THE USA JOURNALS
THE AMERICAN JOURNAL OF ENGINEERING AND TECHNOLOGY (ISSN – 2689-0984)
VOLUME 06 ISSUE11

PUBLISHED DATE: - 04-11-2024
DOI: - https://doi.org/10.37547/tajet/Volume06Issue11-05 **PAGE NO.: - 33-45**

RESEARCH ARTICLE **Open Access**

DRONES IN WARFARE: NIGERIA'S ADOPTION OF TECHNOLOGY IN FIGHTING INSECURITY

Maryjane Y. Oghogho
Ph.D. Student, City University, Cambodia

Irenen O. Ikponmwosa
Ph.D. Student, City University, Cambodia

O.M.C Osazuwa
Ph.D. Student, City University, Cambodia

Abstract
Rapid technological advancements have driven the increasing complexity of warfare, positioning unmanned aerial vehicles (UAVs), or drones, at the forefront of military operations globally. This study examines Nigeria's adoption of drone technology in its fight against insurgencies, banditry, and communal violence. As part of its evolving security strategy, Nigeria has integrated drones into its military operations to enhance intelligence gathering, surveillance, and precision strikes. Despite the operational benefits, the use of drones raises ethical concerns, especially related to civilian casualties, and poses challenges due to limited transparency and regulatory oversight. The study employed a systematic literature review (SLR), drawing on secondary data sources and reports that address the role, effectiveness, and challenges of drones in Nigeria's defense strategies. Key findings highlight that Nigeria's military, particularly the Air Force, has successfully deployed both indigenous and foreign-acquired drones, such as the Amebo, Gulma, and Chinese CH-4, to bolster its intelligence and combat operations. However, the lack of a robust legal framework and the need for improved training and data processing infrastructure hinder the full realization of drone technology's potential. Based on the findings, the study recommends enhancing Nigeria's regulatory framework to ensure ethical drone deployment, investing in indigenous UAV development, and improving inter-agency coordination for more efficient use of drone capabilities. These steps are crucial to ensuring that drones can effectively contribute to Nigeria's national security while minimizing the associated risks.

Keywords Drones (UAVs), military operations, security, ethical, regulatory.

INTRODUCTION

The global landscape of warfare is experiencing a profound transformation, driven by rapid technological advancements. At the center of this shift are unmanned aerial vehicles (UAVs), commonly known as drones, which are reshaping the dynamics of modern conflict. Due to their flexibility and precision, drones have become essential tools in military operations, revolutionizing the way we fight wars and influencing global politics (Calcara et al., 2022). Their ability to perform a range of tasks—from targeted strikes to reconnaissance and surveillance— has led to widespread adoption by militaries across the world. This context increasingly views drones as the future of warfare (Pranger, 2021). Nigeria, facing its own set of

complex security challenges, has joined the growing number of nations embracing this cutting-edge technology as part of its strategic response to national security threats (Adeyemi, 2023).

A diverse array of threats, such as insurgencies, banditry, and communal violence, mark Nigeria's security landscape, straining the country's stability and security infrastructure. These challenges transcend traditional warfare and require innovative approaches to ensure national safety (Calcara et al., 2022). Recognizing the need for a technological overhaul in its security apparatus, Nigeria has turned to drones as a key component of its military strategy. This adoption signifies a shift in Nigeria's approach to counterinsurgency and national security operations, moving toward more advanced and versatile methods to combat these evolving threats (Punch, 2022). The integration of drones into Nigeria's military operations offers several advantages, including enhanced intelligence-gathering capabilities, improved surveillance, and more precise execution of targeted operations. The Nigerian military can navigate difficult terrains and contested areas with greater efficiency thanks to these unmanned systems, which also provide real-time data for decision-making and tactical maneuvers (Uzoma, 2022). By investing in drones, Nigeria is positioning itself at the forefront of technological innovation in defense, demonstrating a commitment to developing a modern, responsive security infrastructure capable of addressing both present and future challenges.

Despite all the advantages, the adoption of drone technology is not without its complexities. The deployment of drones in Nigeria has given rise to ethical concerns, particularly regarding civilian casualties. Unintended harm to civilians has raised questions about the use of drones in warfare, emphasizing the need for stringent oversight and improved targeting procedures to minimize collateral damage (AP News, 2023; Reuters, 2023). Additionally, transparency surrounding Nigeria's drone program remains limited, fueling public suspicion and hindering informed discussions about the role of drones in national security (Punch, 2022). The absence of a clear legal framework governing drone use further complicates the situation, raising concerns about accountability and compliance with international humanitarian law (Adeyemi, 2023; Uzoma, 2022). Moreover, there is a risk that over-reliance on this technology could overshadow the need to address deeper socioeconomic and political issues that contribute to conflict. Drones offer valuable military capabilities, but their integration into a broader peacebuilding strategy that tackles the underlying causes of insecurity is crucial (Punch, 2022). The study acknowledges the importance of balancing technological solutions with comprehensive approaches that consider these underlying factors.

Despite these challenges, drones represent a transformative potential for Nigeria's military strategy. The use of drones is not merely a response to immediate threats but part of a broader effort to build a resilient defense system capable of adapting to the rapidly changing nature of warfare. This transformation involves not only acquiring new technologies but also developing a comprehensive strategy that includes training personnel, refining operational protocols, and continuously assessing the effectiveness of drones in addressing security concerns (Christian, 2021). As Nigeria continues to integrate drones into its defense operations, understanding the broader implications of this shift—both for national security and for regional stability—becomes increasingly important. This study aims to explore these issues, providing insights into the motivations, challenges, and consequences of

drone adoption in Nigeria's complex security environment. This study provides crucial insights into the use of drones in Nigeria, exploring the motivations, challenges, and implications of this technology. It informs policy development for the ethical and responsible deployment of drones, balancing security with ethical concerns. The research also raises public awareness, fostering informed discussions on drone use in national security. It serves as a reference for future studies on drone warfare in Africa and other regions, addressing key research gaps.

METHODOLOGY

This study employs a systematic literature review (SLR) approach, focusing on the collection, evaluation, and synthesis of existing research, reports, and secondary data sources related to Nigeria's adoption of UAV technology in its military and security operations. This method allows for a comprehensive examination of relevant literature to provide insights into the role, effectiveness, and challenges of UAV integration in Nigeria's defense strategies.

Literature Review

The Role of Drones in Nigeria's Security Strategy

The integration of drone technology into Nigeria's security strategy has transformed the nation's efforts to combat insurgency, banditry, and communal violence. As unmanned aerial vehicles (UAVs) gain prominence in global military operations, Nigeria has increasingly utilized drones for intelligence gathering, surveillance, and precision strikes, significantly improving the efficiency and effectiveness of its security operations. In intelligence-led security operations, drones have been particularly beneficial. Ezeji and Mahlangu (2022) emphasize the value of drones in intelligence-led policing in Nigeria and South Africa, demonstrating that UAVs provide real-time data critical for decision-making in counterinsurgency and border control missions. Similarly, Shehu et al. (2022) underscore drones' importance in remote surveillance, particularly in the Northeast, where insurgent activity is prevalent. Despite these advancements, gaps remain in the infrastructure necessary to process the vast amount of drone-generated data (Shehu et al., 2023; Nwachukwu et al., 2022).

The operational efficacy of drones in Nigeria is evident, particularly in precision targeting and aerial reconnaissance. The Nigerian Air Force has used drones extensively in Northern Nigeria to combat insurgency and banditry (Oyewole et al., 2022). These UAVs allow for the precise targeting of insurgent hideouts, reducing collateral damage and improving mission outcomes (Oyewole, Aina, & Ojo, 2022). In the Niger Delta, drones have also been effective in detecting and neutralizing illegal bunkering activities, offering strategic advantages in remote, hard-to- reach areas (Dada & Akila, 2021). However, concerns about civilian casualties and the absence of a clear legal framework governing drone usage persist. Adeyemi (2023) and Pranger (2021) highlight the need for stricter oversight and legal standards to ensure drones' ethical and regulated use in military operations.

Comparatively, Nigeria's adoption of drones reflects global trends in UAV militarization. Ukwuoma, Oke, and Nimfel's (2020) studies demonstrate how the United States, Israel, and Turkey employ similar strategies to leverage drones as part of broader information and communication technologies to manage ungoverned spaces. However, Nigeria's regulatory framework for drone operations is still underdeveloped. While the country has made significant strides, it remains in the early stages of building the technological infrastructure and legal systems necessary for the effective use of drones. Comparative studies with countries like the

U.S. and Israel could offer valuable insights into

how Nigeria can strengthen its regulatory and operational frameworks (Ezeji & Mahlangu, 2022).

Drone Technology and Broader Conflict Dynamics

The increasing reliance on drone technology in Nigeria's military operations addresses some critical aspects of conflict, such as enhancing intelligence and precision strikes, yet it cannot completely solve underlying social and political instability. Drones offer significant advantages in counter-insurgency efforts by improving intelligence gathering and minimizing civilian casualties, which aligns with the broader "hearts and minds" strategy commonly employed in these operations (Yusuf, 2021). However, technological means alone cannot address persistent systemic issues like poverty, inequality, and political marginalization (Ekiugbo, 2020). While drones improve tactical outcomes, the broader socio-political root causes of conflict remain unaddressed. Regionally, Nigeria's use of drones, particularly in the Sahel, reflects a shift from traditional ground strategies, as ground operations have proved less effective against insurgent groups (Okpaleke et al., 2023). However, the growing reliance on drones could potentially trigger tensions with neighboring countries, who may perceive Nigeria's enhanced capabilities as a potential escalation of military power in the region (Rotte, 2016). This complex dynamic between operational efficiency and broader geopolitical concerns requires careful management.

Scholars have increasingly examined the strategic benefits of drone technology for Nigeria's national security. For example, Okpaleke et al. (2023) emphasize drones' advantages in surveillance and intelligence gathering in counter-insurgency operations, while Osaro et al. (2024) point to their critical role in securing infrastructure, such as oil pipelines, which are frequent targets of sabotage. Expanding the applications of drone technology beyond traditional warfare, Ehinomen et al. (2023) highlight its potential for overcoming logistical challenges during elections, demonstrating the technology's versatility in addressing various security challenges. However, research gaps persist in the Nigerian context. While Aina (2024) and Nwankwo (2022) provide valuable insights into the broader political economy of conflict and geopolitical concerns, their work does not specifically address the role of drones in these dynamics. Additionally, the ethical and legal challenges, public perceptions, and long-term sustainability of drone programs require further investigation. To responsibly integrate drone technology into Nigeria's security strategy and account for its complex socio-political landscape, it is essential to fill these gaps.

Ethical and Legal Considerations in Drone Warfare

The rising use of drones in military operations globally, including in Nigeria, presents several ethical and legal challenges that require careful scrutiny. These challenges revolve around the risks of civilian casualties, inadequate legal frameworks, and the need for greater transparency to build public trust. Scholars advocate for comprehensive reforms that strike a balance between the military benefits of drones and the ethical and humanitarian concerns they raise in conflict zones. A key ethical concern in drone warfare is the risk of civilian casualties. The remote nature of drone operations can desensitize operators to the human cost of conflict, potentially lowering ethical barriers and leading to indiscriminate violence. Zwijnenburg and Blok (2016) stress the importance of ethical frameworks that prioritize accountability and minimize harm to non- combatants. They argue that drones, by distancing operators from the battlefield, can dehumanize warfare, making it easier to justify the use of lethal force without fully addressing its consequences. Their research calls for stricter operational protocols and enhanced

training for drone operators to reduce civilian casualties. Gupta and Molyneux (2024) further explore the direct and indirect consequences of drone warfare on civilian populations, particularly in densely populated areas. While drones provide military advantages, their use often results in civilian harm. The authors call for stronger international regulations that ensure drone usage aligns with humanitarian principles, highlighting the need for legal frameworks that prioritize civilian protection in conflict zones.

The legal frameworks governing drone operations remain underdeveloped, both globally and in Nigeria. Funk (2016) and Mueller (2017) argue that existing laws struggle to keep pace with the rapid advancement of drone technology. National laws govern drone operations in Nigeria, but they must conform to international humanitarian law (IHL) and international human rights law (IHRL). Mueller (2017) specifically addresses the legal complexities surrounding extraterritorial drone strikes, particularly outside traditional conflict zones, advocating for the recognition of transnational armed conflicts as a way to better regulate drone warfare. In Nigeria, the use of drones for both internal security and cross-border conflicts necessitates the establishment of clear legal guidelines for their deployment. Kutynska and Dei (2023) highlight the need for updated legal frameworks, particularly regarding privacy and human rights. Their analysis reveals that the rapid expansion of drone usage has outpaced the development of laws capable of addressing potential privacy violations and human rights concerns. The increasing use of drones for surveillance and intelligence gathering in civilian areas in Nigeria underscores the urgent need for robust legal safeguards.

Public perception of drones in Nigeria is another critical factor in their successful deployment. Limited transparency surrounding drone acquisition and use has generated mistrust among communities, raising ethical concerns about privacy and safety. Yusuf (2021) advocates for public participation in decision-making processes related to drone deployment to address ethical concerns. Despite the paucity of literature on public perception of drones in Nigeria, it is crucial to comprehend community responses in conflict zones to formulate policies that strike a balance between security requirements and ethical considerations (Yusuf, 2021; Punch Nigeria, 2022). Public trust is also critical for the successful deployment of drone technology, particularly in regions directly affected by drone operations. Zwijnenburg and Blok (2016) emphasize the importance of transparency in drone programs, arguing that clear communication regarding the purpose, scope, and accountability measures of drone usage can foster public acceptance. Yusuf (2021) similarly advocates for public involvement in decision-making processes related to drone deployment, suggesting that such participation can help alleviate concerns about privacy and civilian safety.

Despite these efforts, public resistance to drone operations remains significant in Nigeria. A report by Oxford Analytica (2024) indicates that the Nigerian military's drone activities have faced backlash due to a lack of oversight and transparency. An underdeveloped legal framework and the absence of clear communication have increased the risk of civilian casualties and further eroded public trust. To address these issues, scholars suggest developing mechanisms for greater transparency and accountability, including public disclosure of drone operations and clearer rules of engagement. The evolution of drone technology toward increased autonomy introduces new ethical dilemmas. Brown (2023) explores the challenges posed by autonomous drones, or "killer drones," which are capable of making lethal decisions

without human intervention. As artificial intelligence (AI) becomes more integrated into military technologies, the ethical question of whether machines can adhere to the principles of just war becomes more pressing. Brown argues that human judgment must remain central to decisions involving lethal force, particularly as drones become more autonomous. This ethical debate is crucial for Nigeria's security strategy, as the country seeks to modernize its military capabilities. Maintaining the legitimacy of Nigeria's drone programs requires ensuring the deployment of both human-operated and autonomous drones in accordance with ethical standards and international law.

While military applications dominate discussions on drones, scholars like Bradley and Chiou (2024) explore the ethical challenges drones pose in non-combat contexts, such as disaster relief and global health missions. Their research highlights the dual-use nature of drones, where humanitarian purposes repurpose military technologies, thereby raising concerns about privacy and surveillance. They call for a comprehensive framework that incorporates aviation safety and ethical principles to guide the responsible use of drones in these sectors. In comparison to other countries, Nigeria's drone strategy remains in a developmental phase. Ukwuoma, Oke, and Nimfel (2020) compare Nigeria's approach to drone warfare with countries like the United States and Israel, noting that while Nigeria has made significant progress, it still lacks the regulatory sophistication of these advanced nations. They argue that Nigeria could benefit from adopting international best practices to enhance both the operational effectiveness and ethical oversight of its drone programs.

Challenges and Strategic Implications of Drone Adoption in Nigeria

Despite the operational advantages of drones, Nigeria faces several challenges in fully realizing the technology's potential due to insufficient training and technical expertise. One major issue is the lack of structured educational frameworks and simulation tools needed for effective training (Ateş, 2022). Nigeria's military lacks comprehensive curricula covering UAV operations, limiting personnel's ability to respond to real-world scenarios (Innocent & Usman, 2021). Additionally, there is a shortage of qualified instructors and technical staff to support drone operators (Ateş, 2022). Without proper training and resources, the effective deployment of drones remains a challenge.

The use of drones is particularly important in addressing illegal activities such as oil bunkering in the Niger Delta, which poses a threat to Nigeria's economic stability. UAVs offer cost- effective surveillance solutions, improving military efficiency in monitoring illegal activities and reallocating resources effectively (Dada & Akila, 2021). These capabilities underscore the significant role that drones play in enhancing Nigeria's security operations, especially in safeguarding critical infrastructure. Several studies have highlighted the importance of properly integrating drone technology into Nigeria's military operations. Dada and Akila (2021) focus on drones' role in combating illegal oil bunkering activities, while Osaro et al. (2024) explore their effectiveness in pipeline surveillance, emphasizing the importance of drones for protecting Nigeria's energy infrastructure. Additionally, Haydar (2022) stresses the need for comprehensive training to ensure that personnel can effectively operate and maintain drones, while Innocent and Usman (2021) propose the use of virtual simulation tools to improve military readiness for drone operations in conflict zones.

Beyond the technological challenges, Zakari (2024) examines the implications of AI-powered drones, raising critical ethical and legal concerns

surrounding the use of autonomous systems in surveillance and combat operations. We must consider the ethical dimensions of drone deployment as they increasingly integrate into national security frameworks, especially as artificial intelligence increasingly influences decision-making processes. This raises questions about accountability and human oversight in the use of AI-driven technologies. While Nigeria's adoption of drone technology has yielded tangible benefits, significant gaps remain in understanding its long-term sustainability, public perception, and integration with existing security infrastructures. Addressing these gaps is vital to ensuring that the country can responsibly and effectively incorporate drone technology into its broader national security strategy.

Findings

The Nigerian military's integration of unmanned aerial vehicles (UAVs) into its security operations marks a significant advancement in its strategic capabilities. These findings highlight how the adoption of UAV technology has revolutionized intelligence, surveillance, reconnaissance (ISR), and combat operations across various branches of the military, focusing on the operational impact of both indigenous and foreign-acquired drone platforms.

Nigeria's Drone Development and Self-Reliance

Nigeria has progressively developed its indigenous drone program to meet growing security demands, starting with collaboration and foreign models like the Israeli Aerostar UAV. This led to the development of platforms like the Amebo, Gulma, and Tsaigumi, which bolstered ISR capabilities. The establishment of the 401st Flying Training School in Kaduna and the introduction of Chinese-made Mugin UAVs for training signify a focused approach to building local expertise in UAV operation (Military Africa 2020). The transition to domestically produced UAVs like Gulma and Tsaigumi exemplifies Nigeria's commitment to self-reliance in drone technology, reducing dependency on foreign support for critical security assets.

Air Force: The Core of Nigeria's Drone Arsenal

The Nigerian Air Force (NAF) has led the military's efforts in UAV deployment. Its drone fleet comprises a mix of indigenous and foreign-acquired platforms. Indigenous drones such as the Tsaigumi, Amebo, and Gulma offer vital ISR capabilities, while foreign acquisitions like the Chinese-made CH-3A and CH-4 UCAVs provide strike capabilities for combat operations against insurgent groups such as Boko Haram. Additionally, the Air Force operates advanced surveillance platforms like the Wing Loong II and the ADS Aerostar, the latter being one of the earliest UAVs used by Nigeria for intelligence gathering during the Niger Delta crisis. NAF's utilization of specialized UAVs such as the Star Tiltrotor and RQ-11 Raven also illustrates the military's capacity for tactical flexibility (Military Africa 2020). For instance, the Star Tiltrotor UAV's vertical takeoff and landing (VTOL) ability enhances operational versatility, while the RQ-11 Raven provides rapid ISR support for infantry units. These platforms enable long-range surveillance and rapid deployment in conflict zones, improving operational reach and ground coordination.

Nigerian Army: Tactical and armed UAVs

The Nigerian Army has focused its UAV deployments primarily on tactical surveillance and reconnaissance. Ground troops have used commercial drones like the DJI Phantom to combat kidnapping, banditry, and insurgency. The Army has also integrated advanced platforms such as the Bayraktar TB2, providing armed drone capabilities for precision strikes (Military Africa 2020). Additionally, the Textron Aerosonde Mk4.7 AAI enhances the Army's ISR capabilities with its fixed-

wing design, delivering real-time situational awareness in complex operational theaters. The Army's use of UAVs like the Ziyan Blowfish demonstrates the military's tactical innovation, providing real-time intelligence to ground troops, thereby improving combat efficiency and reducing risks in battlefield scenarios.

Nigerian Navy: Strengthening Maritime Security

The Nigerian Navy has steadily embraced UAV technology for enhanced maritime domain awareness and coastal security. The use of drones like the ADS Aerostar and RemoEye 002B reflects a focused strategy to safeguard critical maritime infrastructure, particularly during pipeline surveillance operations. Additionally, the deployment of the AR-500B and AR-500C carrier-based drones further expands the Navy's surveillance capabilities, with these UAVs being actively utilized aboard vessels like the NNS Lana hydrographic survey vessel (Military Africa 2020). This improves the Navy's ability to monitor and secure Nigeria's coastal waters.

Paramilitary Forces and Multi-Branch Adoption

Along with other branches of the Nigerian military, the paramilitary forces have also embraced drone technology, utilizing platforms like the Songar, Elistair Orion 2, and Delta Suas UAVs for

security and surveillance tasks (Military Africa 2020). The extensive utilization of drones in Nigeria's security architecture underscores the significant importance of UAV technology in tackling diverse security issues, ranging from border patrol to internal surveillance.

Advanced Drone Technologies and International Partnerships

The Nigerian military continues to diversify its drone fleet by acquiring platforms from international partners, demonstrating a commitment to maintaining a technological edge. The introduction of the Yabhon Flash-20 UAV from the United Arab Emirates and the Textron Aerosonde AAI VTOL UAV from the U.S. illustrates an ongoing investment in long-endurance and versatile surveillance platforms, which enhance Nigeria's capacity for extended ISR missions. Additionally, the military's evaluation of cutting-edge platforms such as the Schiebel Camcopter S-100 for beyond-visual-line-of-sight (BVLOS) operations and the PD-1 UAV from Ukraine reflects Nigeria's ambition to expand its drone technology capabilities for complex, multi-theater operations. These acquisitions, coupled with the continued indigenous development of drones like the Ichoku and Star Tiltrotor, signify Nigeria's strategic push toward both indigenous innovation and international collaboration (Military Africa 2020).

DISCUSSION

The findings from this study illustrate the significant advancements Nigeria has made in integrating unmanned aerial vehicles (UAVs) into its military operations, particularly in addressing security challenges. In comparison with prior research, the current findings reveal both agreements and divergences, especially concerning Nigeria's indigenous drone development. Previous research, such as that by Adeyemi (2023) and Calcara et al. (2022), emphasized the importance of UAVs in enhancing intelligence, surveillance, and reconnaissance (ISR) capabilities, which aligns with the current study's findings on Nigeria's use of drones to improve operational efficiency. However, this study expands on earlier work by providing a detailed examination of Nigeria's efforts to build self-reliance in drone technology through initiatives such as the 401st Flying Training School. This focus on reducing dependence on foreign assets, as evidenced by the development of indigenous drones like Amebo and Tsaigumi, adds a new dimension to the understanding of Nigeria's

UAV strategy.

The Nigerian Air Force (NAF) plays a central role in the country's UAV deployments, utilizing a blend of indigenous and foreign-acquired drones. This is consistent with the work of Oyewole et al. (2022), who noted the effectiveness of drones like the CH-3A and CH-4 in Northern Nigeria. However, this study goes further by discussing the NAF's deployment of advanced platforms such as the Star Tiltrotor and RQ-11 Raven, which offer tactical flexibility and rapid ISR support. Prior research only briefly mentioned these platforms' expanded operational reach. The current findings suggest that Nigeria is moving toward a more diversified and specialized drone arsenal, marking an evolution in its use of UAVs for both ISR and combat operations. The Nigerian Army's integration of UAVs for tactical surveillance and reconnaissance aligns with prior research by Dada & Akila (2021), who discussed the use of drones to monitor illegal activities in remote regions. This study reaffirms the value of drones like the DJI Phantom and Bayraktar TB2 in addressing issues like kidnapping and banditry. However, the current findings demonstrate advancement in the Army's use of drones to provide real-time support to ground forces, thereby improving combat efficiency. This tactical innovation surpasses previous literature coverage, underscoring the Army's growing proficiency in UAV operations.

The Nigerian Navy's adoption of UAVs for maritime surveillance reflects global trends discussed by Rotte (2016), but this study adds depth by examining specific platforms like the ADS Aerostar and AR-500B, which are actively used in maritime domain awareness and coastal security. The deployment of these drones aboard naval vessels, such as the NNS Lana, enhances Nigeria's ability to secure its coastal borders, something that earlier research did not fully explore. This focus on maritime UAV operations provides new insights into the Navy's role in safeguarding critical infrastructure. In addition to military branches, the paramilitary forces have also adopted drones, such as the Songar and Elistair Orion 2, to address internal security challenges. This widespread use of drones across multiple agencies represents a more comprehensive approach to UAV deployment than previously discussed in the literature. While earlier studies focused on military applications, this study highlights the broader adoption of drone technology across Nigeria's entire security architecture, reinforcing the view that UAVs are valuable tools for a wide range of security tasks.

Finally, the current findings emphasize Nigeria's commitment to acquiring advanced drone technologies from international partners, such as the Yabhon Flash-20 and Schiebel Camcopter S-100, which extend the country's ISR capabilities. This ongoing diversification of Nigeria's drone fleet builds upon prior research, such as Ukwuoma et al. (2020), which noted the importance of international collaborations. However, this study provides more recent examples of Nigeria's expanding partnerships and acquisitions, underscoring its strategic vision to maintain a technological edge in drone warfare. This study provides a comprehensive and current analysis of Nigeria's UAV strategy, positioning its findings as a crucial contribution to comprehending the integration of drone technology into Nigeria's wider security framework. To strengthen Nigeria's drone program, it is crucial to enhance indigenous development by increasing investment in local research, fostering partnerships with universities, and expanding training centers like the 401st Flying Training School to build self-reliance in UAV technology. At the same time, improving the regulatory framework is essential for ensuring compliance with international laws, minimizing civilian casualties, and boosting transparency and public trust. Strengthening interagency

coordination through the creation of a unified UAV command and joint training programs will ensure effective deployment across military and paramilitary operations. Additionally, improving data processing capabilities with investments in AI tools and data analytics infrastructure will enhance intelligence gathering and operational efficiency. Lastly, maintaining international collaborations with countries such as the U.S. and China should focus on knowledge transfer and joint development projects to support Nigeria's long-term goal of achieving self-reliance in drone technology.

CONCLUSION

The findings underscore Nigeria's proactive adoption of UAV technology across its military and security agencies, with the Nigerian Air Force leading in the use of both indigenous and foreign drones for ISR and combat operations. The Army and Navy have also effectively integrated drones into their tactical surveillance and maritime security efforts. Nigeria's continued investment in advanced UAV technologies demonstrates a strategic commitment to building a modern, versatile military capable of addressing complex security challenges. The establishment of specialized UAV commands and widespread adoption across various branches highlight the pivotal role drones play in the nation's security strategy. To further optimize Nigeria's drone program, a comprehensive approach is necessary—one that emphasizes continued indigenous development, strengthened regulatory frameworks, enhanced inter-agency coordination, improved data processing capabilities, and strategic international collaborations. This will be crucial for achieving long-term self-reliance and maximizing the operational effectiveness of UAV technology in national security efforts.

REFERENCES

1. Abubakar, Y. (2021). Leveraging Technologies for Counterinsurgency Operations in Nigeria: Available Options. Social Science Research Network, doi: 10.2139/SSRN.3772450
2. Adeyemi, O. (2023, July 28). Nigerian Army Partners IT Agency To Adopt Robots, Drones, Digital Grenades In Fight Against Insurgency. Sahara Reporters. https://dailytrust.com/nigerian-military-to-deploy-robots-drones-digital-grenade-against-terrorists/: https://dailytrust.com/nigerian-military-to-deploy-robots-drones-digital- grenade-against-terrorists/
3. AP News. (2023, December 4). At least 85 civilians killed by a Nigerian army drone attack, in the latest such deadly mistake. https://www.chronicleonline.com/news/world/at-least-85- confirmed-killed-by-nigerian-army-drone-attack-raising-questions-about-such- mistakes/article_6bca38a6-2ebe-5470-b718-de0a10734221.html
4. Bradley, S., & Chiou, E. (2024). Examining the Ethical Considerations of Humanitarian Drones. In Proceedings of the Human Factors and Ergonomics Society Annual Meeting (p. 10711813241275086). Sage CA: Los Angeles, CA: SAGE Publications.
5. Brown, A. (2023). Ethics, autonomy, and killer drones: Can machines do right? Comparative Strategy, 42(6), 731–746. https://doi.org/10.1080/01495933.2023.2263333
6. Calcara, A., Gilli, A., Gilli, M., Marchetti, R., & Zaccagnini, I. (2022). Why Drones Have Not Revolutionized War: The Enduring Hider-Finder Competition in Air Warfare. International Security, 46, 130-171.
7. Christian, F. (2021). Drones in hybrid warfare: Lessons from current battlefields.

8. Cletus, Nwankwo. (2022). Grammar of Geopolitics: Geopolitical Imaginations of Farmer-herder Conflicts in Nigeria. Coğrafya dergisi, doi: 10.26650/jgeog2022-888146

9. Dada, K. S. J., & Akila, J. . (2021). The utilization of unmanned aerial vehicles incombating illegal bunkering activities in the Niger Delta regions of Nigeria. Journal of Advances in Military Studies, 4(1), 101-126. https://doi.org/10.37944/jams.v4i1.96

10. Ehinomen, Ehimare., Ochuko, Felix, Orikpete., Daniel, Raphael, Ejike, Ewim. (2023). The Perennial Logistical Challenges during Nigerian Elections: The Unmanned Aircraft System (UAS) Solution. doi: 10.21203/rs.3.rs-3404759/v1

11. Emoefe, E., & Philip, A. K. (2021). Combating violent conflicts and terrorism in Nigeria: Some considered measures. International Journal of Research in Social Science and Humanities, 3, 8– 17.

12. Ezeji, C. L., & Mahlangu, B. S. (2022). The evaluation of drone and intelligence-led policing technologies in combating crimes in Nigeria and South Africa. Caleb Journal of Development Studies, 5(2), 250–272. https://doi.org/10.26772/cijds-2022-05-02-013

13. Folahanmi, Aina. (2024). Political economy of sub-national fragility and armed conflict in Northwest Nigeria. African Identities, doi: 10.1080/14725843.2024.2308638

14. Francis N. Okpaleke, Bernard Ugochukwu Nwosu, Chukwuma Rowland Okoli & Ezenwa E. Olumba (2023): The case for drones in counter-insurgency operations in West African Sahel, African Security Review, DOI: 10.1080/10246029.2023.2217158 https://doi.org/10.1080/10246029.2023.2217158

15. Funk, A. (2016). Drones in contemporary warfare: The implications for human rights. LSE Human Rights Blog.

16. Gupta, A., & Molyneux, C. (2024). 12 Drones and Civilian Harm. De Gruyter Handbook of Drone Warfare, 4, 159.

17. Hartung, K. (2023). Moralities of Drone Violence: by Christian Enemark, Edinburgh, Edinburgh University Press, 2023, 256 pp., open access (ebook), ISBN 978-1474490108.

18. Haydar, A. (2022). Important Issues In Unmanned Aerial Vehicle User Education And Training. Journal of aviation, doi: 10.30518/jav.1083114

19. Innocent I., Usman K. (2021). Drone simulation for military surveillance in the north-east of Nigeria. Journal of emerging technologies and innovative research

20. Innocent, M. I., & Usman, K. (2021). Drone Simulation for Military Surveillance in the North- East of Nigeria. International Journal of Emerging Technologies and Innovative Research (www. jetir. org), 8(1), 1470-1474.

21. Kutynska, A., & Dei, M. (2023). Legal regulation of the use of drones: Human rights and privacy challenges. Journal of International Legal Communication, 8(1), 39-55. https://doi.org/10.32612/uw.27201643.2023.8.1.pp.39-55

22. Military Africa. (2020, October 28). Nigerian military drones (UAV) – a complete list. Military Africa Retrieved October 18, 2024, from https://www.military.africa/2020/10/nigerian-military- drones-uav-current-army-air-force-and-navy-uav-inventory/

23. Mueller, M. T. (2017). The drone question: Legality, ethics, and the need to recognize transnational armed conflict.

24. Nwachukwu, M. A., Nwachukwu, J., Babatunde, A., Anyanwu, J., Ekweogu, C., & Nwachukwu,

25. N. (2022). Geospatial intelligence training concept for terrorism surveillance, Nigeria to infusive Sub-Saharan African Countries. American Journal of Geospatial Technology, 1(1), 44- 51.

26. Olulowo, K. A. (2018). Unmanned Aerial Vehicles in Counterterrorism Efforts and Implications for International Humanitarian Law (Doctoral dissertation, Walden University).

27. Osaro, PA., Olukaejire, DS., Ifiora, CC., Nir, Marcus., Ishaya, KS. (2024) Effectiveness of Unmanned Aerial Vehicle on Pipeline Surveillance in Nigeria: A Preliminary Survey. Journal of Engineering Research and Reports, doi: 10.9734/jerr/2024/v26i71215

28. Oxford Analytica. (2024). More civilian deaths are likely from Nigerian drones. Emerald Expert Briefings, (oxan-es).

29. Oyewole, S. (2018). Flying and bombing: the contributions of air power to security and crisis management in the Niger Delta region of Nigeria. Defence Studies, 18(4), 514-537.

30. Oyewole, S., Aina, F., & Ojo, J. S. (2022). Wings over flies: Air campaigns against armed banditry in north-west Nigeria. The RUSI Journal, 167(4-5), 92-103.

31. Pranger, B. (2021). The political dimension of drone warfare: The use of Turkish drones in Nagorno-Karabakh.

32. Punch Nigeria. (2022, March 3) Modern military technology recommended to halt Nigeria's festering security challenges. https://punchng.com/modern-military-technology-recommended- to-halt-nigerias-festering-security-challenges/

33. Ralph, R. (2016). Western drones and African security. African Security Review Reuters. (2023, December 4). Civilians killed in Nigerian drone attack in north - officials, witnesses. https://www.reuters.com/investigates/special-report/nigeria-military-civilian- airstrikes/

34. Samuel, Oyewole., Folahanmi, Aina., John, Sunday, Ojo. (2022). Wings over Flies. RUSI Journal, doi: 10.1080/03071847.2022.2153076

35. Shehu, A., Hadiza, A. K., & Sani, A. (2022). Remote surveillance: a means of intelligence gathering for minimizing security challenges in Nigeria. Journal of Engineering Sciences, (4), 59-71.

36. Ukwuoma, H. C., Oke, M., & Nimfel, C. E. (2020). Harnessing Information and Communication Technology (ICT) for the management of ungoverned spaces in Nigeria: Policy and strategic way out. International Journal of Development and Management Review, 15(1), 17-31.

37. Uzoma, P. (2022, November 22). "Drones, Artificial Intelligence to tackle insecurity in Nigeria" - Defence Intelligence Agency. Vanguard Newspapers. https://guardian.ng/technology/tech/nigeria-needs-artificial-intelligence-to-combat-insecurity-says-expert/

38. Yusuf, A. (2021). Leveraging Technologies for Counterinsurgency Operations in Nigeria: Available Options. Leveraging Technologies for Counterinsurgency Operations in Nigeria: Available Options (January 24, 2021).

39. Zakari, M. (2024). Implication Of Artificial Intelligence On National Security For The Nigeria Security Agencies. Journal of Terrorism Studies, 6(1), 6.

40. Zwijnenburg, W., & Blok, Z. (2016). Victims of Drone Warfare: Stretching the Boundaries of

Conflict; Ethics and Remote Control Warfare. The Future of Drone Use: Opportunities and Threats from Ethical and Legal Perspectives, 209-228.