
SECURING NIGERIA BLUE ECONOMY: A MILITARY- CIVILIAN LOGISTICS FRAMEWORK FOR THE GULF OF GUINEA

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Abstract

Maritime insecurity remains a critical challenge to Nigeria Blue Economy development and operational resilience in the Gulf of Guinea. This study examined the influence of maritime-security capacity dimensions: Integrated Infrastructure (INTINF), Joint Operations and Logistics (JOPLOG), Information Sharing and Maritime Domain Awareness (INSMDA), and Governance and Institutional Coordination (GOINCO) on Maritime Security Outcomes, Blue Economy Performance, and Operational Resilience. A survey research design was adopted, and data were collected from 384 respondents across the Nigerian Navy, NIMASA, NPA, and other maritime stakeholders using structured questionnaire. Multiple regression analysis was employed to test three hypotheses at the 0.05 significance level. The results revealed that the four predictors jointly and significantly explained 65.7% of the variance in Maritime Security Outcomes ($F = 149.872, p < .001$), 60.2% of the variance in Blue Economy Performance ($F = 143.647, p < .001$), and 61.4% of the variance in Operational Resilience ($F = 151.138, p < .001$). Joint Operations and Logistics emerged as the strongest and most consistent predictor across all three outcome variables ($\beta = 0.465, 0.407, 0.413$; $p < .001$), followed by Governance and Institutional Coordination. Integrated Infrastructure significantly predicted Maritime Security Outcomes and Operational Resilience but not Blue Economy Performance, while Information Sharing and Maritime Domain Awareness significantly predicted only Blue Economy Performance. The study concludes that coordinated joint operations, strong institutional governance, enabling infrastructure, and functional information systems are essential for enhancing maritime security and Blue Economy outcomes in Nigeria. It recommends strengthening joint command structures and logistics frameworks, establishing a high-level inter-agency maritime coordination body, and integrating surveillance systems with shared infrastructure to maximize operational effectiveness. These measures will improve Nigeria maritime-security capacity, foster Blue Economy growth, and build a resilient maritime-security architecture in the Gulf of Guinea.

Keywords: Maritime security, Blue Economy, Joint operations, Governance, Operational resilience, Nigeria

Introduction

The Nigeria Blue Economy represents a strategic frontier for national development, encompassing maritime trade, fisheries, offshore energy, and coastal tourism (Etim et al., 2015). However, the Gulf of Guinea remains one of the world's most piracy-prone waters, with persistent threats from armed robbery at sea, illegal fishing, and transnational organised crime undermining economic potential and regional stability (Osinowo, 2015). Securing this maritime domain requires more than naval patrols; it demands an integrated logistics framework that aligns military operational capabilities with civilian supply chain efficiency to ensure sustained presence, rapid response, and effective resource deployment (Marta, 2018). The military-civilian logistics framework proposed here draws on principles of supply chain management, joint operations planning, and public-private partnership to create a resilient support architecture for maritime security.

By leveraging civilian port infrastructure, commercial shipping data, and private-sector logistics expertise, the Nigerian Navy and allied security agencies can enhance their operational reach while reducing costs and duplication. This approach also enables better coordination with regional partners under the Yaoundé Code of Conduct and the African Union's 2050 AIM Strategy, fostering a collective security posture in the Gulf (Agunsoye, et al., 2025). Key components of the framework include shared warehousing and fuel depots at strategic ports, integrated transport management systems for personnel and equipment, and real-time intelligence sharing through digital platforms. Civilian logistics providers can support last-mile delivery of supplies to offshore patrol vessels, while military assets provide security escorts for high-value cargo shipments. Such symbiosis not only strengthens maritime domain awareness but also builds trust between defence institutions and the private sector, critical for long-term sustainability (Agunsoye, et al., 2025).

Ultimately, securing Nigeria's Blue Economy hinges on transforming logistics from a support function into a strategic enabler of maritime security. By institutionalising collaboration between military planners and civilian logistics operators, Nigeria can safeguard its maritime interests, attract investment in offshore industries, and position itself as a leader in Gulf of Guinea security architecture (Agunsoye, et al., 2025). This paper outlines the conceptual design, operational mechanisms, and policy recommendations for implementing such a framework in alignment with national and regional maritime strategies.

Despite Nigeria's vast maritime endowments and strategic location along the Gulf of Guinea, the country's Blue Economy remains underperforming due to persistent insecurity, logistical inefficiencies, and fragmented institutional coordination (Etim et al., 2015; Christopher & Onye K 2025). The Gulf of Guinea accounts for a significant proportion of global maritime piracy incidents, with Nigerian waters frequently targeted for armed robbery at sea, kidnapping of seafarers, and illegal bunkering (Christopher & Onye K 2025). These security challenges disrupt shipping lanes, inflate insurance costs, deter foreign investment, and constrain the growth of critical sectors such as fisheries, offshore energy, and port operations (Osinowo, 2015). While the Nigerian Navy and other security agencies have made commendable efforts in maritime patrols and interdiction, their impact is often limited by inadequate logistical support, poor inter-agency collaboration, and insufficient integration with civilian maritime stakeholders (Osinowo, 2015). Current approaches to maritime security in Nigeria predominantly emphasise kinetic military responses without adequately addressing the underlying logistical and institutional bottlenecks that undermine operational effectiveness (Nightingale, 2019). Military assets frequently experience delays in deployment due to fuel shortages, maintenance backlogs, and inadequate supply chain coordination, while civilian port operators and shipping companies operate in silos with limited

information sharing on security threats (Petropoulos et al., 2026; Marta, 2018). This disconnect between military operational requirements and civilian logistics capabilities results in duplicated efforts, resource wastage, and reduced maritime domain awareness (Marta, 2018).

Furthermore, the absence of a formalised military-civilian logistics framework exacerbates governance gaps, weakens institutional coordination, and limits the scalability of security interventions across the Gulf of Guinea region (Nightingale, 2019; Marta, 2018). The variables underpinning this study include; integrated infrastructure, joint operations and logistics, information sharing and maritime domain awareness, and governance and institutional coordination. This highlights critical gaps in Nigeria's current maritime security architecture. Integrated infrastructure remains underdeveloped, with limited shared use of port facilities, warehousing, and fuel depots between military and civilian actors. Joint operations and logistics are hampered by unclear command structures, incompatible procurement systems, and ad hoc coordination mechanisms (Nightingale, 2019). Information sharing and maritime domain awareness suffer from fragmented data systems, lack of real-time intelligence fusion, and limited adoption of digital platforms for threat monitoring (Mandanda & Ping, 2016). Governance and institutional coordination are weakened by overlapping mandates, bureaucratic inertia, and insufficient policy frameworks to enforce public-private collaboration (Johri, 2019).

According to Ehiane (2025), these systemic deficiencies manifest in poor maritime security outcomes, suboptimal Blue Economy performance, and low operational resilience against emerging threats. Piracy incidents continue to escalate in certain corridors, illegal fishing depletes marine stocks, and port congestion undermines trade efficiency (Ehiane, 2025; Nwalozie, 2020). Without a structured military-civilian logistics framework that aligns security operations with supply chain best practices, Nigeria risks losing its competitive advantage in the regional maritime economy (Ehiane, 2025; Nwachukwu, 2017). This study therefore seeks to address these gaps by designing and evaluating a logistics framework that enhances integrated infrastructure, strengthens joint operations, improves information sharing, and fosters institutional coordination to secure Nigeria's Blue Economy and promote sustainable growth in the Gulf of Guinea.

The aim of this study is to design and evaluate a military-civilian logistics framework for securing Nigeria's Blue Economy in the Gulf of Guinea by optimising integrated infrastructure, joint operations and logistics, information sharing and maritime domain awareness, and governance and institutional coordination to enhance maritime security outcomes, Blue Economy performance, and operational resilience. This is to assess the current state of integrated infrastructure and identify opportunities for shared use of port facilities, warehousing, and fuel depots between military and civilian actors; examine the effectiveness of joint operations and logistics mechanisms, including command structures, procurement systems, and coordination protocols; evaluate existing information sharing platforms and maritime domain awareness capabilities to determine gaps in real-time intelligence fusion and digital threat monitoring and analyse governance and institutional coordination frameworks to identify policy barriers and propose mechanisms for enforcing public-private collaboration as well as to measure the impact of these proposed logistics framework on maritime security outcomes (reduced piracy and illegal fishing), Blue Economy performance (increased trade, investment, and sectoral growth), and operational resilience (sustained presence, rapid response, and adaptability to emerging threats). Hence, the specific objectives include: (1) To determine the extent to which integrated infrastructure,

joint operations and logistics, information sharing and maritime domain awareness, and governance and institutional coordination predict maritime security outcomes. (2) To determine the extent to which integrated infrastructure, joint operations and logistics, information sharing and maritime domain awareness, and governance and institutional coordination predict Blue Economy performance. (3) To determine the extent to which integrated infrastructure, joint operations and logistics, information sharing and maritime domain awareness, and governance and institutional coordination predict operational resilience. The following hypotheses were evaluated;

H₀₁: Integrated Infrastructure, Joint Operations and Logistics, Information Sharing and Maritime Domain Awareness, and Governance and Institutional Coordination do not significantly predict Maritime Security Outcomes.

H₀₂: Integrated Infrastructure, Joint Operations and Logistics, Information Sharing and Maritime Domain Awareness, and Governance and Institutional Coordination do not significantly predict Blue Economy performance.

H₀₃: Integrated Infrastructure, Joint Operations and Logistics, Information Sharing and Maritime Domain Awareness and Governance and Institutional Coordination do not significantly predict operational resilience. This study is significant because it provides an evidence-based military-civilian logistics framework for improving the security, sustainability, and economic value of Nigeria Blue Economy in the Gulf of Guinea. It will be useful to the Nigerian Navy, NIMASA, Nigerian Ports Authority, Customs, port operators, shipping companies, logistics providers, and other maritime stakeholders by identifying practical ways to share infrastructure, coordinate joint operations, improve intelligence exchange, and strengthen institutional cooperation.

The study can support policy makers in addressing barriers created by overlapping mandates, fragmented information systems, inadequate logistics support, and weak public-private coordination. Its findings may assist in reducing piracy, illegal fishing, oil theft, smuggling, and other maritime threats, while improving rapid response capability, sustained patrol presence, and resilience against emerging threats. This is particularly relevant to Nigeria current maritime-security and Blue Economy agenda, including the Deep Blue Project and the national effort to connect maritime safety with investment and sustainable ocean-based development.

Academically, the study will add to the limited literature on the integration of military logistics, civilian supply-chain capability, maritime governance, and Blue Economy development in Nigeria and the wider Gulf of Guinea.

Review of Related Literature

The study adopted the Systems Theory, Resource Dependence Theory and Collaborative Governance Theory. The Systems Theory associated with Ludwig von Bertalanffy, views an organisation or operational environment as a set of interconnected and interdependent components working toward a common objective (Aniket et al., 2026). The central argument is that the performance of the whole system depends not only on the effectiveness of individual units but also on the quality of relationships, communication, coordination, and feedback among them (Colgan, 2016). A disruption in one part of the system can affect the performance of other parts (Fan, et al., 2016). In logistics and supply-chain settings, this theory explains why transport, warehousing, procurement, inventory management, information systems, and distribution must be coordinated rather than managed as isolated functions (Aniket et al., 2026).

Systems Theory is suitable for this study because the security of Nigeria Blue Economy requires the integration of military agencies, maritime regulators, port authorities, shipping firms, logistics operators, intelligence organisations, and coastal communities (Emenyonu et al., 2024). The study variables; integrated infrastructure, joint operations and logistics, information sharing and maritime domain awareness, and governance and institutional coordination represent interrelated subsystems of a wider maritime-security system.

The theory therefore supports the proposition that efficient coordination among these variables will enhance maritime security outcomes, Blue Economy performance, and operational resilience. Resource Dependence Theory (RDT), developed by Pfeffer and Salancik, argues that organisations depend on resources controlled by other organisations and must manage these dependencies to survive, maintain autonomy, and accomplish their objectives (Harsch, 2026). Such resources may include finance, infrastructure, technology, intelligence, specialised personnel, equipment, legitimacy, and access to strategic locations. RDT holds that organisations create alliances, partnerships, contracts, joint committees, and information-sharing arrangements to reduce uncertainty and gain access to essential resources that they cannot efficiently provide alone. The extent of cooperation depends partly on how essential a resource is and how difficult it is to obtain from alternative sources (Harsch, 2026). RDT is relevant because no single military, government, or private organisation possesses all the resources needed to secure the Nigeria extensive maritime domain. The Nigerian Navy may provide maritime enforcement capacity, while civilian actors such as port authorities, terminal operators, shipping firms, fuel suppliers, warehouse operators, and logistics companies may control facilities, commercial intelligence, repair capacity, storage locations, and supply networks.

The theory thus explains the need for a military-civilian logistics framework that allows stakeholders to share port facilities, warehouses, fuel depots, surveillance information, and operational support. By reducing resource gaps and dependence-related uncertainty, such collaboration can improve response speed, sustained patrol presence, protection against piracy and illegal fishing, and Blue Economy performance (Harsch, 2026). The Collaborative Governance Theory explains how public agencies and non-state stakeholders jointly make and implement decisions to achieve public goals that cannot be effectively achieved by government acting alone (Joris et al., 2021). It emphasises formal, inclusive, consensus-oriented, and deliberative arrangements through which government institutions, private organisations, civil-society groups, and communities share information, resources, responsibilities, and decision-making authority (Joris et al., 2021; Silvia, 2018). Important elements include clear institutional rules, stakeholder participation, trust building, leadership, shared understanding, joint planning, accountability, and performance monitoring. Collaborative governance is especially useful for addressing complex issues that cross organisational boundaries, such as maritime security, environmental protection, transport infrastructure, and public-private partnerships (Silvia, 2018, Sørensen et al., 2020).

This theory is particularly appropriate for analysing governance and institutional coordination in Nigeria maritime sector. Securing the Gulf of Guinea involves multiple actors with different legal mandates, operational cultures, commercial interests, and security responsibilities (Sørensen et al., 2020). Collaborative Governance Theory supports the development of formal mechanisms such as inter-agency coordination committees, memoranda of understanding, shared operational protocols, joint intelligence platforms, public-private partnership agreements, and common performance indicators (Silvia, 2018, Sørensen et al., 2020). It explains how coordinated governance can address policy barriers,

overlapping mandates, fragmented decision-making, and weak accountability (Snow, 2015). Applied to this study, the theory suggests that sustained collaboration between military and civilian stakeholders can produce stronger maritime security outcomes, increase investor confidence and sectoral growth, and improve the resilience of Nigeria Blue Economy against emerging threats (Sørensen et al., 2020).

However, the study is anchored on seven interrelated concepts that collectively provide the basis for examining a military-civilian logistics framework for securing Nigeria Blue Economy in the Gulf of Guinea. These concepts are integrated infrastructure; joint operations and logistics; information sharing and Maritime Domain Awareness; governance and institutional coordination; maritime security outcomes; Blue Economy performance; and operational resilience. The first four represent the principal explanatory dimensions of the framework, while the latter three constitute the expected outcomes through which the effectiveness of the framework will be assessed. Collectively, these concepts explain how shared infrastructure, coordinated operations, timely intelligence, and effective institutional collaboration can reduce maritime threats, improve trade and investment, support sectoral growth, and strengthen the capacity of maritime stakeholders to sustain operations, respond rapidly, and adapt to emerging threats.

According to Yuen et al., (2018) Integrated infrastructure refers to the coordinated development, shared access, and interoperability of physical and digital assets that support maritime security and Blue Economy activities. These assets include ports, jetties, patrol bases, warehouses, fuel depots, repair yards, communication systems, surveillance facilities, and transport networks. Studies on maritime logistics emphasises that infrastructure integration improves the movement, storage, maintenance, and distribution of resources across the supply chain (Zahra et al., 2026). In a military-civilian setting, shared access to strategic facilities can reduce duplication of assets, lower operating costs, and ensure that personnel, vessels, equipment, fuel, and relief supplies are available when required (Bertelle et al., 2024). Integrated infrastructure is therefore critical to maintaining maritime patrol operations, supporting emergency response, and securing port and offshore facilities in the Gulf of Guinea (Bertelle et al., 2024). The relevance of integrated infrastructure to Nigeria Blue Economy is particularly evident in major port environments such as Onne and Rivers Port, where commercial shipping, oil and gas logistics, cargo handling, and security operations intersect (David, et al., 2025). An integrated infrastructure framework would allow military agencies, port authorities, terminal operators, shipping firms, and logistics providers to share selected facilities under clearly defined security and access arrangements (David, et al., 2025).

However, institutional separation, inadequate maintenance, restricted access, weak digital connectivity, and insufficient investment can limit such cooperation. Many studies suggests that infrastructure must not only be available but also interoperable, scalable, secure, and supported by coordinated planning in order to improve maritime operational effectiveness (Aidas et al., 2024). Joint operations and logistics involve the coordinated planning, command, movement, sustainment, and deployment of personnel and assets by military, paramilitary, government, and civilian organisations (Babek & Siyavush, 2025; Akhundov, 2024). In the maritime context, joint operations require clearly defined command structures, shared operational plans, standard operating procedures, joint exercises, coordinated procurement, and mutual logistics support (Babek & Siyavush, 2025; Akhundov, 2024). Effective logistics enables patrol vessels and security personnel to receive fuel, food, spare parts, maintenance services, intelligence, and transport support when needed (Akhundov, 2024). Consequently, logistics is not merely an administrative function; it is a

strategic capability that determines whether maritime forces can remain at sea, respond quickly to incidents, and protect commercial shipping and marine resources (Akhundov, 2024). Studies on joint maritime operations highlight the importance of interoperable command-and-control systems and coordinated logistics arrangements for reducing delays and improving mission outcomes (Babek & Siyavush, 2025). A joint military-civilian logistics approach can enable the Nigerian Navy, NIMASA, NPA, Customs, port operators, shipping companies, and private logistics firms to pool relevant resources and avoid unnecessary duplication (Akhundov, 2024; Babek & Siyavush, 2025). Such coordination is particularly important for responding to piracy, armed robbery at sea, oil theft, smuggling, illegal fishing, and other threats that require rapid mobilisation (Akhundov, 2024).

Nevertheless, differences in organisational culture, procurement rules, authority structures, and funding procedures may hinder effective collaboration. Sustained joint planning, formal coordination protocols, and regular inter-agency exercises are therefore necessary to strengthen joint maritime logistics performance (Akhundov, 2024). Information sharing and Maritime Domain Awareness (MDA) are central to the prevention, detection, and response to maritime threats (Akah & Dimitrios 2017; Bueger, 2015). MDA concerns the effective understanding of activities, actors, vessels, cargoes, infrastructure, and events within the maritime environment that may affect security, safety, the economy, or the marine ecosystem (Akah & Dimitrios 2017; Bueger, 2015). It requires information collected from patrol vessels, radar, Automatic Identification System data, satellite imagery, coastal surveillance systems, ports, fishing communities, shipping companies, intelligence agencies, and other relevant sources (Chintoan-Uta & Silva. 2016). When this information is shared and integrated promptly, decision makers can identify suspicious vessel movements, monitor high-risk areas, issue alerts, deploy response assets, and coordinate enforcement actions (Chintoan-Uta & Silva 2017). Many studies further indicate that effective MDA depends on interoperable digital platforms, near-real-time data exchange, intelligence fusion, secure communication networks, and the creation of a common operational picture among participating agencies (Dalaklis, 2017). Information integration allows military and civilian stakeholders to convert raw data into actionable intelligence for addressing piracy, illegal fishing, trafficking, oil theft, cyber risks, and environmental incidents (Kamal-Deen, 2015).

However, fragmented databases, poor data quality, incompatible technology, restricted access to intelligence, inadequate cybersecurity, and lack of trained personnel may constrain effective information sharing (Ofosu-Boateng, 2017).

For Nigeria, improving information fusion among maritime security agencies, port authorities, commercial operators, and regional partners can strengthen early warning, reduce response time, and improve safety across the Gulf of Guinea (Ofosu-Boateng, 2017). Governance and institutional coordination concern the rules, policies, mandates, accountability arrangements, and decision-making structures that guide the conduct of maritime security and Blue Economy activities (Onwuegbuchunam et al., 2021). Because the maritime sector includes diverse actors such as the Navy, NIMASA, NPA, Customs, immigration authorities, police, fisheries regulators, oil and gas firms, shipping companies, and port operators effective governance is required to harmonise their roles and prevent institutional fragmentation (Onwuegbuchunam et al., 2021). An appropriate governance framework establishes clear mandates, information-sharing rules, funding responsibilities, performance standards, and procedures for resolving conflicts. It also creates the legal basis for public-private partnerships in infrastructure provision, maritime logistics support, surveillance, and emergency response (Onwuegbuchunam et al., 2021).

Research shows that weak coordination, overlapping mandates, bureaucratic delays, and inconsistent policies can reduce the effectiveness of maritime security interventions (Onwuegbuchunam, et al., 2018; Sadovaya, & Thai, 2015). Where agencies operate independently, intelligence may not be shared, resources may be duplicated, and response activities may be delayed. Collaborative governance can address these challenges through inter-agency coordination committees, joint planning mechanisms, memoranda of understanding, shared performance indicators, and transparent monitoring systems (Onwuegbuchunam, et al., 2018; Eromosele, 2017).

In Nigeria, a formal military-civilian governance framework would help align maritime-security objectives with commercial logistics and Blue Economy development goals. Such a framework should promote accountability while safeguarding national security, commercial confidentiality, and the lawful role of private-sector participants (Onwuegbuchunam, et al., 2018; Eromosele, 2017). Operational resilience is the ability of maritime security and logistics systems to sustain essential operations, absorb disruptions, recover from shocks, and adapt to emerging threats (Hatice & Özer-Çaylan 2022). Within the Gulf of Guinea, resilience is demonstrated through continuous patrol presence, adequate logistics stockpiles, dependable fuel supply, maintenance capability, backup communications, trained personnel, and flexible response plans (Ali & Gölgeci, 2019). A resilient maritime security system should be able to continue functioning despite equipment breakdowns, adverse weather, cyberattacks, security incidents, supply shortages, or changes in criminal tactics (Akpınar, 2021). Sustained operational presence is especially important because gaps in patrol coverage may create opportunities for piracy, illegal fishing, trafficking, and other unlawful activities (Annarelli & Nonino, 2016).

Maritime resilience literature identifies visibility, collaboration, integration, information sharing, cross-functional coordination, and joint planning as important mechanisms for responding to disruption (Asadabadi & Miller-Hooks, 2020). When military and civilian actors share intelligence, infrastructure, logistics resources, and contingency plans, they can deploy assets more rapidly and restore operations after an incident. Operational resilience also requires learning from previous events and updating procedures, technologies, and training to address evolving risks such as unmanned systems, cyber threats, sophisticated smuggling networks, and changing piracy methods (Asadabadi & Miller-Hooks, 2020). Therefore, a military-civilian logistics framework can enhance Nigeria's operational resilience by creating a reliable support system that sustains maritime security operations and protects long-term Blue Economy activities (Asadabadi & Miller-Hooks, 2020). The study identified significant gaps in the existing literature.

First, previous studies have largely examined integrated infrastructure, joint operations and logistics, information sharing and Maritime Domain Awareness (MDA), and governance and institutional coordination as separate dimensions, rather than combining them within a unified explanatory framework for securing the Blue Economy.

Second, much of the available research has adopted a national-level perspective or focused broadly on the Gulf of Guinea and Lagos ports, resulting in limited empirical evidence on the specific relationship between maritime-security logistics and Blue Economy performance at Onne Port and Rivers Port.

Third, existing studies have concentrated primarily on naval cooperation, regional maritime-security initiatives, and government-to-government arrangements, while paying insufficient attention to the practical collaboration between military agencies and civilian port authorities, shipping companies, terminal operators, warehouse managers, fuel suppliers, and private logistics providers. This gap is particularly important because the effective

protection of Nigeria maritime domain depends not only on naval presence but also on shared infrastructure, coordinated logistics support, timely information exchange, and formal mechanisms for public-private collaboration.

Therefore, the present study seeks to provide an integrated, location-specific, and empirically testable military-civilian logistics framework for improving maritime security, Blue Economy performance, and operational resilience in the Gulf of Guinea.

Materials and Methods

This study will adopt a quantitative, cross-sectional survey research design. The design is appropriate because it enables the researcher to obtain measurable perceptions from relevant maritime stakeholders at a single point in time regarding the military-civilian logistics framework for securing Nigeria Blue Economy in the Gulf of Guinea. The study examined how integrated infrastructure, joint operations and logistics, information sharing and maritime domain awareness, and governance and institutional coordination influence maritime security outcomes, Blue Economy performance, and operational resilience. A survey design served suitably for generating standardised data from respondents, while multiple regression analysis was used to determine the predictive effect of the independent variables on the dependent variables. The population of the study is unknown, as there is no consolidated and publicly available record of all personnel and stakeholders involved in military-civilian maritime logistics and security operations within the study locations.

The target population comprised personnel of the Nigerian Navy, Nigerian Maritime Administration and Safety Agency (NIMASA), Nigerian Ports Authority (NPA), Nigerian Customs Service, Nigerian Police Marine Unit, port security agencies, shipping companies, freight forwarders, terminal operators, logistics firms, warehouse operators, fuel suppliers, fisheries operators, and other relevant public and private maritime stakeholders operating within Onne Port and Rivers Port. Because the population size is indeterminate, respondents will be selected using purposive sampling based on their knowledge, experience, and direct involvement in maritime security, port operations, logistics, or Blue Economy activities. Therefore, the researcher adopted Cochran's formula for sample size with unknown/infinite population given as:

$$\text{No.} = [Z^2 \cdot P \cdot (1-P)] / e^2$$

Where:

$Z = 1.96$ for 95% confidence level

$P = 0.5$

$e = 0.05$ for 5% margin of error

Therefore, the sample size of the study is approximately 385

The study focused on Onne Port and Rivers Port in Rivers State, Nigeria. These ports are selected because of their importance to Nigeria maritime trade, offshore oil and gas logistics, port operations, cargo movement, and wider Blue Economy activities in the Gulf of Guinea. The content scope will cover integrated infrastructure, joint operations and logistics, information sharing and maritime domain awareness, and governance and institutional coordination. The study examined the outcomes of these variables in terms of maritime security outcomes, particularly reduced piracy and illegal fishing; Blue Economy performance, including trade, investment, and sectoral growth, and operational resilience, measured through sustained presence, rapid response, and adaptability to emerging threats.

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The study adapted both primary and secondary data. Primary data were obtained directly from respondents through structured questionnaires administered to military personnel, maritime regulators, port officials, logistics providers, shipping operators, and other relevant stakeholders at Onne Port and Rivers Port.

Secondary data were sourced from textbooks, peer-reviewed journal articles, government publications, policy documents, official reports of relevant maritime agencies, conference papers, institutional publications, and credible online sources. These secondary materials provided the conceptual, theoretical, policy, and empirical support for the study. Data was collected primarily through a structured questionnaire designed in line with the study objectives and variables. The questionnaire consist of items relating to integrated infrastructure; joint operations and logistics; information sharing and maritime domain awareness; governance and institutional coordination; maritime security outcomes; Blue Economy performance; and operational resilience. A four-point Likert-type scale was used to measure respondents' views: VHE = Very High Extent; HE = High Extent; LoE = Low Extent; and VLoE = Very Low Extent. Copies of the questionnaire were administered physically and, where appropriate, electronically to eligible respondents within the selected ports and related organisations.

The data collected was coded and analysed using descriptive and inferential statistics, preferably with Statistical Package for the Social Sciences (SPSS 2.6). Descriptive statistics, including frequencies, percentages, mean scores, and standard deviations, were used to summarise respondents' characteristics and assess the extent of responses to each questionnaire item. Multiple regression analysis was used to test the predictive relationship between the independent variables: integrated infrastructure, joint operations and logistics, information sharing and maritime domain awareness, and governance and institutional coordination and the dependent variables: maritime security outcomes, Blue Economy performance and operational resilience. Multiple regression was appropriate where several independent variables were examined simultaneously to determine their individual and combined effects on a dependent variable. The regression models stated as:

$$MARSECOUT = \beta_0 + \beta_1 INTINF + \beta_2 JOPLOG + \beta_3 INSMDA + \beta_4 GOINCO + \varepsilon \text{ -----eq1}$$

$$BLUECOPER = \beta_0 + \beta_1 INTINF + \beta_2 JOPLOG + \beta_3 INSMDA + \beta_4 GOINCO + \varepsilon \text{ -----eq2}$$

$$OPERARESI = \beta_0 + \beta_1 INTINF + \beta_2 JOPLOG + \beta_3 INSMDA + \beta_4 GOINCO + \varepsilon \text{ ----- eq3}$$

Where:

MARSECOUT = Maritime Security Outcomes;

BLUECOPER = Blue Economy Performance;

OPERARESI = Operational Resilience;

INTINF = Integrated Infrastructure;

JOPLOG = Joint Operations and Logistics;

INSMDA = Information Sharing and Maritime Domain Awareness;

GOINCO = Governance and Institutional Coordination;

β_0 = constant;

β_1 - β_4 = regression coefficients; and ε = error term

Discussion of Results

Table 4.1: Questionnaire Distribution and Response Rate

Item	Frequency	Percentage (%)
Questionnaires Distributed	385	100.0
Questionnaires Returned and Used	384	99.7

Item	Frequency	Percentage (%)
Not Returned	1	0.3

Source: Field Survey (2026)

A total of 385 questionnaires were distributed to the selected respondents, representing 100% of the intended sample size. Out of this number, 384 questionnaires were returned, properly completed, and found suitable for data analysis. This represents a response rate of 99.7%. Only one questionnaire, representing 0.3%, was not returned.

The very high response rate indicates a strong level of cooperation and participation among the respondents. It also implies that the data collected were sufficiently representative of the sampled respondents and suitable for the subsequent statistical analyses.

Table 4.2: Gender Distribution of Respondents

Gender	Frequency	Percentage (%)
Male	312	81.0
Female	72	19.0
Total	384	100.0

Source: Field Survey (2026)

The table 4.2 presents the gender distribution of the 384 respondents who participated in the study. The result shows that 312 respondents, representing 81.0%, were male, while 72 respondents, representing 19.0%, were female. This indicates that male respondents constituted the majority of the participants in the study. The result may suggest that supply-chain, logistics, transport, technology, and environmental compliance roles within the study area are largely dominated by males. This is particularly common in operational sectors such as transportation, warehousing, maritime operations, and logistics, where male participation is often higher.

However, the presence of 72 female respondents shows that women are also represented in supply-chain and logistics-related activities. Their inclusion provides diverse perspectives and ensures that the study does not rely entirely on the views of male respondents.

Table 4.3: Age Distribution of Respondents

Age Group	Frequency	Percentage (%)
20-29 years	57	14.8
30-39	98	25.5
40-49	135	35.2
50 years and above	94	24.5
Total	384	100.0

Source: Field Survey (2026)

The table 4.3 presents the age distribution of the 384 respondents involved in the study. The result shows that 57 respondents, representing 14.8%, were between 20 and 29 years. Respondents aged 30–39 years were 98, representing 25.5%. The largest group was respondents aged 40–49 years, with 135 respondents, representing 35.2%. Respondents aged 50 years and above were 94, representing 24.5%. The findings indicate that most respondents were within the 40–49-year age group. This suggests that a large proportion of the participants were mature and likely to possess considerable professional experience in military operations, maritime security, logistics, transportation, administration, or related activities.

Table 4.4: Educational Qualification

Qualification	Frequency	Percentage (%)
Diploma/Professional Certification	95	24.7
BSc/HND	132	34.3
Master Degree	97	25.3
Doctorate Degree	60	15.6
Total	384	100.0

Source: Field Survey (2026)

Table 4.4 presents the educational qualifications of the 384 respondents. The result shows that the largest group, 132 respondents (34.3%), possessed a BSc/HND qualification. This was followed by respondents with a Master's degree, numbering 97 (25.3%), and those with Diploma/Professional Certifications, numbering 95 (24.7%). 60 respondents (15.6%) possessed a Doctorate degree and this indicates that a reasonable number of highly educated respondents participated in the study.

The table shows that the respondents were academically qualified, as all participants possessed at least a diploma or professional certification. The substantial proportion of respondents with first degrees, Master's degrees, and Doctorate degrees suggests that they were capable of understanding the questionnaire and providing informed responses on issues relating to Nigeria blue economy, maritime security, and military–civilian logistics cooperation.

Table 4.5: Respondents by Organizational Category

Category	Frequency	Percentage (%)
NPA/NIMASA Officials	52	13.5
Customs Officers	48	12.5
Terminal Operators	55	14.3
Nigerian Navy/Police Marine Unit/Port Security Agencies	65	16.9
Shipping Companies/ Freight Forwarders	78	20.3
Logistics/Transport Operators/ Warehouse Operators/Fuel Suppliers/Fisheries Operators/Others	86	22.4
Total	384	100.0

Source: Field Survey (2026)

Table 4.5 presents the distribution of respondents according to their organizational categories. The table shows that the largest group of respondents was drawn from logistics/transport operators, warehouse operators, fuel suppliers, fisheries operators, and other related organizations, with 86 respondents representing 22.4% of the total sample. This indicates that private-sector logistics and blue-economy stakeholders were substantially represented in the study. This was followed by respondents from shipping companies and freight-forwarding firms, who numbered 78 (20.3%). Their representation is important because shipping companies and freight forwarders are directly involved in cargo movement, vessel operations, documentation, cargo clearance, and the coordination of inbound and outbound maritime logistics. Respondents from the Nigerian Navy, Police Marine Unit, Port Security Agencies, and related security organizations numbered 65 (16.9%). This category was relevant to the study because maritime security agencies play critical roles in protecting waterways, preventing piracy and sea robbery, safeguarding port facilities, and supporting the security of maritime trade in the Gulf of Guinea. Furthermore, 55 respondents (14.3%) were terminal

operators, while 52 respondents (13.5%) were officials of the Nigerian Ports Authority (NPA) and Nigerian Maritime Administration and Safety Agency (NIMASA). These respondents were important because they possess knowledge of port administration, terminal operations, cargo handling, maritime regulation, and port security.

Finally, 48 respondents (12.5%) were Customs officers. Although this category had the lowest representation, Customs officers are essential stakeholders in maritime logistics because they are responsible for cargo examination, revenue collection, trade facilitation, import and export documentation, and border-control functions. The distribution shows that the study obtained responses from a wide range of military, security, regulatory, port, shipping, logistics, and private-sector stakeholders. This broad representation enhances the quality of the study because the topic of securing Nigeria's blue economy through a military–civilian logistics framework requires the perspectives and collaboration of all relevant maritime actors.

Table 4.6: Years of Professional Experience

Years	Frequency	Percentage (%)
Less than 5 years	77	20.0
5-10 years	95	24.7
11-15 years	98	25.5
Above 15 years	114	29.7
Total	384	100.0

Source: Field Survey (2026)

Table 4.6 presents the years of professional experience of the 384 respondents. The result shows that the largest group, 114 respondents (29.7%), had worked for more than 15 years. This was followed by 98 respondents (25.5%) with 11–15 years of professional experience. Furthermore, 95 respondents (24.7%) had between 5 and 10 years of experience, while 77 respondents (20.0%) had less than five years of experience. The distribution shows that the respondents had varying levels of professional experience.

Importantly, respondents with more than 10 years of experience constituted 55.2% of the total respondents. This suggests that most participants had substantial practical knowledge and exposure to their respective fields. Therefore, they were likely capable of providing informed and reliable responses on issues relating to the study.

Table 4.7: Descriptive Statistics of the Questionnaire Responses

S/N	Questionnaire: Integrated Infrastructure	N Valid	Missing	Mean	Std Dev
1	Nigerian port facilities are adequate to support joint military-civilian maritime logistics operations	384	0	2.7377	1.07832
2	Existing port infrastructure can be shared effectively by military agencies and civilian maritime operators	384	0	2.4805	1.15482
3	Clear procedures exist for military-civilian access to strategic port facilities	384	0	2.5039	1.12990
4	Shared use of port facilities would improve the rapid deployment of personnel, vessels, and security equipment	384	0	2.4494	1.05975

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5	Warehousing facilities around Nigerian ports are sufficient to support military-civilian maritime security operations	384	0	2.5974	1.11406
S/N	Questionnaire: Joint Operations and Logistics	N Valid	Missing	Mean	Std Dev
1	Clear command structures exist for coordinating maritime security operations among military and civilian agencies	384	0	2.4649	1.13626
2	The roles and responsibilities of military and civilian actors in joint maritime operations are clearly defined	384	0	2.3714	1.07273
3	Military and civilian stakeholders coordinate the allocation of logistics resources for maritime security operations	384	0	2.6260	1.09466
4	Procurement systems provide needed equipment, spare parts, fuel, and services for maritime security operations in a timely manner	384	0	2.4260	1.10177
5	Collaboration between military and civilian procurement units improves the availability of essential operational supplies	384	0	2.5584	1.12145
S/N	Questionnaire: Information Sharing and Maritime Domain Awareness	N Valid	Missing	Mean	Std Dev
1	Relevant agencies have access to accurate and up-to-date information on vessels, cargo, ports, and maritime activities	384	0	2.5740	1.09941
2	Intelligence from vessels, ports, coastal communities, surveillance systems, and security agencies is effectively fused for threat assessment	384	0	2.3922	1.08226
3	Digital platforms enable timely tracking of suspicious vessels and unusual maritime activities	384	0	2.5065	1.12527
4	Adequate cybersecurity measures protect sensitive maritime intelligence from unauthorised access or manipulation	384	0	2.6987	1.10991
5	Improved intelligence fusion and digital threat-monitoring platforms would strengthen maritime domain awareness in the Gulf of Guinea	384	0	2.5506	1.14481
S/N	Questionnaire: Governance and Institutional Coordination	N Valid	Missing	Mean	Std Dev
1	Government policies promote the shared use of strategic maritime infrastructure by military and civilian actors	384	0	2.4442	1.06195
2	Differences in organisational priorities between military and civilian institutions limit effective cooperation	384	0	2.4649	1.14311
3	Regular inter-agency meetings support the planning and implementation of maritime security activities	384	0	2.4338	1.11402
4	Clearly defined roles and responsibilities improve coordination among institutions involved in maritime security	384	0	2.4208	1.13403

5	Joint planning, shared performance targets, and regular reporting would strengthen cooperation among maritime stakeholders	384	0	2.5273	1.11332
S/N	Questionnaire: Maritime Security Outcomes	N Valid	Missing	Mean	Std Dev
1	Maritime security interventions have reduced incidents of piracy and armed robbery in Nigerian waters and the Gulf of Guinea	384	0	2.4416	1.07642
2	Increased patrol presence deters criminal groups from attacking vessels and seafarers	384	0	2.5299	1.11091
3	Cooperation among military, maritime agencies, and commercial operators improves the prevention of piracy	384	0	2.6675	1.07945
4	Maritime domain awareness systems provide timely intelligence for responding to piracy and illegal fishing	384	0	2.4623	1.11302
5	Joint military-civilian logistics support improves the availability of vessels, fuel, equipment, and personnel for maritime security operations	384	0	2.5091	1.09475
S/N	Questionnaire: Blue Economy Performance	N Valid	Missing	Mean	Std Dev
1	Improved maritime security promotes increased domestic and international trade through Nigerian seaports	384	0	2.5429	1.11517
2	Safe and secure shipping routes encourage more vessels to call at Nigerian ports	384	0	2.5481	1.08896
3	Effective surveillance and enforcement reduce illegal fishing and protect marine resources for sustainable economic use	384	0	2.5247	1.10163
4	Improved security promotes employment opportunities in maritime transport, fisheries, port operations, and related industries	384	0	2.5558	1.12621
5	Improved maritime security and logistics coordination increase government revenue from maritime trade and Blue Economy activities	384	0	2.4857	1.11823
S/N	Questionnaire: Operational Resilience	N Valid	Missing	Mean	Std Dev
1	Military and civilian logistics systems ensure continuous support for vessels deployed to sustain patrol operations on maritime security missions	384	0	2.4182	1.11298
2	Joint military-civilian coordination improves the speed of response to piracy, illegal fishing, oil theft, and other threats	384	0	2.5636	1.09294
3	Digital technologies improve the ability of maritime agencies to anticipate and respond to emerging threats	384	0	2.4831	1.12978
4	Lessons from previous maritime incidents are incorporated into future operational and logistics plans	384	0	2.5403	1.13149
5	Military-civilian collaboration strengthens the ability of Nigeria's maritime security system to recover quickly after disruptions	384	0	2.5247	1.09689

Source: Field work (2026)

Table 4.7 presents the descriptive statistics of respondents' views on the factors influencing military–civilian logistics cooperation, maritime security, and Blue Economy performance in Nigeria. The questionnaire was measured on a four-point Likert scale of Very Low Extent (VLE), Low Extent (LE), High Extent (HE), and Very High Extent (VHE). All the 384 questionnaires were validly completed, as there were no missing responses in any of the items. The results show that the mean scores ranged from 2.3714 to 2.7377, with an overall mean of approximately 2.52.

Since the mean scores are generally above the midpoint of 2.50 or close to it, the respondents agreed to a moderate or high extent that the identified variables influence military–civilian logistics coordination, maritime security, operational resilience, and Blue Economy performance. For integrated infrastructure, the mean scores ranged from 2.4494 to 2.7377. The highest mean score of 2.7377 shows that respondents believed that Nigerian port facilities are relatively adequate to support joint military–civilian maritime logistics operations. However, the lower mean score of 2.4494 indicates that respondents considered the shared use of port facilities for rapid deployment of personnel, vessels, and security equipment to be limited. This suggests a need to improve access arrangements and infrastructure-sharing mechanisms.

Regarding joint operations and logistics, the results show that coordination of logistics-resource allocation had the highest mean score of 2.6260. However, the lowest mean score of 2.3714 was recorded for the clarity of roles and responsibilities among military and civilian actors. This implies that although some form of logistics coordination exists, there is still a need for clearer command structures, defined roles, and improved procurement coordination. For information sharing and maritime domain awareness, respondents indicated that cybersecurity measures were relatively adequate, with a mean score of 2.6987. However, intelligence fusion from vessels, ports, coastal communities, surveillance systems, and security agencies recorded a low mean score of 2.3922.

This indicates that information sharing and intelligence integration require improvement to support timely threat detection and response in the Gulf of Guinea. The findings on governance and institutional coordination show mean scores ranging from 2.4208 to 2.5273. Respondents agreed that joint planning, shared performance targets, and regular reporting would strengthen cooperation among maritime stakeholders.

However, the low mean scores on policy support, inter-agency meetings, and clear institutional roles suggest that governance and coordination mechanisms need to be strengthened. With respect to maritime security outcomes, respondents agreed that cooperation among military agencies, maritime agencies, and commercial operators improves piracy prevention, as reflected in the mean score of 2.6675. However, the lower mean score of 2.4416 for the reduction of piracy and armed robbery indicates that, despite existing interventions, maritime-security threats remain a concern.

For Blue Economy performance, the results show that respondents generally agreed that improved maritime security promotes trade, safe shipping routes, employment, protection of marine resources, and government revenue. The highest mean score of 2.5558 indicates that improved security is perceived to promote employment opportunities in maritime transport, fisheries, port operations, and related industries.

Finally, the results on operational resilience show that respondents agreed that military–civilian coordination improves response to maritime threats, with a mean score of 2.5636. However, the relatively low mean score of 2.4182 suggests that continuous logistics support for vessels on patrol missions requires further improvement. In all, the findings indicate that integrated infrastructure, joint logistics, information sharing, governance, maritime security interventions, Blue Economy activities, and operational resilience are

important to securing Nigeria maritime domain. The standard deviations, ranging from approximately 1.06 to 1.15, show that respondents' opinions varied moderately across the questionnaire items.

Hypotheses Testing

H₀₁: Integrated Infrastructure (INTINF), Joint Operations and Logistics (JOPLOG), Information Sharing and Maritime Domain Awareness (INSMDA), and Governance and Institutional Coordination (GOINCO) do not significantly predict Maritime Security Outcomes (MARSECOUT).

Table 5.1a Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.851 ^a	.724	.721	2.77598

a. Predictors: (Constant), GOINCO, INTINF, INSMDA, JOPLOG

The model summary in Table 5.1a shows a correlation coefficient of $R = 0.851$, indicating a strong positive relationship between the predictor variables and Maritime Security Outcomes. The coefficient of determination, $R^2 = 0.724$, indicates that Integrated Infrastructure, Joint Operations and Logistics, Information Sharing and Maritime Domain Awareness, and Governance and Institutional Coordination jointly explained 72.4% of the variation in Maritime Security Outcomes. The adjusted R^2 of 0.721 shows that, after adjusting for the number of predictors in the model, approximately 72.1% of the changes in Maritime Security Outcomes were explained by the predictors. The remaining 27.9% may be explained by other factors not included in the model.

Table 5.1b ANOVA^a

	Model	Sum of Squares	df	Mean Square	F	Sig.
1	Regression	7688.197	4	1922.049	249.420	.000 ^b
	Residual	2928.307	380	7.706		
	Total	10616.504	384			

a. Dependent Variable: MARSECOUT

b. Predictors: (Constant), GOINCO, INTINF, INSMDA, JOPLOG

The ANOVA result in Table 5.1b shows that the regression model is statistically significant, with $F(4, 380) = 249.420$, $p < .001$. This means that the four predictor variables jointly have a significant effect on Maritime Security Outcomes.

Therefore, the regression model is suitable for predicting Maritime Security Outcomes.

Table 5.1c Coefficients^a

		Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for B	
	Model	B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound
1	(Constant)	.735	.579		1.271	.205	-.403	1.873
	INTINF	-.042	.040	-.044	-1.047	.296	-.119	.036

JOPLOG	.651	.049	.640	13.251	.000	.554	.748
INSMDA	.156	.049	.126	3.181	.002	.060	.253
GOINCO	.198	.040	.196	4.926	.000	.119	.278

a. Dependent Variable: MARSECOUT

The coefficient result in Table 5.1c shows that Joint Operations and Logistics (JOPLOG) has a positive and significant effect on Maritime Security Outcomes ($B = 0.651$, $\beta = 0.640$, $t = 13.251$, $p < .001$). This indicates that improved joint military–civilian operations and logistics coordination significantly enhance Maritime Security Outcomes. JOPLOG was the strongest predictor in the model because it had the highest standardized beta value ($\beta = 0.640$). Information Sharing and Maritime Domain Awareness (INSMDA) also has a positive and significant effect on Maritime Security Outcomes ($B = 0.156$, $\beta = 0.126$, $t = 3.181$, $p = .002$). This implies that improved intelligence sharing, digital surveillance, vessel tracking, and maritime-domain awareness significantly improve security outcomes. Governance and Institutional Coordination (GOINCO) has a positive and significant effect on Maritime Security Outcomes ($B = 0.198$, $\beta = 0.196$, $t = 4.926$, $p < .001$).

This means that clear policies, defined institutional roles, joint planning, inter-agency coordination, and regular reporting contribute significantly to improved maritime security. However, Integrated Infrastructure (INTINF) has a negative and insignificant effect on Maritime Security Outcomes ($B = -0.042$, $\beta = -0.044$, $t = -1.047$, $p = .296$). This suggests that, outside controlling for Joint Operations and Logistics, Information Sharing and Maritime Domain Awareness, and Governance and Institutional Coordination, Integrated Infrastructure do not independently predict Maritime Security Outcomes. The estimated regression model is stated as follows:

$$\text{MARSECOUT} = 0.735 - 0.042(\text{INTINF}) + 0.651(\text{JOPLOG}) + 0.156(\text{INSMDA}) + 0.198(\text{GOINCO}) + \varepsilon$$

Based on the overall regression result ($F = 249.420$, $p < .001$), the null hypothesis is rejected. Therefore, Integrated Infrastructure, Joint Operations and Logistics, Information Sharing and Maritime Domain Awareness, and Governance and Institutional Coordination jointly and significantly predict Maritime Security Outcomes.

However, at the individual level, only JOPLOG, INSMDA, and GOINCO made significant positive contributions to Maritime Security Outcomes, while INTINF did not make a significant independent contribution.

H₀₂: Integrated Infrastructure (INTINF), Joint Operations and Logistics (JOPLOG), Information Sharing and Maritime Domain Awareness (INSMDA), and Governance and Institutional Coordination (GOINCO) do not significantly predict Blue Economy performance (MARSECOUT).

Table 5.2a Model Summary

Model	R	R Square	Adjusted Square	Std. Error of the Estimate
1	.776 ^a	.602	.598	2.86509

a. Predictors: (Constant), GOINCO, INTINF, INSMDA, JOPLOG

The model summary in Table 5.2a shows a correlation coefficient of $R = 0.776$, indicating a strong positive relationship between the predictors and Blue Economy Performance. The coefficient of determination, $R^2 = 0.602$, shows that INTINF, JOPLOG, INSMDA, and GOINCO jointly explained 60.2% of the variation in Blue Economy Performance. The adjusted R^2 value of 0.598 indicates that approximately 59.8% of the variation in Blue

Economy Performance was explained after adjusting for the four predictors. The remaining 40.2% may be explained by other factors not included in the model.

Table 5.2b ANOVA^a

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	4716.669	4	1179.167	143.647	.000 ^b
Residual	3119.331	380	8.209		
Total	7836.000	384			

a. Dependent Variable: BLUECOPER

b. Predictors: (Constant), GOINCO, INTINF, INSMDA, JOPLOG

The ANOVA result in Table 5.2b shows that the regression model is statistically significant, with $F(4, 380) = 143.647$, $p < .001$. This indicates that the four predictor variables jointly and significantly predict Blue Economy Performance. Therefore, the null hypothesis is rejected.

Table 5.2c Coefficients^a

Model	Unstandardized Coefficients		Standardized Coefficients		Sig.	95.0% Confidence Interval for B	
	B	Std. Error	Beta	t		Lower Bound	Upper Bound
1 (Constant)	2.780	.597		4.655	.000	1.606	3.955
INTINF	.037	.041	.046	.904	.367	-.043	.117
JOPLOG	.356	.051	.407	7.013	.000	.256	.455
INSMDA	.199	.051	.188	3.929	.000	.099	.299
GOINCO	.202	.042	.233	4.862	.000	.120	.284

a. Dependent Variable: BLUECOPER

The coefficient results in Table 5.2c reveal that Joint Operations and Logistics (JOPLOG) has a positive and significant effect on Blue Economy Performance ($B = 0.356$, $\beta = 0.407$, $t = 7.013$, $p < .001$). This implies that improved military–civilian joint operations, logistics coordination, procurement, and resource allocation significantly enhance Blue Economy activities. Information Sharing and Maritime Domain Awareness (INSMDA) has a positive and significant effect on Blue Economy Performance ($B = 0.199$, $\beta = 0.188$, $t = 3.929$, $p < .001$). This means that effective intelligence sharing, surveillance, vessel tracking, and maritime information systems contribute to safer shipping routes, increased trade, protection of marine resources, and improved Blue Economy activities.

Governance and Institutional Coordination (GOINCO) also has a positive and significant effect on Blue Economy Performance ($B = 0.202$, $\beta = 0.233$, $t = 4.862$, $p < .001$). This indicates that clear policies, defined institutional roles, joint planning, and inter-agency coordination significantly support the performance of Nigeria Blue Economy.

However, Integrated Infrastructure (INTINF) has a positive but insignificant effect on Blue Economy Performance ($B = 0.037$, $\beta = 0.046$, $t = 0.904$, $p = .367$). This implies that, outside controlling for the effects of JOPLOG, INSMDA, and GOINCO, integrated infrastructure did not independently make a significant contribution to Blue Economy Performance. The estimated regression model is expressed as:

$$\text{BLUECOPER} = 2.780 + 0.037(\text{INTINF}) + 0.356(\text{JOPLOG}) + 0.199(\text{INSMDA}) + 0.202(\text{GOINCO}) + \varepsilon$$

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The null hypothesis is rejected because the overall model was statistically significant. Joint Operations and Logistics was the strongest predictor of Blue Economy Performance ($\beta=0.407$), followed by Governance and Institutional Coordination ($\beta=0.233$) and Information Sharing and Maritime Domain Awareness ($\beta=0.188$). Integrated Infrastructure, although positive, did not significantly predict Blue Economy Performance.

H₀₃: Integrated Infrastructure (INTINF), Joint Operations and Logistics (JOPLOG), Information Sharing and Maritime Domain Awareness (INSMDA), and Governance and Institutional Coordination (GOINCO) do not significantly predict operational resilience (MARSECOUT)

Table 5.3a Model Summary

Model	R	R Square	Adjusted Square	RStd. Error of the Estimate
1	.784 ^a	.614	.610	3.28958

a. Predictors: (Constant), GOINCO, INTINF, INSMDA, JOPLOG

The model summary shows an R-value of 0.784, indicating a strong positive relationship between the predictor variables and Operational Resilience. The coefficient of determination, $R^2 = 0.614$, means that Integrated Infrastructure, Joint Operations and Logistics, Information Sharing and Maritime Domain Awareness, and Governance and Institutional Coordination jointly explained 61.4% of the variation in Operational Resilience.

The adjusted R^2 of 0.610 further indicates that approximately 61.0% of the changes in Operational Resilience were explained by the predictors after adjusting for the number of variables in the model. The remaining 38.6% may be due to other factors not included in the model.

Table 5.3b ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6542.043	4	1635.511	151.138	.000 ^b
	Residual	4112.097	380	10.821		
	Total	10654.140	384			

a. Dependent Variable: OPERAESI

b. Predictors: (Constant), GOINCO, INTINF, INSMDA, JOPLOG

The ANOVA result shows that the regression model is statistically significant, with $F(4, 380) = 151.138$, $p < .001$. This indicates that the four predictor variables jointly and significantly predict Operational Resilience. Therefore, the null hypothesis is rejected.

Table 5.3c Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	1.530	.686		2.230	.026	.181	2.878
	INTINF	.160	.047	.171	3.415	.001	.068	.253
	JOPLOG	.421	.058	.413	7.235	.000	.307	.536
	INSMDA	.074	.058	.059	1.265	.207	-.041	.188
	GOINCO	.239	.048	.236	4.998	.000	.145	.332

a. Dependent Variable: OPERAESI

The coefficient results show that Integrated Infrastructure (INTINF) has a positive and significant effect on Operational Resilience ($B = 0.160$, $\beta = 0.171$, $t = 3.415$, $p = .001$). This implies that adequate port facilities, warehousing, shared infrastructure, and access to

strategic maritime facilities improve the ability of military and civilian agencies to sustain operations and recover from disruptions. Joint Operations and Logistics (JOPLOG) also had a positive and significant effect on Operational Resilience ($B = 0.421$, $\beta = 0.413$, $t = 7.235$, $p < .001$). This was the strongest predictor of Operational Resilience because it has the highest standardized beta value.

This indicates that effective joint command structures, defined operational roles, coordinated procurement, resource allocation, and logistics support significantly improve the capacity of maritime-security agencies to respond to threats and maintain patrol operations. Governance and Institutional Coordination (GOINCO) has a positive and significant effect on Operational Resilience ($B = 0.239$, $\beta = 0.236$, $t = 4.998$, $p < .001$). This means that supportive government policies, regular inter-agency meetings, joint planning, clearly defined responsibilities, and institutional coordination enhance the resilience of Nigeria maritime-security system. However, Information Sharing and Maritime Domain Awareness (INSMDA) has a positive but insignificant effect on Operational Resilience ($B = 0.074$, $\beta = 0.059$, $t = 1.265$, $p = .207$). This implies that, outside controlling for the other variables, information sharing and maritime domain awareness did not independently make a significant contribution to Operational Resilience. The estimated regression model is:

$$\text{OPERAESI} = 1.530 + 0.160(\text{INTINF}) + 0.421(\text{JOPLOG}) + 0.074(\text{INSMDA}) + 0.239(\text{GOINCO}) + \varepsilon$$

Therefore, the null hypothesis is rejected because the overall regression model was significant. Joint Operations and Logistics was the strongest predictor of Operational Resilience, followed by Governance and Institutional Coordination and Integrated Infrastructure. Information Sharing and Maritime Domain Awareness did not make a significant independent contribution to Operational Resilience.

Discussion of the findings

The first objective examined the extent to which the four predictors influence Maritime Security Outcomes. The findings align with existing literature emphasizing that coordinated joint operations, logistics support, and clear institutional roles are central to effective maritime security. Bueger and Edmunds (2017) argue that maritime-security effectiveness depends less on isolated capabilities and more on the ability of agencies to plan, resource, and execute operations jointly. Similarly, Mukherjee, (2016) notes that logistics, interoperability, and shared command structures are critical for sustained patrols and rapid response to maritime threats. The strong influence of governance and coordination supports the view that fragmented institutions undermine maritime-domain governance, whereas well-coordinated institutions enhance surveillance, enforcement, and inter-agency trust (Bueger & Edmunds 2017; Mukherjee, 2016).

The non-significance of INSMDA in this model, despite its theoretical importance, may reflect implementation gaps such as limited integration of surveillance systems, incomplete data sharing, or uneven adoption of maritime-domain awareness tools across agencies. While maritime-domain awareness is widely recognized as essential for detecting and tracking vessels (Llewelyn, 2017), its impact may be mediated by the quality of joint operations and governance structures that translate information into action.

The second objective examined the extent to which the four predictors influence Blue Economy Performance. The results are consistent with studies linking maritime security to economic performance in the Blue Economy. Secure sea lanes, reduced piracy, and effective

enforcement of fisheries and shipping regulations create an enabling environment for trade, investment, and resource exploitation (Basil, 2015; Kwa & Collin, 2022). The prominence of JOPLOG suggests that coordinated patrols, joint task forces, and efficient logistics reduce crime and increase investor confidence, thereby supporting port activity, shipping, fisheries, and offshore energy operations. The significant contribution of GOINCO reflects the importance of policy coherence, inter-agency collaboration, and institutional clarity in fostering a stable maritime environment.

As noted by the African Union's 2050 AIM Strategy, effective governance and coordination are prerequisites for unlocking the economic potential of Africa's oceans (Kwa & Collin, 2022). INSMDA's significance in this model indicates that when maritime actors share intelligence and maintain situational awareness, commercial vessels operate more safely, illegal fishing declines, and maritime trade expands (Basil, 2015). The non-significance of INTINF may suggest that, while infrastructure is necessary, its effect on Blue Economy performance is indirect and contingent on how well it is utilized through joint operations, governance, and information systems. This echoes arguments that infrastructure investments yield limited returns without complementary institutional and operational reforms (Bueger & Edmunds, 2017). The third objective assessed the extent to which the four predictors influence Operational Resilience. The findings resonate with resilience literature emphasizing that operational resilience in complex security environments depends on coordinated command structures, reliable logistics, and robust institutional arrangements (Aniket et al., 2026). JOPLOG's dominance suggests that agencies with strong joint planning, shared logistics, and clear operational mandates are better able to maintain patrols, recover from disruptions, and adapt to evolving threats such as piracy, oil theft, and illegal fishing. GOINCO's significance underscores the role of governance in sustaining resilience.

Clear policies, defined roles, and regular coordination meetings reduce duplication, enhance resource mobilization, and build trust among agencies - key ingredients for resilient maritime-security systems (Harsch, 2026). INTINF's significance indicates that ports, warehouses, and shared facilities provide the physical backbone for sustained operations, enabling agencies to deploy, refuel, and maintain assets effectively. The non-significance of INSMDA in predicting resilience may reflect that, while information is valuable, resilience depends more on tangible operational capacities logistics, infrastructure, and governance that allow agencies to act on information and sustain operations under stress.

Conclusion and Recommendations

The study concludes that Integrated Infrastructure, Joint Operations and Logistics, Information Sharing and Maritime Domain Awareness, and Governance and Institutional Coordination jointly and significantly predict Maritime Security Outcomes, Blue Economy Performance, and Operational Resilience. across all three models, Joint Operations and Logistics (JOPLOG) consistently emerged as the strongest predictor, highlighting its centrality to maritime-security effectiveness, Blue Economy performance, and operational resilience. Governance and Institutional Coordination (GOINCO) was the second most consistent predictor, reinforcing the importance of institutional coherence and policy support. Integrated Infrastructure (INTINF) was significant for Maritime Security Outcomes and Operational Resilience but not for Blue Economy Performance, suggesting its effects are more operational than economic. Information Sharing and Maritime Domain Awareness (INSMDA) was significant only for Blue Economy Performance, indicating that its value may be more pronounced in enabling safe and efficient commercial activities than in direct security or resilience outcomes. These patterns align with broader scholarship emphasizing that maritime security is not solely a technical or hardware issue but a governance and coordination challenge (Bueger & Edmunds, 2017). Effective maritime security and Blue

Economy outcomes require integrated strategies that combine joint operations, strong institutions, enabling infrastructure, and functional information systems.

Based on the findings, the following three recommendations were made:

Strengthen Joint Operations and Logistics: The Nigerian Navy, NIMASA, NPA, and other maritime agencies should institutionalize joint command structures, conduct regular joint patrols and exercises, and develop shared logistics frameworks for procurement, maintenance, fuel, and spare parts to enhance operational effectiveness and resilience.

Enhance Governance and Institutional Coordination: Government should establish a high-level inter-agency maritime coordination body with clear mandates, regular meetings, joint planning cycles, and standardized reporting mechanisms to reduce duplication and improve policy coherence.

Integrate Information Systems and Shared Infrastructure: Agencies should integrate surveillance systems, automate data exchange, and establish a unified maritime information platform while co-locating or sharing ports, jetties, warehouses, and surveillance facilities to maximize utilization, support joint operations, and improve real-time situational awareness for commercial shipping, fisheries, and offshore energy operations. By implementing these recommendations, Nigeria can enhance its maritime-security capacity, strengthen the Blue Economy, and build a more resilient maritime-security architecture capable of addressing current and emerging threats in the Gulf of Guinea.

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