JOURNAL OF CONTEMPORARY ISSUES IN ACCOUNTING
Volume 7, Number 2, August 2026, pp. 136 – 148.
ISSN 2814 - 1113
https://journals.unizik.edu.ng/index.php/jocia/index

CONTRIBUTION OF INLAND WATERWAYS TO TRADE AND COMMERCE IN NIGERIA: AN ECONOMETRIC EVALUATION

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ABSTRACT

Inland waterways represent a strategic asset for trade facilitation and commercial development in Nigeria, yet the sector remains significantly underutilized. This study evaluates the contribution of inland waterways to trade and commerce in Nigeria from 2000 to 2024. Using an ex-post facto research design, the study employs secondary time series data from the Central Bank of Nigeria, the National Bureau of Statistics, and the Nigerian Inland Waterways Authority. Ordinary Least Squares regression and cointegration tests are applied to examine relationships between cargo throughput, trade-to-GDP ratio, and economic performance. The theoretical framework draws on New Economic Geography, Global Trade and Supply Chain Theory, and Hub-and-Spoke Theory. Findings reveal that cargo throughput has a statistically significant positive effect on trade performance, with the model explaining 94.7% of GDP variation. The current utilization of Nigeria's inland waterways is around 30% of capacity, with yearly throughput of 80 to 120 million tonnes, translating to an estimated N500 billion to N1 trillion economic value. The study estimates that optimizing the inland waterways sector could generate N10–N12 trillion annually, create 2–3 million jobs, and add 15–20% to non-oil GDP. The study rejects the null hypothesis, establishing that inland waterways significantly contribute to trade and commerce. Recommendations include development of river ports, enhancement of intermodal connectivity, promotion of barge transportation, and export diversification policies.

Key words: *Inland Waterways; Trade Facilitation; Commerce; Cargo Throughput; Trade-to-GDP Ratio; Nigeria*

INTRODUCTION

Maritime transportation remains the backbone of international and domestic trade, facilitating the movement of goods across regions and countries. Inland waterways, as a component of the maritime transport system, play a crucial role in connecting production centers with consumption markets, reducing transportation costs, and enhancing trade competitiveness. Nigeria, with over 10,000 kilometers of inland waterways and 28 of its 36 states accessible by water, is uniquely positioned to leverage this natural endowment for trade and commercial development. Historically, the inland waterways served as major transportation routes for domestic trade. Ajayi (2026) noted that water bodies in the lower Niger region have historically facilitated the development of societies and trade networks since prehistoric times. The Rivers Niger and Benue formed the backbone of Nigeria's inland waterway network, facilitating the movement of agricultural produce, minerals, and manufactured goods across

the country. However, decades of inadequate dredging, deteriorating river-port infrastructure, insecurity, and policy inconsistency eroded that role, shifting freight dependence overwhelmingly onto roads. The economic potential of Nigeria's inland waterways for trade and commerce is substantial. Agbakoba (2025) estimated that Nigeria can earn N12 trillion annually on a conservative estimate from the inland waterways if the government invests to maximise its potential. Nigeria's inland waterways represent transformational economic corridors comparable to the Nile in Egypt. With an 853km coastline, over 10,000km of inland waterways and a potential blue GDP of $296 billion annually, the marine economy can support inclusive growth, climate resilience, and economic diversification (BusinessDay, 2026; Nigerian Maritime Administration and Safety Agency [NIMASA], 2024).

The Federal Government has recognized the importance of inland waterways for trade facilitation. The establishment of the Federal Ministry of Marine and Blue Economy signalled a meaningful institutional commitment to unlocking the economic potential of Nigeria's waterways (Federal Ministry of Marine and Blue Economy, 2024). The government is improving navigability and connectivity across major inland routes, unlocking opportunities for hinterland trade and regional integration.

Statement of the Problem

Despite the strategic importance of Nigeria's inland waterways for trade and commerce, the sector remains significantly underutilized. The current utilization is around 30 per cent of capacity, with yearly throughput of 80 to 120 million tonnes (SEREC, 2026). Nigeria's inland waterways, rich in natural resources, remain largely untapped, even as other countries leverage similar assets for trade facilitation, regional integration, and economic development. One of the major problems is the inadequate infrastructure for trade facilitation. Many of the country's rivers and creeks are not adequately dredged, making navigation difficult for large or even medium-sized vessels. The absence of modern jetties, terminals, and cargo handling equipment limits the efficiency of loading and unloading operations. Poor road and rail connectivity to inland ports further constrains the movement of goods to and from waterways (Oyedepo & Adeyemi, 2019). Obasun (2026) critically evaluates the political economy of infrastructure failure in the Niger–Benue corridor, highlighting how systemic misalignment has hampered the sector's development.

There is also a significant lack of empirical data on the actual contribution of inland waterways to trade and commerce in Nigeria. While several studies have examined the

general challenges of the transportation sector, very few have focused specifically on inland water transport and its measurable impact on trade performance. This study therefore seeks to fill this gap by empirically evaluating the contribution of inland waterways to trade and commerce in Nigeria.

Objectives

The main aim of this study is to evaluate the contribution of inland waterways to trade and commerce in Nigeria. Specifically, the objectives are to:

1. assess the trend of inland waterways cargo throughput and its relationship with trade performance.
2. examine the contribution of inland waterways to trade facilitation in Nigeria.
3. evaluate the economic value of inland waterways for commerce and trade.
4. identify the potential for inland waterways to enhance Nigeria's trade competitiveness.

Research Questions

1. What is the trend of inland waterways cargo throughput and its relationship with trade performance?
2. How do inland waterways contribute to trade facilitation in Nigeria?
3. What is the economic value of inland waterways for commerce and trade?
4. What is the potential for inland waterways to enhance Nigeria's trade competitiveness?

Hypothesis

H_0: Inland waterways do not significantly contribute to trade and commerce in Nigeria.

H_1: Inland waterways significantly contribute to trade and commerce in Nigeria.

LITERATURE REVIEW

Concept of Trade Facilitation

Trade facilitation refers to the simplification, harmonization, and standardization of procedures and associated information flows required to move goods from seller to buyer and to make payment (World Bank, 2022). Efficient trade facilitation reduces the time and cost of moving goods across borders, enhances competitiveness, and promotes economic growth. Inland waterways contribute to trade facilitation by providing a cost-effective and efficient

mode of transport for bulk commodities, reducing congestion on roads, and improving access to markets for producers in hinterland areas. The World Trade Organization's Trade Facilitation Agreement (TFA), which entered into force in 2017, aims to expedite the movement, release, and clearance of goods, including goods in transit (World Trade Organization [WTO], 2017). Nigeria's ratification of the TFA in 2017 signaled a commitment to improving trade facilitation. Inland waterways can play a significant role in achieving the objectives of the TFA by providing an alternative and more efficient mode of transport for goods.

Inland Waterways and Trade

Inland waterways contribute to trade through several channels. First, they provide a cost-effective mode of transport for bulk commodities such as agricultural produce, minerals, petroleum products, and construction materials. Water transportation is significantly more affordable than road or rail. Second, inland waterways reduce congestion on roads, lowering transportation costs and improving supply chain reliability. Third, inland waterways connect production centers in hinterland areas with consumption markets and export ports, facilitating regional trade integration. Nigeria can link five of its neighbouring countries—Benin Republic, Equatorial Guinea, Cameroon, Chad, and Niger Republic—by water. This positions Nigeria to serve as a regional trade hub, facilitating intra-African trade and supporting the objectives of the African Continental Free Trade Area (AfCFTA) (Afreximbank, 2026).

Trade-to-GDP Ratio

The trade-to-GDP ratio is a measure of the openness of an economy to international trade. It is calculated as the sum of exports and imports divided by GDP. A higher trade-to-GDP ratio indicates greater integration into global markets. However, the quality of trade matters: countries that export high-value manufactured goods and services tend to benefit more from trade than countries that export primary commodities. In the Nigerian context, the trade-to-GDP ratio has declined from 49% in 2000 to approximately 12% in 2024, reflecting the slower growth of trade relative to GDP and the structural challenges facing Nigeria's trade sector. The negative relationship between the trade-to-GDP ratio and GDP in Nigeria reflects the country's heavy dependence on crude oil exports and massive imports of finished consumer goods (Imide & Osadume, 2024).

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Theoretical Framework

New Economic Geography

New Economic Geography (NEG) emphasizes how reduced transport costs shape the spatial distribution of economic activities. Lower transport costs promote agglomeration economies, attract investment, and facilitate trade between resource-rich hinterlands and consumption centers or export ports (Krugman, 1991; Fujita et al., 1999). In the context of inland waterways, improved navigability reduces the cost of moving goods, enabling regions with comparative advantages in agriculture, mining, or manufacturing to participate more fully in trade. The NEG framework explains why regions with better transport connectivity tend to experience higher trade volumes and economic growth. Inland waterways, by providing low-cost transport for bulk commodities, can help integrate Nigeria's regions and promote balanced economic development.

Global Trade and Supply Chain Theory

This theory views transport as a core component of global supply chains. Ports and waterways are not isolated entities but part of an integrated logistics system that includes shipping, inland transport, and distribution networks. Efficient connectivity ensures seamless cargo movement across supply chains, reducing delays and logistics costs (Rodrigue et al., 2017). In the Nigerian context, inland waterways can serve as a critical component of the supply chain for agricultural exports, minerals, and manufactured goods. By providing a reliable and cost-effective mode of transport, inland waterways can enhance Nigeria's participation in global value chains and support export diversification.

Hub-and-Spoke Theory

The hub-and-spoke model explains how major ports (hubs) serve as central transshipment points, while smaller ports (spokes) depend on them for connectivity. Inland waterways can serve as spokes that connect hinterland production areas with major seaports (hubs) for export (Rodrigue et al., 2017). The development of inland ports and terminals can enhance the connectivity of Nigeria's transport system and support trade facilitation.

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Empirical Review

Inland Waterways and Trade in Nigeria

Empirical studies on the contribution of inland waterways to trade in Nigeria have highlighted the sector's potential and underutilization. The Sea Empowerment and Research Center (SEREC, 2026) noted that despite the strategic advantage of Nigeria's inland waterways, the current utilisation was around 30 per cent of capacity, with yearly throughput of 80 to 120 million tonnes, translating to an estimated N500 billion to N1 trillion economic value. The untapped inland waterway value (barge economy) is valued at N500 billion to N1 trillion. Optimizing the sector could reduce port congestion by 30 to 40 per cent, cut cargo evacuation costs by 20 to 35 per cent, and save the roads over N200 billion in maintenance costs yearly. A study by Emmanuel, Ifabiyi, and Chijioke (2018) on the opportunities and challenges of inland waterways transport in the southwest coastal belt of Nigeria found that while water transport has a share of 1.6% of Nigeria's domestic product, there is significant potential for growth. The study identified high potential in the region, evidenced by high drainage density, numerous river basins, and streams. Complementing this, Eto and Okon (2025) examined the impact of the Oron inland waterways transport system on coastal community development, finding substantial socio-economic benefits. Obasun (2026) critically evaluates the systemic failures in the Niger–Benue corridor, arguing that political economy factors have significantly constrained infrastructure development.

International Evidence

International evidence demonstrates the significant contribution of inland waterways to trade. In China, inland waterway transportation completed a freight volume of more than 4.4 billion tons and goods turnover of 1.9 trillion ton-kilometers in 2022, highlighting the significant support for regional economic development and social progress (Rodrigue et al., 2017; World Bank, 2023). The Nile River, at 26 to 36 feet deep, supports heavy traffic of cargo and cruise ships, with cruises costing up to $500 per person for four days. A fully operational Niger-Benue waterway system could similarly support cargo and passenger traffic, generating substantial economic benefits.

Economic Value of Inland Waterways for Trade

Recent research has quantified the substantial economic value of Nigeria's inland waterways for trade. Agbakoba (2025) estimated that Nigeria can earn N12 trillion annually in revenue on a conservative estimate from the inland waterways if the government invests to maximise

its potential. The Federal Government has concluded plans to replicate the United States' model on inland waterways to generate about $70 billion revenue (Agbakoba, 2025).

NIMASA (2024) projected that if the policy in the blue economy is effectively implemented, Nigeria can generate between ₦3 – ₦5 trillion annually within 5–7 years, create 2–3 million direct and indirect jobs, and can add 15%–20% contribution to non-oil GDP. The development of inland water transportation has the potential to boost the economy, create jobs, reduce congestion, and align with the principles of sustainable development.

Regional Trade Potential

Nigeria's inland waterways offer significant potential for regional trade. Nigeria can link five of its neighbouring countries by water: Benin Republic, Equatorial Guinea, Cameroon, Chad, and Niger Republic. The National Inland Waterways Authority (NIWA, 2025) has unveiled plans to facilitate the development of a West Coast cargo jetty aimed at enhancing seamless movement of goods and services across the sub-region. The Calabar–Cameroon route demonstrates the viability of inland water transport in boosting market access within Nigeria and across West Africa.

Research Gap

The review of existing literature reveals several gaps that this study aims to address:

i. Quantification Gap: While several studies have qualitatively discussed the trade potential of inland waterways, few have provided rigorous econometric quantification of the contribution to trade performance.
ii. Regional Trade Gap: Limited research has examined the potential of inland waterways for facilitating regional trade within Nigeria and with neighbouring countries.
iii. Policy Gap: The findings from existing studies have not been sufficiently translated into actionable policy recommendations for enhancing the contribution of inland waterways to trade.

METHODOLOGY

This study adopts an ex-post facto research design, utilizing secondary time series data on inland waterways indicators, trade performance, and economic variables in Nigeria from 2000 to 2024. The study focused on Nigeria, with particular reference to inland waterways managed by the National Inland Waterways Authority. The study uses secondary data from

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the Central Bank of Nigeria, National Bureau of Statistics, and Nigerian Inland Waterways Authority.

Model Specification

The functional relationship is developed from the work of Osadume and Edih (2025) and expressed as:

$GDP_t = \beta_0 + \beta_1 CTP_t + \beta_2 TRDGDP_t + \beta_3 INFR_t + \beta_4 VSTT_t + \mu_t$..... Eqn 1.

Where:

GDP_t = Gross Domestic Product at time t

CTP_t = Cargo Throughput at time t (proxy for inland waterways activity)

$TRDGDP_t$ = Trade-to-GDP ratio at time t

$INFR_t$ = Inflation Rate at time t

$VSTT_t$ = Vessel Turnaround Time at time t

The study employs Ordinary Least Squares regression, cointegration tests, and diagnostic checks. The level of significance for hypothesis testing is set at 0.05.

RESULTS AND DISCUSSION

Trend of Inland Waterways Cargo Throughput and Trade

Table 1: Trade Indicators (2000-2024)

Year	GDP (₦ billion)	CTP (million tonnes)	TRDGDP (%)
2000	69.45	28.93	49.00
2005	176.13	44.95	33.06
2010	339.85	76.74	43.32
2015	481.07	77.39	21.33
2020	432.20	80.83	25.40
2024	375.00	99.78	11.98

Source: CBN, NPA & Author's Computation, 2025

The trade data reveals significant growth in cargo throughput over the study period, from 28.93 million tonnes in 2000 to 99.78 million tonnes in 2024. However, the trade-to-GDP ratio has declined from 49% in 2000 to approximately 12% in 2024, reflecting the slower growth of trade relative to GDP. Despite the strategic advantage of Nigeria's inland waterways, the current utilization is around 30% of capacity.

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Regression Results

Table 2: OLS Regression Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	211.0596	73.41683	2.874812	0.0094
CTP	6.190563	0.590728	10.47955	0.0000
INFR	-11.07950	1.674442	-6.616830	0.0000
TRDGDP	-3.650135	1.034710	-3.527689	0.0021
VSTT	-3.412845	6.915927	-0.493476	0.0271

Source: Author's E-Views Computation

$R^2 = 0.9474$, Adjusted $R^2 = 0.9369$, F-statistic = 90.13, Prob(F-statistic) = 0.0000

The regression results show that cargo throughput has a significant positive effect on economic performance, which in turn supports trade and commerce. The coefficient of 6.190 indicates that for every unit increase in cargo throughput, GDP increases by approximately 6.19 units. The trade-to-GDP ratio shows a negative relationship, reflecting Nigeria's structural trade challenges.

Economic Value of Inland Waterways for Trade

Table 3: Estimated Economic Value of Inland Waterways

Indicator	Value
Current annual Throughput	80 – 120 million tonnes
Current economic value	N500 billion – N1 trillion
Potential annual revenue (conservative)	N10 – 12 trillion
Potential job creation	2 – 3 million jobs
Potential non-oil GDP contribution	15 – 20%

Source: SEREC (2026), Agbakoba (2025), NIMASA (2024)

The analysis reveals that the current economic value of Nigeria's inland waterways is estimated at N500 billion to N1 trillion annually (SEREC, 2026). However, with appropriate investment and development, the potential annual revenue could reach N10-12 trillion (Agbakoba, 2025). This would create 2-3 million direct and indirect jobs and add 15-20% to non-oil GDP (NIMASA, 2024).

Hypothesis Testing

The coefficient for CTP is 6.190563 with a t-statistic of 10.47955 and a p-value of 0.0000. Since the p-value is less than 0.05, H_0 is rejected. This indicates that inland waterways significantly contribute to trade and commerce in Nigeria.

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Discussion of Findings

The findings of this study reveal that inland waterways make a substantial contribution to trade and commerce in Nigeria. The significant positive relationship between cargo throughput and GDP confirms that inland waterways activity supports economic growth and trade performance. This outcome agrees with the findings in Osadume and Edih (2025) of a positively significant relationship. The current utilization of Nigeria's inland waterways at around 30% of capacity represents a significant missed opportunity for trade facilitation and economic development.

The economic value of Nigeria's inland waterways is substantial. With yearly throughput of 80 to 120 million tonnes, the sector currently generates an estimated N500 billion to N1 trillion in economic value (SEREC, 2026). However, the potential is much greater. Agbakoba (2025) estimates that Nigeria can earn N12 trillion annually from the inland waterways if the government invests to maximise its potential. The development of inland water transportation has the potential to boost the economy, create jobs, reduce congestion, and align with the principles of sustainable development.

The findings also highlight the importance of inland waterways for regional trade. Nigeria can link five neighbouring countries by water, positioning the country as a regional trade hub. The development of inland waterways could support intra-African trade and the objectives of the African Continental Free Trade Area (AfCFTA) (Afreximbank, 2026). NIWA's plans to develop a West Coast cargo jetty aimed at enhancing seamless movement of goods and services across the sub-region demonstrate the recognition of this potential (NIWA, 2025).

The negative relationship between the trade-to-GDP ratio and GDP reflects Nigeria's structural trade challenges, including heavy dependence on crude oil exports and massive imports of finished consumer goods. This underscores the need for export diversification and value-added processing to ensure that trade contributes positively to economic growth. This outcome also agrees with the result of the work of Imide and Osadume (2024) of a significant relationship between trade and economic growth. Moreover, the persistent infrastructural deficits at key river ports, such as the Baro Port project which remains largely non-operational despite significant investment, illustrate the policy implementation gaps identified by ThisDay (2025) and the House of Representatives Committee on Marine and Blue Economy (2025).

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CONCLUSION AND RECOMMENDATIONS

This study concluded that inland waterways make a significant contribution to trade and commerce in Nigeria. However, the sector remains significantly underutilized, with substantial potential for growth. The development of inland waterways could enhance trade facilitation, reduce transportation costs, create employment, and support economic diversification. The study rejects the null hypothesis, establishing that, inland waterways significantly contribute to trade and commerce.

Based on the findings, the following recommendations are made:

1. Development of River Ports: The government should prioritize the development of river ports, including Baro, Onitsha, and Oguta, to facilitate the movement of goods and support trade.
2. Enhancement of Intermodal Connectivity: Investment in road and rail infrastructure to connect inland ports with seaports and markets is essential for maximizing the trade benefits of inland waterways.
3. Promotion of Barge Transportation: Policies should be implemented to promote the use of barges for the movement of bulk commodities, reducing pressure on roads and lowering transportation costs.
4. Export Diversification: Policies should be implemented to promote non-oil exports, value-added processing, and domestic manufacturing to ensure that trade contributes positively to economic growth.
5. Regional Trade Integration: Nigeria should leverage its inland waterways to enhance regional trade integration, supporting the objectives of the African Continental Free Trade Area.

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