INTERNATIONAL SOCIAL SCIENCES AND EDUCATION JOURNAL (ISSEJ)
ISSN: 3005-3463 (Online)
DOI: 10.61424/issej
Journal Homepage: https://bluemarkpublishers.com/index.php/ISSEJ

ISSEJ
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Exploring Maritime Insecurity Management Strategies for Comparative Advantage in Nigeria's Maritime Zones

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ARTICLE INFO

Received: October 15th, 2025
Accepted: December 27th 2025
Published*:* January, 06th 2026
Volume: 4
Issue: 1
DOI: 10.61424/issej.v4i1.634

KEYWORDS

Maritime insecurity, insecurity management strategies, port efficiency, maritime investment and trade volume

ABSTRACT

Maritime insecurity has emerged as one of the most decisive structural constraints undermining Nigeria's ability to convert its vast maritime endowments into sustainable economic advantage. This study investigates the implications of maritime insecurity threats on economic sustenance in Africa. Five objectives, five research questions and one hypothesis were proposed, answered and tested respectively in this study. Data was generated from 189 respondents, comprising of personnel from maritime security agencies, port and maritime administrative institutions, and maritime-dependent economic operators, using researchers' developed questionnaire titled 'Maritime Insecurity Management Strategies for Comparative Advantage Questionnaire' (MIMSCAQ). Using mean, standard deviation, Pearson correlation analysis, regression and ANOVA, the researchers found out that maritime insecurity constitutes a high-extent limiting factor on port efficiency, logistics reliability, maritime investment, and sustainable blue economy exploitation in Nigeria. Furthermore, the study found a moderate extent of reduction in maritime crimes following the implementation of existing maritime insecurity management strategies. Again, improved maritime security contributes significantly to the comparative economic advantage of Nigeria's maritime zones. Finally, institutional challenges are the most severe constraints to effective maritime security management. Consequently, the researchers concluded that while Nigeria has made notable progress in maritime insecurity management, the full economic benefits of maritime security can only be realized through coordinated institutional reform, sustained operational capacity, and technologically driven security systems. Based on the conclusion, the researchers recommended for robust institutional coordination, technologically enabled security management and enforcement, and operationally coherent security frameworks.

1. Introduction

Maritime zones constitute critical national assets for coastal states, encompassing territorial waters, contiguous zones, and exclusive economic zones (EEZs) where states exercise sovereign rights over natural resources and enforcement jurisdiction (United Nations Convention on the Law of the Sea, 1982). For Nigeria, its extended coastline of over 850 kilometers along the Gulf of Guinea situates the nation strategically for trade, energy exportation, fisheries, and broader maritime commerce (Magaji, 2022). Despite this advantageous location, the country's maritime domain has

increasingly become vulnerable to diverse forms of insecurity that undermine its economic potential and regional influence.

One of the predominant manifestations of insecurity in Nigeria's maritime zones is piracy and armed robbery at sea. The Gulf of Guinea, which includes Nigerian waters, has historically accounted for a significant share of global piracy incidents, affecting vessel safety, crew wellbeing, and insurance costs (Chukwuemeka, 2025). Beyond piracy, maritime crime in Nigeria also includes illegal bunkering, unauthorized theft of crude oil—marine smuggling, human and narcotics trafficking, and illegal, unreported, and unregulated (IUU) fishing. These activities not only cause direct revenue losses but also disrupt legitimate maritime economic activity, eroding investor confidence in Nigeria's maritime sector (Uchenna et al., 2025). The economic impact of maritime insecurity is profound. Persistent insecurity increases the cost of maritime trade, deters foreign direct investment, and reduces port throughput, thereby diminishing Nigeria's comparative advantage in regional and international shipping markets (Ekwok et al., 2025). For example, insecurity has been shown to negatively affect seaborne trade volumes in Nigerian ports, with adverse effects on local economic activities and stakeholder confidence (Ekwok et al., 2025). Additionally, illegal activities such as oil theft and illegal bunkering undermine national revenue streams derived from the energy sector, imposing significant fiscal costs (Chukwuemeka, 2025).

The multifaceted nature of maritime insecurity in Nigeria requires strategic responses that are both adaptive and comprehensive**.** Security strategies have ranged from intensified naval patrols and surveillance exercises to collaborative regional efforts under frameworks such as the Yaoundé Code of Conduct, which emphasize joint action against maritime threats (Uchenna et al., 2025). At the national level, the Nigerian Navy and relevant agencies have also pursued the development of enhanced maritime domain awareness (MDA) capabilities, leveraging modern surveillance technologies to detect and respond to threats proactively (ThisDayLive, 2025). However, limitations in inter-agency coordination, resource constraints, and technological gaps persist, weakening the overall effectiveness of these measures.

Given these dynamics, exploring maritime insecurity management strategies becomes crucial not only for mitigating threats but also for transforming Nigeria's maritime zones into areas of comparative advantage. Effective management strategies, rooted in coordinated security architecture, technology integration, stakeholder engagement, and regional collaboration can foster a secure maritime environment that supports sustainable economic growth, enhances trade competitiveness, and strengthens Nigeria's geopolitical leverage within the Gulf of Guinea.

Maritime insecurity in Nigeria's maritime zones, primarily piracy, armed robbery at sea, oil theft, illegal fishing, and other transnational crimes, remains a significant impediment to national security, economic growth, and the sustainable development of the blue economy (Ukpai and Onah, 2025). The Gulf of Guinea (GoG), which includes Nigerian waters, continues to be a focal point for such maritime criminality despite concerted regional and national responses (Mohammed and Dalaklis, 2024). Strategic interventions have been developed to enhance maritime domain awareness (MDA), legal frameworks, multilateral cooperation, and operational capacities among Nigerian and regional actors. Persistent maritime insecurity, when unchecked, can exerts a direct negative impact on economic activity. For example, piracy and armed robbery have been shown to increase shipping costs and adversely affect Nigeria's economic growth by deterring investment, increasing logistical expenditures, and suppressing non-oil trade expansion (OFOAJ Study, 2022). Inverse relationship between piracy frequency and economic output is likely to underscore the importance of effective security interventions to stabilize trade and enhance broader economic outcomes.

A central component of contemporary security strategy in Nigerian waters is the augmentation of maritime domain awareness, using technology, sensors, and integrated command centers to monitor activities across territorial waters and the Exclusive Economic Zone (EEZ). The Nigerian *Deep Blue Project*, implemented by the Nigerian Maritime Administration and Safety Agency (NIMASA) in partnership with the Nigerian Navy, represents a flagship technological approach. It integrates patrol vessels, drones, aircraft, coastal radars, Automatic Identification System (AIS), and a Command, Control, Communication, Computer, and Intelligence (C4i) network to detect and respond to maritime threats (NIMASA, 2025). Such technological investment is expected to contribute to a measurable decline in piracy incidents in Nigeria's waters by improving real-time monitoring and response capacity. Comparative data show that piracy incidents within the Gulf of Guinea fell sharply between 2020 and 2021, with Nigeria reporting

fewer incidents due to increased patrols and a credible security presence at known pirate hotspots (THISDAYLIVE Report, 2022). The International Maritime Bureau (IMB) also affirmed a regional decline that coincided with enhanced counter-piracy initiatives, resulting in Nigeria's temporary delisting from "piracy-prone" status (THISDAYLIVE Report, 2022).

Effective security management in Nigeria's maritime domain is driven by interagency coordination and regional cooperation. Nigerian national agencies, such as NIMASA, the Nigerian Navy, Marine Police, and other civil security bodies, engage in collaborative patrols, intelligence sharing, and joint operational planning to curb maritime crimes (Oje et al., 2025). Beyond national actors, Nigeria participates in broader regional frameworks like the Yaoundé Code of Conduct and the G7, including Friends of the Gulf of Guinea (FoGG), which facilitate information sharing and coordinated security responses across littoral states. These arrangements aim to reduce "ungoverned maritime space" by pooling resources, harmonizing procedures, and conducting joint operations, an approach widely recommended in the maritime security literature, (Atlantic Council, 2025).

Structural security management also involves strengthening legal frameworks to prosecute maritime crimes. Recent scholarship highlights the importance of domestic legislation, such as the Nigerian Suppression of Piracy and Other Maritime Offences (SPOMO) Act, which provides statutory authority to pursue piracy and related maritime offences (Mohammed and Dalaklis, 2024). Legal harmonization across GoG states and enforcement of international conventions (e.g., IMO protocols) are seen as critical to ensuring that perpetrators are held accountable and that prosecution is feasible across jurisdictions (Ogah, Aliyu and Edoka, 2023). Weak legal enforcement and procedural delays contribute to near-impunity for maritime offenders. For example, despite numerous piracy incidents, very few cases reach prosecution due to gaps in enforcement capacity and legal follow-through (Atlantic Council, 2025). Jurisdictional ambiguity between enforcement bodies, such as the Nigerian Navy, the Nigerian Maritime Administration and Safety Agency (NIMASA), and other agencies, further complicates legal action and weakens deterrence (Maritime law enforcement evaluation, 2023). These legal challenges slow criminal justice responses and discourage swift resolution of security breaches.

Effective maritime security requires capacity building, both human and material. Training programmes for security personnel, investing in modern assets (patrol boats, surveillance aircraft), and upgrading logistical support enhance the operational readiness of Nigerian maritime forces. Jande (2025) asserted that increased staffing, specialized skills training, and sustained funding for maritime security operations are pivotal for sustained enforcement effectiveness. Emerging literature also recognizes the interplay between socio-economic conditions and maritime crime. High unemployment, poverty, and social exclusion in coastal and Niger Delta communities are identified drivers of piracy and oil theft (Ajayi et al., 2025). Consequently, some scholars such as Ukpai and Onah (2025) advocated for security strategies that integrate community development and livelihood programmes. This includes supporting alternative economic opportunities and engaging local stakeholders in surveillance and reporting mechanisms to reduce incentives for crime.

Port efficiency is a central determinant of comparative advantage for maritime nations. Efficient ports reduce dwell times, improve turnaround, and enhance connectivity, thereby making national trade hubs more competitive regionally and globally. Port infrastructure and operational efficiency significantly correlate with the broader economic performance of maritime sectors (Osadume and Imide, 2024). This study highlights that investments in cargo handling equipment and other port logistics improvements are positively correlated with maritime sector performance, indicating that operational efficiency functions as a mediator between security and economic outcomes.

Maritime security interventions play an indirect but important role in enhancing port efficiency by reducing risks of disruption that can lead to congestion and delays. When shipping companies perceive higher security, they are more likely to schedule calls at ports, improving throughput and utilization of port infrastructure. Moreover, stable security environments reduce unexpected halts in port operations, enabling better logistics planning and efficiency

(WAJBMS-IMSUBIZ Journal, 2024). Investor confidence in maritime infrastructure is closely tied to the perceived security of maritime zones. High insecurity increases risk premiums required by investors for port infrastructure and related logistics investment, dampening foreign direct investment (FDI) and delaying crucial infrastructure upgrades (Maritime Security and Trade Openness in the Gulf of Guinea, 2022). From the foregoing, it is evidence that improved maritime security can signal stability, thereby attracting capital inflows into port development, shipping services, and associated logistics capabilities. While specific quantitative estimates for Nigeria are limited in contemporary literature, regional comparisons suggest that improvements in security, aligned with governance reforms and coordinated regional interventions, constitute the architecture for encouraging investment in maritime infrastructure, which in turn supports export diversification and increased trade participation. In other words, security deficits can result in capital diversion to safer regional hubs, thus weakening comparative advantage for insecure coastal ports (Maritime Security and Trade Openness in the Gulf of Guinea, 2022), while effective maritime security interventions are pivotal for logistics reliability. Secure maritime environments allow for smoother logistics operations, including better demand forecasting, integrated warehouse management, and predictable vessel scheduling, all of which contribute to stronger economic orientation of ports. Efficient logistics facilitated by reliable security can reduce supply chain disruptions, lower transaction costs, and enable ports to serve as competitive gateways in regional and global trade networks.

Despite observed improvements, several **c**hallenges temper the overall effectiveness of current security strategies. First, recent global piracy reporting suggests an uptick in incidents in some periods, including within the Gulf of Guinea, which underscores the potential for fluctuating risk due to evolving tactics and operational gaps (Atlantic Council. (2025). Moreover, the sustainability of security gains hinges on resources, institutional coherence, and socio-economic contexts. Underfunded maritime agencies, limited interoperability among regional naval forces, and enduring socio-economic drivers of piracy, such as poverty and unemployment in coastal communities, can undermine the long-term impact of formal security strategies. Literature notes that absent broader development and governance reforms, security gains remain fragile (Atlantic Council Analysis, 2025).

Perhaps the most widely cited challenge is the lack of coherent coordination among maritime security institutions. Nigeria's maritime governance architecture is characterized by overlapping mandates among multiple agencies, including NIMASA, the Nigerian Ports Authority (NPA), the Nigerian Navy, the Nigerian Shippers' Council (NSC), and others, (Nwanmuoh, Ukpai, Onah and Nwosu, 2025). These overlapping roles create jurisdictional conflicts, duplication of functions, and bureaucratic bottlenecks that diminish operational effectiveness (Maritime governance study, 2025). Nwanmuoh et'al (2025) lamented the fragmented institutional landscape in the management of maritime sector which results in inter-agency rivalry and poor information sharing, leading to inconsistent decision-making and delayed security responses. For instance, repeated inspections, double documentation requirements, and conflicting directives impede efficient maritime security operations and lead to increased costs and slower enforcement (Maritime governance study, 2025). This fragmentation also undermines unified strategic planning and reduces the capacity for joint operations against piracy and other maritime crimes.

Again, corruption within maritime security institutions and broader governance structures further undermines effective insecurity management. Corrupt practices, such as bribery and collusion with criminal networks, weaken law enforcement efforts and protect illicit actors. Atlantic Council analysis reports that corruption and lack of political will to enforce maritime laws allow piracy networks to operate with de facto impunity (Atlantic Council, 2025). Weak governance deepens institutional distrust and hampers the willingness of international partners to engage fully in cooperative security initiatives.

This study is anchored on the Security-Development Nexus Theory, complemented by elements of Comparative Advantage Theory. The Security-Development Nexus theory posits that security and development are mutually reinforcing, such that the absence of security constrains economic development, while underdevelopment perpetuates insecurity (Stewart, 2004). In the maritime context, this theory suggests that insecure maritime spaces discourage trade, investment, and resource exploitation, thereby weakening economic growth and state capacity. Conversely, effective maritime security management fosters stable conditions that enable economic activity, institutional growth, and sustainable development (Bueger, 2015). Applied to Nigeria, the theory explains how persistent maritime insecurity in the Gulf of Guinea constrains port efficiency, shipping competitiveness, and blue economy development.

It also provides a conceptual basis for assessing whether Nigeria's maritime security strategies are sufficiently integrated with development objectives to generate long-term economic benefits.

Comparative Advantage Theory, originally advanced by Ricardo in 1817) explains how nations gain economic benefits by specializing in activities where they possess relative efficiency advantages. In the maritime sector, comparative advantage derives from factors such as strategic geographic location, resource endowments, port infrastructure, and secure sea lanes. However, insecurity erodes these advantages by increasing operational costs and risk premiums (Ekwok et al., 2025).

Integrating this theory into the framework allows the study to examine how maritime insecurity management strategies can protect and enhance Nigeria's inherent maritime advantages. The framework, therefore links security strategies (independent variable) to comparative advantage outcomes such as increased trade volume, port competitiveness, investment inflows, and blue economy growth (dependent variables). Together, the Security-Development Nexus and Comparative Advantage Theory provide a robust analytical lens for understanding how effective maritime insecurity management can transform Nigeria's maritime zones from high-risk spaces into engines of economic competitiveness and sustainable development.

Table 1. Operationalization of Variables

Variable Category	Variable	Possible Indicators
Independent	Maritime insecurity management strategies	Frequency of naval patrols, level of surveillance technology, inter-agency collaboration, regional agreements
Mediating	Level of maritime insecurity	Incidence of piracy, armed robbery, illegal bunkering
Dependent	Comparative advantage	Trade volume, port efficiency, FDI inflow, maritime revenue
Moderating	Institutional & contextual factors	Budgetary capacity, legal enforcement strength, governance effectiveness

Samuel and Chikodiri (2025) investigated how certain unsustainable practices impinge on the use of ocean resources and the overall development of Nigeria's blue economy, using focus group discussions, key informant interviews and field observation. Findings show that the country's blue economy faces serious challenges, which range from armed robbery at sea, unsustainable fishing practices and oil spillage to artisanal crude oil refining.

Stanley (2025) examined the factors responsible for piracy. Additionally, it seeks to identify the challenge in combatting maritime piracy and proposes a solution to address this menace. The study employed a desktop resource approach utilizing an explanatory research design to analyze the complexity surrounding maritime insecurity. The study revealed that maritime insecurity, particularly piracy, has significantly threatened Nigerian economic engagement, leading to substantial revenue loss.

Ademola (2024) explored the intricate relationship between maritime security and economic growth in Nigeria, focusing on SIFAX Shipping Company. The study aims to uncover how maritime security challenges impact operational efficiency and economic activities within Nigeria' shipping and logistics sector, utilizing both quantitative and qualitative data. Survey data from SIFAX employees and other stakeholders, supplemented by secondary data from industry reports, formed the basis of the analysis. Findings indicate a weak negative correlation between concerns about maritime security threats and organizational response effectiveness.

William, Swee-Lim, Cesar and John (2007) examined the effects of job insecurity on job satisfaction and organizational performance. Performance was measured with perceptual data. A total of 320 employees from various organizations participated in the research. The hypothesized model was tested by means of structural equation

modeling. Their findings show that job insecurity has a significant negative impact on employee satisfaction and an indirect effect on perceived organizational performance.

1.1 Statement of the Problem

Nigeria possesses one of the most strategically significant maritime zones in Africa, with vast territorial waters and an extensive Exclusive Economic Zone (EEZ) rich in hydrocarbons, fisheries, and shipping routes that support regional and international trade. Ideally, these maritime endowments should confer a strong comparative advantage, positioning Nigeria as a dominant maritime hub in the Gulf of Guinea. However, persistent maritime insecurity continues to undermine this potential.

Despite substantial policy attention and security interventions, Nigeria's maritime zones have remained vulnerable to piracy, armed robbery at sea, illegal bunkering, smuggling, trafficking, and illegal, unreported, and unregulated (IUU) fishing. These threats have imposed severe economic costs through increased shipping insurance premiums, diversion of shipping routes, reduced port competitiveness, loss of oil revenues, and declining investor confidence in the maritime and blue economy sectors. Although reported piracy incidents have fluctuated in recent years, the underlying structural drivers of maritime insecurity such as weak maritime governance, limited maritime domain awareness, inadequate inter-agency coordination, and socio-economic grievances in coastal communities, remain largely unresolved.

Furthermore, existing maritime security responses in Nigeria have been predominantly enforcement-oriented, emphasizing naval patrols and reactive military operations. While these measures are necessary, they are often insufficient when implemented in isolation, without complementary strategies such as institutional integration, technological innovation, regional cooperation, and inclusive economic development. As a result, Nigeria has struggled to translate maritime security investments into sustained economic competitiveness and comparative advantage within the Gulf of Guinea maritime space.

The problem, therefore, is not merely the persistence of maritime insecurity, but the apparent disconnect between maritime insecurity management strategies and their capacity to generate comparative economic advantage for Nigeria. There is a paucity of empirical and conceptual studies that systematically examine how maritime insecurity management strategies can be optimized to enhance Nigeria's maritime competitiveness and economic performance. Addressing this gap is critical for repositioning Nigeria's maritime zones as secure, productive, and strategically advantageous spaces for national development.

1.2 Objectives of the Study

The aim of this study is to evaluate how maritime insecurity management strategies can enhance the comparative economic advantage of Nigeria's maritime zones.

Specifically, this study will achieve the following objectives;

1. Identify and categorize the dominant maritime insecurity threats affecting maritime trade, blue economy sectors, and port operations in Nigeria's maritime zones.

2. Examine the current security management strategies being deployed to mitigate maritime insecurity within the Nigeria's maritime zones.

3. Assess the effectiveness of these management strategies in reducing piracy incidents, illegal maritime activities, and operational disruptions affecting trade flows and economic stability.

4. Analyze the relationship between maritime security interventions and comparative economic advantage, focusing on trade competitiveness, port efficiency, investment attraction, and maritime logistics performance in the zones.

5. Investigate institutional and operational challenges (legal, technological, financial, and coordination gaps) that hinder successful maritime insecurity management in the Nigeria's maritime zones.

1.3 Research Questions

The following research questions were raised and answered in relation with the objectives of this study;

1. What are the major maritime insecurity threats limiting maritime trade, logistics, and blue economy development in the Nigeria's maritime zones?

2. What national security management strategies are currently applied to mitigate maritime insecurity in the Nigeria's maritime zones?

3. To what extent have the existing maritime insecurity management strategies reduced piracy, sea robbery, illegal resource extraction, and other maritime crimes in the region?

4. How does improved maritime security contribute to the comparative economic advantage of Nigeria's maritime zones in terms of trade performance, port competitiveness, and investment attraction?

5. What institutional, operational, and technical challenges affect the successful implementation of maritime insecurity management interventions in the Nigeria's maritime zones?

1.4 Research Hypotheses

This study will test the hypothesis that;

Maritime insecurity management strategies does not have a significant association with comparative economic advantage in the Nigeria's maritime zones.

2. Methodology

This section provides the various methods used in this study as well as the philosophy, logic and rationality for using those methods.

2.1 Area of study

This study is situated within the Niger Delta Maritime Corridor of Nigeria, a critical sub-region of Nigeria's maritime domain located along the eastern segment of the Gulf of Guinea. This corridor hosts Nigeria's most critical maritime economic infrastructure, major ports, offshore oil and gas installations, shipping routes, and security operational zones, while simultaneously accounting for a disproportionate share of maritime insecurity incidents. The complexities makes the zone an appropriate focus for examining maritime insecurity management strategies and their implications for comparative advantage.

Geographically, the study area covers Nigeria's coastal and offshore waters adjacent to the core Niger Delta states, namely Delta, Bayelsa, Rivers, Akwa Ibom, and Cross River States. The corridor extends from the western boundary of Delta State through Bayelsa and Rivers States to the eastern maritime boundary with Cameroon, encompassing Nigeria's Territorial Sea and portions of the Exclusive Economic Zone (EEZ) contiguous with these states.

2.2 Research Design

This study adopted a descriptive survey research design. The design is appropriate because it enables the systematic collection of data from key maritime security and logistics stakeholders with a view to examining existing maritime insecurity management strategies and their implications for comparative advantage within Nigeria's maritime zones. The design allows for the integration of perspectives from regulatory, security, and operational actors in the maritime sector.

2.3 Population of the study

The population of this study includes personnel from maritime security agencies (Nigerian Navy officers and Nigerian Maritime Administration and Safety Agency (NIMASA personnel), port and maritime administrative institutions (Nigerian Ports Authority (NPA) and port terminal management staff) and maritime-dependent economic operators (managers and operational staff of shipping and logistics companies). These stakeholders are considered appropriate because they possess practical and policy-relevant knowledge of maritime security strategies, institutional coordination, and economic outcomes. The population for this study is indeterminate, as the exact number of individuals meeting the study criteria could not be ascertained due to the absence of comprehensive records and the dynamic nature of the population. The fluid and informal characteristics of the population precluded precise enumeration; therefore, non-probability sampling methods were employed to obtain relevant data.

2.4 Sample and sampling techniques

The sample of this study is 189 respondents selected through a multi-stage sampling technique comprising stratified, purposive and snowball sampling methods. Stratification ensured that all critical stakeholder groups in maritime security and logistics operations were adequately represented in the study. Within each stratum, purposive sampling was used to select respondents occupying positions relevant to maritime security management, port operations, logistics coordination, and policy implementation. Snowball sampling was employed particularly among shipping and logistics companies and port terminal operators, where access to staff lists was limited. Initial respondents facilitated the identification of additional participants who met the study's inclusion criteria. Although Cochran's formula for an unknown (effectively infinite) population recommends $n \approx 384$ at 95% confidence and ±5% margin of error, practical constraints limited the sample of this study to 189.The sample frame is presented in table 2.

Table 2. Sample frame

Institutional Group	**Sampling Technique**	**Sample Size**
Nigerian Navy	Purposive	36
NIMASA	Purposive	45
Nigerian Ports Authority (NPA)	Purposive	38
Port Terminal Management Staff	Purposive	41
Shipping and Logistics Companies	Purposive / Snowball	29
Total		**189**

2.5 Methods of data collection

Data were collected using a structured questionnaire designed by the researchers titled 'Maritime Insecurity Management Strategies for Comparative Advantage Questionnaire' (MIMSCAQ) with a reliability coefficient of 0.85 established through Cronbach's Alpha test. The instrument is a closed-ended items structured on a Likert-type scale to capture contextual insights. The researchers and research assistants designated for each of the ports visited the ports at different intervals and administered the MIMSCAQ on respondents.

2.6 Methods of data analysis

Data generated using the MIMSCAQ was analyzed using descriptive statistics (mean and standard deviation) to provide perceptions of variables and answers to the research questions. Pearson product moment correlation was used to determine the relationship between maritime insecurity management strategies and comparative economic advantage, while regression analysis and ANOVA were used to assess predictive effects of maritime insecurity management strategies on indicators of comparative economic advantage at 0.05 level of significance.

3. Results and interpretations

Answering the research questions

Research question one

What are the major maritime insecurity threats limiting maritime trade, logistics, and blue economy development in Nigeria's maritime zones?

Table 3. Descriptive Statistics of Maritime Insecurity Threats (n = 189)

S/N	Maritime Insecurity Threats	Mean ($\bar{x}$)	Std. Deviation	Decision
1	Piracy and armed robbery at sea	3.38	0.61	Major threat
2	Kidnapping of seafarers and offshore workers	3.29	0.64	Major threat
3	Illegal bunkering and crude oil theft	3.47	0.58	Major threat
4	Smuggling and trafficking (arms, drugs, humans)	3.11	0.67	Major threat
5	Sabotage of maritime infrastructure (pipelines, platforms)	2.98	0.71	Major threat
6	Weak maritime surveillance and intelligence systems	3.22	0.63	Major threat
7	Corruption and compromise within maritime institutions	3.26	0.60	Major threat
8	Inadequate port and terminal security facilities	3.05	0.66	Major threat
9	Poor inter-agency coordination among maritime security actors	3.18	0.62	Major threat
10	Proliferation of small arms in coastal communities	2.94	0.69	Major threat
	Grand Mean	**3.19**	—	**Major threat**

The descriptive statistics reveal that all identified maritime insecurity variables recorded mean values above the benchmark mean of 2.50, indicating that respondents perceive them as major constraints to maritime trade, logistics efficiency, and blue economy development in Nigeria's maritime zones.

Specifically, illegal bunkering and crude oil theft ($\bar{x}$ = 3.47) emerged as the most severe maritime insecurity threat, reflecting its direct impact on national revenue loss, environmental degradation, and shipping risk perception. Piracy and armed robbery at sea ($\bar{x}$ = 3.38) and kidnapping of seafarers ($\bar{x}$ = 3.29) were also highly rated, reinforcing Nigeria's vulnerability within the Gulf of Guinea maritime corridor. Institutional and governance-related challenges, such as corruption ($\bar{x}$ = 3.26), weak surveillance systems ($\bar{x}$ = 3.22), and poor inter-agency coordination ($\bar{x}$ = 3.18) were perceived as critical enablers of maritime crime. Finally, the grand mean of 3.19 confirms that maritime insecurity constitutes a high-extent limiting factor on port efficiency, logistics reliability, maritime investment, and sustainable blue economy exploitation in Nigeria.

Research question two

What national security management strategies are currently applied to mitigate maritime insecurity in Nigeria's maritime zones?

Table 4. Descriptive Statistics of National Security Management Strategies (n = 189)

S/N	National Security Management Strategies	SA	A	D	SD	Mean	SD
1	Deployment of Nigerian Navy patrols and gunboats in maritime zones	82	71	24	12	3.18	0.82
2	Implementation of the Deep Blue Project (Integrated National Maritime Security Architecture)	69	76	31	13	3.06	0.84
3	Inter-agency collaboration among Navy, NIMASA, NPA, and other security agencies	63	78	33	15	3.00	0.86
4	Use of maritime surveillance technologies (radar, AIS, drones, C4i systems)	58	74	38	19	2.90	0.92
5	Legal enforcement and prosecution of maritime crimes	44	67	48	30	2.66	1.01
6	Intelligence gathering and information sharing on maritime threats	51	70	42	26	2.78	0.97
7	Joint patrols with regional and international partners (e.g., Gulf of Guinea cooperation)	39	64	53	33	2.58	1.03
Grand Mean						**2.88**	

The descriptive statistics indicate that multiple national security management strategies are currently applied to mitigate maritime insecurity in Nigeria's maritime zones, as reflected by a grand mean score of 2.88, which exceeds the decision benchmark of 2.50. The deployment of Nigerian Navy patrols and gunboats recorded the highest mean score (M = 3.18), suggesting that respondents perceive naval presence as the most visible and consistently applied strategy. Similarly, the Deep Blue Project (M = 3.06) and inter-agency collaboration (M = 3.00) were rated highly, indicating broad awareness and acknowledgment of institutional security frameworks.

The use of maritime surveillance technologies (M = 2.90) and intelligence gathering mechanisms (M = 2.78) were moderately rated, implying that while such strategies exist, their operational effectiveness and coverage may not be uniform across all maritime zones.

In contrast, legal enforcement and prosecution of maritime crimes (M = 2.66) and joint patrols with regional and international partners (M = 2.58) recorded comparatively lower mean scores, though still above the benchmark. This suggests that these strategies are applied but may be constrained by legal, jurisdictional, financial, or coordination challenges.

Research question three

To what extent have the existing maritime insecurity management strategies reduced piracy, sea robbery, illegal resource extraction, and other maritime crimes in the region?

Table 5. Descriptive Statistics on the Extent of Crime Reduction (n = 189)

S/N	Indicators of Maritime Crime Reduction	VHE	HE	LE	VLE	Mean	SD
1	Reduction in incidents of piracy attacks	41	68	52	28	2.65	0.96
2	Reduction in cases of sea robbery against ships and offshore assets	38	71	55	25	2.64	0.94
3	Reduction in illegal oil bunkering and resource extraction	34	63	58	34	2.51	1.00
4	Reduction in kidnapping of crew and maritime workers	46	74	43	26	2.74	0.93
5	Reduction in smuggling and trafficking activities through maritime routes	31	61	64	33	2.47	0.98
6	Overall reduction in maritime criminal activities in the region	37	69	54	29	2.60	0.95
Grand Mean						**2.60**	

The descriptive results show a moderate extent of reduction in maritime crimes following the implementation of existing maritime insecurity management strategies, as indicated by a grand mean score of 2.60, which is marginally above the criterion mean of 2.50.

Specifically, respondents reported a relatively higher reduction in kidnapping of crew and maritime workers (M = 2.74), suggesting that targeted naval patrols, escort operations, and intelligence-led interventions have had a more noticeable impact in this area. Similarly, reductions in piracy incidents (M = 2.65) and sea robbery (M = 2.64) were rated above the benchmark, indicating some positive outcomes of security interventions. However, the reduction in illegal oil bunkering and resource extraction (M = 2.51) was only marginally above the decision threshold, implying that such crimes remain persistent despite security efforts. Notably, the reduction in smuggling and trafficking activities (M = 2.47) fell below the criterion mean, suggesting that existing strategies have been less effective in addressing these transnational and covert maritime crimes.

The standard deviation values (ranging from 0.93 to 1.00) indicate moderate variability in respondents' perceptions, reflecting differences in operational experiences, geographical zones, and institutional roles.

Research question four

How does improved maritime security contribute to the comparative economic advantage of Nigeria's maritime zones in terms of trade performance, port competitiveness, and investment attraction?

Table 6. Descriptive Statistics on Economic Contributions of Improved Maritime Security (n = 189)

S/N	Economic Advantage Indicators	VHC	HC	LC	VLC	Mean	SD
1	Improved maritime security enhances international trade volumes and shipping traffic	56	79	36	18	2.92	0.85
2	Reduction in security risks lowers shipping and insurance costs for trade operators	61	74	34	20	2.94	0.88
3	Enhanced port safety improves operational efficiency and turnaround time	52	81	38	18	2.89	0.84
4	Secure maritime environment increases port competitiveness within the Gulf of Guinea	49	77	41	22	2.81	0.90
5	Improved maritime security attracts foreign direct investment into port and logistics infrastructure	54	72	39	24	2.83	0.91
6	Security stability encourages private sector participation in maritime and blue economy sectors	47	75	45	22	2.77	0.92
Grand Mean						**2.86**	

The descriptive statistics indicate that improved maritime security contributes significantly to the comparative economic advantage of Nigeria's maritime zones, as evidenced by a grand mean score of 2.86, which exceeds the criterion mean of 2.50. In particular, respondents perceived a strong contribution of maritime security to trade performance, as reflected in improved trade volumes and shipping traffic (M = 2.92) and reduced shipping and insurance costs (M = 2.94). These findings suggest that effective maritime security reduces operational risks and enhances Nigeria's attractiveness as a maritime trade corridor. Similarly, enhanced maritime security was found to improve port competitiveness, especially through improved operational efficiency and reduced vessel turnaround time (M = 2.89), as well as increased competitiveness within the Gulf of Guinea region (M = 2.81). This indicates that security stability is a key determinant of port performance and regional market positioning.

With respect to investment attraction, respondents reported that improved maritime security contributes to increased foreign direct investment (M = 2.83) and greater private sector participation in maritime and blue economy activities (M = 2.77). Although these indicators recorded slightly lower mean scores compared to trade-related benefits, they remain above the decision benchmark, indicating a generally positive contribution.

The standard deviation values (0.84–0.92) reflect moderate dispersion in perceptions, suggesting some variation across respondent categories and maritime zones.

Research Question five

What institutional, operational, and technical challenges affect the successful implementation of maritime insecurity management interventions in Nigeria's maritime zones?

Table 7. Descriptive Statistics of Implementation Challenges (n = 189)

A. Institutional Challenges

S/N	Institutional Challenge Indicators	VHC	HC	LC	VLC	Mean	SD
1	Weak inter-agency coordination among Navy, NIMASA, NPA, and other bodies	71	78	27	13	3.10	0.81
2	Overlapping mandates and role ambiguity among maritime security institutions	66	74	32	17	3.00	0.86
3	Inadequate legal framework and weak enforcement of maritime security laws	62	70	36	21	2.92	0.90
4	Insufficient and inconsistent funding for maritime security operations	74	73	27	15	3.09	0.84

Sub-Grand Mean (Institutional) 3.03

B. Operational Challenges

S/N	Operational Challenge Indicators	VHC	HC	LC	VLC	Mean	SD
5	Limited patrol coverage across vast maritime zones	69	76	28	16	3.05	0.83
6	Shortage of trained and specialized maritime security personnel	64	79	30	16	3.01	0.84
7	Poor intelligence sharing and coordination during operations	61	74	36	18	2.94	0.89
8	Slow response time to maritime security incidents	58	77	35	19	2.92	0.88

Sub-Grand Mean (Operational) 2.98

C. Technical Challenges

S/N	Technical Challenge Indicators	VHC	HC	LC	VLC	Mean	SD
9	Inadequate maritime surveillance and monitoring technology	63	75	32	19	2.98	0.87
10	Poor maintenance and sustainability of security equipment	68	72	31	18	3.01	0.88
11	Limited integration of ICT systems (AIS, radar, C4i platforms)	59	78	34	18	2.94	0.86
12	Insufficient technical capacity to operate advanced security systems	61	74	35	19	2.93	0.88

Sub-Grand Mean (Technical) 2.97

Overall Summary of Challenges

Challenge category	Sub-Grand Mean
Institutional Challenges	3.03
Operational Challenges	2.98
Technical Challenges	2.97
Overall Grand Mean	**2.99**

The descriptive statistics reveal that institutional, operational, and technical challenges significantly affect the successful implementation of maritime insecurity management interventions in Nigeria's maritime zones, as reflected by an overall grand mean of 2.99, which exceeds the criterion mean of 2.50. Among the three categories, institutional challenges were perceived as the most severe (Sub-GM = 3.03), particularly issues related to weak inter-agency coordination, overlapping mandates, and inadequate funding. These findings suggest that governance and institutional fragmentation constitute major constraints to effective maritime security management. Operational challenges (Sub-GM = 2.98) were also rated as substantial, especially limited patrol coverage, shortage of skilled personnel, and slow response times, indicating capacity and logistical gaps in day-to-day security operations. Similarly, technical challenges (Sub-GM = 2.97) were identified as major impediments, with respondents emphasizing deficiencies in surveillance technology, equipment maintenance, and system integration, which undermine situational awareness and rapid response capabilities.

The relatively high and closely clustered mean scores across categories suggest that the challenges are systemic and interrelated, requiring coordinated institutional reforms, operational capacity building, and sustained technological investment.

Testing the hypothesis

Table 8. Pearson Correlation Result (n = 189)

Variables	N	Mean	SD	r	p-value
Maritime Insecurity Management Strategies	189	2.88	0.46		
Comparative Economic Advantage	189	2.86	0.49	**0.63**	**0.000**

The Pearson correlation coefficient (r = 0.63) indicates a strong positive association between maritime insecurity management strategies and comparative economic advantage in Nigeria's maritime zones. The associated p-value ($p < 0.05$) shows that the relationship is statistically significant**.** This implies that improvements in maritime security management are associated with corresponding improvements in trade performance, port competitiveness, and investment attraction.

Regression analysis (supporting test)

Model Summary

R	R^2	Adjusted	R^2 Std. Error
0.63	0.40	0.39	0.38

ANOVA

Source	df	F	p-value
Regression	1	124.6	0.000
Residual	187		
Total	188		

Coefficients

Predictor	B	Std. Error	t	p-value
Constant	0.91	0.17	5.35	0.000
Maritime Security Strategies	0.68	0.06	11.17	0.000

The regression model is statistically significant ($F(1,187) = 124.6$, $p < 0.05$). The R^2 value of 0.40 indicates that 40% of the variation in comparative economic advantage is explained by maritime insecurity management strategies. The positive regression coefficient ($\beta = 0.68$, $p < 0.05$) confirms that effective maritime security strategies significantly predict improvements in economic outcomes within Nigeria's maritime zones. Since the p-value (0.000) is less than the 0.05 level of significance, the null hypothesis is rejected. There is a statistically significant and positive association between maritime insecurity management strategies and comparative economic advantage in Nigeria's maritime zones. Enhanced security interventions are strongly linked to improved trade performance, increased port competitiveness, and greater investment attraction.

4. Discussion of findings

4.1 Dominant maritime insecurity threats

Based on the perceptions of the respondents, maritime insecurity in Nigeria's maritime zones is systemic and multifaceted, encompassing violent crimes at sea, economic sabotage, and institutional weaknesses. These threats significantly undermine maritime trade competitiveness, logistics performance, and the long-term development of Nigeria's blue economy.

The prominence of illegal bunkering and oil theft as the leading maritime insecurity threat aligns with Adebayo (2020) and Onuoha (2019) who identified Nigeria's maritime domain as highly vulnerable to resource-based maritime crimes. Oil theft not only results in substantial revenue losses but also generates environmental degradation that undermines fisheries, coastal livelihoods, and other blue economy sectors. The finding supports the argument that economic sabotage at sea poses a direct threat to sustainable maritime development. Similarly, the high mean scores for piracy, armed robbery, and kidnapping reinforce Nigeria's long-standing security challenges within the Gulf of Guinea. These crimes increase shipping costs through higher insurance premiums, rerouting of vessels, and delayed cargo delivery, thereby weakening maritime trade competitiveness. The present findings confirm that despite recent security interventions, violent maritime crimes continue to constrain logistics efficiency and investor confidence.

4.2 Current security management strategies and mitigation of maritime insecurity

The findings demonstrate that Nigeria currently applies a combination of naval deployment, integrated maritime security architecture (Deep Blue Project), inter-agency coordination, surveillance technologies, intelligence sharing, legal enforcement mechanisms, and regional cooperation to mitigate maritime insecurity. However, the varying mean scores indicate uneven implementation intensity, with operational patrols and national initiatives being more prominent than legal and multinational enforcement strategies.

The study found that Nigeria's maritime insecurity management strategies, particularly naval patrols, the Deep Blue Project, surveillance systems, and inter-agency coordination have led to a moderate reduction in piracy, sea robbery, and kidnapping**,** while having a comparatively weaker impact on illegal resource extraction and smuggling. This pattern aligns with Onuoha (2019) and UNODC (2021), who indicated that security interventions in the Gulf of Guinea have been more effective against overt and violent maritime crimes than against organized, covert, and transnational activities such as oil theft and trafficking.

From a theoretical standpoint, this finding supports the Routine Activity Theory, which suggests that visible guardianship (e.g., patrols and escorts) deters opportunistic crime, but is less effective against highly organized criminal networks that adapt to enforcement measures. It also reflects the argument that maritime insecurity in Nigeria is embedded in broader political, economic and governance structures, making purely military solutions insufficient (Adekola and Allen, 2018).

4.3 Effectiveness of security management strategies on trade flows and economic stability.

The findings indicate that existing maritime insecurity management strategies have led to a moderate reduction in piracy, sea robbery, kidnapping, and some forms of illegal maritime activity in the region. While gains are evident in addressing overt and violent crimes, challenges persist in controlling illegal resource extraction and smuggling, suggesting the need for enhanced intelligence integration, legal enforcement, and regional cooperation. The findings of this study indicate that effective maritime security management strategies such as sustained naval patrols, enhanced maritime surveillance, intelligence sharing, and inter-agency coordination have contributed significantly to improved trade flows within Nigeria's maritime zones. Respondents perceived reductions in security risks, piracy incidents, and sea robbery as key factors facilitating increased shipping traffic, improved vessel turnaround time, and greater reliability of maritime transport services. This aligns with Bensassi and Martínez-Zarzoso (2012) and OECD, (2019) who reported that maritime insecurity directly disrupts trade by increasing shipping delays, freight costs, and insurance premiums.

From an economic perspective, improved maritime security reduces transaction and risk costs associated with maritime trade, thereby enhancing the attractiveness of shipping routes and ports. The study's results indicate that effective security management strategies also contribute to economic stability by fostering investor confidence in maritime-dependent sectors such as shipping, port infrastructure, logistics, and the blue economy. This is also consistent with Collier et al. (2003) and World Bank (2017) who demonstrated that insecurity undermines macroeconomic stability by discouraging investment and disrupting supply chains.

4.4 Maritime security interventions and comparative economic advantage

The findings demonstrate that improved maritime security contributes to Nigeria's comparative economic advantage by enhancing trade performance, strengthening port competitiveness, and attracting investment. While trade-related gains are most pronounced, security-induced improvements in port efficiency and investor confidence further reinforce Nigeria's position as a strategic maritime hub in the Gulf of Guinea.

The results of the Pearson correlation and regression analyses revealed a strong and statistically significant association between maritime insecurity management strategies and comparative economic advantage in Nigeria's maritime zones ($r = 0.63$, $p < 0.05$). The study established a strong and statistically significant positive association between maritime insecurity management strategies and comparative economic advantage, particularly in terms of trade performance, port efficiency, competitiveness, and investment attraction. This confirms existing empirical evidence Bueger (2015) and OECD (2019) that maritime security is a critical enabler of economic performance in port-dependent economies. The finding is consistent with Institutional Economics Theory, which posits that secure and predictable institutional environments reduce transaction costs, enhance investor confidence, and improve market efficiency. Improved maritime security reduces insurance premiums, shipping delays, and operational risks, thereby enhancing Nigeria's competitiveness within the Gulf of Guinea maritime corridor.

4.5 Institutional and operational challenges in maritime insecurity management

The findings demonstrate that the successful implementation of maritime insecurity management interventions in Nigeria's maritime zones is constrained by institutional coordination and funding gaps, operational capacity limitations, and technical and technological deficiencies. Addressing these interconnected challenges is critical to enhancing the effectiveness and sustainability of Nigeria's maritime security architecture. The study revealed that institutional challenges, particularly weak inter-agency coordination, overlapping mandates, and funding inconsistencies, constitute the most significant barriers to effective maritime insecurity management. Operational limitations (patrol coverage, personnel shortages) and technical gaps (surveillance integration and maintenance) further constrain implementation.

These findings are consistent with Badejo (2017) and Ploch Blanchard and Humphrey (2020) that described Nigeria's maritime security architecture as fragmented and coordination-deficient, despite the existence of multiple capable

institutions. The persistence of these constraints underscores the limits of capacity expansion without institutional reform.

6. Conclusions

Based on the empirical analyses of this study, the following conclusions are drawn:

1. Nigeria has deployed a range of maritime insecurity management strategies, including naval patrols, the Deep Blue Project, inter-agency coordination mechanisms, surveillance technologies, intelligence gathering, and regional cooperation frameworks. Naval deployment and national security architecture are the most visible and consistently applied interventions.
2. The existing maritime security strategies have contributed to a moderate reduction in key maritime crimes such as piracy, sea robbery, and kidnapping of crew. However, the impact on illegal resource extraction, smuggling, and other covert maritime crimes remains limited, indicating uneven effectiveness across crime categories. This suggests that current interventions are more effective against overt and violent threats than against organized and transnational maritime crimes.
3. Improved maritime security has made a significant contribution to Nigeria's comparative economic advantage, particularly in terms of enhanced trade performance, improved port efficiency, increased port competitiveness, and stronger investment attraction. Respondents consistently perceived security stability as a critical enabler of maritime trade flows and investor confidence.
4. The successful implementation of maritime insecurity management strategies is significantly constrained by institutional fragmentation, overlapping mandates, inadequate and inconsistent funding, limited operational coverage, manpower shortages, and technological gaps. Institutional challenges were identified as the most severe, underscoring governance and coordination deficits within the maritime security architecture.
5. Inferential analysis confirmed a strong and statistically significant positive association between maritime insecurity management strategies and comparative economic advantage. This empirical evidence validates the theoretical proposition that maritime security is not merely a safety concern but a strategic economic determinant in coastal and maritime economies.

6.1 Recommendations

In light of the findings and conclusions, the following recommendations are proposed:

1**.** Establishment of a formalized, legally backed inter-agency coordination framework that clearly defines roles and responsibilities among the Nigerian Navy, NIMASA, NPA, and other relevant agencies. In other words, government should streamline overlapping mandates to reduce institutional rivalry and improve operational synergy.

2. Review and strengthen existing maritime security laws to ensure swift prosecution and deterrence of maritime crimes, particularly illegal oil bunkering, smuggling, and trafficking. Improve the capacity of maritime courts and enforcement agencies to handle maritime crime cases effectively.

3. Increase patrol assets and operational coverage, especially in high-risk and underserved maritime corridors. Invest in continuous training and specialization of maritime security personnel, with emphasis on intelligence-led operations and counter–transnational crime tactics.

4. Expand the deployment and integration of advanced maritime surveillance systems (AIS, radar, drones, satellite monitoring, and C4i platforms). Ensure sustainable maintenance, system interoperability, and technical skill development to maximize the effectiveness of security technologies.

5. Strengthen intelligence-sharing mechanisms at national and regional levels within the Gulf of Guinea framework, focusing on cross-border maritime threats. Promote joint patrols, information fusion centers, and coordinated response protocols with neighboring coastal states.

6. Implement regular monitoring and evaluation mechanisms that link security interventions to measurable outcomes such as crime reduction rates, trade volumes, port turnaround time, and investment inflows. This will enable evidence-based adjustments to maritime security strategies.

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