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Impact Assessment of Oron Inland Waterways Transport System on the Growth and Development of Oron Coastal Community and Environs

Eto, Gabriel M.
Okon, Nse B.
Maritime Academy of Nigeria, Oron

Abstract

The paper examines the impact of Oron inland waterways transport system on the growth and development of Oron coastal community and environs. It evaluates eight objectives that mirrored the research problem and adopts cross-sectional survey design to examine the population of study. It uses multi-stage sampling techniques that involved stratified and random sampling techniques to select the sample. Out of a population of 1,873, Taro Yamane formula was used to determine the sample size of 363. In order to analyze the data gathered, descriptive statistics was used. The study adopted simple random sampling technique due to its ease of use and accuracy of representation. From interviews, literature review, media reports and critical stakeholders' opinions, the study examines the economic impact of the Oron inland waterways transport system and notes that it enhances the efficiency of local businesses by reducing transportation costs, and it facilitates increased trade and creates employment opportunities. The study identifies the challenges facing Oron inland waterways transport system and finds that they could be tackled through coordinated efforts of government agencies, transport operators, local communities, and businesses in order to enhance safety measures, improve infrastructure, and strengthen security protocols. Consequently, the study recommends, among others, that equitable resource allocation to Oron waterways transport system is necessary in light of its significance in enhancing connectivity towards promoting trade and commerce, job creation, and trade cost reduction.

Keywords: ***infrastructure, inland waterways transport, connectivity, resilience, investment***

Introduction

Water transport encompasses various modes such as shipping, barges, ferries, and other vessels that navigate rivers, canals, and oceans. It holds a vital position that serves as a cornerstone for economic development, national integration, and sustainable connectivity (Transport Community, 2025**).** Nigeria has an extensive network of inland waterways in the form of rivers, canals, backwaters and creeks and yet, making the most of them is fraught with several challenges. The operational and infrastructural challenges of inland waterways transport system in coastal communities in Akwa Ibom state are a mirror of the general constraints facing inland waterways transport services in Nigeria, which the National Inland Waterways Authority is mandated to tackle.

Inland waterways transportation of freight and passenger is facing daunting challenges and is highly under-utilized in Nigeria compared to other large countries and geographic areas like the United States, China and the European Union (UNCTAD, 2021).
The decline of river transport in Nigeria started as a result of the focus on development of roads and railways (Badejo, 2014). Navigating through inland waterways in Nigeria generally is fraught with numerous challenges contrary to what obtains on the global scene where improvements have been made in shipping transport. Accordingly, inland waterways transport (IWT) systems have become more efficient and risk-free with the introduction of

modern water crafts. The latest state-of-the-art ships have removed the constraints of distance and time, such that currently, one can travel from one corner of some region to the other conveniently in less time. But this is not so in Nigeria.

The advancements in shipping technology have resulted in the wider scope of maritime transport (Garcia, 2021). However, the global advancement in maritime transport is limited in geographic scope because developing countries like Nigeria are still lagging behind in terms of technology and innovation. Consequently, among other factors, this accounts for why inland waterways transport services in Oron coastal community of Awka Ibom State is faced with operational and infrastructural challenges, the result of which is sub optimal performance and dismal impact on its growth and the development of neighbouring communities.

Oron coastal community and its environs rely on its inland waterways transportation (IWT) system for passenger transport services and bulk freight transport to and from places like Calabar, Cameroon and other coastal communities within Akwa Ibom State. This makes the waterways transport services to play dominant role in the socioeconomic activities of Oron coastal community and its environs. The Oron inland waterways have become extremely busy in recent times as alternative routes, given the rapidly deteriorating roads that link Awka Ibom State with Cross River State. However, there are operational and infrastructural challenges, which detract from the immense potential of the waterways to trigger developmental and growth impulse in Oron coastal community and its hinterland.

Some of the challenges are infrastructure-related which arise from lack of funding, and the underdevelopment and underutilization of the inland waterways despite their enormous potential. The lack of standard jetty facilities and equipment, which also lead to inefficiency and operational constraints, all culminate in arrested development. Furthermore, limited funding (lack of financial resources) for boat operators and security outfits constitute a major challenge and serious drawback. This constitutes the bedrock of the problem of this study.

The Problem

The existence of waterways has been a significant factor in the growth of cities and whole regions; they have served first as avenues of exploration and new settlement and later as means through which commerce and trade flourished (Eto, 2021). Accordingly, inasmuch as the Oron inland waterways are crucial for fishing (positioning Oron a major fishing hub in Nigeria) facilitating trade and commerce (particularly for the beach market and other local markets, timber, palm oil, and seafood), the waterways transport system is facing daunting challenges. Operational challenges such as inadequate maintenance, lack of skilled personnel, and limited access to finance hinder the development of the Oron inland waterways transportation system. Infrastructure constraints are a significant issue, with the Oron inland waterways lacking modern navigation infrastructure. This leads to inefficient and unreliable transportation services, which affect the Oron beach market.

Furthermore, other challenges are ineffective utilization of the inland waterways resources due to lack of investment drive in the sector, inadequate policies, and insufficient institutional capacity. Security and safety concerns arising from lack of effective safety measures and enforcement mechanisms increase the risks of accidents, robbery, and other security threats. All of which often lead to loss of life, damage to cargo, and increased insurance costs. Consequently, these challenges detract from the potential impact which Oron inland

waterways transport system could have on the growth and development of Oron coastal community and its hinterland, particularly the beach market.

The aim of the study is to identify the challenges and proffer solutions that would contribute to enhancing connectivity, reducing transport costs, and unlocking economic opportunities, and promoting sustainable practices that would contribute to the overall resilience of the economy of Oron coastal community. The objectives are:

1. To analyze the economic impact of the Oron Inland Waterways Transport System on local businesses, trade, and employment opportunities.
2. To examine the role of the inland waterways transport system in enhancing mobility and accessibility for residents, businesses, and tourists in Oron.
3. To assess the social impact of the Oron inland waterways transport system on the quality of life, education, and healthcare accessibility for the Oron coastal community.
4. To evaluate the possible environmental effects of Oron inland waterway transport on coastal ecosystems, including water pollution, erosion, and biodiversity changes.
5. To investigate safety and security challenges associated with the Oron inland water transport system and their implications for residents and businesses.
6. To examine the challenges that limit the effectiveness and the impact of Oron inland waterways transport system on the growth of Oron.
7. To determine the level of government policies and investments in the development and maintenance of the Oron inland waterways transport system.
8. To propose strategies for optimizing the efficiency of the inland waterways transport system for sustainable development in Oron.

Literature and Empirical Review

Transportation serves as the life-wire of the economy and its efficiency determines the well - being (growth and development) of the society. Mobility crisis in Nigeria has been worsened by the fact that there is currently no clearly articulated policy for transport development [except for the draft National Transport Policy of 2021 and the recently approved 10 Year National Policy on Marine and Blue Economy (2025-2034) – Ships & Ports, 2025]. This explains why there is an imbalance between resource allocations to the various modes and gross inadequacy of existing infrastructural facilities (Eto, 2021).

According to Calderon-Rivera, Baruseviciene & Ballini (2024), the uneven development of waterways and the infrastructure to support inland water transport has become more evident worldwide, Nigeria included. Consequently, freight transportation by waterways is highly under-utilized in Nigeria compared to other large countries and geographic areas like the United States, China and the European Union.

Numerous authors have identified the benefits derivable from inland waterways transportation (IWT) development in terms of education, innovation, access to new markets and technologies, passenger transportation capacity, shipping saving costs, and employment capacity (Wiegmans & Konings, 2017, Calderon-Rivera et al., 2024). Other benefits of IWT identified are related to the industry development such as the safety of cargo and people, good environmental performance, material supply, cost-efficient transport for bulk cargo, and interconnection between seaports, inland river ports, and waterways. Yet other benefits are low costs and safety of cargo handling. These costs are lower than road and rail, making IWT a more sustainable transportation option (Hofbauer & Putz, 2020).

Nevertheless, IWT, just like other transport modes, also generates some external social costs which are related to accidents, noise, congestion, habitat damage, air pollution, climate change, and well-to-tank emissions. On the other hand, these social costs are lower than road and rail transportation, thereby making IWT a more sustainable transportation option. Furthermore, the continuous increase in cargo and container traffic and the rise of congestion in big cities near seaports lead to the promotion of alternatives such as IWT (Hofbauer & Putz, 2020).
In addition, the uninterrupted increase in cargo and container traffic and the rise of congestion in big cities close to the seaports results in the promotion of IWT as alternative mode. Countries with developed IWT systems pay top most priority attention to generating policies for their promotion and infrastructure maintenance and possess specialized institutions with unified plans and development strategies (Sidaway, Price & Probert, 1995).

Empirical Reviews
In a study titled "Barriers and solutions for sustainable development of inland waterway transport: A literature review", Calderon-Rivera, et al (2024) observe that China is endowed with three important rivers, the Yangtze, Pearl, and Yellow rivers, which enable crucial hinterland connections for the distribution of local production and aid access to the seaport of Shanghai, on which 4886 million tons of cargoes were transported in 2013. This provided access to new markets and passenger transportation capacity, reduced shipping costs, and enhanced employment capacity

In Europe, according to Zhu, Gao, He, Zhang, Jin, & Tan (2021) in a study titled "Green logistics oriented tug scheduling for inland waterway logistics", IWT assumes significant importance as 21 out of the 28 member states possess inland waterways and out of these networks, 50% is located mainly in France, Germany, the Netherlands, and Belgium. However, despite the fact that significant cargo volume of 535 million tons is attributed to Europe's IWT in 2023, China's transportation performance in IWT has been historically higher than that of the European Union. This performance is similar to that of the United States, which transported 581 million tons through IWT in the same year. Conversely, while Brazil holds the third position among countries boasting the world's most extensive navigable waterways, yet only 22% of these watercourses are utilized for cargo transportation. Zhu et al. (2021) further observe that this limited usage can be attributed primarily to the considerable distance from major production centers and lower investments in infrastructure when compared to China and Europe. Accordingly, the authors recommend more of public private partnership investment in IWT infrastructure in order to reduce shipping costs and enhance job creation.
The study conducted by Chijioke (2022) titled "Challenges and Prospects of Inland Waterways in Southeast Nigeria" reveals that insecurity and the poor state of the terminals are the major challenges impeding inland waterways transport operations in Oma-Mbala River, Anambra State. According to the study, the inland waterways in the study area hold huge prospects for trade and commerce, and it recommends regional policing in the hotspots prone to attacks on the routes and that government should collaborate with stakeholders in the communities adjacent to the waterways in the study area and provide basic water transport infrastructure.

In the view of Ekop and Ibok (2021), in a study titled "Seasonal Variation of Passengers along the Calabar-Oron Inland Waterways Corridor, Nigeria", the authors assert that whenever there is rainfall, passengers are faced with the difficulty of leaving home to the terminals because the boats do not have roofs to shade them from the elements. They

therefore recommend that credit facilities be provided by the government and financial institutions to empower operators for effective performance.

In a study by Okon, Jatau and Attah (2023), titled “Assessment of Safety Measures and Operational Challenges of Inland Waterway Transport along Oron - Calabar Route, Nigeria”, the authors observe that boat and engine replacement was the most challenging factor, while water hyacinth was the least. Other challenges they identified were frequent bad weather conditions, high running costs, floating logs and debris, extortion by law enforcement agents, difficulty in making headway against the opposite current, high cost of safety equipment, passengers' refusal to adhere to safety measures, and poor berthing facilities in their order of impact. They recommend proper funding and enforcement of safety measures.

In their study titled “Infrastructural Challenges Hindering Passengers Patronage along the Calabar-Oron Inland Waterways Corridor, Nigeria”, Ibok, Otop, and Chianebeng (2021), observe that infrastructural challenges affect patronage thereby contributing to safety and security concerns, which compromise passengers comfort and convenience. The authors observe that this situation contributes to water phobia.

Gaps in current knowledge

The literature reviewed revealed much attention focused on infrastructural challenges which contribute to safety and security concerns, thereby compromising passengers comfort and convenience. Others addressed safety and security challenges which border on water weeds and the deplorable condition of the boats, which hinder maximum patronage. However, none of the literature reviewed assessed the potential impact of Oron inland waterways transport (IWT) system from the perspectives of enhancing connectivity, public-private partnership investment in infrastructure, and biodiversity preservation, which could combine to lead to efficient and reliable transportation services and consequential social and economic development of Oron and its environs. Furthermore, another gap in current knowledge, which justifies the conduct of this study, is lack of literature that address the failure to fully exploit the Oron inland waterways transport system, the result of which has led to its ineffective marine resource utilization. This is attributable to lack of investment in the sector, inadequate policies, and insufficient institutional capacity.

Methodology

The study uses survey design which involves 4-point Likert scale questionnaire and structured interview. It uses cross-sectional survey design on the population to gather data. The sample selection was by multi-stage sampling techniques that involved stratified and random sampling techniques due to its thoroughness and accuracy of representation. In order to analyze the data gathered, descriptive statistics was used.

Study Area

The five Local Government Areas that make up the Oron ethnic tribe in Akwa Ibom State include Oron, Udung Uko, Urue Offong/Oruko, Okobo and Mbo Local Government Areas. The Oron Inland Waterways (Figure 1) in Akwa Ibom State play a significant role in transportation, commerce, and connectivity within the region. Oron is a coastal town in southern Akwa Ibom State, located along the eastern shore of the Cross River Estuary and the Atlantic Ocean**.**

The inland waterways extend through the Oron River**,** Qua Iboe River**,** and their tributaries, connecting to the Cross River**,** Calabar River, and other smaller creeks. The waterways link

Oron to Calabar (Cross River State), Ikot Abasi, Eket, and other coastal communities in the Niger Delta. They serve as a key transport route for ferries, boats, and canoes, supporting trade and fishing activities. The Oron-Calabar waterway is a major route for ferry transportation between Oron Beach and Calabar (Edet et al., 2014).

The terrain is low-lying and consists of mangrove swamps, creeks, and estuaries. Tidal influences from the Atlantic Ocean affect water levels and flow patterns. The area is prone to coastal erosion, flooding, and mangrove depletion due to climate change and human activities. The Maritime Academy of Nigeria (the foremost maritime training institution) is located near these waterways, highlighting their strategic importance (Ibok et al., 2021).

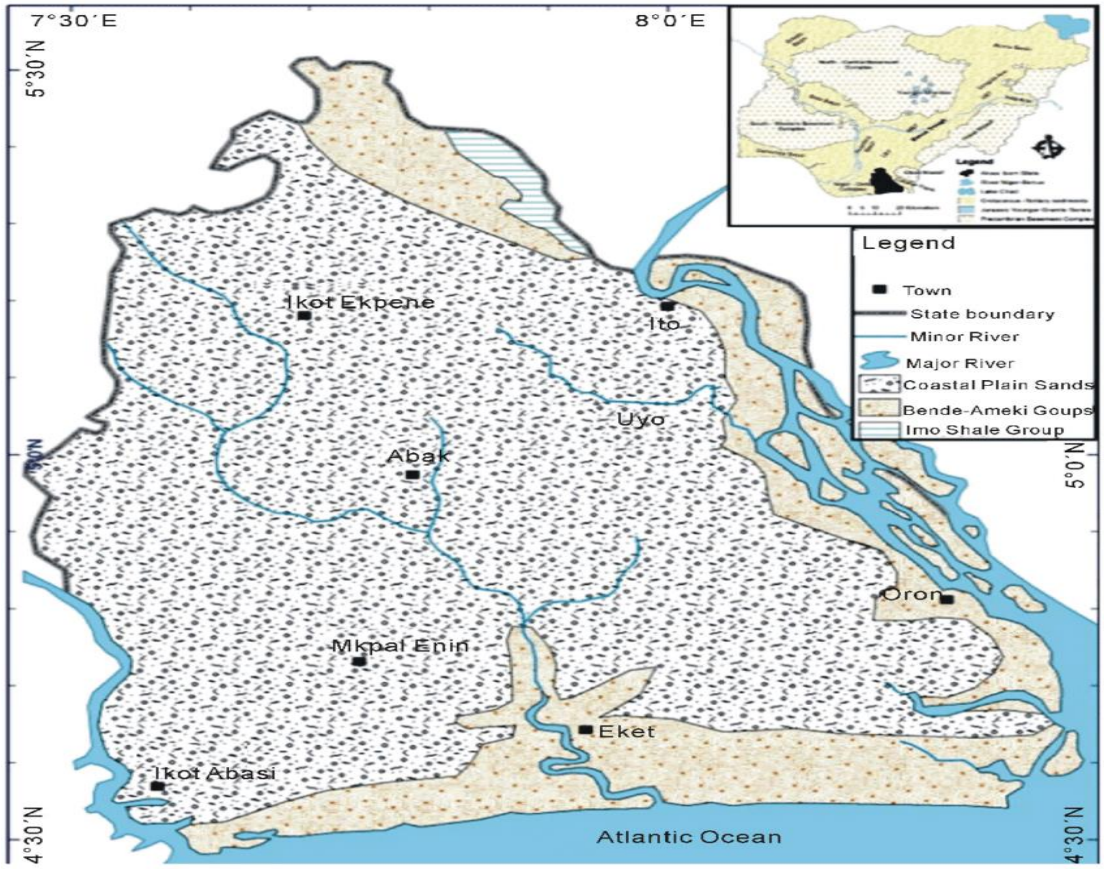

Figure 1: Map of Akwa Ibom, Showing Oron and its Inland waterways
Source: Edet et al. (2014)

Table 1 Population of the study

S/N	Respondents	Population
1	Commuters	417
2	Boat owners	52
3	Boat drivers	59
4	Traders	1,230
5	Jetty operators	28
6	Nigerian Customs Service	30
7	Nigeria Immigration Service	25
8	Marine Police	32
	Total	**1,873**

Source**:** Researchers' Computation (2025)

The study used primary and secondary sources of data. Questionnaire and structured interview were the instruments used for sourcing primary data. The study adopted the Taro Yamane formula to determine the sample size, out of population of study of 1,873.

Taro Yamane method: $n = \frac{N}{(1+N\ (e)2)}$

Where:

n= sample size required

N = number of people in the population

e = allowable error (%) which is 0.05

After substitution 363 was derived. Hence the sample size for the study was 363.

Table 2: Sample Size Determination

S/N	**Respondents**	**Population**	**Proportion**	**Sample size**
1	Commuters	417	363 (417) / 1,873	81
2	Boat owners	52	363 (52) / 1,873	10
3	Boat drivers	59	363 (59) / 1,873	12
4	Traders	1,230	363 (1,230) / 1,873	238
5	Jetty operators	28	363 (28) / 1,873	5
6	Nigerian Customs Service	30	363 (30) / 1,873	6
7	Nigeria Immigration Service	25	363 (25) / 1,873	5
8	Marine Police	32	363 (32) / 1,873	6
	Total	**1873**		**363**

Source: Researchers' Computation (2025)

RESULTS AND DISCUSSION

Summary of Questionnaire Distributed

The questionnaire distributed and the number of copies retrieved are presented in Table 3.

Table 3: Copies of Questionnaire Administered

Number of copies of Questionnaire Distributed	Number of copies of Questionnaire Retrieved	% of Copies of Questionnaire Retrieved
363	**356**	**98.07**

Source: *Field survey* (2025)

A total of 363 copies of the questionnaire were distributed to major stakeholders in the maritime transport sector. 356 copies were returned to represent 98.07% response rate as shown in the Table above.

Socio-economic Characteristics of Respondents

Table 3: Demographic Analysis of Respondents

Characteristics	Frequency	Percentage
Male	242	68
Female	114	32
Total	**356**	**100**

Source: Field survey (2025)

The gender distribution of the respondents is shown in Table 3. The distribution shows that 242 or 68% of the respondents were male while 114 or 32% were female. This shows that majority of the respondents were male.

Table 4: Age Distribution of Respondents

Age	Respondents	Percentage (%)
Less than 18	Nil	Nil
18-35	178	50
36-64	169	47
Above 65	9	3
Total	**356**	**100**

Source: *Field survey* (2025)

The age distribution in Table 4 shows that there were no respondents less than 18 years of age. Those whose age fell into the age bracket 18-35 years were 178 or 50%. Those who fell within the 36-64 years range were 169 or 47%, and they happened to be the majority. The respondents whose age was above 65 years were 9 or 3%.

Table 5: Educational Level

Educational Level	**Respondents**	**Percentage (%)**
Primary	35	10
Secondary	203	57
Tertiary	118	33
Total	**356**	**100**

Source: *Field survey* (2025)

The formal education of respondents as shown in Table 5 shows that all the respondents attained various degrees of formal education. Those who only attained Primary School education were 35 or 10%. Those who attained Secondary School education were 203 or 57% and the respondents who happened to attained Tertiary education, were 118 or 33%.

Table 6 Occupation of Respondents

S/N	**Occupation**	**Respondents**	**Percentage**
1	Lecturers	49	14
2	Boat owners	10	3
3	Boat drivers	12	3

4	Traders	236	66
5	Jetty operators	5	1
6	Civil servants	30	9
7	Bankers	14	4
	Total	**356**	**100**

Source**:** Researchers' Computation (2025)

The occupation distribution shown in Table 6 indicates that 49 or 14% were lecturers. Boat owners were 10 or 3%. Boat drivers were 12 or 3%. Traders were 236 or 66%. Jetty Operators were 5 or 1%. Civil servants were 30 or 9% and bankers were 14 or 4%.

Discussion of Results

Objective 1: To analyze the economic impact of the Oron Inland Waterways Transport System on local businesses, trade, and employment opportunities.

In the view of respondents, the Oron Inland Waterways Transport System significantly enhances local businesses by reducing transportation costs, which facilitates increased trade. Additionally, it creates employment opportunities through the development of related services and infrastructure, contributing positively to the local economy.

Objective 2: To examine the role of the inland waterways transport system in enhancing mobility and accessibility for residents, businesses, and tourists in Oron.

According to respondents, an efficient inland waterways transport system is crucial for enhancing mobility and accessibility, facilitating easier movement for residents, businesses, and tourists. It supports economic growth, improves access to services, and enriches the overall experience of visiting or living in Oron.

Objective 3: To assess the social impact of the Oron inland waterways *transport system on the quality of life, education, and healthcare accessibility for the Oron coastal community.*

Respondents were of the view that the inland waterways transport system significantly influences the quality of life in the Oron coastal community as it affects access to education and healthcare. They reasoned that reliable Oron inland waterways transportation would enhance opportunities for employment and education, while barriers can lead to missed healthcare appointments, ultimately impacting overall well-being.

Objective 4: To evaluate the possible environmental effects of Oron inland waterway transport on coastal ecosystems, including water pollution, erosion, and biodiversity changes.

Respondents observed as follows:

Oron inland waterway transport can significantly impact coastal ecosystems through water pollution, habitat loss, and increased coastal erosion. These activities may lead to changes in biodiversity, including the introduction of invasive species and the decline of native populations, ultimately altering the ecological balance.

In terms of the following, respondents observed that:

- Water Pollution - Contaminants: Inland waterway transport often results in the discharge of pollutants such as fuel, chemicals, and waste from vessels. These contaminants can severely affect water quality, leading to harmful effects on marine life and ecosystems.
- Ballast Water: The use of ballast water in ships can introduce invasive aquatic species into new environments, disrupting local ecosystems and outcompeting native species.
- Oil Spills**:** Accidental spills from vessels can lead to significant environmental damage, affecting both water quality and marine organisms.

Erosion

- Increased Erosion**:** The construction and maintenance of inland waterways can alter natural water flow and sediment transport, leading to increased erosion of riverbanks and coastal areas.
- Dredging Activities: Dredging to maintain navigable waterways can disturb sediments, increase turbidity, and lead to habitat loss for aquatic organisms.

Biodiversity Changes

- Invasive Species: The introduction of non-native species through ballast water and other means can lead to declines in native biodiversity, as these species may not have natural predators in the new environment.
- Habitat Alteration: The development of transport infrastructure can lead to habitat fragmentation, reducing the available space for native species and disrupting migration patterns.
- Endangered Species: Increased human activity and pollution can threaten vulnerable species, leading to declines in their populations and altering the overall biodiversity of coastal ecosystems.

Objective 5: To investigate safety and security challenges associated with the Oron inland water transport system and their implications for residents and businesses.

According to respondents, the Oron inland water transport offers several advantages, such as cost-effectiveness and environmental sustainability. However, it also comes with various safety and security challenges that can have significant implications for residents and businesses in Oron coastal community and its environs. Some of the key challenges are:

Safety Challenges:

1. Accidents and Collisions:

- Cause: Poor navigation, operator error, inadequate signaling, and congested waterways, failure to adhere to safety regulations.
- Implications: Accidents can lead to loss of life, injuries, and damage to vessels and infrastructure, resulting in economic losses for businesses and increased insurance costs.

2. Infrastructure Quality:

- Cause: Aging locks, dams, and terminals can lead to failures.
- Implications: Infrastructure failures can disrupt services, causing delays and increased costs for businesses relying on timely transport. Poor conditions may also endanger the safety of passengers and cargo.

3. Weather Conditions:
- Cause: Fog/haze, storms, and flooding can create hazardous conditions for navigation.
- Implications: Adverse weather can result in transport delays, impacting supply chains and the availability of goods for residents and businesses.

4. Environmental Hazards:
- Cause: Pollution and water quality issues can arise from shipping activities.
- Implications: Contaminated waterways can threaten public health and local ecosystems, affecting fishing and tourism industries.

5. Vessel Standards and Maintenance:
- Cause: Vessels that do not meet safety standards.
- Implications: Substandard vessels can lead to accidents and spills, threatening both human safety and the environment.

Security Challenges:
1. Theft and Piracy:
- Cause: Vulnerable areas along waterways may be prone to criminal activities.
- Implications: Businesses may face losses due to theft of goods, while fear of piracy can increase shipping costs and insurance premiums. Residents may feel unsafe or be at risk of crime near docks and terminals.

2. Terrorism and Vandalism:
- Cause: Critical transportation infrastructure can be a target for terrorist activities.
- Implications: Attacks can cause widespread disruption, affect local economies, and instill fear among residents and businesses reliant on IWT for transport.

3. Illegal Activities:
- Cause: Smuggling from Cameroun and Gabon and unregulated trade can flourish in Oron and poorly monitored along the waterways.
- Implications: This can undermine legitimate businesses, leading to economic harm and potential legal consequences for those inadvertently involved.

4. Cyber-security Threats:
- Cause: Increased digitization of logistics and navigation systems.
- Implications: Cyber-attacks on transport systems can disrupt operations, leading to financial losses and potentially compromising safety.
In the view of respondents, the overall implications of safety and security challenges of Oron inland waterways transport system for residents and businesses in Oron and its environs are as follows:
- Economic Impact: Disruptions in the Oron inland water transport can affect the supply chain, leading to delays, increased costs, and potential loss of customers, which ultimately impacts the local economy.
- Health and Safety Concerns: Residents living near the waterways may experience health risks due to pollution or hazards from accidents. Safety concerns can also affect property values and quality of life.
- Insurance Costs: Increased risks associated with safety and security can raise insurance premiums for businesses and residents, adding to overall operational costs.
- Regulatory Compliance: Businesses may face increasing regulations aimed at improving safety and security, resulting in higher compliance costs and added administrative burdens.

Objective 6: To determine the level of government policies and investments in the development and maintenance of the Oron inland waterways transport system.

According to respondents, the Oron inland waterways transport system in Nigeria (along with other aspects of the country's broader inland water transport network) faces various challenges and opportunities that are influenced by government policies and investments. They noted key aspects regarding the level of government involvement in the development and maintenance of this system to include:

1. Government Policies:
- National Transport Policy: The Nigerian government has established policies (the draft National Transport Policy of 2021 and the 10 Year National Policy on Marine and Blue Economy (2025-2034)) aimed at promoting integrated transport systems, which include inland waterways as a crucial component. The Draft National Transport Policy (2021) encourages the use of waterways to reduce road congestion, enhance trade, and provide more efficient transport options.
- Nigerian Inland Waterways Authority (NIWA): NIWA is the main regulatory body responsible for developing and maintaining inland waterways in Nigeria. It has been tasked with overseeing navigational safety, environmental protection, and infrastructure development within the waterways.

2. Investment in Infrastructure:
- Ongoing Projects: The government has initiated various projects to improve the infrastructure along the Oron inland waterways, including the dredging to ensure navigability and the construction of jetties and terminals. Investments have been made in Oron to enhance access to the sea and boost local economies.
- Public-Private Partnerships (PPPs): The government has encouraged PPPs to attract private investment in the development of waterways. This approach aims to leverage private sector expertise and resources for better management and service delivery.
- Funding Challenges: Despite intentions to improve the Oron IWT infrastructure, funding remains a recurring challenge. Budget constraints and competing demands from other sectors can limit the extent of investment in inland waterways.

3. Maintenance and Development Efforts:
- Regular Maintenance Programs: Regular maintenance of river channels, buoys, and navigational aids is essential for ensuring safe operations. However, consistent funding and political support are often necessary to maintain these efforts effectively.
- Focus on Local Economies: The development of the Oron inland waterways is not just about transport; it is also tied to supporting local industries, particularly the beach market, fishing and agriculture. The government recognizes the potential for economic growth and employment generation through improved inland water transport.

4. Challenges in Implementation:
- Coordination Issues: Effective implementation of policies has been hampered by inadequate inter-agency coordination among federal, state, and local governments.
- Regulatory Framework: While there are regulations in place, enforcement can be inconsistent, leading to issues such as illegal fishing, pollution, and encroachment on waterways, which can affect transport operations.

5. Community Involvement:
- Local Stakeholder Engagement: In some cases, community engagement has proved vital for the successful development of inland waterways. Local communities often have insights into specific needs and challenges, but consistent government engagement with these stakeholders is crucial for sustainable development.

Objective 7: To examine the challenges that limit the effectiveness and the impact of Oron inland waterways transport system on the growth of Oron and environs.

According to respondents, challenges that limit the effectiveness and the impact of Oron inland waterways transport system on the growth of Oron and environs include:
1. The lack of financial support despite the requirement that high investments for the construction and maintenance of IWT infrastructure are necessary

2. Poor Infrastructure and Lack of Modern Facilities: (i) The lack of well-equipped jetties, docks, and terminals limits the efficiency of water transport (ii) Many existing ports and landing points are either dilapidated or not well-maintained (iii) Absence of modern ferry terminals and mechanized loading/unloading systems affects commercial activities.

3. Shallow Waterways and Siltation: (i) Continuous siltation and sand deposition make navigation difficult, especially for larger boats and ferries (ii) Dredging is infrequent or insufficient, leading to narrow and shallow passages (iii) During the dry season, some routes become less navigable due to low water levels.

4. Safety and Security Issues: (i) Cases of sea robbery and theft pose threats to traders and passengers (ii) Lack of patrol boats and security personnel along the waterways increases criminal activities (iii) Poor enforcement of safety regulations leads to frequent boat mishaps and accidents due to overloading and lack of life jackets.

5. Inconsistent Government Policies and Poor Funding: (i) Inadequate government investment in inland waterway development (ii) Inconsistent policies on marine transportation, taxation, and licensing discourage private investors (iii) Limited funding for dredging, waterway maintenance, and infrastructure expansion.

6. Dependence on Traditional and Unregulated Transport Systems: (i) Most water transport is informal, operated by local boat owners with wooden canoes and outdated engines (ii) Lack of structured transport schedules, making movement unpredictable (iii) Poor enforcement of standard operating procedures affects efficiency and safety.

7. Environmental and Climate Challenges: (i) Coastal erosion, mangrove destruction, and pollution threaten water transport routes (ii) Flooding and rising sea levels disrupt ferry services and settlements along the waterways (ii) Oil spills and waste dumping reduce water quality, affecting both transport and fishing (iii) IWT is vulnerable to weather variation due to the direct impact on vessel navigability and water level fluctuations. Meteorological changes related to floods, and droughts impact not only reliability but also the cost of IWT operations (iv) Extreme weather events such as heat waves and heavy precipitation affect not only the infrastructure but also the performance of inland waterways transport systems, which generates a lack of reliability, delays, and congestion

8. Competition from Road Transport: (i) Improved road networks in Akwa Ibom and Cross River States reduce the demand for inland water transport (ii) Many travelers prefer road transport due to its speed, safety, and reliability compared to water transport (iii) Poor integration between water and road transport systems limits intermodal connectivity.

9. Lack of Public Awareness and Investment in Tourism: (i) The tourism potential of Oron's waterways is underutilized, with little government promotion (ii) The Oron Museum, rich cultural heritage, and beautiful water routes could attract visitors if properly developed (iii) Lack of organized eco-tourism packages, ferry tours, and waterfront development affects growth.

Objective 8: To propose strategies for optimizing the efficiency of the inland waterways transport system for sustainable development in Oron.

Respondents were of the view that optimizing the efficiency of the transport system in Oron, particularly focusing on the inland waterways, can significantly contribute to sustainable development. They proposed the following strategies that could be considered:

1. Infrastructure Development and Maintenance: (i) Dredging and Channel Maintenance: Regular dredging of navigable channels to ensure they remain deep enough for safe passage of vessels will enhance transport efficiency (ii) Construction of Modern Terminals: Building well-equipped terminals with loading and unloading facilities can facilitate better handling of cargo and passenger operations (iii) Investment in Multi-modal Transport Facilities: Creating intermodal transport hubs that integrate road, rail, and waterways can streamline logistics and improve connectivity.

2. Regulatory Framework and Policy Enhancement: (i) Strengthening NIWA's Role: Empowering the Nigerian Inland Waterways Authority (NIWA) to enforce regulations and standards effectively will improve safety and operational efficiency (ii) Updating Policies: Periodically reviewing and updating transport policies to reflect current challenges and innovations in technology can enhance system efficiency.

3. Public-Private Partnerships (PPPs): (i) Encouraging Private Investment: Establishing frameworks that invite private sector participation can lead to more innovative solutions and alleviate financial constraints in developing and maintaining waterway infrastructure (ii) Leveraging Existing Capabilities: Collaborating with private operators who have experience in logistics can optimize operations and service delivery.

4. Technology Integration: (i) Adopting Smart Technologies: Implementing GPS tracking systems for vessels can enhance navigation and monitoring, increasing safety and efficiency (ii) Digital Platforms for Booking and Scheduling: Developing online platforms for cargo booking and scheduling can streamline processes and reduce waiting times at terminals.

5. Sustainable Practices and Environmental Considerations (i) Promoting Eco-friendly Transportation: Using energy-efficient boats or hybrid vessels can minimize environmental impact while promoting sustainability (ii) Monitoring and Mitigating Pollution: Setting up programs to monitor water quality and enforcing regulations against pollution can help maintain a healthy ecosystem, which is essential for fishing and tourism.

6. Capacity Building and Training (i) Skill Development Programs: Offering training programs for local workforce development in logistics and transportation management can enhance operational efficiency (ii) Awareness Campaigns: Educating stakeholders about the benefits of using inland waterways can increase usage and promote a shift from road transport.

7. Community Engagement and Involvement: (i) Involving Local Communities: Engaging local communities in planning and decision-making ensures that transport solutions address their needs and gain grassroots support (ii) Promoting Local Advocacy Groups: Forming local advocacy groups can facilitate dialogue between the government, private sector, and the community, fostering collaboration.

8. Enhanced Connectivity and Accessibility: (i) Road Improvement Projects: Improving access roads to ports, jetties, and inland terminals can reduce bottlenecks and enhance overall transport efficiency (ii) Regular Route Assessment: Conducting assessments of popular transport routes can help identify inefficiencies and optimize schedules accordingly.

9. Financial Support and Incentives: (i) Subsidies for Operators: Providing financial incentives for local water transport operators can encourage service expansion and improve safety compliance (ii) Grants for Infrastructure Projects: Offering grants or low-interest loans to support infrastructure projects can stimulate investment in necessary improvements. On the whole, respondents noted that to maximize the impact of Oron's inland waterways on economic growth and development of Oron and its environs, solutions could include:

- Dredging and expansion of the water routes for better navigation
- Upgrading jetties, ports, and terminals with modern facilities
- Improved security patrols to curb robbery and theft
- Government-private partnerships for funding and transport regulation
- Integration of water and road transport for seamless movement.
- Promotion of tourism and water-based economic activities

Conclusion

The Nigerian government has been making concerted efforts to develop and maintain the Oron inland waterways transport system. However, challenges bordering on funding, inter-agency coordination, and effective implementation persist. A combined approach involving government commitment, private sector investment, and community involvement is essential to harness the full potential of the inland waterways for economic growth and transport efficiency in Nigeria. Continued focus on infrastructure development and safety regulations will be crucial for the long-term sustainability of this transport mode.

To address the challenges identified requires coordinated efforts involving government agencies, transport operators, local communities, and businesses to enhance safety measures, improve infrastructure, and strengthen security protocols. The implementation of strategies suggested must be done in a cohesive and integrated manner in order to optimize the efficiency of the transport system in Oron, with a view to achieving in sustainable development. Fostering collaborations among government entities, private sector players, and local communities is crucial for the successful implementation of suggested strategies. This holistic approach can enhance not only the inland waterways transport system but also the overall economic growth and quality of life for residents in Oron.

Recommendations

1. Government should show commitment along with encouraging private sector investment and community involvement towards harnessing the full potential of the inland waterways for economic growth and transport efficiency in Oron and environs.
2. Government should focus on infrastructure development and safety regulations in order to boost activities of the beach market and encourage trade flow
3. To encourage multimodal transport system that facilitates modal shift, government should pay close attention to Oron inland waterways transport system in view of the economic significance of the waterways.
4. Equitable resource allocation to Oron waterways transport system is necessary in light of its significance in enhancing safety, security and connectivity in promoting trade and commerce, job creation, and trade cost reduction.

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