are completed within expected timeframes). Table 4.2 presents the result of the analysis

Table 4.2. Regression result on the influence of Safety Practices on IWT performance

Variable	B	Std. Error	β	T	Sig.
Constant	1.245	0.214	-	5.82	0.000
Safety Practices (SPI)	0.528	0.062	0.412	8.51	0.000

Model Summary: $R = 0.412$; $R^2 = 0.170$; Adjusted $R^2 = 0.167$; $F(1,350) = 72.45$; $p < 0.05$

Source: Author Survey (2026)

The regression outcome shows that safety practices has a positive and significant influence on the operational performance of IWT in Mokwa LGA ($\beta = 0.412$, $t = 8.51$, $p < 0.05$). The model explains about 17% of the total variation in operational performance of IWT ($R^2 = 0.170$), indicating that the model explains a moderate proportion of the total variance of IWT operational performance. This finding

implies that improving safety procedures such as adherence to carrying capacity, provision of life saving equipment, and adequate maintenance of vessels will influence the reliability, efficiency, and level of user satisfaction of IWT services. The rather low R^2 value however shows that other variables outside safety practices also contribute significantly to the determination of operational performance. This finding therefore, indicates that safety practices is a significant predictor of changes in operational performance of IWT. The null hypothesis is therefore rejected. This finding agrees with the study by Roso et al. (2020) in Sweden, which indicated that safety played a major role in the operational performance of IWT.

Conclusion and Recommendations

This study assessed the operational performance of IWT in Mokwa LGA of Niger State, adopting a descriptive research design, with a quantitative method. Based on the findings of the study, it was concluded that the operational performance of IWT in Mokwa LGA was average with a grand mean of 2.61, a functional but limited statement marred by inefficiencies. While the IWT system performed fairly well in the realms of affordability, daily availability, and seasonal operation, the system had very low mean ratings in areas of accessibility, reliability, timeliness, capacity management, and the conditions of overall safety. The high rate of overcrowding, outdated state of vessels, insufficient safety measures, and weak complaints systems were noted signs of systematic difficulties that affected user's satisfaction and the level of service quality of IWT. The result further revealed that the adoption/neglect of safety practices had significant statistical influence on the overall operational performance of IWT in Mokwa. However, adherence to safety practices, despite significant was not the only determinant of operational performance as it only explained 17% of the variations, indicating that other operational or institutional variables might also play significant role. The study therefore recommends that the Niger State government should focus on the implementation of safety laws, the supply of proper safety gear, and the periodic maintenance of ships and infrastructure. Furthermore, efforts should be made to enhance operating schedules, develop efficient complaint systems, train operators, and ensure integrated transport planning in order to enhance efficiency, reliability, and sustainability of IWT in Mokwa LGA.

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