



Harnessing Artificial Intelligence for Enhanced Maritime Security in Nigeria

By

MOHAMMED Sani Abbas

Department of Defence and Security Studies, Nigerian Defence Academy, Kaduna

Abstract

This study explores the potential of Artificial Intelligence (AI) to enhance maritime security in Nigeria, a nation facing persistent threats such as piracy, oil theft, and illegal fishing. Despite global advancements in AI-driven maritime surveillance, Nigeria lags in adoption due to infrastructural, regulatory, and institutional limitations. The research employs a qualitative, exploratory approach using secondary data from academic, governmental, and industry sources. Thematic analysis revealed that while AI offers tools for predictive analytics, anomaly detection, and autonomous patrol systems, Nigeria's fragmented data architecture and low digital readiness hinder implementation. Comparative analysis with global case studies highlights the uniqueness of Nigeria's context and the need for localized solutions. The study recommends phased AI adoption, public-private partnerships, capacity building, and regulatory reform to support integration. Findings contribute to the discourse on intelligent maritime governance and propose a framework adaptable to other developing maritime states.



INTRODUCTION

The "Giant of Africa," that being Nigeria, has a pivotal position along the Gulf of Guinea, with a vast maritime domain that covers over 780 kilometers of coastline and an Exclusive Economic Zone of 200 nautical miles. The maritime space has a massive national and continental impact, being majorly useful in international trade, economic development, and regional cooperation. It is discovered that over 70% of Nigeria's trade is conducted through its maritime routes, highlighting the critical significance of safeguarding its waters (Okafor-Yarwood & Pigeon, 2020). Despite this importance, Nigeria's maritime region continues to be intensely concerned by complex security challenges, involving aspects such as piracy, armed robbery at sea, illegal crude oil bunkering, smuggling, and illegal/unregulated fishing. These threats have broad implications, not only for the economy of Nigeria but also for international maritime commerce and regional stability.

Although in the context of Nigeria, the integration of AI into maritime security is still emerging. A vital gap is recognized in literature and practice concerning how AI technologies can be fitted to the country's unique socio-political, economic, and infrastructural contexts. Interventions that exist mainly concentrate on hardware solutions like patrol vessels and radar systems, without significant investment in AI research, development, and implementation. Additionally, problems like poor digital infrastructure, restricted technical expertise and funding constraints continue to hamper the maximum exploitation of AI's potential (Eze, 2021). Focusing on these challenges not only requires technical innovation but also institutional reform, stakeholder collaboration, and realignment of policies.

This paper seeks to delve into the potential of utilizing AI to optimize maritime security in



Nigeria, seeking to provide answers for key questions like: How can we enhance surveillance and threat identification in Nigeria's maritime domain through the application of AI technologies? What AI solutions exist recently, and how can they be contextualized for Nigeria's environment? What are the challenges and prospects of implementing AI-based security interventions in the maritime sector? By investigating these questions, the research will provide both a theoretical and practical framework for integrating AI into Nigeria's maritime security strategy.

The rationale for this research is grounded in the urgent need for innovative solutions to counter maritime insecurity. Given the strategic and economic importance of Nigeria's maritime domain, failure to address its security gaps risks not only continued loss of revenue, estimated at over \$1.5 billion annually due to piracy and illegal activities (Onuoha, 2019), but also a potential deterioration of investor confidence and regional peace. AI offers a pathway to smarter, faster, and more cost-effective security management. This research contends that the adoption of AI, coupled with appropriate policy and infrastructural support, could mark a turning point in Nigeria's quest for maritime stability.

Literature Review

The maritime domain plays a critical role in global trade and national economic development, particularly for coastal countries like Nigeria. Academic interest in maritime security has emerged significantly in recent years, mainly due to rising threats like piracy, sea robbery, human trafficking, illegal fishing, and environmental degradation. The Gulf of Guinea, where Nigeria is centrally positioned, has evolved as one of the most hazardous maritime regions globally. By doing so, researchers and practitioners have continuously



emphasized the need for innovative, technology-driven methods in maritime governance and security enforcement.

AI in Global Maritime Security

Artificial Intelligence (AI) has revolutionized global maritime security by enhancing situational awareness, risk assessment, and response times. Countries such as the United States, Singapore, and members of the European Union utilize AI-driven systems for vessel tracking, anomaly detection, and predictive threat analytics. AI technologies, including machine learning and computer vision, process satellite data, radar inputs, and maritime signals to detect illicit activity and optimize resource deployment. AI-supported autonomous drones and underwater surveillance systems have also expanded maritime patrol coverage. Global case studies demonstrate that AI integration increases operational efficiency, reduces human error, and enables proactive interventions in complex maritime environments (Pohontu & Ermolai, 2024).

Maritime Security in Nigeria and the Gulf of Guinea

Nigeria's maritime area has long been troubled by tenacious security threats. Researchers have steadily stressed the frequency of piracy, oil theft, and kidnapping in Nigeria's territorial waters (Okafor-Yarwood & Pigeon, 2020). These issues have disadvantaged economic activities, put off foreign investment, and revenue generation. However, regional and national implementations, like the Deep Blue Project presented by the Nigerian Maritime Administration and Safety Agency, have yielded exceptional achievements. Scholars claim that the deeply entrenched nature of maritime crime requires more advanced surveillance and enforcement systems (Eboh, 2021). Deep Blue Project is a Nigerian



government initiative launched by the Nigerian Maritime Administration and Safety Agency (NIMASA) aimed at enhancing maritime security through the deployment of surveillance technologies, naval assets, and inter-agency coordination.

It is highly evident in global security indices that insecurity is so severe in Nigeria's maritime region. Correspondingly, the Gulf of Guinea reported over 95% of all maritime kidnappings in 2020, with Nigeria being the core of such activities. This is in accordance with the International Maritime Bureau (2021). However, there has been a recent decline in instances due to improved regional cooperation and nautical presence; these threats which have not been stamped out completely have the potential to grow in complexity. The traditional approaches of maritime surveillance and implementations, depending greatly on human patrolling, radar systems, and infrequent nautical operations, are proving insufficient in addressing the increasingly sophisticated approaches used by maritime criminals. The need for an ideal shift focusing on intelligent, proactive, and technology-driven security frameworks is greatly pressing.

AI, involving real-time processing of data, pattern recognition, independent decision-making, and predictive analytics, displays an exceptional opportunity to develop the security of the maritime industry. Universally, AI is being leveraged to identify odd vessel behavior, checking on illegal fishing activities through the use of satellite imagery, improving port operations, and optimizing situational awareness through intelligent surveillance systems (Zhou et al., 2021). For instance, in Singapore, the United States, and the European Union, AI-driven maritime domain awareness (MDA) platforms are already bringing in measurable enhancements in security outcomes (Chen et al., 2022). These achievements deliver convincing evidence that AI, when correctly integrated into national



security architectures, can act as a game-changer in limiting maritime threats.

According to Anyimadu (2018), a major challenge in Nigeria's maritime security approach is the reactive nature of its enforcement strategies. Traditional approaches entailing manned patrols, coastguard surveillance, and radar systems have been depicted as inadequate in limiting international maritime crime networks. These schemes mostly suffer from dormant responses, inadequate coverage, and human inefficiencies. Currently, the developing focus regarding digital and independent schemes has evolved as a critical aspect in scholarly dissertations on maritime security reform.

Artificial Intelligence and Security Technologies

AI has become an increasingly major tool in global security operations. Its capability to collect, process, and assess enormous volumes of data in real-time permits predictive abilities that outshine traditional models of surveillance and detection of threats. AI encompasses multiple subfields, such as machine learning, computer vision, and Natural Language Processing (NLP), which have been applied in a wide range of domains, including security (Zhou et al., 2021). AI systems are utilized to enhance vessel monitoring, detect irregularities, predict banned activities, and assist with port logistics in the maritime region.

A study conducted by Chen et al. (2022) verified how surveillance systems powered by AI can track ship movements and recognize deviations from typical maritime behavior. This is particularly beneficial in identifying ships involved in illegal activities such as oil theft or human trafficking. AI models having expertise in historical vessel data can signal authorities to behavior patterns that seem shady, enabling proactive interventions.



Countries like Singapore and the United States have AI integrated into port operations and MDA backgrounds to promote security, reducing ineffective operations and responding fast to threats.

Additionally, combining AI with Internet of Things devices and satellite imagery has led to advanced Maritime Intelligence Surveillance and Reconnaissance (MISR) systems that provide regular actual data which can be used to assess risks and exploit resources accordingly. Osei-Tutu (2020) declares that AI's advantage is not only in its speed and accuracy but also in its adaptability and scalability to diverse operational frameworks.

AI and Maritime Security in the African Context

Although AI is well-known for its benefits in security operations, its integration into maritime governance in Africa remains limited. The technological and infrastructural gap is a substantial hindrance that describes much of the continent. Eze (2021) highlights that as AI's awareness is evolving in strategy and academic circles, African states including Nigeria are yet to reveal the major investments required to operationalize AI in public security. This entails investments in digital infrastructure, skilled human resources, and institutional schemas.

In East Africa, countries like Kenya have begun piloting AI-enabled surveillance for port management in Mombasa, supported by partnerships with Chinese tech firms and global logistics companies. The Kenya Ports Authority has experimented with automated container tracking and facial recognition systems for access control, although implementation is still nascent (Yonazi, 2024).

In North Africa, Morocco has taken steps toward integrating AI into customs and maritime



border control. Casablanca Port has incorporated AI-assisted analytics for cargo inspection and risk profiling to enhance anti-smuggling operations. Tunisia, on the other hand, has focused more on cyber elements of maritime security, investing in AI-supported cybersecurity frameworks for port infrastructure (Bouazza et al., 2023).

South Africa stands out on the continent for its relatively advanced AI ecosystem. The Port of Durban, for instance, has implemented AI-driven logistics optimization and vessel traffic management systems. The South African Maritime Safety Authority has collaborated with research institutions to explore predictive analytics for marine safety and oil spill detection (Arakpogun et al., 2021).

Additionally, the literature presents a knowledge gap in how the applications of AI are confined to the specific socio-political environments of African maritime territories. As global systems depend on high-resolution satellite data and steady internet connectivity, many African countries struggle with unreliable data networks and restricted access to actual geospatial intelligence. Consequently, importing off-the-shelf AI solutions without adapting them to local contexts may prove ineffective (Akpan-Obong, 2023).

Nevertheless, there are emerging instances of growth. A regional framework for maritime security cooperation among the Gulf of Guinea states, the Yaoundé Code of Conduct, has increasingly focused on digital surveillance. Yaoundé Code of Conduct is an agreement signed in 2013 by West and Central African nations to enhance information sharing and coordinated maritime law enforcement. Some scholars debate that this forms a foundation on which AI can be layered to advance an integrated regional MISR system (Okafor-Yarwood et al., 2024). However, much of the scholarly dissertation requires a strategic



context that merges AI technology with regional political will, community engagement, and legal reforms.

Maritime Security Challenges

As AI provides a great promise, the literature is also complete with discussions concerning its constraints and risks. One issue is the possibility of algorithmic unfairness and errors in predictive policing, which may lead to misidentification of threats or biased enforcement systems. Scholars like Onyema (2019) alert that in the lack of openness and accountability approaches, AI tools can strengthen existing inequalities and result in civil liberties violations.

Another major challenge is cybersecurity, as the utilization of AI-driven systems increases the probability of cyber threats. Port management systems, shipping databases, and nautical communication platforms may be the targets of state and non-state actors, who aim to disrupt intelligence networks or national economies (Chukwuma et al., 2021). Therefore, any application of AI in Nigeria's maritime security should be accompanied by robust cybersecurity policies and strengthened through international cyber defence collaboration.

Data privacy and legal regulation are equally significant factors to consider. Onuoha (2020) declares that Nigeria lacks an understandable legal framework for managing AI effectiveness in national security, which brings up questions regarding oversight, accountability, and human rights security. In the absence of adequate legal protections, there is a risk that AI tools could be misused for political or commercial gain rather than serving the public interest.



Theoretical Framework

This study is based on two theoretical domains. These are security studies and technology adoption theory. Together, they frame the integration of AI into maritime security systems.

The Securitization Theory (Buzan & Wæver, 2008) is relevant from a security perspective. Securitization theory suggests that state and non-state actors frame certain issues like piracy or illegal bunkering as existing threats that require urgent and exceptional responses. In Nigeria's case, maritime insecurity has been increasingly securitized. This has created space for technological interventions such as AI surveillance and autonomous systems to be legitimized as national priorities.

The Technology Acceptance Model (TAM) and Diffusion of Innovations Theory (Soon et al., 2016) explain how new technologies like AI are perceived and adopted within institutions. TAM emphasizes perceived usefulness and ease of use as drivers of adoption. Diffusion Theory highlights the importance of innovation compatibility, organizational readiness, and communication channels.

Conceptually, the integration of AI into maritime security is in line with the MDA Framework. The framework advocates for holistic surveillance and real-time intelligence gathering across maritime assets. AI serves as a force multiplier in MDA. It enables automated threat detection, vessel tracking, and predictive analytics. Also, the AI Capability Maturity Model provides a lens for assessing institutional readiness and guiding phased implementation.

These theories and models together help assess Nigeria's preparedness, stakeholder motivations, and institutional barriers in adopting AI for maritime security. They also



provide a structured basis for evaluating how AI technologies can be strategically localized to fit the operational, legal, and socio-political landscape of Nigeria.

Methodology

This study employs a qualitative, exploratory research design to investigate AI's capabilities in enhancing maritime security in Nigeria. A qualitative approach is highly appropriate for this sector, since it permits complete comprehension of multifaceted socio-technological systems, suitable factors, and institutional changing aspects that quantitative data may not fully illustrate. Given that AI implementation in Nigeria's maritime space is still in its early stages of development, exploratory research provides the flexibility to reveal new insights, perspectives, and contexts relevant to scholars and policymakers (Creswell & Poth, 2018).

Findings and Discussion

The study had findings that emphasized on relevant potential for AI to enhance Nigeria maritime security. This area reveals important insights across four major sectors:

- a. Maritime security cases used by AI.
- b. Current maritime threats in Nigeria.
- c. The readiness of Nigeria for AI adoption.
- d. The challenges and opportunities involved with AI implementation in this sector.

AI Use Cases in Maritime Security

AI has enabled significant advancements in maritime operations globally, from anomaly detection using satellite imagery and AIS data to predictive threat forecasting and



autonomous surveillance drones (Zhou et al., 2021; Chen et al., 2022). In countries like the U.S. and Singapore, AI supports proactive monitoring, port security, and rapid incident response.

In Nigeria, however, the use of AI in maritime security remains mostly conceptual. While similar technologies offer promising applications such as drone-assisted patrols or real-time vessel tracking, the country's limited infrastructure, unreliable data streams, and low AI adoption mean these use cases are not yet fully deployable. Therefore, adaptation and phased experimentation are key.

Nigeria's Maritime Security Landscape

Nigeria's maritime region, especially the Niger Delta and the Gulf of Guinea, continuously encounter some levels of insecurity. Piracy and sea robbery have been tenacious problems, with the country being at the top in global piracy index for several consecutive years until 2021 (International Maritime Bureau, 2021). Although current data indicates a modest decline in threats due to effective naval operation, regional collaboration and the launch of Nigeria's Deep Blue Project. However, new challenges are emerging, particularly cyberattacks on maritime communication systems and the unauthorized shipment of goods.

Illegal oil bunkering is particularly rampant in the Niger Delta, costing Nigeria billions of dollars annually in lost revenue (Okafor-Yarwood & Pigeon, 2020). This illicit activity is often carried out by sophisticated networks using insider information and gaps in maritime monitoring systems. In such a dynamic threat environment, AI offers not just speed and efficiency but also resilience, adapting to evolving criminal tactics.



Nigeria's Readiness for AI Integration

While the theoretical benefits of AI for maritime security are evident, Nigeria's readiness to deploy such technology remains limited. A major gap lies in infrastructure as most coastal areas suffer from poor internet connectivity, inadequate data storage facilities, and outdated surveillance technology. Furthermore, Nigeria lacks a centralized maritime data repository, making it difficult to implement systems that rely heavily on large, structured datasets (Akpan-Obong, 2023).

Countries like the Netherlands and Japan have integrated AI into maritime operations through central maritime data exchanges and high-bandwidth sensor networks. These systems enable real-time analytics and rapid deployment of security responses. Nigeria's lack of digital cohesion and absence of integrated maritime databases reveals a fundamental gap. The Nigerian context, shaped by underfunded infrastructure and fragmented institutional collaboration, requires stepwise AI implementation with foundational investments in data standardization and inter-agency interoperability.

In terms of human capital, Nigeria is still developing its AI ecosystem. While several universities and tech hubs have started offering AI training programs, there is limited synergy between these institutions and the country's security agencies. The absence of interdisciplinary collaboration between AI experts, policymakers, and maritime security personnel has slowed the development of localized AI tools (Uzomah, 2024).

The regulatory environment for AI is still evolving institutionally. Nigeria's National Artificial Intelligence Policy is under advancement as of recent. The draft National AI Strategy document did not explicitly detail how AI will be employed for general security



or, more specifically, maritime security applications. This controlling vacuum forms ambiguity for investors and developers and brings up principled concerns in the field of data governance, privacy, and algorithmic accountability.

Nigeria has certain foundational features in place. The Navy's Falcon Eye Project and the Regional Maritime Awareness Capability Centre as well as the Deep Blue Project all provide surveillance equipment, command centres, and nautical assets which deliver strategic rooms that could be optimized with AI applications. Moreover, Nigeria is a guarantor of regional security agreements like the Yaoundé Code of Conduct, which facilitates the sharing of information and could promote AI systems in the Gulf of Guinea.

Challenges and Opportunities in AI Implementation

The problems involved with utilizing AI in maritime security are diverse. Previously mentioned, the insufficient digital infrastructure significantly restricts the performance of AI solutions. Satellite-based surveillance systems, crucial for AI monitoring of open seas, are costly to get and maintain. Furthermore, the dependency on imported technologies brings up worries about data sovereignty and external reliability (Molina-Molina et al., 2021).

Cybersecurity has another crucial challenge whereby AI systems if not well safeguarded, can be misused by adversaries to damage operations or take in false information into decision-making processes. Chukwuma et al. (2021) alert that maritime infrastructures are increasingly becoming targets for state and non-state cyber actors, and without strong cyber hygiene approaches, AI systems could unintentionally become courses of attack.

Another major factor is cultural and institutional resistance to technology adoption. Most



maritime agencies still depend on manual schemes and are cautious of mechanization, partially due to fears of displacement in jobs and inadequate technical comprehension. Continuous capacity building and public sector sensitization is highly needed when building trust in AI (Bodó & Janssen, 2022).

Looking at it positively, there are extensive opportunities for the integration of AI. Nigeria can influence public-private partnerships to have access to innovative technologies, without bearing the full cost of advancement. Partnerships with universal tech firms and academic institutions can boost innovation. For example, the Nigerian government could partner with organizations like the International Maritime Organization (IMO) and Interpol, both of which have begun to experiment with AI-based threat intelligence platforms (IMO, 2022).

AI can also empower community-based surveillance, especially in the Niger Delta, where local fishermen and transporters can serve as real-time data collectors using mobile devices. AI models can be trained to recognize community-reported anomalies, providing a decentralized security apparatus that complements state-led efforts (Eze, 2021).

Furthermore, the implementation of modular AI systems allows for scalability. Nigeria does not need to roll out a national AI platform overnight. Pilot programs in high-risk zones like Bonny Island or Lagos Anchorage could serve as testbeds for AI surveillance, which can then be scaled based on impact assessments.

Summary of Key Insights

- a. AI can advance maritime security in Nigeria by use of predictive analytics, independent schemes, and optimized surveillance.



- b. The most pressing threats in Nigeria's maritime space are piracy, oil theft, and illegal fishing all of which can be mitigated through smart technologies.
- c. The willingness of Nigeria for the integration of AI is limited by infrastructural short falls, weak controlled backgrounds, and restricted technical skills.
- d. Even though there are limitations, opportunities occur through universal collaborations, regional partnerships, and phased implementation approaches.

These outcomes spotlight the requirement for coordinated national strategy that incorporates AI into Nigeria's maritime security architecture. The attention must go beyond just technical procurement to entail institutional reform, skill development, and a policy background that promotes principled and effective AI utilization.

Policy Implications and Recommendations

The integration of AI into the maritime security agenda of Nigeria displays transformative abilities but also stresses structural policy realignment. A vital effect is the requirement for institutional capacity building. Government agencies, such as the Nigerian Maritime Administration and Safety Agency, must significantly invest in educating their workforces to comprehend, manage, and operate AI-based systems effectively. Without a proficient staff, the adoption of even the most developed AI technologies would be of no gain (Eze, 2021).

Another critical policy requirement is the development of a comprehensive national AI regulatory framework. As of recent, Nigeria has a shortage of particular legislation managing the principled utilization of AI in national security settings. The proposed National Artificial Intelligence Policy should therefore include sections on AI employment



for security including maritime security. This would be in addition to relevant sections addressing safeguarding data, cybersecurity, and accountability measures to prevent misapplication or inappropriate results (Onuoha, 2020).

The government should also enable public-private partnerships to quickly trace AI integration. Nigeria can have access to technical skills and infrastructure support through collaborations with technical companies and research institutions, minimizing the problem of state resources (Akpan-Obong, 2023). Incentivizing advancements through the breaking of taxes and research grants can also boost local AI evolution in relation to Nigeria's maritime requirements.

Additionally, regional partnerships must be strengthened. Nigeria should actively collaborate with other Gulf of Guinea countries to create a shared AI-driven MDA platform. Cooperative surveillance and sharing of intelligence will improve functional effectiveness and minimize cross-border maritime crime (Okafor-Yarwood et al., 2024).

Lastly, a phased implementation strategy should be adopted by the government, starting with pilot programs in key areas such as the Niger Delta and Lagos Anchorage, thereby enabling real-time evaluation, gathering feedback from stakeholders, and continuous scaling in accordance with achievement metrics. These suggestions deliver a structural passage for utilizing AI to safeguard Nigeria's future maritime.

Conclusion

The maritime domain forms the foundation of Nigeria's economic, geopolitical, and security landscape. Nevertheless, for years, it has been plagued by persistent threats, including piracy, illegal oil bunkering, sea robbery, and unregulated fishing. These



problems not only affect national revenue but also threaten regional peace and global trade security. As traditional enforcement approaches continue to decline, the integration of AI is developing as a transformative remedy with the ability to improve surveillance, threat identification, and operational coordination.

The study has assessed how AI technologies, extending from predictive analytics to independent schemes can be utilized to bring out Nigeria's maritime security issues. The universal success stories of AI implementations in maritime governance offer valuable lessons and models that Nigeria can adapt, despite local realities such as inadequate infrastructure, significant gaps, and technical expertise shortages (Zhou et al., 2021; Eze, 2021). The outcomes also propose that with the right direction of policies and strategic investments. AI can change the maritime security patterns of Nigeria from reactive defence to proactive operations led intelligently.

Essentially, the pathway ahead must be underlined by controlled reforms, institutional capacity building, and universal collaborations. The great benefits of AI will only be fully recognized if utilized principally and with sufficient protection to safeguard data and public rights (Onuoha, 2020). Experimental programs in areas that are highly risky can act as testbeds for steady scaling and enhancements.

Despite the contributions of this study, it has several limitations. The research relied primarily on secondary data and literature-based insights, lacking empirical fieldwork or stakeholder interviews from maritime authorities, AI practitioners, or local communities. This may limit the contextual richness and real-time applicability of some findings. Additionally, classified or restricted data on national security protocols was inaccessible.



In summary, AI is not a solution but an essential remedy that if correctly employed, can aid in safeguarding Nigeria's maritime domain for maintainable economic advancement, regional stability, and national protection. Research in the future should concentrate on analyzing experimental enforcements and advancing local AI solutions in relation to Nigeria's sole maritime setting.

References

- Akpan-Obong, P. I., Trinh, M. P., Ayo, C. K., & Oni, A. (2023). E-Governance as good governance? evidence from 15 West African countries. *Information Technology for Development*, 29(2-3), 256-275.
- Anyimadu, A. (2018). *Securing the Gulf of Guinea: A regional response to piracy, armed robbery at sea and other maritime threats*. Chatham House.
- Arakpogun, E. O., Elsahn, Z., Olan, F., & Elsahn, F. (2021). Artificial intelligence in Africa: Challenges and opportunities. *The fourth industrial revolution: Implementation of artificial intelligence for growing business success*, 375-388.
- Bodó, B., & Janssen, H. (2022). Maintaining trust in a technologized public sector. *Policy and Society*, 41(3), 414-429.
- Bouazza, S., Benmamoun, Z., & Hachimi, H. (2023). Maritime bilateral connectivity analysis for sustainable maritime growth: Case of Morocco. *Sustainability*, 15(6), 4993.
- Bowen, G. A. (2019). *Document analysis as a qualitative research method*. Qualitative Research Journal, 19(3), 333-340.
- Buzan, B., & Wæver, O. (2009). Macrosecuritisation and security constellations:



reconsidering scale in securitisation theory. *Review of international studies*, 35(2), 253-276.

Chen, Y., Li, Z., & Zhou, K. (2022). *Artificial intelligence in port security and surveillance: A global review of current applications*. *Maritime Technology and Research*, 5(2), 89–104.

Chukwuma, C., Ogunleye, A., & Danjuma, M. (2021). *Cybersecurity and maritime infrastructure in Nigeria: Emerging threats and policy responses*. *Nigerian Journal of Security Studies*, 4(1), 45–59.

Creswell, J. W., & Poth, C. N. (2018). *Qualitative inquiry and research design: Choosing among five approaches* (4th ed.). Sage Publications.

Eboh, M. (2021). *Evaluating Nigeria's Deep Blue Project: Maritime security beyond naval response*. *Journal of African Maritime Affairs*, 3(2), 101–115.

Eze, S. C. (2021). *Barriers to AI adoption in Nigeria's public sector: Insights from security and governance applications*. *AI & Society*, 36(4), 1229–1240.

International Maritime Bureau. (2021). *Piracy and armed robbery report – Annual 2020*. ICC Commercial Crime Services. <https://www.icc-ccs.org>

International Maritime Organization. (2022). *Maritime cybersecurity: Guidance and updates*. <https://www.imo.org/en/OurWork/Security/Pages/Cyber-security.aspx>

Molina-Molina, J. C., Salhaoui, M., Guerrero-González, A., & Arioua, M. (2021). Autonomous marine robot based on AI recognition for permanent surveillance in marine protected areas. *Sensors*, 21(8), 2664.



Nowell, L. S., Norris, J. M., White, D. E., & Moules, N. J. (2017). *Thematic analysis: Striving to meet the trustworthiness criteria*. International Journal of Qualitative Methods, 16(1), 1–13. <https://doi.org/10.1177/1609406917733847>

Okafor-Yarwood, I., & Pigeon, M. (2020). *Illegal, unreported and unregulated fishing and the complexities of the sustainable development goals (SDGs) for countries in the Gulf of Guinea*. Marine Policy, 117, 103867. <https://doi.org/10.1016/j.marpol.2020.103867>

Okafor-Yarwood, I., Eastwood, O., Chikowore, N., & de Oliveira Paes, L. (2024). Technology and maritime security in Africa: Opportunities and challenges in Gulf of Guinea. *Marine Policy*, 160, 105976.

Onuoha, F. (2019). *Oil theft and maritime insecurity in the Gulf of Guinea: Nigeria's criminal network in focus*. African Journal of Criminology and Justice Studies, 12(1), 45–59.

Onuoha, F. (2020). *Artificial intelligence and national security in Nigeria: Opportunities, risks, and governance frameworks*. Nigerian Journal of Public Policy and Administration, 6(1), 72–88.

Onyema, E. M. (2019). Integration of emerging technologies in teaching and learning process in Nigeria: the challenges.

Osei-Tutu, A. (2020). *Digital technologies and maritime security: The role of AI in West African coastal protection*. African Security Review, 29(4), 311–326.

Pohontu, A., & Ermolai, V. (2024). Artificial Intelligence in Maritime Domain Awareness Applications: Trends and Prospects. In *Digital Transformation: Exploring the Impact of*



Digital Transformation on Organizational Processes (pp. 193-204). Cham: Springer Nature Switzerland.

Soon, K. W. K., Lee, C. A., & Boursier, P. (2016). A study of the determinants affecting adoption of big data using integrated Technology Acceptance Model (TAM) and diffusion of innovation (DOI) in Malaysia. *International journal of applied business and economic research*, 14(1), 17-47.

Tan, L., Xu, Y., & Meng, Q. (2020). *Review of unmanned maritime surveillance systems for maritime safety and security*. Ocean Engineering, 216, 107864. <https://doi.org/10.1016/j.oceaneng.2020.107864>

Uzomah, M. M., & Eruetemu, P. O. (2024). Artificial intelligence and digital economy and the economic state of Nigerians. *Journal of Emerging Technologies*, 4(1), 26-35.

Yonazi, e. (2024). artificial intelligence in enhancing safety on lake victoria: a bibliographic analysis of patterns and trends in the literature, development, and future applicability for maritime safety.

Zhou, X., Li, W., & Han, J. (2021). *Big data and AI in maritime transportation systems: State-of-the-art and future directions*. Journal of Marine Science and Engineering, 9(6), 630. <https://doi.org/10.3390/jmse9060630>